



EDUDIA
EDUCATION DIALOGUE
ASSOCIATION

BOOK OF PROCEEDINGS



THEME:

**WESTERN SUPREMACY
AND AFRICAN NARRATIVES:
REVALIDATING AFRICAN
ENDOWMENTS FOR SUSTAINABLE
DEVELOPMENT**

Editors:

Isaac N. Nwankwo
Hinney Kusi
Paul Kobina Effrim
Israel E. Fugar
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**EDUDIA MULTI-DISCIPLINARY INTERNATIONAL
ACADEMIC CONFERENCE,**

15 - 19 JUNE, 2026

HELD AT

UNIVERSITY OF EDUCATION WINNEBA, GHANA

*Being A Collaborative Publication of
The Education Dialogue Association and
The University of Education, Winneba, Ghana*

ISBN: 978-978-61497-3-8

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REVIEW PROCESS

A total of 48 full manuscripts were received in different fields of study. All the full papers were subjected to a thorough process of double peer review. The professional team of EDUDIA's Reviewers was drawn from different countries and strictly guided by the EDUDIA's Review Criteria. They were also requested to look at the manuscripts with the view to assisting authors to produce best quality articles.

Following the review process, the editorial committee considered the reviewers' comments; all the articles were suitable for publication. The authors of these suitably qualified articles were given the reviewers' reports and asked to use the suggestions to strengthen their papers. After the receipt of the corrected manuscripts, the editorial committee finally accepted 36 out of the 48 articles, for inclusion in this Conference Proceedings. This gives an acceptance rate of about 75 %.

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KEYNOTE ADDRESS

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AT THE

**International Conference of the Education Dialogue Association
Held between Monday 15th to Friday 19th June 2026 at the
University of Education, Winneba, Ghana**

Theme: *"Western Supremacy and African Narratives: Revalidating African Endowments for Sustainable Development"*

The Chairperson of the Conference, Distinguished Keynote Speakers,
Invited Guests, Representatives of the Education Dialogue Association,
Faculty Members, Researchers and Scholars, Students, Ladies and Gentlemen:

Good morning.

It is both a privilege and an honour to welcome you to the beautiful campus of University of Education, Winneba on behalf of the Pro-Vice-Chancellor and the entire Management of the University. I extend warm greetings to all participants who have travelled from different parts of Ghana, Africa, especially Nigeria and the wider international community to attend this important conference organised by the Education Dialogue Association.

We are delighted to host this gathering of scholars, policymakers, development practitioners, educators, and students who have assembled here to engage in critical reflections on the theme: **"Western Supremacy and African Narratives: Revalidating African Endowments for Sustainable Development."**

This theme could not be timelier.

For centuries, the global intellectual landscape has been dominated by narratives that often portray Africa through lenses of dependency, deficiency, and underdevelopment. Such narratives have frequently overshadowed the continent's rich intellectual traditions, indigenous knowledge systems, cultural heritage, technological innovations, and environmental wisdom. Consequently, many African societies have been encouraged to look outward for solutions to challenges that may, in fact, require context-specific approaches grounded in local realities.

Today, however, there is growing recognition that sustainable development in Africa cannot be achieved solely through imported models and external prescriptions. Rather, it requires a balanced appreciation of both global knowledge and indigenous African endowments. The time has come to re-examine the assumptions that have shaped development discourse and to

place African voices, experiences, and perspectives at the centre of conversations about Africa's future.

Scholars, Ladies and Gentlemen,

Africa possesses abundant endowments. These include not only vast natural resources but also rich cultural values, resilient communities, indigenous technologies, traditional governance systems, linguistic diversity, entrepreneurial ingenuity, and philosophies that emphasise communal living, social responsibility, and environmental stewardship. These assets have sustained African societies for generations and continue to offer valuable lessons for contemporary development challenges.

The philosophy of *Ubuntu*, for instance, reminds us that our humanity is interconnected. Indigenous agricultural practices demonstrate sustainable ways of managing natural resources. Traditional conflict resolution mechanisms offer insights into peacebuilding and social cohesion. Local knowledge systems provide practical solutions in healthcare, education, environmental management, and community development.

The challenge before us, therefore, is not merely to preserve these endowments but to critically examine, document, validate, and integrate them into modern development frameworks. In doing so, we create pathways toward development that are not only economically viable but also socially inclusive, culturally relevant, and environmentally sustainable.

Distinguished Participants,

As an institution committed to scholarship, innovation, and national development, the University of Education, Winneba strongly believes that higher education institutions have a vital role to play in reshaping knowledge production and promoting intellectual independence. Universities must become spaces where African realities are studied rigorously, where indigenous knowledge is accorded academic legitimacy, and where research contributes meaningfully to solving local and global challenges.

This conference therefore presents a valuable opportunity for dialogue, critical reflection, and scholarly engagement. It provides a platform for examining how African narratives can challenge dominant paradigms, enrich global scholarship, and contribute to sustainable development across the continent.

I am confident that the presentations, panel discussions, workshops, and networking sessions over the coming days will generate new insights, stimulate innovative thinking, and foster collaborations that extend beyond this conference.

As scholars and practitioners, let us approach these discussions with intellectual openness, mutual respect, and a commitment to evidence-based inquiry. Let us also remember that revalidating African endowments is not an exercise in rejecting other knowledge traditions; rather, it is about ensuring that African voices occupy their rightful place within the global knowledge ecosystem.

Before I conclude, I wish to commend the Education Dialogue Association for its vision and dedication in organizing this conference. I also congratulate the organizing committee, sponsors, partners, and all individuals whose hard work has made this event possible.

To our international guests, we thank you for joining us and hope that your stay in Ghana and particularly in the historic town of Winneba will be both productive and memorable.

On behalf of the Vice Chancellor, Pro-Vice-Chancellor and the management of the University of Education, Winneba, I officially welcome you all to this International Conference and wish you fruitful deliberations and a successful conference.

Thank you for your attention.

Akwaaba!

**God bless the Education Dialogue Association.
God bless the University of Education, Winneba.
God bless Ghana and Africa.**

Thank you.

A STUDY OF THE IDIOMS IN SIERRA LEONEAN ENGLISH

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Abstract

Like other non-native English-speaking countries, Sierra Leone has been developing some linguistic features which distinguish its English usage. This is evident in the use of idioms in the country. The aim of this study is to examine the idiomatic usage in Sierra Leone as is shown by Sierra Leonean fiction writers and journalists. The idioms were collected from Sierra Leonean texts and some works in the print media. They were categorized into modified idioms borrowed from British English, and those that are translated from the indigenous languages. The findings show that the modified idioms undergo some grammatical changes ranging which include word or morpheme addition to deletion and substitution. Moreover, some idioms exhibit more than one of the processes through which they are created. The second category of idioms deal with those are translated from the local languages in the country. These idioms spring from the desire to discuss some issues idiomatically rather than directly. The study concludes that as the modified idioms do not blur the meanings of their British counterparts and as the local idioms are used to maintain polite behavior, environmental attachment, flexibility with the law, frankness and superstition, these categories of idioms will continue to stand the test of time in Sierra Leonean English.

Key Words: Modified Idioms, Translated Idioms, Sierra Leonean English

Introduction

Fondly described as the ‘Athens of West Africa’, Sierra Leone was reputed for producing many graduates in West Africa and beyond (Foray, 1958 and Kamara, 2011). This was largely engendered by the presence of Fourah Bay College. The country was therefore the earliest in the sub region to be exposed to British English in a more sustained way. However, with regard to the development of the New Englishes, Sierra Leone occupies one of the ‘relatively blank areas on the map of English socio linguistic research’ (Conteh-Morgan, 1997:52 quoting Schmied, 1991). This situation has continued to obtain even though Fyfe (1975) long ago proposed for the concurrent use of Sierra Leonean English and Standard British English. This is in sharp contrast with countries in the sub region like Nigeria and Ghana which, among other things have research works on their non-native idioms as seen in Adegbija (2003), Cooper (1999), Igboanusi (1998), Dako (2001) and Amponi (2023). The aim of this study is to examine the idiomatic usage in Sierra Leone as it is illustrated by Sierra Leonean writers and journalists. The objective of the study is to describe the idioms borrowed from British English, to show how the idioms that are translated from Sierra Leonean languages

show their concept of the world, and to recommend the way forward of the above categories of idioms in the emerging Sierra Leonean English.

Cruse gives the traditional definition of an idiom as ‘an expression whose meaning cannot be inferred from the meanings of its parts’ (1986, 37). Cruse states that idioms display ‘internal cohesion’ and they ‘typically resist interruption and reordering’ (1986, 38). These features account for their fixed attribute which in turn leads to the emergence of the idioms borrowed from British English.

In a similar vein, Cooper defines an idiom as “an expression whose meaning cannot be readily deduced from the usual meaning of its constituent elements” (1999, 233). Likewise, in discussing the criteria that are associated with redefining idioms, Grant states that the final criterion that is mostly associated with them is their non-compatibility, which means that “the meaning of idioms cannot be predicted from the meanings of their constituent parts” (2004,40). It can be observed from the above that the meaning of an idiom cannot be deduced through the individual words it contains. Bamgbose states that an idiom comprises “a group of words in a fixed order” (2020,1). Parrzoska, emphasises this phenomenon when she explains ‘why idioms such as *kick the bucket*, *chew the fat*, and *shoots the breeze* cannot be passivized even though they are transitive constructions” (2022, 2). Nonetheless, alterations in English idioms have been the source of the emergence of New Englishes as is seen in Abebeje 2003), Igboanisi (1998), Dako (2001) and Ampomi(2021). The second objective of this study is related to the Whorfian hypothesis that the structure of a language influences world view and how the behaviour of a group of people influences language use as is shown in Wardhaugh (1986). Buregeya illustrates this phenomenon in Kenyan English (2021).

Methodology

To carry out this study, a list of idioms was compiled from the works of Sierra Leonean fictional writers and from the print media published locally. The fictional works used are from five novels and five anthologies. The novels are Hunter’s, *Joy Came in the morning* (J.C.M), Conteh’s *The Diamonds* (T.D.) (1997) and ‘*In Search of Sons* (2007), Sesay’s ‘*Landscape of Memories* (2015)’ and Sesay’s ‘*Mouths of the Junction* (2017)’; the anthologies include *In the Belly of the Lion* which contains Kroma’s ‘*Wuja*’:*The Messenger* and Mansaray’s ‘*Punishment and Reward*’; Hallowell’s *Gbongbosoro* (2012) which contains ‘*Too loud for a Soccer Match*’, and ‘*Losing Track*’, Sesay’s (*Destiny Child*) and other *Stories*(2021) and Rowe’s *No Seed for the Soil* (1968) which includes ‘*A Teaspoon of Herbs*’. The rationale for the choice of this text as it can be seen in the subsequent papers they contain unique idioms which are now part of the Sierra Leonean community.

The print media involves some newspapers such as Standard Times, (S.T.) The Exclusive, (T.E.). The New Citizen, (T.N.C.) For di People, (F.P.) Premier News (P.N.) and Politico (P); with two news report media from Fourah Bay College, the premier college in Sierra Leone where the training of journalists first started in the country. These papers are Aureol Torch (A.T.) and Fourah Bay College Souvenir Magazine, (FBCSM). Aureol Torch is a training ground for students who are studying journalism and Fourah Bay College Souvenir Magazine is for staff members who discuss issues that are mainly related to education. Both the writers

and the journalists of these news outlets were selected for this study because writers have the greater advantage of influencing the language usage of people than other outlets as their writing can affect both the young and the old. The researcher read the works and identified the idioms that are used paying attention to the contexts in which they are used.

The idioms were subcategorized into idioms borrowed from British English, and those that are translated from the indigenous languages. As a non-native speaker of English, the researcher verified the idioms that are borrowed from British English in terms of the following dictionaries which were published by British institutions: Cambridge International Dictionary of Idioms, and The Oxford Dictionary of Idioms. Table 3 which is adapted on the 2015 Population and Housing census and deals with the ethnic composition in the country has also been involved in this study.

Data Presentation

Tables 1 and 2 respectively present the modified idioms, and those that are translations from the indigenous languages. Table 1 presents the idioms, their British equivalents, the affected words or morphemes, the modification processes involved and the sources of the idioms. Table 2 presents the expressions from the texts, the idioms derived from them, their equivalents from the local languages, their meanings, the languages involved and their sources. The pieces of information highlighted in these tables largely follow the ones shown by Kamtchueng in his discussion of the non-standard idioms used Cameroon writers of English expressions (2014).

Table 1: Idioms Inherited from British English

No	Sierra Leonean Idioms	Target Idioms	British Idioms	Words or Morphemes affected	The Processes involved	Sources
1	There is no doubt that the desire to deal with corruption head-on is beginning to bear fruits in Sierra Leone	There is no doubt that the desire to deal with corruption head-on is beginning to bear fruit in Sierra Leone		Fruits>Fruit	Addition	Aureol Torch March, 2006,9
2	All hands must be on deck to restore our past glory	All hands-on deck to restore our past glory		Must be	Addition	Standard Times 13 April 2016, 7
3	They started to wag their tongues and pointing accusing fingers at each other.	They started to wag their tongues and pointing a finger at each other.		accusing fingers > a finger	-Addition - Substitution	Landscape of Memories 2015, 36.
4	Things are getting out of hands and the authorities must act now with our full support.	Things are getting out of hand and the authorities must act now with our full support		Hands> Hand	-Addition	Politico 16 December 2020, 5
5	Out of the blues,	Out of the blue, just		Blues>Blue	-Additions	Destiny Child

	just like that, without even knowing how it comes about...	like that, without even knowing how it comes about...			and other Stories, 2021, 30
6	We also may need some younger person to give us such helping hands	We also may need some younger person to give us a hand.	helping hands > a hand	Addition - Substitution	Mansaray Punishment & Reward Gbanabom, In the Belly Lion, 2015 112-120
7	Slowly but gradually errors started accumulating, by 1991 <i>hell got loose</i>	Slowly but gradually errors started accumulating, until by 1991 all hell broke or was let loose	Got>Broke/let, all, was	Substitution Deletion	Standard Times 10 February, 2016, 9
8	But they thought it fit to put out your light <i>in the twinkle of an eye</i> , without cause.	But they thought it fit to put out your light <i>in the twinkling of an eye</i> , without cause.	twinkle > twinkling	Deletion	No Seed for Soil 1968, 61 – 65
9	This is not the first time people's names are been <i>dragged through the mud</i> and ...	This is not the first time people's names are been <i>dragged through the mud</i> and ...	The	Deletion	Premier News 2 September 2013, 2
10	The fact is we all are responsible and it is time we look in to each other's face and say enough is enough	The fact is we all are responsible and it is time we look each other's in the face and say enough is enough	In to>In the	Substitution Deletion	Standard Times 6 October 2016, 5
11	...and anything he said seemed to be getting on her nerve	...and anything he said seemed to be getting on her nerves	Nerve>Nerves	Deletion	The New Citizen 14 th March, 2007 5
12	This was all done off head and when he encountered some momentary blocks...	This was all done off the top of his head and when he encountered some momentary blocks...	off head > off the top of his head	Deletion	Fourah Bay College Souvenir Magazine 190th, 2017, 86.
13	Conferring the doctorate degree on the IGP, Dr. M. Y. Bangura disclosed that he was speaking on behalf of the university commissioner and <i>stepping in the</i>	Conferring the doctorate degree on the IGP, Dr. M. Y. Bangura disclosed that he was speaking on behalf of the university commissioner and <i>stepping into the shoes</i> of the pro-	in > into shoe > shoes	Substitution	The Exclusive, 11th February, 2021, 3.

	<i>shoe</i> of the pro-chancellor, Dr. Grazer to confer the Degree on the IGP.	chancellor, Dr. Grazer to confer the Degree on the IGP.			
14	According to sources, the parents <i>took to their flight</i> when they learnt that the main gate of the detention centre was destroyed.	According to sources, the parents <i>took to their heels</i> when they learnt that the main gate of the detention centre was destroyed.	Flight>Hills	Substitution	Premier News 14 December, 2015, 7
15	You must always cut your coat according to your size.	You must always cut your coat according to your cloth.	Size > Cloth	Substitution	The New Citizen 29th July, 2014, 4.
16	The incident with Nyahawa <i>flashed in his mind</i> , and filled him with doubts about his first romantic test since arriving in Njama.	The incident with Nyahawa <i>sprang or came to his mind</i> , and filled him with doubts about his first romantic test since arriving in Njama.	-flashed > sprang or came -in > to	Substitution	Conteh, <i>The Diamonds</i> 1997, 124
17	Adding Pepper to your injury is the hassle of transportation...	Adding insult to your injury is the hassle of transportation...	Pepper>Injury	Substitution	Aureol Torch August 2019, 6
18	... if you want Lamboi to put the system off, all you need to do is to <i>squeeze your palm</i> and make him laugh and smile.	... if you want Lamboi to put the system off, all you need to do is to <i>grease or oil your palm</i> and make him laugh and smile.	squeeze > grease or oil	Substitution	Standard Times 2nd February, 2018, 4.
19	He let Kabba bring him in as a minister of Trade and Industry to wet his appetite.	He let Kabba bring him in as a minister of Trade and Industry to whet his appetite.	wet > whet	Substitution	For di People 16th May 2007, 3.

Table 2: Idioms Borrowed from the Indigenous Languages

No	Expressions from Text	Idioms Derived	Indigenous Language Expression	Meanings	Languages	Sources
20	You never made <i>sweet eyes at him</i> or allowed him to touch you, Stella?	-To make sweet eyes at someone -To touch someone	fɔ fɔ eye to posin fɔ toch posin	To show interest in some one To have an affair with someone	Krio	Joy Came in the morning 2013, 70
21	The sweat running	Someone's	ngi hein	Someone's	Mende	Hallowell 'Too Loud

	down our joints, the towel we used to wipe our property wet with semen ...	property		genitals		for a Soccer Match', 2012, 24
22	We discovered that police officers have to beg neighbours to ease themselves. But when these kind neighbours are fast asleep and their compounds locked, the female cops in particular have no other option, but to pee on a gutter at the back of the container! How the police and the people in their custody do for the Big One, we could not tell	To go for the big one	fɔ go fɔ di big wan	To defecate	Krio	Politico 30th October, 2020, 5
23	Gibao was a son of the soil	Son of the soil	ndɔɔ lelui	Son of the ground	Mende	Conteh, The Diamonds 1997, 91
24	It was in this place that I ate soil	To eat soil in a place	nɔ dɛ di kɔbɔf	To be born and bred in a place	Temne	The Mouths of the Junction, 67
25	Bee needs to tell his friend Oladepo Venn that if he has failed to live by the stipulated timeframe, he will surely go by the Blackman's means	To go by the Blackman's means	fɔ dai by blakman wey	To die by unnatural means	Krio	Standard Times 30 May 2007, 3
26	I am going to see the topmen in the police station and kill the case	To kill the case	jei waa	Kill case	Mende	Conteh, The Diamonds 1997, 224
27	Without mincing words, let me be very frank to state that my present socioeconomic situation has degenerated to such a hopeless level that my family and I are subsisting on dry bread and cold	Dry bread	drai bred	Bread without butter	Krio	Standard Times 10th September, 2012, 6

- water and I am close to the level of destitution.
- 28 When you tell people the raw truth, nothing but the raw truth, they take offence To tell tonya ngalei Saying the Mende someone the lelei raw truth Conteh, In Search of Sons 2007, 98
- 29 Now, if you don't stop the madness that I heard you and your union want to make, I will show you why monkeys don't eat pepper To show fo show posin wai To threaten Krio to correct someone for wrongdoing Losing Track, Gbongbosoro 2012, 36
- 30 They show us white teeth, but deep down their hearts were as black as tar White teeth fo fo wait To appear Krio friendly outwardly but evil in character Standard Times 14 April 2016, 7

Table 3 Ethnic composition of Sierra Leone, regions and district

Region	Krio	Mende	Temene	Limba	Kono	Koranko	Fullah	susu
Sierra Leone	1.3	31.9	31.4	8.4	5.1	4.4	3.8	2.9
Eastern	0.2	54.7	4.8	2.2	19.4	2.1	2.6	0.5
Northern	0.2	1.1	57.0	13.8	0.2	10.1	3.8	5.8
Southern	0.3	78.1	8.0	0.9	0.3	0.2	1.8	0.5
Western	5.4	14.1	40.3	13.2	2.3	1.6	6.9	3.0
Area								
District								
Kailahun	0.1	70.7	1.0	0.6	1.0	0.1	0.9	0.1
Kenema	0.3	83.4	4.8	1.8	0.6	0.4	3.1	0.7
Kono	0.3	3.3	8.6	4.5	61.2	6.0	3.8	0.5
Bombali	0.3	1.4	45.0	24.8	0.3	0.6	4.4	6.5
Kambia	0.1	0.7	54.8	17.9	0.1	0.1	1.7	20.8
Koinadugu	0.1	0.4	3.4	15.8	0.3	81.3	11.9	0.2
Port Loko	0.4	1.7	84.4	4.1	0.3	0.2	1.5	5.2
Tonkolili	0.2	0.9	81.5	8.1	0.2	7.3	0.9	0.1
Bo	0.5	81.9	61.7	1.7	0.4	0.2	2.8	0.6
Bonthe	0.4	72.4	1.6	0.3	0.2	0.1	1.0	0.4
Moyamba	0.3	55.4	22.3	0.7	0.4	0.1	1.5	1.0
Pujehun	0.1	95.8	0.7	0.3	0.1	0.3	0.7	0.1
Western	3.4	12.8	47.4	11.3	2.4	1.5	6.1	2.5
Area Rural								
Western	6.2	14.6	37.3	14.1	2.3	1.6	7.3	3.1
Area Urban								

Data Analysis

Idiom 1 “to bear fruit” means to “have good results” (The Oxford Dictionary of idioms, 117). The Sierra Leonean variant tends to add the -s plural marker to the noun fruit. In addition to its “ship board senses”, idiom 2 also means “all members of the team are required to be

involved” (The Oxford Dictionary of idioms, 134). The Sierra Leone variant tends to add the modal “must” Idiom 3 “point a finger at someone” means “to accuse someone of being responsible for something that has happened” (Cambridge International Dictionary of Idioms, 136). The Sierra Leonean variant adds both the word “accuse” which is shown in the meaning of idiom and the -s plural marker. Idiom 4 “get out of hand” refers to “a situation [that] cannot be controlled any more” (Cambridge International Dictionary of Idioms, 173). In its Sierra Leonean counterpart -s plural maker is added to the noun “hand”. Idiom 5 “out of the blue” means a situation that happens “without warning”, very unexpectedly” (The Oxford Dictionary of Idioms, 3). The Sierra Leone variant of the idiom have the -s plural marker in the noun blue. Idiom 6 is concerned with ‘*to give (or lend) a hand*’ which means to ‘*assist in an action or enterprise*’ (The **Oxford Dictionary of Idioms, 134**). The idiom is also modified in Sierra Leone because of the change of ‘*hand*’ into the plural when it involves more than one person. Moreover, like ‘*accusing*’ in the second idiom, the Sierra Leonean tends to add ‘*helping*’ to the idiom probably as a result of knowledge of its meaning. Idiom 7 “all hell broke or was let loose” means “suddenly there was chaos or uproar” (The Oxford Dictionary of Idioms, 141). Its Sierra Leone variant has the tendency to delete the adjective “all” and the verb “was” and to substitute “got” with “broke” or “let”. Idiom 8 ‘*in the twinkling of an eye*’ which means something that ‘*happens very quickly*’ (Cambridge International Dictionary of Idioms, 405), the Sierra Leonean author tends to delete the ‘-ing’ bound morpheme in the word ‘*twinkling*’. Idiom 9 “to drag someone through the mud” means “to make damaging allegations about someone” (Oxford Dictionary of idioms, 85). In Sierra Leone, the definite article (the) tends to be omitted in the idiom. To “look someone in the face” (see idiom 10 above) means to “look directly at someone without showing embarrassment, fair or shame” (The Oxford Dictionary of Idioms, 177). The Sierra Leonean variant of the idiom tends to omit the definite article “the”. To “get on somebody’s nerves” (see idiom 11 above) means “to annoy someone especially by doing something again and again” (Cambridge International Dictionary of Idioms, 268). The -s plural marker which is a bound morpheme tends to be omitted in the Sierra Leone variant of the idiom. Idiom 12 “off the top of your head” means “to do something without careful thought or investigation” (The Oxford Dictionary of idioms, 139). In the Sierra Leonean variant of the idiom both the noun phrase “the top” and the preposition and determiner “of” and “his” tend to be omitted respectively.

Idiom 13, the original idiom ‘*to step into somebody’s shoes*’ means ‘*to take the job or position which someone had before you*’ (Cambridge International Dictionary of Idioms, 347). The Sierra Leonean equivalent uses the singular noun ‘*shoe*’ and a different preposition. The difference in number may be attributed to the arbitrary nature of number in English as shown in Gleason citing examples such as trousers, breeches, shorts and slacks which ‘are grammatically plural with no evidence semantic justification’ (1955, 224). Payne John and Huddleston Rodney (2002 – 340) describe these nouns as bipartite and Biber et al. (2002: 62 – 64) express a similar view in their discussion of categories or quantifying noun. Idiom 14 to take to your heels means “to run away quickly” Cambridge International Dictionary of Idioms, 188). In Sierra Leone, “heels” tend to be replaced with “flight.” The British idiom ‘*to cut your coat according to your cloth*’ (see 15 above) means ‘*to only buy what you have enough money to pay for*’ (Cambridge International Dictionary of Idioms, 73). This idiom is originally concerned with the need to live within one’s means. In Sierra Leone,

however, the reporter tends to replace the noun ‘*cloth*’ with ‘*size*’. The lexical difference is caused by the fact that the original users of the idiom focus on one’s resource which in this case is ‘*cloth*’ rather than on one’s physical appearance. Idiom 16, ‘*to come or spring to mind*’ means ‘*a thought or idea which occurs to someone*’ (The Oxford Dictionary of Idioms 189). The author tends to substitute ‘*come*’ or ‘*spring*’ with ‘*flash*’ and ‘*in*’ with ‘*to*’. These differences are respectively caused by replacing a synonymous verb and a preposition. To “add insult to injury” means to “do or say something that makes a bad or displeasing situation even worse” (The Oxford Dictionary of Idioms, 153). In the Sierra Leone variant of the idiom see the seventeenth idiom above, the noun “insult” is “replaced with pepper” The idiom, ‘*to grease or oil someone’s palm*’ means to ‘*bribe someone*’ (The Oxford Dictionary of Idioms. 129). The idiom originates from the practice of applying grease to a machine. It would appear that Sierra Leoneans are unaware of this origin. As regards the British idiom ‘*to whet someone’s appetite for something*’ which means to make him ‘*want more of it*’ (Cambridge International Dictionary of Idioms, 9) Sierra Leoneans tend to replace the verb ‘*whet*’ with ‘*wet*’ which is its homophonous partner (see the nineteenth idiom above).

The study also highlights, the idioms that are related to the home languages in Sierra Leone. These idioms show that Sierra Leoneans think based on their thought processes. For example, courtship and sex are discussed openly in a roundabout way because it is considered indecent to discuss them openly. This is what the twenty first and twenty second idioms show.

In the twentieth idiom, facial expressions which are inundated with smiles are associated with courtship, so also is having sex with a woman associated with touching her. Closely related to this is the fact that Sierra Leoneans do not refer to the sexual organs openly. The Mendes – the largest ethnic group in the country (as is shown in Table 3 of page 7) - would refer to the sexual organs as ‘*la bui*’ which means ‘*bottom mouth*’ rather than ‘*kpini*’ which means ‘*penis*’ and ‘*hein*’ which means ‘*property*’ rather than ‘*kpotei*’ which means ‘*vagina*’. This accounts for the twenty first idiom above. The same is also true of the idioms relating to excretion and other bodily functions. As is shown in idiom 22, instead of saying someone is going to defecate or even going to the toilet, Sierra Leoneans will tend to use the Krio idiom by saying the person is going for ‘*the big one*’ which itself is derived from the English ‘*big job*’. The Temnes- the second largest ethnic group in the country (see Table 3) also exhibit this tendency as they prefer using ‘*I kɔ wur rakan*’ which means ‘*I am going outside*’ instead of ‘*I kɔ bɔm*’ which means ‘*I am going to defecate*’. The Limbas - arguably the third largest ethnic group in the country (see Table 3) - will also prefer to say ‘*Yaj kij ba huɣ*’ which means ‘*I want to move outside*’ rather than to say ‘*Yaj kij ba thará*’ which means ‘*I want to defecate*’.

Idiom 23 shows how Mendes are closely associated with nature. Someone is considered a son of the soil if he is an indigene of a particular locality. Similarly, the twenty fourth idiom reinforces the closeness between someone and the environment in which he is born and bred. Idiom 25 originates from Krio and it shows that one can die by an unnatural means. This is also captured in Limba where the idiom is expressed as, ‘*Tuka hu ka ba gboɲ* /Death which not for nothing/ to die by black man’s means. Idiom 26 shows that however serious a case is, it can be handled in the African way by using informal means. This is what the Mende idiom

illustrates. Idiom 27 springs from Krio and it means ‘bread without butter’. This food is normally eaten by average people in the country. Idiom 28 shows the frank nature of the average Sierra Leonean. For example, this Mende idiom shows that Sierra Leoneans tend to see the naked truth especially when it comes to resolving issues. This is also reflected in Limba where the idiom is expressed as, ‘Ba konde wə koloŋ baŋ /To tell someone the naked truth/ the/To tell someone the raw truth.

Idiom 29 reinforces this Sierra Leonean feature of frankness especially when addressing issues. This means that those who are culpable of wrongdoing are bound to pay the price for their actions. Idiom 30 refers to a person who appears to be friendly but he is dangerous. It is particularly used in Krio. However, this idiom can also be seen in Mende and Temne as is shown in ‘*bi yɔngɔi golengɔ, kɛɛ bi lii nyamungɔ*’ and ‘*ɛ shek ɛfera kə buh kəbi*’ respectively. Although Sierra Leoneans are renowned for their hospitality particularly to strangers, they sometimes display envy against one another.

It is observed from the above that the changes which the idioms borrowed from British English exhibit consistency in their formation. This means that some add new words or morphemes into them, some delete the original words or morphemes, and some replace them. The situation has become the norm in the country to the extent that for the thirty years plus experience the researcher has had as an English teacher, he frequently comes across idioms that do not correctly match with their British counterparts. This is evident in idioms such as what is sauce for the goose is sauce for the gander, bite the hand that feeds you, a snake in the grass, to be on talking terms, to make a noise, to get a child, to be welcome, to make a mountain out of a mole hill, to pull resources and to wreak havoc which are respectively rendered in the country as what is good for the goose is good for the gander, bite the finger that feeds you, a green snake in a green grass, to be on speaking terms, to make noise, to have a child, to be welcomed, to make a mountain out of an ant hill, to pull resources together, and to wreak havoc. Pitt expressed a direct sentiment when she investigated the English usage of secondary school pupils. She stated that;

One of the thorniest problems the language teacher has to face is how to get the students to express themselves well on paper not only by using English IDIOMATICALLY and ACCURATELY but also avoiding stereotyped ideas. (Pitt, 1973, p.3). (emphasis is mine)

However, it can be stated that the modified idioms that have been stated above and other relating to them constitute an irreversible trend because as Fyle (1968) earlier warned” (the) attitude of “British” and “best” may be desirable for the patriotic Britisher, but it narrowing and limiting for the Sierra Leonean” (1968, 9). Significantly, in spite of the different forms which modified idioms take, this does not lead to any different in meaning from their British counterparts. This is possibly what Parizoska, mean when she states that “any idiom can undergo deliberate modifications of its grammatical structure” (2022, 12).

The idioms in the local languages have shown how the cultural requirements in the country have influenced the English usage. This is seen in how the idiom relating to playing love,

excretion, bodily functions and private parts of the human body are expressed. The emergence of these idioms in English to express these thought processes have given a special status to English because according to Kachru (1982, 333) in his examination of South Asian English, the language has transformed itself “from a mere guest or friend to citing Raja that of one of our own, caste, our creed, our sect and of our tradition” (1978, 421). It is deducible from the above that the Sierra Leonean culture can now be expressed through Sierra Leonean English.

Conclusion

On the whole, the structural differences between Sierra Leonean idioms are being identified between Sierra Leonean idioms and those borrowed from British English. Although teachers of English have been making strides for their learners to acquire mastery of British English, it is clear that these differences cannot lead to any break in communication between Sierra Leoneans and their British counterparts. Moreover, idioms in the local languages can now be seen in Sierra Leonean English usage playing their role in describing the behaviour that is typical of Sierra Leoneans which include their politeness, attachment to their environment, crime, frankness, and superstition. These two phenomena show that modified native English idioms and the local idioms have a place in the emerging Sierra Leonean English variety.

Recommendations

It can be noticed that the use of idioms has most times proved the most difficult aspect for learners of languages. Teachers of English are therefore required to have this in mind when they are dealing with both native language and local idioms. The approach should abide by the following guides:

1. When dealing with the idioms borrowed from native English the teacher should consider the context in which they are being used. This means that if the idioms are different from native English usage in terms of addition, omission, or usage the learner should not be penalized if they are used in the correct context.
2. In relation to the local idioms, the teacher’s focus should be on the context in which they are being used. This means that the learner should only be penalized if the idioms are not used in the correct context.

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FIFTEEN YEARS ON: ASSESSING THE INTEGRATION OF LEADERSHIP FOR LEARNING PRACTICES IN GHANAIAN BASIC SCHOOLS

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Abstract

The Leadership for Learning (LfL) framework, which links leadership directly with teaching and learning processes, was introduced in Ghana in 2009 through a partnership between the Ghana Education Service, the University of Cape Coast, and the University of Cambridge. Fifteen years after its initial implementation, this mixed-methods study assesses the extent to which LfL practices have been integrated into basic schools in Ghana's Central Region. Using a convergent parallel design, quantitative data were collected from 525 headteachers across seven districts through structured questionnaires. In comparison, qualitative insights were gathered from 10 purposively selected headteachers through semi-structured interviews. The findings reveal that several key LfL practices have been successfully integrated, including promoting continuous professional development for teachers (M=4.5), maintaining open communication between headteachers and staff (M=4.6), and fostering transparent communication with parents and communities (M=4.5). Headteachers reported positive outcomes, including enhanced teacher instructional performance (M=4.3), improved learner engagement (M=4.3), and safer school climates (M=4.4). However, significant challenges persist, particularly in resource mobilisation (M=3.2), equitable resource distribution (M=3.6), and community involvement (M=3.8). The study concludes that while headteachers have successfully embedded learner-centred and collaborative leadership approaches, systemic barriers including inadequate infrastructure (M=4.5), limited funding (M=4.3), and frequent policy changes (M=4.3) continue to constrain full LfL implementation. The findings contribute to understanding how LfL principles are adapted and sustained in resource-constrained, sub-Saharan African contexts and have implications for leadership development programmes, education policy, and international development partnerships.

Keywords: Leadership for Learning; basic schools; programme evaluation; Ghana; educational leadership

Introduction

Education is widely recognised as essential for societal development and individual empowerment (UNESCO, 2021), with research demonstrating that school leadership is a key determinant of student success, second only to classroom instruction (Leithwood, Louis, Anderson & Wahlstrom, 2004). This recognition has led to the growing prominence of

frameworks such as Leadership for Learning (LfL), which link leadership directly to teaching and learning processes, promote collaborative school cultures, and emphasise shared responsibility for student achievement (MacBeath & Dempster, 2009).

The LfL framework, developed by the Cambridge Network led by John MacBeath, is built around five core principles: maintaining a focus on learning as an activity; creating conditions conducive to learning; promoting dialogue about leadership and learning; sharing leadership among staff and students; and using evidence to inform practice (MacBeath & Dempster, 2009). These principles represent a shift towards more inclusive, participatory, and evidence-informed approaches to school leadership (Harris & Jones, 2019).

In Ghana, the LfL programme was introduced in 2009 through a collaborative effort between the Ghana Education Service (GES), the Institute for Educational Planning and Administration (IEPA) at the University of Cape Coast (UCC), and the Centre for Commonwealth Education (CCE) at the University of Cambridge. The programme aimed to enhance the leadership competencies of basic school headteachers and improve the quality of education in the long term (Jull, Swaffield, & MacBeath, 2014; Tangonyire, 2018). Following initial success in pilot schools, stakeholders urged nationwide adoption and the inclusion of LfL practices in the Headteachers' Handbook (Jull et al., 2014).

Previous studies documented positive early impacts of the LfL Ghana programme, including innovative approaches such as using mobile technology to support school leaders (Swaffield, Jull, & Ampah-Mensah, 2013) and notable gains in student learning outcomes (Jull et al., 2014; Tangonyire, 2018). However, these studies did not fully address the long-term integration of LfL practices, particularly in terms of how they translate into sustained improvements in teaching and learning across diverse environments.

Fifteen years after its initial implementation, an important question emerges: To what extent have LfL practices been sustained and embedded in Ghanaian basic schools? This study addresses this gap by examining the integration of LfL practices in the Central Region of Ghana, one of the pioneering regions for the programme. The Central Region presents a unique case due to its diverse mix of urban, peri-urban, and rural schools, each with distinct challenges and opportunities, providing an ideal context to explore the depth and sustainability of the LfL programme's impact.

This study is guided by two primary research questions:

1. To what extent have LfL practices been integrated into basic schools in the Central Region of Ghana?
2. What are the benefits and challenges encountered in integrating LfL practices?

By answering these questions, the study contributes to understanding how LfL principles are adapted and sustained in resource-constrained, sub-Saharan African contexts and offers practical insights for policymakers, educational leaders, and international development partners seeking to enhance leadership capacity in basic education.

Literature Review

Theoretical Framework: Instructional Leadership Theory

This study is grounded in Instructional Leadership Theory, which has emerged as one of the most influential frameworks in educational leadership research (Hallinger, 2005). Rooted in the effective schools movement (Edmonds, 1979), instructional leadership emphasises the principal's role in prioritising teaching and learning above administrative tasks. Hallinger and Murphy (1985) expanded this into a three-dimensional framework: defining the school mission, managing the instructional programme, and promoting a positive school learning climate.

Robinson, Lloyd, and Rowe (2008) conducted a meta-analysis finding that instructional leadership had a significantly greater impact on student achievement than transformational leadership styles. Leadership behaviours involving promoting and participating in teacher learning and development, setting clear academic goals, and monitoring instruction were strongly associated with improved student performance.

In low- and middle-income countries, including Ghana, instructional leadership has gained traction as education systems increasingly focus on accountability and learning outcomes. Oduro (2009) emphasised that in the Ghanaian context, instructional leadership is often constrained by limited resources, excessive administrative duties, and inadequate training. However, when school heads engage teachers in professional learning communities and use performance data to inform decisions, student outcomes tend to improve (Owusu-Acheampong & Essuman, 2022).

The Leadership for Learning Framework

The LfL framework builds on instructional leadership by positioning leadership as a collaborative, learning-centred activity involving all stakeholders (MacBeath & Dempster, 2009). The framework is built around five core principles:

1. Maintaining a focus on learning as an activity – emphasising that learning is the core purpose of schooling and should guide all leadership decisions.
2. Creating conditions conducive to learning – ensuring that the physical, social, and emotional environment supports effective teaching and learning.
3. Promoting dialogue about leadership and learning – encouraging open communication and reflective practice among all stakeholders.
4. Sharing leadership among staff and students – distributing leadership responsibilities to build collective capacity and ownership.
5. Using evidence to inform practice – basing instructional improvements on data and feedback (MacBeath & Dempster, 2009).

Empirical studies support the LfL framework's positive impact on school improvement. Dempster, Lovett, and Flückiger (2011) found that schools in Australia implementing LfL practices showed improvements in literacy and numeracy performance, particularly where leadership was collaborative. In Ghana, Owusu-Acheampong and Essuman (2022) demonstrated that schools applying LfL practices experienced better academic performance.

LfL Implementation in Ghana

The LfL Ghana programme, inspired by the Carpe Vitam programme, focused on five distinctive principles and practices for leadership and learning (Swaffield & MacBeath, 2009). According to Tangonyire (2018), who cited Jull, Swaffield, and MacBeath (2014), the programme aimed to improve the quality of learning through effective school leadership, strengthen the leadership capacity of headteachers, and advocate for leadership development as a prerequisite for appointing school heads.

Following initial implementation in 2009, which achieved success in select schools, stakeholders urged nationwide adoption and recommended including LfL practices in the Headteachers' Handbook (Jull et al., 2014). Tangonyire (2018) examined the integration of LfL practices in Ghana's basic schools and concluded that the framework significantly enhanced school leaders' competencies and improved teaching and learning quality.

Challenges to LfL Integration in Developing Contexts

Research across sub-Saharan Africa has identified persistent challenges to LfL implementation. These include:

Leadership capacity gaps: Many headteachers remain entrenched in traditional hierarchical leadership paradigms, focusing on compliance and administration rather than instructional leadership (Bush & Glover, 2014). Harris and Jones (2019) reported that over 65% of school heads in South African schools felt unprepared to lead LfL-aligned initiatives.

Resource constraints: Schools in developing regions often operate on limited budgets that prioritise basic operational needs over innovative frameworks. Ncube and Tshabalala (2020) found that 70% of primary schools in Zimbabwe lacked funding to support LfL initiatives.

Cultural and structural barriers: Traditional leadership structures discourage teacher participation in leadership roles. Oduro and MacBeath (2017) noted that Ghanaian principals rarely consulted teachers in decision-making processes, stifling innovation.

Policy and administrative barriers: National education policies often lack explicit provisions for LfL, leaving schools without clear guidance or support. Agyemang and Boateng (2020) found that while some Ghanaian policies mentioned leadership and collaboration, they were not prioritised or sufficiently funded.

Research Gap

While previous studies have documented positive early impacts of the LfL Ghana programme, there remains a gap in understanding the long-term integration and sustainability of LfL practices. This study addresses this gap by examining the extent to which LfL practices have been embedded in basic schools fifteen years after initial implementation, identifying both successes and persistent challenges in the Ghanaian context.

Methodology

Research Paradigm and Design

This study is grounded in the pragmatic research philosophy, which prioritises practical outcomes and solutions (Creswell & Creswell, 2018). Pragmatism provides the philosophical foundation for integrating qualitative and quantitative data, allowing researchers to address complex questions that cannot be adequately answered through a single approach (Creswell & Plano Clark, 2018). The study employed a convergent parallel mixed-methods design, involving the simultaneous collection of both qualitative and quantitative data, which were analysed separately and then merged for interpretation (Creswell & Plano Clark, 2018). This design enables researchers to integrate numeric trends with personal experiences, offering a more comprehensive understanding of the research problem.

Study Area

The study was conducted in the Central Region of Ghana, focusing on seven districts that were pioneering districts in implementing the LfL programme: Abura-Asebu-Kwamankese, Agona East, Agona West, Asikuma-Odoben-Brakwa, Cape Coast, Komenda-Edina-Eguafo-Abirem, and Mfantseman. These districts were selected due to their historical involvement in the LfL pilot phase and their diverse mix of urban, peri-urban, and rural schools.

Population and Sample

The target population comprised 756 headteachers of public basic schools from the seven selected districts. Using a census sampling technique, all headteachers were invited to participate in the survey phase. A total of 525 headteachers fully completed and returned the questionnaires, resulting in a response rate of 69.4%, which is considered adequate for survey-based research in educational contexts (Fincham, 2008; Nulty, 2008).

For the qualitative phase, 10 headteachers were purposively selected from the survey respondents based on their schools' performance ratings. Five headteachers from high-performing schools and five from low-performing schools were selected to participate in semi-structured interviews, enabling a balanced exploration of factors contributing to both success and challenge in LfL integration.

Data Collection Instruments

Questionnaire: A structured questionnaire was designed with five sections. Section one focused on the extent to which 15 LfL practices were being implemented, using a 5-point scale (1 = not being practised at all, 5 = being highly practised). Section two examined the perceived importance of these practices. Section three assessed the benefits of LfL integration (1 = strongly disagree, 5 = strongly agree). Section four addressed challenges (1 = strongly disagree, 5 = strongly agree). Section five collected demographic information. The questionnaire was pre-tested with 30 headteachers in Cape Coast Municipality, yielding a Cronbach's alpha coefficient of 0.89, indicating high internal consistency (Creswell, 2014).

Semi-structured interviews: An interview guide was designed to complement the questionnaire findings, focusing on strategies for integrating LfL practices, factors

contributing to successful integration, and challenges encountered. Interviews lasted 10-15 minutes and were audio-recorded with participants' consent.

Data Collection Procedure

Ethical clearance was obtained from the University of Cape Coast Institutional Review Board (UCCIRB). A letter of introduction from the Institute for Educational Planning and Administration facilitated access to schools. Informed consent was obtained from all participants, who were assured of confidentiality and voluntary participation. Quantitative data were collected in June 2024 through self-administered questionnaires, primarily face-to-face, with online and phone options available. Qualitative data were collected in December 2024 through semi-structured interviews with the 10 selected headteachers.

Data Analysis

Quantitative data were entered into SPSS and analysed using descriptive statistics (means and standard deviations) to assess the extent of LfL integration, benefits, and challenges. The following decision rule was applied for interpreting mean scores on benefits and challenges: 1.0-1.4 = Not Sure; 1.4-2.4 = Strongly Disagree; 2.4-3.4 = Disagree; 3.4-4.4 = Agree; 4.4-5.0 = Strongly Agree. Qualitative data were transcribed and subjected to thematic analysis, involving identifying recurring themes, concepts, and patterns within the data. Thematic coding was employed to categorise and interpret content, with quotes used to support emerging themes.

Ethical Considerations

The study adhered to established ethical principles, including obtaining informed consent, maintaining participant anonymity, preventing harm, and ensuring confidentiality. All electronic data were password-protected, and hard copies were stored in locked spaces accessible only to the researcher. After study completion, all data were destroyed to prevent unauthorised access.

Results

Demographic Characteristics of Respondents

Of the 525 headteachers who completed the questionnaire, 455 (86.7%) responded regarding their years of headship experience. The largest group (36.0%) had served 5-10 years in their current position, indicating a substantial segment with moderate to long-term leadership experience. A further 23.7% had 1-3 years' experience, 21.8% had 3-5 years, 9.5% had less than a year, and 8.8% had more than 10 years. Regarding academic qualifications (n=459), the majority held bachelor's degrees (71.5%), while 24.4% held master's degrees and 4.1% held diplomas. This reflects a reasonably well-educated leadership cohort. Gender distribution (n=464) showed significant disparity, with males comprising 65.7% and females 33.6% of respondents. School location (n=459) revealed that 63.4% of schools were in rural areas and 36.2% in urban settings.

Extent of LfL Practice Integration

Table 1 presents headteachers' ratings of the extent to which 15 LfL practices were integrated in their schools, categorised into three groups: highly practised ($M \geq 4.5$), well-practised ($M = 4.0-4.4$), and moderately practised ($M < 4.0$).

Table 1: Extent of Integration of LfL Practices in Basic Schools

LfL Practice	Mean	SD	Interpretation
Highly Practised ($M \geq 4.5$)			
Open and effective communication between head and teachers	4.6	0.74	Highly practised
Transparent communication between head, parents and community	4.5	0.78	Highly practised
Teachers' continuous professional development encouraged	4.5	0.75	Highly practised
Well-Practised ($M = 4.0-4.4$)			
Focus on learners' academic achievement	4.4	0.82	Well-practised
Information on learners' performance used to enhance teaching	4.3	0.81	Well-practised
School problems solved to foster positive learning environment	4.2	0.88	Well-practised
Favourable school climate for learners and teachers	4.2	0.88	Well-practised
Collaboration among teachers, parents, and community	4.2	0.91	Well-practised
Learning experiences prioritised in decision-making	4.2	0.87	Well-practised
Inclusivity and diversity promoted	4.1	0.90	Well-practised
Support for high-quality teaching and learning	4.0	0.98	Well-practised
Supportive culture promoting learners' well-being	4.0	0.90	Well-practised
Moderately Practised ($M < 4.0$)			
Active community involvement in educational decisions	3.8	1.07	Moderately practised
Equitable distribution of resources	3.6	1.04	Moderately practised
Adequate resources (funding, time, personnel)	3.2	1.10	Moderately practised

Source: Field data (2025)

The findings reveal that three LfL practices are highly integrated: promoting continuous professional development for teachers ($M=4.5$, $SD=0.75$), open communication between heads and teachers ($M=4.6$, $SD=0.74$), and transparent communication with parents and communities ($M=4.5$, $SD=0.78$). Eleven practices are well integrated, with means ranging from 4.0 to 4.4. However, three practices are only moderately integrated: active community involvement ($M=3.8$, $SD=1.07$), equitable resource distribution ($M=3.6$, $SD=1.04$), and resource mobilisation ($M=3.2$, $SD=1.10$).

Benefits of LfL Integration

Table 2 presents headteachers' perceptions of the benefits resulting from LfL integration.

Table 2: Benefits of Integrating LfL Practices

Benefit	Mean	SD	Interpretation
Learners and teachers feel safe, respected, and valued	4.4	0.74	Agree
Teachers benefit from continuous professional development	4.4	0.72	Agree
Increased learners' engagement in learning	4.3	0.71	Agree
Harmonious and supportive school environment	4.3	0.73	Agree
Enhanced staff teaching skills and methodologies	4.3	0.72	Agree
Improved teachers' classroom instructional performance	4.3	0.67	Agree
Improved learners' learning outcomes	4.2	0.74	Agree
Increased learners' literacy and numeracy skills	4.2	0.70	Agree
Improved performance in standardised tests (e.g., BECE)	4.2	0.76	Agree
Increased learner involvement in class discussions	4.2	0.74	Agree
Data-informed decision-making processes	4.2	0.68	Agree
Regular collection and analysis of data	4.1	0.71	Agree
Regular parent and community participation	4.0	0.81	Agree
Addressing diverse needs of all learners	4.0	0.87	Agree
Efficient allocation and management of resources	4.0	0.90	Agree

Source: Field data (2025)

All benefit indicators received mean scores above 4.0, indicating general agreement that LfL integration has produced positive outcomes. The highest-rated benefits relate to school

climate (learners and teachers feeling safe, respected, and valued: M=4.4), teacher professional development (M=4.4), learner engagement (M=4.3), and enhanced teaching skills (M=4.3).

Challenges to LfL Integration

Table 3 presents the challenges hindering LfL integration.

Table 3: Challenges Encountered in Integrating LfL Practices

Challenge	Mean	SD	Interpretation
Inadequate school infrastructure (libraries, computer labs)	4.5	0.887	Strongly Agree
Limited funding for teaching and learning activities	4.3	0.931	Agree
Frequent changes in education policies and priorities	4.3	0.946	Agree
Limited headteacher role in teacher recruitment/transfers	4.2	1.062	Agree
Heavy workloads (administrative and extracurricular)	4.0	0.988	Agree
High teacher turnover/attrition	3.8	1.254	Agree
Large class sizes/high student-to-teacher ratios	3.7	1.141	Agree
Apathy among community members	3.7	1.098	Agree
Insufficient leadership training for headteachers	3.6	1.135	Agree
Apathy among teachers/staff	3.5	1.094	Agree

Source: Field data (2025)

Inadequate school infrastructure emerged as the most pressing challenge, with respondents strongly agreeing (M=4.5, SD=0.887). Limited funding (M=4.3), frequent policy changes (M=4.3), and limited headteacher autonomy in teacher recruitment (M=4.2) were also major concerns.

Qualitative Findings: Headteachers' Strategies and Experiences

Thematic analysis of interviews with 10 headteachers revealed seven key themes regarding how LfL practices are integrated.

Theme 1: Implementation of LfL Practices through Structured Activities

Headteachers reported using diverse strategies to implement LfL practices, including early morning classes, differentiated instruction, quizzes, reading competitions, and learner clubs. As one headteacher explained:

"When I joined the staff and realised the children were not doing well, I introduced early reading grade early in the morning, around 6:45 AM to 7:30 AM. It is compulsory for every teacher to take the children

through the early reading grade. Then, every Wednesday, instead of having all-morning worship, we try to use about 15 minutes for worship and about 30 minutes for phonetics and reading. Then, every Friday, we hold a reading competition and quizzes." (John, Male, Low-performing school)

Another described a comprehensive approach:

"At my school, we implement accelerated learning, which means we start our lessons one hour before the regular class time. We also conduct remedial activities and other learning support initiatives. We collaborate with stakeholders, including the SMC chairman, PTA, and other community members, so that they can help us. They come to check on the children, how they are learning." (Mary, Female, Low-performing school)

Theme 2: Teacher Support and Professional Development

Headteachers emphasised strengthening Professional Learning Communities (PLCs) as essential for building teacher capacity. A headteacher from a high-performing school described:

"We have a PLC being implemented in my school. We do it every Thursday, where subject difficulties are discussed among the teachers. Aside from that, we also do exchange teaching. Intermittently, I moved some of the upper primary teachers to teach at the JHS; JHS teachers also come to teach the upper primary, as well as the KG and lower primary." (Catherine, Female, High-performing school)

Another added:

"I am building up the teachers' dossier, and all these factors are taken into account in my plan. Nobody wants a negative report on their record, so everyone is doing their best to support the programmes that we have been implementing." (John, Male, Low-performing school)

Theme 3: Parental and Community Involvement

Headteachers described innovative approaches to engaging parents and communities:

"Before you enrol your ward, I will meet the parents. My school is only JHS... Before we accept your word, we will meet the parents and provide you with the school's code of conduct, which we will read to you for your acceptance. This includes guidelines on attending meetings and the expected conduct within the school. I tell them that this is our school culture." (Lucy, Female, High-performing school)

Another explained:

"We have one or two projects ongoing when we call for PTA meetings, and we would like some assistance; they support us. Even now, they have supported us, despite the large class sizes, and we have heat in the

classrooms; they have also supported us by providing ceiling fans for the JHS classrooms." (Felicia, Female, Low-performing school)

Theme 4: Prioritising Learner Development

Headteachers reported intentional focus on holistic learner development through co-curricular activities:

"We have a debating club, a STEM club, and a robotics club in the school. During their club meetings, especially STEM and those with a humanities focus, we usually emphasise the importance of girls making bold decisions to overcome the fear of mathematics. Now, we have encouraged more girls to pursue sciences." (Lucy, Female, High-performing school)

Theme 5: Monitoring and Evaluation

Headteachers used various tools to monitor teaching and learning:

"Yes, I attend the class with a monitoring tool. The monitoring tool is designed in such a way that I will go to the class and look for something specific that I am seeking... With the tool, I can assess the teacher on a scale of one to five to determine whether they were able to implement it or encountered challenges. Afterwards, I discussed my observation with the teacher." (Broni, Male, Low-performing school)

However, some headteachers acknowledged limitations:

"Well, I do monitor, but not adequately. I have to tell the truth." (Felicia, Female, Low-performing school).

Theme 6: Sustaining and Expanding Successful Practices

Headteachers emphasised institutionalising effective practices:

"We still need to maintain our good relationship. Usually, when we meet, I advise them and remind them that we are each other's keepers... I also encourage and motivate them to do their best. Even in my absence, they will do what is right, and when I return, they will provide me with feedback." (Baidoo, Male, High-performing school)

Theme 7: Overcoming Challenges through Innovation

Headteachers demonstrated remarkable creativity in addressing resource constraints:

"One of them is a financial challenge. Sometimes, capitation grants may not be available, and we need to explore alternative options; however, our primary support comes from the school farm. We sometimes harvest our cabbage and maize, and use part of the money to motivate the teachers and the children." (Baidoo, Male, High-performing school)

Another described addressing teacher shortages:

"Some of the challenges are that this school is in the village and is not on the main road, so teachers are not willing to come and teach here. To address this, we use volunteer teachers... we do a lot of in-service training for them, and they are now able to teach." (Broni, Male, Low-performing school)

Discussion

Extent of LfL Integration

The findings reveal that fifteen years after its introduction, LfL practices have been substantially integrated into basic schools in Ghana's Central Region. The high levels of integration for practices related to communication, professional development, and learner focus indicate that headteachers have internalised core LfL principles. This finding aligns with Tangonyire's (2018) observation that the LfL framework significantly enhanced school leaders' competencies in Ghana.

The strong emphasis on continuous professional development (M=4.5) reflects headteachers' understanding that teacher capacity building is central to improving learning outcomes. This aligns with Darling-Hammond, Hyler, and Gardner's (2017) assertion that effective CPD programmes equip teachers with innovative pedagogical strategies and foster reflective practice. Similarly, the high rating for open communication between headteachers and teachers (M=4.6) supports Leithwood, Harris, and Hopkins' (2020) identification of effective communication as crucial for transformational leadership.

However, the moderate integration of resource-related practices (M=3.2-3.6) reveals persistent challenges. The difficulty in mobilising adequate resources (M=3.2) echoes Oduro's (2009) observation that Ghanaian headteachers often assume leadership roles without adequate material support. This finding also aligns with Ncube and Tshabalala's (2020) research in Zimbabwe, where 70% of schools lacked funding to support LfL initiatives.

Benefits of LfL Integration

The positive outcomes reported across all benefit indicators demonstrate LfL's transformative potential. The highest-rated benefits relate to school climate (M=4.4), teacher development (M=4.4), and learner engagement (M=4.3). These findings support Thapa et al.'s (2013) research linking positive school climate to improved academic performance and reduced behavioural issues. They also align with Guskey's (2002) emphasis on CPD as essential for maintaining high-quality teaching.

The agreement that LfL integration has improved learners' learning outcomes (M=4.2), literacy and numeracy skills (M=4.2), and performance in standardised tests (M=4.2) provides empirical support for the LfL framework's effectiveness in the Ghanaian context. This corroborates Owusu-Acheampong and Essuman's (2022) finding that schools applying LfL practices experienced better academic performance in the Central Region.

Persistent Challenges

Despite these successes, significant challenges continue to constrain full LfL implementation. The identification of inadequate infrastructure as the most pressing challenge (M=4.5) reflects systemic underinvestment in Ghana's basic education sector. Adeyemi and Adu (2020) affirm that robust infrastructure forms the bedrock of effective education delivery, and its absence compromises instructional quality and student engagement.

Limited funding (M=4.3) and frequent policy changes (M=4.3) represent additional systemic barriers. Harris and Jones (2020) note that adequate funding is indispensable for sustaining LfL practices, while Hallinger and Wang (2021) emphasise that policy coherence is essential for sustained implementation. The finding that headteachers have limited say in teacher recruitment and transfers (M=4.2) resonates with Harris and Muijs' (2019) argument that school heads should be given greater autonomy to align staff expertise with instructional goals.

Head Teacher Innovation and Resilience

The qualitative findings reveal remarkable creativity among headteachers in navigating constraints. The establishment of school farms to generate income, recruitment of volunteer teachers from communities, and partnerships with donors for feeding programmes demonstrate what might be termed "distributed resource mobilisation" – extending distributed leadership concepts (Spillane, 2006) to include shared responsibility for resource acquisition. These innovations challenge deficit narratives about African educational leadership and highlight headteachers' agency in creating enabling conditions for learning despite systemic constraints. As one headteacher noted, "I use my own money" (Baidoo), reflecting personal commitment that extends beyond formal role requirements.

Implications for Theory and Practice

The findings contribute to the theoretical understanding of how LfL principles are adapted in resource-constrained contexts. They suggest that while the core LfL principles remain relevant, their implementation requires contextual adaptation that recognises the realities of under-resourced schools. The study extends MacBeath and Dempster's (2009) framework by demonstrating how "creating conditions conducive to learning" must be interpreted to include headteacher-led resource mobilisation and community partnership building in contexts where government provision is inadequate.

For practice, the findings highlight the need for leadership development programmes that prepare headteachers not only for instructional leadership but also for strategic resource mobilisation, community engagement, and policy navigation. The variation in monitoring practices across schools points to the need for standardised guidelines and training in data use for school improvement.

For policy, the persistent challenges of inadequate infrastructure, limited funding, and policy instability require systemic responses. The Ministry of Education and Ghana Education Service must address these foundational issues if LfL's full potential is to be realised.

Conclusion

This study assessed the integration of Leadership for Learning practices in basic schools in Ghana's Central Region, fifteen years after the programme's introduction. The findings reveal substantial integration of core LfL practices, particularly those related to communication, professional development, and learner focus. Headteachers reported positive outcomes, including enhanced teacher performance, improved learner engagement, and safer school climates. However, significant challenges persist, particularly inadequate infrastructure, limited funding, frequent policy changes, and constrained headteacher autonomy.

The study contributes to understanding how LfL principles are adapted and sustained in resource-constrained, sub-Saharan African contexts. It demonstrates that while systemic barriers constrain full implementation, headteachers demonstrate remarkable creativity and resilience in creating enabling conditions for learning. The findings have implications for leadership development programmes, education policy, and international development partnerships seeking to enhance leadership capacity in basic education.

Limitations and Future Research

This study has several limitations. First, data were collected exclusively from headteachers in the Central Region, limiting generalisability to other regions. Second, the study relied on self-reported data, which may be subject to social desirability bias. Third, the cross-sectional design captured a single point in time, limiting the ability to observe changes over time.

Future research should consider longitudinal studies to track LfL integration over extended periods, comparative studies across regions, and investigations of the indirect mechanisms through which LfL influences student outcomes. Research exploring how headteachers' innovative resource mobilisation strategies can be systematised and scaled would also be valuable.

Recommendations

Based on the findings, the following recommendations are proposed:

1. For headteachers: Continue strengthening professional learning communities and stakeholder engagement while developing strategic resource mobilisation skills. Document and share innovative practices with colleagues.
2. For the Ghana Education Service: Address infrastructural deficits, ensure consistent funding for teaching and learning, minimise frequent policy changes, and grant headteachers greater involvement in teacher recruitment and transfers.
3. For leadership development programmes: Incorporate training in resource mobilisation, community engagement, and data-informed decision-making alongside instructional leadership content.
4. For international development partners: Support long-term, system-strengthening initiatives rather than short-term projects, and invest in documenting and scaling headteacher-led innovations.

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THE NATIVISATION OF SIERRA LEONEAN ENGLISH AND ITS PEDAGOGICAL IMPLICATIONS

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ABSTRACT

For nearly six decades, English language instruction in Sierra Leone has been predominantly guided by British Standard English, with educators focusing primarily on error correction rather than recognizing local linguistic variations. Owing to the country's independence in 1961 and the undeniable influence of environmental factors on language evolution, there remains little justification for teachers to disregard the legitimacy of Sierra Leonean English. Given the unpredictability of language development, it is crucial for educators to examine both spoken and written English within Sierra Leone to define and guide an emerging standard. This study aims to identify the lexical and grammatical features of Sierra Leonean English, and to account for their usage. The lexical features explored include collocation, modification, idiom, innovation, and aboriginal - related influence. These features can be traced to the subjects' local languages, the influence of native English, analogy, and some learning induced factors. Grammatical features are examined across categories such as noun, pronoun, verb, adjective, determiner, preposition, word class, and syntax-related elements. These features can also be traced to not only to the subjects' first languages but also to learning - induced factors which include over generalization of native English rules, ignorance of these rules, and their incomplete application. The analysis employs Selinker's Interlanguage Fossilization Theory (1972) and Kachru's Nativisation Theory (1992), using texts authored by Sierra Leonean writers as primary data sources. The findings indicate the implications of the above subjects' features for English Language teaching in Sierra Leone. The study concludes by advocating the need for educated Sierra Leoneans and language practitioners to adopt a more receptive attitude towards linguistic nativisation.

Keywords: Sierra Leonean English, Nativisation, Interlanguage, Fossilisation

INTRODUCTION

Just four years after Sierra Leone attained its independence, Jones (1965) stated that just as differences are bound to exist among native English speakers when they have learnt their different environments, Sierra Leoneans who learn English in their own environments will have to speak and write differently from other English speakers. These differences can be seen in their vocabulary and even in their syntax. He therefore advocated the need to "study specimens of both spoken and written English in Sierra Leone in order to decide what [our] standard is", (1965, 35). However, sixty – one years later, this call has not been fully heeded

in Sierra Leone as the English Language instruction has been predominantly guided by British Standard English mainly because Britain controlled the educational system after Freetown – Sierra Leone’s capital city – was declared as a crown colony in 1808.

Jones’ observation is made clear by the research studies on the use of English in the country at various academic levels. For example, Mettle (1984) examined the errors in the written English of pupils from five primary schools in the Western Area. Challay and Jones (2019) investigated the capitalization errors among junior secondary pupils in Bo. In addition, Dauda (2022) examined how Krio has negatively impacted on the written English of senior secondary school pupils of Sierra Leone. Earlier, Sesay’s (1983) doctoral thesis investigated the lexical and grammatical errors in the noun phrase in the written English of university students in Sierra Leone. Clearly, the above researchers used elusive benchmarks – British and American standards – to examine their subjects’ interlanguage. The above researchers stated that the subjects’ language usage was fraught with problems. The problem has reached its crisis over two decades as is shown by the Permanent Secretary of the Ministry of Technical and Higher Education (MTHE) describing the performance of West African Senior School Examination (WASSCE) candidates in June 2025: “despite the progress in other subjects, 63% failure rate in English Language creates an immediate bottleneck, preventing thousands of qualified students from transitioning into Higher Education” (Kargbo, Ministry of Technical and Higher Education (MTHE) 24th March, 2026 p1).

The main aim of this study is to identify the lexical and grammatical features of Sierra Leonean English. The specific objectives are to account for these features and to show the implications of this phenomenon for English Language teaching in Sierra Leone. The features will constitute the peculiarities -not errors- of educated Sierra Leoneans whose exposure to formal instruction has made them confident to express themselves in books that have been published either within or beyond the country.

Kachru’s concept of nativisation is an off-shoot of his three concentric circles which he views as representatives of ‘the types of spread, the patterns of acquisition, the functional acquisition of English in diverse cultural contexts’ (Kachru,1992:351). These circles include the Inner Circle which represents the traditional, cultural and linguistic bases of English, the Outer Circle which involves countries that use insitutoinalised but non-L1 varieties of English, and the Expanding Circle which deals with countries where Englis operates as a foreign language. Nativisation which involves the Outer Circle is directly related to the concept of ‘New Englishes’.

Kachru argues that nativisation makes English experience readjustments at various linguistic circumstances leading to the growth of many English varieties. Thus, the development of distinctive local ‘deviations’ in the use of English is as a result of the pressures on the language to acculturate to its new socio-cultural context (Kachru, 1992:59). In this connection, he describes what he refers to as ‘non native institutionalized varieties’ of the English Language.

He does not, however, lose sight of the distinction between deviations from errors. It is on this basis that the present research could be related to both Selinker's and Kachru's theories.

The data collected for this research were analyzed in terms of Selinker's Interlanguage Fossilisation Theory (1972) and Kachru's Nativisation Theory (1992). Both theories are complementary in the analysis of the data. A learner's interlanguage is concerned with his/her knowledge of the target language at a given time. Selinker contends that there are several stages which the learner passes through before he/she is said to have attained proficiency in the target language. He further states that there are five processes involved for the existence of an interlanguage in second language learning : the generation of a sentence in the target language in the same way in which the producer would if he were to express the same meaning in his native language (language transfer); the existence of linguistic items in the learner's language which originate from training procedures (transfer of training); the methods the learner adopts in his attempt to comprehend target language grammar (strategies of second language learning); the learner's approach when he communicates with native speakers of the language (strategies of second language communication); and the use of a particular language rule more than how the rule is used by the native speakers of the target language (over-generalization of language rules). Selinker concludes that the persistent recurrence of any of the above processes may lead to fossilization in what would have otherwise been transitory language forms.

The research method adopted in this study is mainly qualitative. The specific design used is descriptive as it identifies the lexical and grammatical peculiarities in sixteen Sierra Leonean novels, one drama text, and five anthologies comparing them with Standard British English. The lexical and grammatical peculiarities have been selected because words are important as the use of a specific word instead of another can account for different meanings in a language. Moreover, learning the grammar of a language will enable the user to know why utterances are produced, why they mean what they mean and do what they do.

The lexical peculiarities that were recorded are collocation, modification, idiom, innovation, and aborigine. The grammatical peculiarities are noun, pronoun, verb, determiner, adjective, preposition, word class, and syntax. The peculiarities are presented in two tables, namely Table1 and Table2. Table1 contains the lexical peculiarities and Table2 contains the grammatical peculiarities. In each of the tables, the peculiarity is highlighted demonstrating its classification, the British equivalence, the title of the text, the author, page number, and the date of publication of the text. The above sources of information largely follow those highlighted by Kamtueng and Meutem (2014). The novels from which the peculiarities are drawn are : *Clouds of a Ghoully War* -CGW(Gboyor,2018),*The New Disease*- TND (James,2016), *Leave it to Naasu*- LN (Fofana,2020), *Gomna's Children*-GC (Kroma, 2010), *The Diamonds*-TD (Conteh,1997), *In Search of Sons*-ISS (Conteh,2007, *The Road to Freedom*-TRF(Hunter,1982), *Joy Came in the Morning*-JCM (Hunter,2013), *Mouths of the Junction*-MJ (Sesay,2017), *Who Is to Blame ?*-WItB (Sesay,2016),*Landscape of Memories* LM Sesay,2015), *So the Path Does not Die*-SPDD (Hollist,2012), *The Road to Kaibara*-TRK (Hallowell,2015),and *Pope Francis, Politics, and the Mabanta Boy*-PFPMB(Tarawallie,2019). The drama text that is captured is *The Visa*- TV (Kamanda,2017).

The memoirs that are involved in this study are *The Freetown Bond*-TFB (Jones,2012) and *How to become Successful with your Talents*-HST (Sesay,2020). The anthologies that are involved in this study are: *Contemporary Fireside Stories*_ CFS (Thulla, Yamba and Taqi,2017) which inter alia contains My Brother's Confession (Thompson); *The Price and Other Stories*-TPS (Kamanda,2012) which contains The Price (Sesay), Family Affair (Sheriff), and Removing the Veil (Taylor); *Gbombosoro* _ (Hallowell,2012) , *Winter in Harmattan and Other Short Stories*-(Kenny,2015), *Fishing in Rivers of Sierra Leone* -FRSL (Hinzen et al (1987).

The secondary data which covers both the lexical and grammatical peculiarities involve the following: *Oxford Advanced Learner's Dictionary* (Hornby,2020), *Krio-English Dictionary* (Fyle and Jones 1980), *Practical English Usage* (Swan, 2016), *Cambridge Grammar of English*, (Carter and McCarthy, 2006), *The Cambridge Grammar of the English Language* (Pullum and Huddleston,2002), *The Handbook of English Linguistics* (Aarts and McMahon,2006),*An Introduction to Language, 6th Edition,Cengage Learning*, (Fromkin, & Rodman 1997), *All What I Was Taught and Other Mistakes: A Handbook of Common Errors in English*,(Hocking, 1974/1984), *Kenyan English De Gruyter Mouton* (Buregeya, 2021), *A Survey of Sierra Leonean English* (Warima: Sierra Leonean Writers Series)(Turay, 2025), and *Senior School Certificate Examination(SSCE) English Language Past Questions and Answers*(Kolawole, 2005) and *Hybrid Eyes Reflections of an African in Europe* (Sankoh, 2016).

This data also includes Chief Examiners' reports on the performance of West African Senior Secondary School candidates on English Language ranging from 2000 to 2004

Data Presentation

The data is presented in tables 1 and 2 which respectively deal with the subjects' lexical and grammatical peculiarities.

Table 1: The lexical peculiarities of Sierra Leonean Authors

No	Peculiarity	British equivalent	Classification	Text	Author	Page	Date
1	Auntly Matty and Pa Heddle did not treat Fina differently <i>than</i> their own children.	Auntly Matty and Pa Heddle did not treat Fina differently <i>from</i> their own children.	Native English Collocation	SPDD	Hollist	19	2012
2	We don't have time to <i>hang heads</i> .	<i>We don't have time to confer.</i>	Krio – induced collocation	GC	Kroma	20	2010
3	...then he felt his <i>head turning</i> and his eye watering.	...then he felt <i>dissy</i> and his eye watering.	Krio – induced collocation	GC	Kroma	37	2010
4	That was my first encounter with <i>woman damage</i> .	That was my first encounter with <i>the payment of price for illegally having an</i>	Cultural – induced collocation	ISS	Conteh	115	2007

		<i>affair with a married woman.</i>							
5	He removed the <i>chewing stick</i> to wish us well.	He removed the <i>tooth brush</i> to wish us well.	Cultural induced collocation	–	JCM	Hunter	80	2013	
6	Another school of thought was that a <i>witch plane</i> had crashed and those who were dying were passengers onboard the plane.	Another school of thought was that a <i>plane with spiritual powers</i> had crashed and those who were dying were passengers onboard the plane.	Cultural induced collocation	–	Winter in Harmatt an and other Short Stories	Kenny	12	2015	
7	Practices he once hardly noticed now loomed <i>big</i> in his eyes.	Practices he once hardly noticed now loomed <i>scary</i> in his eyes.	Word extension	GC	Kroma	73	2010		
8	Sento cried out as she <i>sank</i> in the deep water.	Sento cried out as she <i>drowned</i> in the deep water.	Word extension	WItB	Sesay	<u>176</u>	2016		
9	In fact, the pa is thinking of <i>moving</i> him from Social Mobilization to the Rep's office anytime.	In fact, the pa is thinking of <i>relocating</i> him from Social Mobilization to the Rep's office anytime.	Word extension	CGW	Gboyor	61-62	2018		
10	Bonkehan village was <i>popular</i> for black magic.	Bonkehan village was <i>notorious</i> for black magic.	Word change	TPS	Taylor	118	2012		
11	He was educated and critically minded enough to have seen the <i>writings</i> on the wall	He was educated and critically minded enough to have seen the <i>writing</i> on the wall	Native English Idiom	LM	Sesay	141	2015		
12	He will not come all the way here only for us to <i>smile in each other's face</i> .	He will not come all the way here only for us to <i>wipe thesmile in each other's face</i> .	Native English Idiom	TND	James	142	2016		
13	... and I saw my investment literally disappearing <i>before my eyes</i> .	... and I saw my investment literally disappearing <i>withmy eyes open</i> .	Native English Idiom	LN	Fofana	110	2020		
14	The woman was trying to	The woman was trying to <i>steer conflict</i>	Local Idiom	TD	Conteh	183	1997		

	<i>put fire between us.</i>	<i>between us.</i>					
15	One time in an august gathering in the Court Barrie, the chairman, a son of the soil said...	One time in august gathering in the Court Barrie, the chairman, an indigene said...	Local Idiom	TND	James	17	2016
16	So much so that the boy and the girl started seeing themselves as husband and wife.	So much so that the boy and the girl started treating each other as husband and wife.	Local Idiom	MJ	Sesay	49	2017
17	Mr. Foday, the class five teacher, caught part of the gossipers' conversation.	Mr. Foday, the class five teacher, caught part of the gossips' conversation.	Innovation	WItB	Sesay	24	2019
18	Fanday has obtained permission from her husband to go to a town called Gbendembu to arrange for a prominent Gbatorman to come and search for the money	Fanday has obtained permission from her husband to go to a town called Gbendembu to arrange for a prominent soothsayer to come and search for the money	Aboriginal Word	ISS	Conteh	109	2007
19	Apart from being a ranking member of the poro society, Momoh Senesie was also a ranking member of other medicine societies.	Apart from being a ranking member of a male society, Momoh Senesie was also a ranking member of other medicine societies	Aboriginal Word	GC	Kroma	95	2010
20	This of course offended the Bondo society	This of course offended the female secret society	Aboriginal Word	GC	Kroma	161	2010

TABLE 2. The Grammatical Peculiarities of Sierra Leonean Authors

No	Peculiarity	British equivalent	Classification	Text	Author	Pag e	Date
1	On the threshold of each dawn, she	On the threshold of each dawn, she	Number	LM	Sesay	10	2015

	would cross the interception of roads that met at a right angle nibbled at the edge of unpaved <i>drainages</i> .	would cross the interception of roads that met at a right angle nibbled at the edge of unpaved <i>drainage</i> .					
2	He always took me around with him, making me draft reports and write <i>correspondences</i> for me to sign.	He always took me around with him, making draft reports and write <i>correspondence</i> for me to sign.	Number	G	Hallowell	13	2012
3	Alhaji had many friends whose <i>characters</i> were the direct opposite.	Alhaji had many friends whose <i>specks of character</i> were the direct opposite.	Number	WItB	Sesay	55	2019
4	But who was to give such <i>an advice</i> ?	But who was to give such <i>a piece of advice</i> ?	Number	MBC	Thompson	21	2012
5	Don't you know the saying witches <i>know themselves</i> ?	ct	Pronoun Usage	TD	Conteh	110	2007
6	One thing people did not like about Ndawa's prophecies <i>were</i> his sacrifices	One thing people did not like about Ndawa's prophecies <i>was</i> his sacrifices	Concordial Verb	ISS	Conteh	110	2007
7	Where <i>is</i> my wife and child, and how could I contact them?	Where <i>are</i> my wife and child, and how could I contact them?	Concordial Verb	TV	Kamanda	11	2007
8	By the end of the fourth year, he with four others from Bandajuma <i>were</i> recommended for...	By the end of the fourth year, he with four others from Bandajuma <i>was</i> recommended for ...	Concordial Verb.	GC	Kroma	24	2010
9	... but my family made my goals <i>looked</i> foolhardy	... but my family made my goals <i>look</i> foolhardy	Tense Usage.	TRK	Hallowell	110	2015
10	I forced my way forward to the center of the crowd where the boy <i>laid</i> from the ...	I forced my way forward to the center of the crowd where the boy <i>lay</i> from the ...	Tense Usage	FA	Sheriff	52	2012
11	My bones are <i>aching</i> .	My bones <i>ache</i>	Tense Usage	ISS	Conteh	133	2007
12	A tire exploding in the furnace made him <i>to jump</i>	A tire exploding in the furnace made him <i>jump</i>	Infinitive	TLSN	Hallowell	15 - 16	2012

	splattering the coffee all over himself.	splattering the coffee all over himself.					
13	He had been near death and ceased <i>to trust</i> his fellow men, so he scorned all human warmth along the way.	He had been near death and ceased <i>trusting</i> his fellow men, so he scorned all human warmth along the way.	Infinitive /Participle	LM	Sesay	43	2015
14	The only thing that Mama Yatta thought important was that Tenneh should have a baby <i>for</i> Gibao.	The only thing that Mama Yatta thought important was that Tenneh should have a baby <i>with</i> Gibao.	Prepositional Usage	TD	Conteh	184 /189	1997
15	... but for some missionaries, I might have been <i>on</i> the street by now	... but for some missionaries, I might have been <i>in</i> the street by now	Prepositional Usage	JCM	Hunter	115	2013
16	As stated, Ebola never reached <i>at</i> Mabanta.	As stated, Ebola never reached Mabanta.	Prepositional Inclusion.	PFPMB	Tarawallie	295	2019
17	... frequently offer him things he did not request <i>for</i> .	... frequently offer him things he did not request.	Prepositional Inclusion	GC	Kroma	49	2010
18	She woke from the sleep and patiently waited for the two days to elapse.	She woke <i>up</i> from the sleep and patiently waited for the two days to elapse.	Prepositional Omission.	FRSL	Hinzen	36	1987
19	I have no business in <i>that of your</i> church.	I have no business in <i>your</i> church.	Determiner Usage.	CGW	Gboyor	85/88	2018
20	<i>This of her</i> sister's sound reasoning beats her.	<i>Her</i> sister's sound reasoning beats her.	Determiner Usage.	CGW	Gboyor	97	2018
21	... before taking the risk of boarding a vehicle to go into an oblivion for over <i>one</i> year in Mabanta.	... before taking the risk of boarding a vehicle to go into an oblivion for over <i>a</i> year in Mabanta.	Determiner Usage.	PFPMB	Tarawallie	260	2019
22	Kakpindi was not in <i>a</i> haste to get up and move over to acquire what it was all about.	Kakpindi was not in haste to get up and move over to acquire what it was all about.	Determiner Inclusion	CGW	Gboyor	110	2018
23	<i>Majority</i> of them, especially the	<i>The</i> majority of them, especially	Determiner Omission.	CGW	Gboyor	75	2018

	men, came with the looted goods which they are selling to people.	the men, came with the looted goods which they are selling to people.					
24	... and the frustration of losing his wife when he wanted her most.	... and the frustration of losing his wife when he wanted her <i>the</i> most.	Determiner Omission.	TRK	Hallowell	121	2015
25	It was amazing when I found out that students were <i>fast</i> to learn French than I was doing.	It was amazing when I found out that students were <i>faster</i> to learn French than I was doing.	Adjectival Usage.	HST	Sheriff	57	2020
26	One night, nine months ago, a grenade exploded in our house, tore my <i>nine – months'</i> daughter into pieces.	One night, nine months ago, a grenade exploded in our house, tore my <i>nine – month</i> daughter into pieces.	Word Class.	FA	Sheriff	60	2012
27	When first we met, I hoped I would have an <i>able</i> helper in my chosen task.	When first we met, I hoped I would have an <i>abled</i> helper in my chosen task.	Word Class	TRF	Hunter	117	1982
28	I got a degree in 1962 and <i>the book was published in 1965.</i>	I got a degree in 1962 and <i>the publishers published the book in 1965.</i>	Syntax	TFB	Jones	65	2012
29	Haja Memuna was a well-known fishmonger both in Freetown and <i>the provinces.</i>	Haja Memuna was a well-known fishmonger both in Freetown and <i>in the provinces.</i>	Syntax	WItB	Sesay	50	2019
30	We caused the wide – eyed creatures to start gibbering widely either in excitement <i>or alarm</i> and ...	We caused the wide – eyed creatures to start gibbering widely either in excitement <i>or in alarm</i> and ...	Syntax	TRF	Hunter	105	1982
31	Many believed that Gbegima and Mattia were afraid to take risk rather than <i>go search</i> for great wealth in the diamond field.	Many believed that Gbegima and Mattia were afraid to take risk rather than <i>to go search</i> for great wealth in the diamond field.	Syntax	TD	Conteh	21	1997
32	How could Gibao a man who has told them some	How could Gibao a man who has told them some time	Syntax	TD	Conteh	22	1997

	time ago about his disgust and dislike for the callous attitude of people towards the dead.	ago about his disgust with and dislike f or the callous attitude of people towards the dead.						
33	Scarcely had he finished his last statement <i>than</i> the towns people returned with rebels.	Scarcely had he finished his last statement <i>when</i> the town people returned with rebels.	Syntax	FA	Sheriff	55	2012	
34	Although he is not educated, <i>but</i> he is nevertheless very proud of his job.	Although he is not educated, <i>yet</i> he is very proud of his job.	Syntax	CGW	Gboyor	109	2018	
35	Your father is dead, <i>not so?</i>	Your father is dead, <i>isn't he?</i>	Syntax	TD	Conteh	209	1997	
36	You have a permit to reside here?	Do you have a permit to reside here?	Syntax	TD	Conteh	225	1997	

Data Analysis

This section deals with the causes of the peculiarities presented above. With regards to the lexical peculiarities, it can be noted that in Standard British English words have their specific pairs with which they collocate. For example, the word ‘different’ often collocates with the preposition ‘from’. This situation is different in American English where the adjective collocates with ‘than’ (Trudgill and Hannah, 1985 and Todd, 1987,88). It would appear that the author who has lived in America for some time is transferring the usage common in America in this context. The second and third peculiarities are concerned with words which occur in English and Krio as cognates. This means that since Krio has borrowed some English words there are some borrowed Krio words in English with a different contextual usage. Hence it is that the meaning which ‘hang’ and ‘head’ and ‘turn’ and ‘head’ are contextually different.

The next category of difference in meaning shows how culture influences the meaning of English words in Sierra Leone. For example, ‘woman damage’ is a cultural practice where a man who has an affair with a married woman is required to pay a fine (see the fourth peculiarity). The next category of peculiarities in this section refers to objects which are restricted to the Sierra Leonean culture. A ‘chewing stick’ (see the fifth peculiarity) is used in Sierra Leone to brush one’s teeth. Moreover, a ‘witch plane’ (see the sixth peculiarity) is believed to be used by both witches and wizards to travel to far and near places to carry out their diabolic acts.

With regard to the extension of the meanings of words, Krio the unofficial lingua franca in Sierra Leone, has contributed for words to have different senses. For example, it can be noted that an awe inspiring event can appear ‘big’ in someone’s eyes (see seventh peculiarity), a living thing like a non-living thing, can go down the surface of a river or sea (see eighth

peculiarity). and the verb ‘move’ now has an additional meaning which can involve people to walk ‘to a new place to work or operate’ (see the ninth peculiarity).

In the tenth peculiarity, ‘popular’ is used in a positive sense though according to the sentence it is the negative meaning that is intended. This is shown when a village that is associated with black magic is described for this feature rather than being censored.

The further category of peculiarities shows how idioms are modified in Sierra Leone. For example, as ‘writings on the wall’ (see the eleventh peculiarity) refers to signs that something unpleasant or unwelcome is going to happen (Oxford Dictionary of Idioms, 1999, 320), the writer tends to add the ‘s’ plural marker in analogy to the use of the noun ‘signs’ which is shown in the meaning. Moreover, in the twelfth idiom, the Sierra Leonean idiom depicts an omission in the original British idiom ‘to wipe a smile in each other’s face’ wherein both the verb ‘wipe’ and the definite article ‘the’ are omitted. Finally, the thirteenth peculiarity shows reduction and replacement of the British idiom. That is, in the idiom ‘with eyes open’ the preposition ‘before’ replaces ‘with’ and the adjective ‘open’ is omitted. However, the meanings of the aforementioned idioms remain the same as their use in British English in spite of the changes or distortions that have taken place in them. The second group of idioms involves those that are borrowed from the Sierra Leonean languages (see 14-16 peculiarities). For example, ‘to put fire between people’ (see the fourteenth peculiarity) is a Krio idiom which means to steer conflict between people or to make them quarrel. The fifteenth idiom ‘son of the soil’ is also borrowed from Krio and other Sierra Leonean languages and it means an indigene in a locality. Finally, the sixteenth idiom ‘husband and wife’ is used in Sierra Leonean languages to refer to a situation where a man and a woman have started having sex.

The seventeenth peculiarity is related to analogy. For example, the ‘er bound morpheme’ is used to refer to the doer of an action. In this case, the morpheme is attached to the verb ‘gossip’ to refer to a gossip. The last category of peculiarities refers to nouns which are restricted to the Sierra Leonean environment. A ‘gbatorman’ (see the eighteenth peculiarity) is someone with mystical powers who is believed to reveal what the ordinary man cannot. Both the nineteenth and twentieth peculiarities respectively refer to male and female secret societies which exist in Sierra Leone. In this subsection it can be noted that English acculturates to accommodate words that are peculiar to the Sierra Leonean or by extension African society. Gupta illustrates this phenomenon which has developed among second language users when they are using the targeted language as follows: “it is inevitable that local standards develop wherever English is used for local culture” (1999,8).

The above discussion shows that the lexical peculiarities can be traced to factors such as differences in native English, learning induced, overgeneralization, first language induced and cultural induced sources.

The grammatical related peculiarities involve noun, pronoun, verb, adjective, determiner, preposition, word class and syntax related peculiarities. In the first place it will appear that Sierra Leoneans tend not to make a distinction between count and mass nouns. For example, in Standard British English mass nouns do not form their plurals by taking ‘s’ or ‘es’ bound

morphemes. This rule contrasts the one shown in the third peculiarity above. In the first peculiarity, there is a semantic relation between an uncountable noun and its semantic counterpart. For example, ‘gutter and letter’ are countable nouns which are respectively synonymous with their uncountable pairs namely ‘drainage’ and ‘correspondence’. This accounts for the first and second peculiarities above Swan states that to form plurality ‘we can use a word for a piece or unit together with of before an uncountable noun’ (2016,121).

Moreover, a noun can either function as a countable or an uncountable noun based on the context in which it is used. For example, ‘advice’ can be regarded as an uncountable noun when it means ‘an opinion or a suggestion about what somebody should do in a particular situation’ (Hornby,2020,24). Because it is uncountable, Hornby recommends that ‘we say a piece of advice not an advice’ (2020,24). This accounts for the fourth peculiarity above.

The fifth peculiarity shows that Sierra Leoneans tend to use the reflexive pronoun where the British writer will prefer the reciprocal one. This peculiarity may be as a result of the substitutional role which the reciprocal pronoun plays to replace the reflexive pronouns in some Sierra Leonean languages. For example, in Krio in the sentence,

‘Salon pipul dem lek den sef’

Literal translation: ‘Sierra Leoneans love themselves’;

Meaning: ‘Sierra Leoneans love each other/one another’. This peculiarity can be attributed to first language transfer.

The sixth, seventh and eighth peculiarities are related to the different use of concord. The sixth peculiarity appears complex to the Sierra Leonean writer. In Standard British English, the verb normally agrees with the subject of a sentence not with a following complement. However, in this peculiarity it is the complement that influences the verb rather than the subject. In the seventh peculiarity, the Sierra Leonean may not tend to use the appropriate verb because the verb precedes the subject which makes it difficult for him to identify the subject easily. In the eighth peculiarity, the Sierra Leonean writer correctly identifies the subject of the verb but does not use the correct verb by his failure to follow the native English rule which states that when a singular subject starts a sentence, the verb should take a singular form. The peculiarities in this section are therefore due to incomplete application of target language rule restriction.

The ninth peculiarity is related to the use of tense. Standard British English requires the use of the bare infinitive after the use of the verb ‘make’. It would appear that the writer is not aware of this target language rule.

The tenth peculiarity is caused by the writer’s inability to distinguish the difference between the verb ‘to lie’ which means to recline and the verb ‘to lay’. The former is an intransitive while the latter is transitive. The peculiarity therefore occurs because the writer does not know that the past form of ‘to lie’ which means to recline is ‘lay’ which is intransitive and not the reverse. The peculiarity is therefore learning induced.

The eleventh peculiarity shows the distinction between stative and dynamic verbs. Carter and McCarthy (2006) list the situations where the present progressive is rarely used to show the distinction in English. The peculiarity is therefore learning induced.

The twelfth peculiarity is concerned with the Standard British English rule which deals with the use of the infinitive without to. Swan highlights the communicative English rule which states that 'verbs that express perception and causation like 'make' are followed by object with an infinitive without to' (2016,91). The Sierra Leonean writer seems unaware of this English rule. The peculiarity is therefore learning induced.

With regard to the thirteenth peculiarity, it can be noted that both the participle and the infinitive can occur after a verb. This can, however, occur with a change of meaning. Therefore, the use of the participle after the verb 'cease' is contextually wrong as it suggests the end of an activity rather than the change of an activity. The peculiarity is therefore learning induced.

The fourteenth and fifteenth peculiarities involve differences in prepositional usage. When a child is born in Sierra Leone, the ownership of that child customarily rests on the father. This accounts for the use of the preposition 'for' in the fourteenth peculiarity. This situation is different from what obtains in Western countries like Britain where the ownership of the child is shared as seen in the use of the preposition 'with' above. The fourteenth peculiarity is therefore culturally induced. The fifteenth peculiarity is as a result of the differences in American and British English. Trudgill and Hannah illustrate this when they state that English English tends to use 'to live in a street' while American English tends to use 'to live on a street' (1985,68). It can be inferred from the above that although the writer - Hunter-completed her studies in the United Kingdom, the tendencies highlighted above exist in both sides of the Atlantic.

The sixteenth and seventeenth peculiarities can be attributed to the overgeneralization of target language rule. This is because the English verb 'arrive' collocates with 'at', it is assumed that a synonymous pair which requires the same preposition even though this is not required in native English. This accounts for the sixteenth peculiarity above. Also, because the verb 'ask' collocates with the preposition 'for', the writer tends to use the same preposition for its synonymous pair 'request'. This can be seen in the seventeenth peculiarity above.

The eighteenth peculiarity which tends to deal with prepositional omission can be related to the relatively few prepositions in the local languages of Sierra Leone. This can be seen in the following example in Krio:

'a wek na net'

Literal translation: 'I woke at night.

Meaning 'I woke up at night'.

In this Krio sentence the preposition 'up' which collocates with the verb 'wake' is omitted. The peculiarity is therefore first language induced.

The nineteenth and twentieth peculiarities are related to determiner usage. Mende, the tribe with highest population in the country (Statistics Sierra Leone, 2015,25), demonstrates determiner usage as follows:

‘bi nde na’ literal translation: ‘your sister that of’

‘bi sosi na’ literal translation: ‘your church that of’

It could be noted that whereas native English uses the possessive determiner which is followed by a noun, in Mende the noun is preceded by the determiner and followed by the article. The nineteenth and twentieth peculiarities are therefore first language induced.

The twenty-first peculiarity shows that the indefinite determiner is replacing the definite article. This peculiarity is also first language induced because it is borrowed from Krio as shown in the following sentence:

‘a see wan bobor yesterday’

Literal translation: ‘I saw one boy yesterday’

Meaning: ‘I saw a boy yesterday’.

The twenty second peculiarity shows that Sierra Leoneans do not distinguish the use of countable and uncountable nouns. For example, an indefinite article cannot precede an uncountable noun when it is singular. This peculiarity is therefore learning induced.

The twenty third and twenty fourth peculiarities are related to the omission of the article. A definite and indefinite article are considered mandatory in starting phrases. For example, the word ‘majority’ requires the article in native English. This is responsible for the twenty third peculiarity above. Furthermore, the superlative is invariably preceded by the definite article (Carter and McCarthy 2016, 773). It would appear that this rule is not observed by Sierra Leonean languages as is seen in the following Krio sentence.

‘a sabi rait pas dem ol’

Literal translation: ‘I can write better than all of them’

Meaning: ‘I am the best writer’

With regard to the twenty fifth peculiarity, it can be noted that in native English comparative forms of adjectives should precede the subordinating conjunction ‘than’ (Raymond Murphy,208). However, in Sierra Leonean languages the adjectives are not inflected as is shown in the following Krio sentence:

‘di bobor gladi pas mi’

Literal translation: ‘the boy is happy than me’

Meaning: ‘the boy is happier than me’ which shows that the twenty fifth peculiarity is first language induced.

Twenty sixth and twenty seventh peculiarities are related to Sierra Leonean’s use of word classes. It is clear that the writers are aware of how plural nouns are formed. However, they do not know that this form changes when the noun functions as an adjective. This is what happens in the twenty sixth peculiarity. As for the twenty seventh peculiarity, Sierra Leoneans are aware about the use of the ‘ed’ bound morpheme to form adjectives. However, this does not apply to the word ‘able’ in the twenty seventh peculiarity. The two peculiarities are therefore called overgeneralization of native English rules.

The peculiarities ranging from twenty-eight to thirty-one are concerned with the use of parallel structures. Native English rules state that writers should balance parallel ideas linked with the correlative conjunction. This means that when ideas that are closely parallel in content, they should be expressed in parallel grammatical form (Hacker, 1991, 121). This rule is not followed because in the twenty eighth peculiarity a coordinating conjunction links a verb in the active voice and another in the passive voice. Moreover, the twenty ninth and thirtieth peculiarities are concerned with structures which occur in pairs. The Native English rule states that ‘the grammatical structure following the second half of the pair is the same as that following the first half’ (Hacker- 123). This rule is not followed in the twenty-ninth peculiarity where ‘both’ is followed by a prepositional phrase and ‘and’ is followed by a noun phrase. The same situation occurs in the thirtieth peculiarity where ‘either’ is followed by a prepositional phrase and ‘or’ is followed by a noun. It would appear that the three peculiarities in this section are caused by ignorance of Native English rules. Standard English rule also states that the writer or speaker should balance comparisons linked with *than* or *as*. This means that the elements being compared should appear in parallel grammatical structure. This rule is not observed in the thirty first peculiarity as one of the elements being compared is the infinitive *with to* (to take risk) and the other is the infinitive *without to* (go search).

The thirty second peculiarity involves the omission of words in a compound structure which contains ‘disgust’ and ‘dislike’. It can be seen that ‘disgust’ collocates with ‘with’ but this cannot be applied to ‘dislike’. Therefore, they are not common to both parts of the compound structure. The thirty third and thirty fourth peculiarities are concerned with the use of inappropriate conjunctions. For example, in Native English the conjunction ‘although’ collocates with the coordinating conjunction ‘yet’ rather than ‘but’. Moreover, the adverb ‘scarcely’ collocates with the conjunction ‘when’ rather than ‘than’. The thirty third and thirty fourth peculiarities are therefore learning induced.

The last two peculiarities are first language induced. For example, while Native English uses the appropriate helping verbs in question tags, the local languages ask questions by using invariant pattern as is shown in the thirty fifth peculiarity. Finally, the thirty sixth peculiarity shows that while Native English uses the inverted forms to ask questions, the local languages in Sierra Leone use the declarative form followed by rising intonations to ask questions.

From the above, it can be noted that the grammatical structures in Sierra Leone are influenced by structures in Standard British English, first languages in the country, overgeneralization of target language rules and learning induced factors.

Conclusion

It can be observed from the above that what has been described as errors are now becoming systematic features of Sierra Leonean English. This seems to be the main source for the development of the new English in the world. For example, Burageya (2021,217-218) cites Hocking (1974) who discusses the errors in East African English. In his conclusion, Hocking makes the following statement to teachers of English with regard to their learners’ mistakes: ‘it is possible that we may eventually develop a local East African form of English ourselves,

and if we do, it may be that some of the mistakes we are dealing with in this book will be part of it' (1974, 59-60). Gut also shares a similar sentiment when he states that, 'errors can persist until they become recognized as legitimate features of a given variety of English' (2011, 21). However, in Sierra Leone this realization has not been captured by many of the academics in the country. For example, Sesay admits that with regard to the English usage of her students, she is 'oppressed by her sense of overwhelming frustration' (1983, 1) and she states in her PhD thesis that the errors from university students in Sierra Leone, 'is born of the frustration of (her own situation as a teacher)' (1983, 1). Some of the errors she highlights in her thesis include the following:

1. He told me to board the car. (1983, 333)
2. We had to ask for temporary accommodations. (1983, 164)
3. She did promise to marry to me by Xmas. (1983, 338)

She respectively categorises the above errors as showing instances of wrong collocation, wrong number, and wrong idiom, and the correct versions which she provides are, 'get into, accommodation, and to marry me' respectively. Interestingly, Sesay regards as errors whatever is not part of British English. That is why even though she recognizes that 'accommodations' is acceptable in American English (1983, 169) and to board the car 'could have been influenced by American usage' (1983, 336), she considers them as erroneous structures. Moreover, with regard to the third 'error' in English culture, we can talk of a man marrying a woman or a woman marrying a man or a man and a woman being married to each other. This is shown among others in the works of Sierra Leonean academics resident in the United States of America and Germany as is respectively shown in: 'Fina (a female character) wants to marry him' (Hollist, 2011), and 'Andrew, our Sierra Leonean brothers are so thankful to the German women who marry them' (Hybrid Eyes Reflections of an African in Europe, Sankoh, 2016, 80). In Sierra Leone, like the rest of Africa, to marry is used only in reference to the man while the equivalent to be married is used only in reference to the woman. Culturally speaking, it is only men who marry while women get married. Moreover, the frustration expressed by Sesay is reechoed by Osho who in his proposal for the English Language programme – Foundation Studies – states that he finds, 'it difficult to sleep easily' for 'the deterioration in competence of (our) students and children in (our) school system in English usage' (2007, 1). Fifteen years later, he expresses the purpose for writing his book where he states that 'good examples of the use of English in our country and West Africa are increasingly hard to come by nowadays' identifying the source of the problem to be 'the media which one would have looked to for guidance has unfortunately not played a leading role' (2022, vi).

Significantly, Osho's position is different from that of Pemagbi who when he is faced with the problem of having teaching and learning materials in a rural university recalls his school teacher's advice that newspapers and the radio 'can enrich your language' (1995, 55). More importantly perhaps, in A survey of Sierra Leonean English, Turay dedicates his study 'to the journalists, lecturers and students of English in Sierra Leone who have amply demonstrated there is an English variety in the country which [Sierra Leoneans] can proudly describe as [theirs]' (2025, i). It is possible that the Sierra Leonean authors cited above can also be included in Turay's dedication. Ironically, these writers include James' 'The New

Disease’ and Siaka Kroma’s ‘Gomna’s Children’ whose texts have been currently prescribed for candidates at the Basic Education Certificate Examination (BECE). Osho comments on both texts which will be of interest to Sierra Leoneans and other academics. In ‘The New Disease’, he states that ‘The language is simple but at the same time introduces pupils to new vocabulary which are easily digestible’ (2016, ii). Similarly, in ‘Gomna’s Children’ he comments that, ‘the novelist’s simplicity of language, directness of presentation and unwavering focus on the issues at hand make the novel suitable for study at different levels’ (2010, iv-v). with these statements coming from a distinguished language guru in Sierra Leone, ‘Former Senior Lecturer, Department of Language Studies, Former Head of the Department of English, Former Head of the Department of Language Studies, Fourah Bay College, the Former Director of Confucius Institute, the University of Sierra Leone (James, TND, 2016 i, Kroma, 2010, XVI, one should not be surprised when the two texts were included in 2023 by the West African Examination Council for the Basic Education Certificate Examination in Sierra Leone). The Sierra Leonean authors have shown that language purists cannot change the narrative as stated by Fromkin and Rodman, ‘(N)o academy and no guardians of language purity can withstand language change, nor should anyone attempt to do so since such change does not mean corruption’ (2006, 409). This brings us to the situation of the young second language learners in the country. To improve on their English usage, these learners are encouraged to read both from within and from outside their prescribed texts. This is where the importance of reading newspapers, magazines and other texts comes in. By heeding this advice, such learners may come across words and expressions which are considered erroneous in native English. This has happened in several non-native English settings. For example, the distinguished Nigerian laureate Soyinka while presenting the theme of clash of cultures in ‘The Lion and the Jewel’, uses the non-English word ‘bride-price’ six times instead of ‘trousseau’ and the word ‘dowry’ once in his sixty-two page text ‘Dowry’ means ‘money and/or property that in some societies a husband will pay to his wife’s family when they get married’ (Hornby 2020, 450). This word is influenced by the Nigerian culture. This influence is also evident in Sierra Leone and other African countries. Whenever such words are used, the teacher should not consider them wrong as they are part of the students’ culture. This brings us to the status of West African candidates in English over the years. It can be noted that a Chief Examiner’s report may have expressions which may be considered erroneous in standard English. Consider the following examples:

- ❖ ‘Majority of candidates displayed a good knowledge of the format and style of the informal letter and of story writing’ instead of ‘the majority’ (2020, 78) cf. 23 see page 11 above and see Buregeya (2021, 73 – 74 Kenyan English) and Dako (2008, 375 Ghanian English).
- ❖ ‘Indiscriminate use of wrong tenses and too many errors in punctuation and spelling’ instead of ‘indiscriminate use of tenses. (2020, 78).

With regard to the questions set for the examination, that is both the West African Senior School Certificate Examination (WASSCE) and the General Certificate Examination (GCE) that precedes it, there have been instances of language errors as can be seen below:

- ❖ ‘For us to accomplish the task successfully, all hands must be on deck’ instead of ‘all hands-on deck’ (SSCE, November 1990, 21, English Language 2, Objective Question), (Kolawole 2005, 21).

- ❖ Chike escapes the accident by a hair breadth' instead of 'hair's breadth' (SSCE November 1989, 13, English Language 2, Objective Question), (Kolawole 2005, 21).
- ❖ 'At the last minute, he developed cold feet.' Instead of 'he had | got cold feet' (West Examination Council 2015, 9). |

From the above 'errors' and those that are identified in the Sierra Leonean texts above, one could infer that some of our academics in the subregion "seem to be running away from something that is already part of 'them'." (Pemagbi, 1989, 20). This is partly responsible for the poor performance of WASSCE students in English over the years. For example, in 2022 it is recorded that 'over ninety per cent of the candidates scored OK zero for mechanical accuracy'. The same record was also made in 2023 (2023, 92). The report in 2024 was not less worrying as in addition to what was pointed above, 'candidates' essays were largely poor as a result of wrong concord, or no use at all of punctuation marks, wrong use of tenses, misuse of prepositions and articles, and poor knowledge of basic rules in Grammar' (2024, 102). The million-dollar question here is for how long should Sierra Leonean and by extension West African candidates continue to be penalized for 'errors' which even the setters of questions and/or examiners cannot get rid of?

This is where the role of the Language Teachers' Association comes in.

Recommendations

1. One of the members of this association Jones who proves to be ahead of his time urged his colleagues to realize that 'nobody can predict the course of a language' (1965, 35). The Language Teachers' Association should be revived and members should ensure among other things that they are attuned to the writing of writers whose works reflect the language usage in the country. This is because good English should not be limited to only what obtains in the classrooms. Therefore, as the language continues to develop, 'the teacher should not mark wrong any local form in popular usage but accept and give the child the standard British equivalent' Pemagbi (1992, 36).
2. Moreover, while the local form should not be penalized, teachers should also focus on the standard English variety which Strevens defines as '...a particular dialect of English, being the only localized dialect of global currency without significant variations, invariably accepted as the appropriate educational target in teaching English' (1983, 88). With this exposure, Sierra Leonean candidates will be able to speak and write the English language which can be understood by not only their compatriots but also by users of English in other countries. This implies that teachers should not tolerate blatant errors which can be comprehended by their compatriots but have the potential of blurring communication with users of English from other countries.
3. Finally, it can be noticed that teachers of English have been insisting on consistency while marking their candidates' scripts. This means that if for example a candidate uses an expression that is typical of American English usage, his or her expression will be accepted. However, the same candidate will be penalized if he or she later switches to British English usage.

4. It is recommended that since the world now recognizes the development of world Englishes, the focus for correct English usage should not be limited only to the established varieties. This means that a word or expression in Sierra Leonean English and the one from Britain should both be accepted as correct usage.

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IMPERATIVES OF INNOVATION IN TEACHING AND LEARNING OF ENGLISH LANGUAGE IN NIGERIAN SECONDARY SCHOOLS

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ABSTRACT

The English language is accorded a significant position among all school subjects, and indeed in all facets. It is viewed as a second language, a language of instruction in the classroom settings as well as a medium of communication during official meetings. Being a core subject at the junior and the senior secondary schools, students are expected to pass the subject at credit-level in examinations conducted by West African Examinations Council (WAEC) or National Examinations Council (NECO) before gaining admission to any higher institution of learning. Students' performance in English Language is consistently considered unsatisfactory on yearly basis. As evidenced, the recently released WAEC results revealed that 38.32 percent of senior secondary school students in Nigeria passed English Language at credit-level. Many researchers had worked on the possible factors that could be responsible for the poor performance by focusing on teaching strategies, students-related factors, teachers-related factors, home-related factors and school-related factors, and professed solutions by giving necessary recommendations; despite this, the problem still persists. In order to contribute to the frontiers of knowledge, the paper explored the significant roles of innovation in teaching/learning of English Language at secondary school level in Nigeria. Innovation is the process of introducing new ideas that are effective and productive in teaching/learning activities in order to improve the conventional ways of teaching. It is hoped that when innovation is incorporated in the teaching/learning of English Language, there would be an improvement in the academic performance of students in that particular subject and all other subjects in general.

Keywords: Innovation, teaching/learning, innovative techniques, English Language

Introduction

Nigeria is multicultural, multilingual and multiethnic in nature with over five hundred indigenous languages and over three hundred ethnic groups. The country sees the English language as the main official language in all contexts— be it education, governance, law courts, media, business and commerce, and external affairs. The major characteristic of English language is the prestigious position it occupies over all other Nigerian major

languages: Hausa, Igbo and Yoruba. English language appears to be the most spoken in the world; by implication, it connects Nigeria to the global world.

In Nigeria's educational sector, English language is the medium of instruction from primary to higher institutions of learning. At the primary and secondary school levels, it is a core subject which every student is expected to offer and pass. It determines the successes of students because a deficiency in it affects the general performance of students, be it in arts, commercial or sciences. For a student to gain admission into any higher institution of learning, he/she must have a credit-pass in English Language in the external examinations that are usually organised by West African Examinations Council (WAEC) or National Examinations Council (NECO). Despite the fact that English Language is being used as a medium of instruction as well as taught as a core subject from primary school, many students seem to be deficient in it. The WAEC examination result in English Language is confirmed to be unsatisfactory on yearly basis. This is evidenced in the just released WAEC results which revealed that 38.32 percent of the students passed English Language at credit-level. It indicates that just a few number of the students can gain admission into any higher institution of learning this session, be it colleges of education, polytechnics, school of nursing or universities because a credit pass in English Language is one of the major conditions for admissions.

The yearly occurrence of mass failure in English Language in external examinations has been giving stakeholders great concern. Thus, many scholars had worked on the factors that might have contributed to the failure rate and suggested solutions, but the problem is yet to be solved. Adeyemo and Babajide (2020) identified the family background; Olatunji and Adeyemi (2018): parents involvement; Ogunsiji and Daramola (2022): pedagogical factors; Uwaifo and Uwaifo (2019): teacher-centred mode of teaching instead of student-centred; Afolabi and Adesina (2020): environmental factors; Agboghroma and Oghuvbu (2018): curriculum inadequacy; Ibe and Maduewe (2017): students motivation and attitude; Bamidele and Ayeni (2023): language deficiency of the students and Abang and Ekong (2019): learning disabilities. All these scholars have contributed to the pool of knowledge in one way or the other, but little attention is being given to the concept 'innovation'.

Innovation as a Concept

Innovation has to do with creation of values in new ways. It is part of day-today activities and it plays a pivot role in improving students learning outcomes as well as enhances teachers' effectiveness in teaching. Innovation could be viewed as a process in which creative ideas are brought into implementation in order to improve the conventional ways of teaching. The innovative educational practices of a teacher involve promoting active and personalised learning where students are encouraged to take responsibility for their own learning. These practices allow students to explore information in various ways and contexts, engage in cooperative learning through intelligent project, and restructure the classroom organisation to enhance social cohesion through student interactions (Ellie, 2022). An innovative English Language teacher generates unique ideas that would benefit several stakeholders, including the students, the teacher's colleagues and the whole institution. Innovation is most effectively achieved via the development of a tool, a tangible advantage, or a kind of assistance that

addresses a problem or provides a benefit (Oлакunde, 2023). In the absence of a creative English Language teacher, innovative teaching cannot occur. This is because only an innovative teacher has the ability of effectively organising and addressing difficulties rather than pondering on them (Ellis, 2019).

Innovative activities employed in the classroom have the potential to transform the way in which students acquire knowledge and how they may effectively apply it in practical situations. The skills and the confidence gained by students throughout their school years significantly influence their approach to future employment since the classroom serves as the foundation for future prospect. Therefore, English Language teachers should encourage activities that include open-ended questions, collaborative and creative projects, brainstorming sessions and conversations, even in the midst of demanding curricular schedules. Students do exhibit enhanced innovative skills beyond the confines of the classroom. They redefine challenges and opportunities, leading to practical and innovative solutions in the long run (Ukoima, Miina and Dimkpa, 2021).

The optimal combination of creativity and curriculum enables students to incorporate innovation in acquiring new knowledge. Creativity is one's ability to think outside the box while the curriculum acts as the guiding path. By implication, curriculum has to be structured to align with new ideas. According to Sri and Novianty (2025) there are five distinctive features that could influence the adoption of innovation: relative advantage, compatibility, complexity, triability and observability. Relative advantage focuses on the benefit to be derived in the new idea when compared with the existing ones; compatibility deals with the alignment of the new idea with the existing curriculum, practices and students' needs; complexity is the evaluation of the difficulty level of the idea; triability allows for the proper testing of the idea to determine its effectiveness/suitability before the general acceptability, and observability refers to the visibility level among teachers, students and other stakeholders. An innovative English Language teacher should be able to apply the 5Es of teaching, which are engage, explore, explain, elaborate and evaluate, for effective teaching and learning accomplishment. He/she should encourage collaborative learning, thinking outside the box for new ideas, vividly discussing the concept needed to be taught, expatiating by building on the students' prior knowledge and periodically assessing the students to determine their comprehension level.

Innovative Methods that can be Applied in Teaching and Learning of English Language

Employing innovative idea in classroom activities is crucial for a teacher's success in his/her profession because it propels a teacher's creations and development. Acquiring innovative skills is not optional for English Language teachers to be relevant in the 21st century because we are in the world of technological advancement. Kirsten (2023) stated five innovations that could effectively change the teaching and learning of English language. They are the use of authentic materials with natural language to enhance proper communication; the use of interactive white board where the teacher can save and reuse work for references, replay the listening activities which had been previously recorded as well as access the internet for necessary information; use of digital tools such as Google docs to share information on the platforms; online continuous professional development by accessing information online and

sharing with other teachers for collaboration to take place; and the last but not the least is dogma which is an approach that is student-centred.

This indicates that an innovative English Language teacher should be able to apply the 5Cs of teaching: collaboration, communication, creativity, critical thinking and computational skill effectively. This implies that English Language teachers should work hand in hand with their students and their colleagues that are in the same area of specialisation. Thus, communication is very important because when there is proper interaction, there would be exchange of ideas/opinions which invariably enhance effective teaching and learning, but if there is communication gap, interaction level would be poor; thus, contributing to unsatisfactory performance. Critical thinking skills could be deductive, analytical, interpretative, synthetic, and evaluative. Deductive skill emphasises making logical inferences; analytical is ability to break down problems or ideas into smaller components to enhance understanding; interpretative refers to one's ability to give detailed account of a particular concept; synthetic has to do with the ways ideas are combined to form a cogent conclusion, while evaluative thinking involves making objective judgments about issues or ideas. English Language teachers should know when and how to make use of different skills; the skill to be applied depend on the students intelligence level taking into consideration the individual differences as well as the level of difficult of the concept to be taught. Also, English Language teachers should move with the trend of things by upgrading their knowledge in technological tools applications.

Likewise, NMREC Achievers (2024) highlighted some innovative techniques that can be applied in English language classrooms; they include the use of think-pair-share technique which encourages collaborative learning, students actively participate and exchange ideas thereby enhance proper understanding of the concepts being taught; role-playing: students are allowed to mimic a particular subject/object in real life situations; SMART Board teaching, that is, the use of white board for teaching; introduction of brainstorming activities to enhance the critical thinking abilities of the students as a means of generating a number of ideas to a specific problem; E-bridge activity that comprises the technology-based activity needed to bridge the gaps between learning and understanding; for instance, using software-based models to emulate the functionality of physical hardware; class polls can be used as feedback from the students responses; chart preparation/presentation could be done through provision of visual aids, such as diagrams, posters or graphs to illustrate the concepts being discussed; usage of LMS to create opportunities for administering online quizzes, examinations and assignments for students; likewise, students could submit their responses electronically while feedback and grades could be sent through the platform; flipped classroom could be encouraged by the teacher, teaching/learning could take place outside the classroom using videos or online resources while class time would be used for discussion and application of knowledge.

The teacher needs to apply the 5Ts of teaching effectively: time of task, teacher preparedness, textbook (resources), technology and testing at the right level. English Language as a subject has different aspects: oral, lexis and structure, comprehension, summary and essay writing. Each of these aspects should be taught thoroughly without leaving any untouched. It is the

duty of English Language teacher to appropriately distribute the allotted time for the subject based on the aspects to be focused, identify the productivity level as well as areas of difficulties. Although it might be difficult for teachers of English to shift ground from the conventional way of teaching, it should be realised that changes is inevitable. English Language teachers should be versatile in subject mastery as well as skills to be applied for effective teaching. Textbook should be selected to match students' level of intelligence taking into consideration their age as well as their background knowledge. English Language teachers should test the students at intervals to determine their comprehension level. The assessment could be formative or summative. It is formative when students are tested at the beginning of the classroom activities to be sure of their background knowledge, that is, their prior experiences on the concepts of discussion. On the other hand, the summative assessment occurs at the end of the lesson. Through students' responses, the English Language teacher would know where the students are lagging behind and try as much as possible to explain further.

Chong (2024) enumerated ten trends and innovations in English language teaching; they are global citizenship and students as agents of change, inquiry-based learning and critical thinking, self-awareness and emotional intelligence, interpersonal skills, global competitiveness, learner autonomy, the importance of real-world situations, speaking practice with speech recognition, artificial intelligence and embracing diversity, and collaboration skills. Dyshkant (2026) went further to state twenty (20) innovative teaching methods which could enhance effective teaching/learning, and these are interactive lesson, using virtual reality technology, using AI in education, blended learning , 3D printing also known as additive manufacturing which involves creating objects based on digital model, use of design-thinking process, project-based learning, jigsaw cloud computing teaching, flipped classroom, peer teaching, peer feedback, crossover teaching, personalized learning, active learning, gamification, problem-based learning, mistake-led teaching and collaborative learning. According to Joy et al. (2023), flipped classroom was used in Chennai to present to the students the anatomy of larynx using various types of model. The participants agreed that learning was made easier for them because they were already been exposed to the concept before the presentation. Lombardo et al (2021) also supported the fact that incorporating innovative techniques in teaching/learning enhances improvement in learning outcomes. In this era of technological advancement, English language teachers should be ready to move with the trend of things by familiarising themselves with the changes that are taking place in the educational setting because they can only impact the knowledge they have acquired.

Also, Care College of Engineering (2026) viewed innovation in teaching and learning as a process that involves incorporation of technological tools and resources, such as PowerPoint presentation, online quiz, webinar, video lectures, online competition, workshops, lecture method and interactive learning, application based learning, practical learning, industrial projects, activity based learning, experimental learning, problem-solving session, the minutes paper activity, brainstorming and group activity. This implies that for teachers of English language to be relevant in the 21st century they have to be computer literate.

Siumariata (2024) explored different types of innovative techniques, and made a submission that although innovation enhances effective teaching/learning, but there are some challenges being faced when it comes to complementing innovative ideas with conventional/traditional teaching methods. Those challenges include novice in the application of digital tools, poor accessibility to internet services and over-dependence on digital tools. It implies that both students and teachers should brace-up and try as much as possible to boost their knowledge on computer applications; stakeholders should be supportive by providing conducive environment for teaching/learning. Also, teachers should be mindful not to over-use digital tools because the tools cannot replace the functions of teachers. Teachers should always be on ground to act as instructors.

Hafidurranman and Dwiaryanti (2024) stated some advantages of using technology-based tools to teach and they are as follows: enhancing students' language proficiency which invariably boost the learning outcomes, developing critical thinking abilities in the students and facilitating proper interaction between students as well as their teachers. Accordingly, it was suggested that teachers should equip themselves with adequate skills by undergoing trainings, workshops and seminars, realising the fact that knowledge is not static. Likewise, Nuri (2025) examined the impact of innovative strategies in English language teaching. It was revealed that the strategies positively influence students' language competency and proficiency. It was then recommended that stakeholders should implement innovative techniques to improve learning experiences of students.

Conclusion

It has been observed that there has been a shift from theoretical practices (teacher-centred) in the classroom activities to practicality (student-centred) through the application of technological tools. The usefulness of innovative techniques cannot be underrated in this industrial revolution age in order to attain this height. It is believed that when teachers of English Language incorporate innovation into their teaching, students would understand the contents being taught better, respond accordingly, retain the information received and apply the knowledge gained into their day-to-day activities when need be.

Recommendations

It is then recommended that:

English Language teachers should always incorporate innovative techniques into their teaching for effectiveness to take place;

Both English Language teachers and students should update their knowledge on the use of technological tools to enhance English Language performance in schools;

Stakeholders should make classrooms conducive to learning by providing necessary infrastructure, such as uninterrupted internet facilities;

Secondary school curriculum should be periodically reviewed to include those innovative techniques that can be used in teaching English Language as a school subject; and

English Language teachers should be encouraged to go for trainings, workshops and seminars on how to apply innovations in teaching/learning.

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INDIGENOUS KNOWLEDGE SYSTEMS AND MODERN TECHNOLOGIES: AFRICAN INDIGENOUS SCIENCES FOR ACHIEVING THE SUSTAINABLE DEVELOPMENT GOALS

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ABSTRACT

Indigenous Knowledge Systems (IKS) represent a rich repository of African indigenous sciences that have sustained communities for centuries, yet their integration with modern technologies for achieving the Sustainable Development Goals (SDGs) remains underexplored. This literature review synthesizes current knowledge on how African indigenous sciences encompassing traditional agriculture, soil management, ethno medicine, water harvesting, weather forecasting, and biodiversity conservation can synergize with modern technologies including Geographic Information Systems, remote sensing, mobile applications, artificial intelligence, and biotechnology. The review examines the contributions of indigenous sciences to SDGs related to poverty alleviation (SDG 1), zero hunger (SDG 2), good health (SDG 3), quality education (SDG 4), gender equality (SDG 5), clean water (SDG 6), climate action (SDG 13), life on land (SDG 15), and life below water (SDG 14). Key findings reveal that successful knowledge co-production requires decolonial methodologies, ethical protocols, and recognition of indigenous data sovereignty. However, significant barriers persist, including epistemic injustice, biopiracy, language loss, and policy gaps. Case studies from across Africa demonstrate that hybrid approaches combining traditional forecasting with satellite data, indigenous soil management with precision agriculture, and ethnomedicine with pharmaceutical development yield sustainable outcomes. The review concludes that epistemic pluralism, supportive policies, and indigenous-led innovation are essential for leveraging African indigenous sciences alongside modern technologies to achieve the SDGs.

Keywords: Indigenous Knowledge Systems; African indigenous sciences; Traditional Ecological Knowledge; Sustainable Development Goals; knowledge co-production

1. Introduction

Africa faces a convergence of interconnected crises: climate-induced droughts and floods, land degradation affecting 65% of agricultural land, rapid urbanization, and persistent food insecurity that leaves one in five Africans undernourished. These challenges are compounded by weak institutional capacity, inadequate infrastructure, and financing gaps that constrain climate adaptation efforts (Kom & Nethengwe, 2024; Dei et al., 2025).

IKS refers to the cumulative body of knowledge, practices, and beliefs evolving through adaptive processes and transmitted intergenerationally, encompassing technologies, agriculture, medicine, and resource governance systems (Mawere, 2014). African indigenous sciences represent systematic observational knowledge of local ecologies, including soil classification, weather forecasting, and biodiversity management (Emeagwali & Shizha, 2016).

The conventional dichotomy framing indigenous knowledge as inferior to modern science is increasingly recognized as false and harmful. Rather than opposing systems, Mazzocchi (2018) advocates for epistemic pluralism recognizing that different knowledge systems offer complementary insights, with indigenous sciences providing holistic, locally-adapted understandings that modern reductionist approaches often miss (Ludwig et al., 2024).

This review synthesizes literature on how African indigenous sciences can integrate with modern technologies to advance SDGs 1-6, 13-15. We examine applications in agriculture, health, water management, and climate adaptation, identify barriers to integration, and propose pathways for equitable knowledge co-production (Kom & Nethengwe, 2024; Dei et al., 2025).

2. Conceptual Framework

Epistemology and ontology of African indigenous sciences

African indigenous sciences are grounded in a relational ontology where knowledge emerges from interconnectedness between humans, nature, and the spiritual realm, contrasting with Western dualistic frameworks. Mawere (2011) articulates that African epistemology integrates metaphysical and empirical ways of knowing, including divination, revelation, and ancestral wisdom alongside observational knowledge.

Traditional Ecological Knowledge (TEK) as scientific practice

TEK represents systematic, empirical knowledge refined through centuries of observation, adaptation, and practice, offering vital insights into ecological processes and sustainable resource use. Fa and Luiselli (2025) emphasize that TEK should not be subordinated to scientific knowledge but recognized as a complementary knowledge system grounded in rigorous place-based testing.

The Sustainable Development Goals as an analytical framework

The SDGs provide a comprehensive framework for assessing how indigenous sciences contribute to development outcomes, particularly through interlinkages between disaster risk management, indigenous knowledge, and sustainability targets. A 2024 assessment by the sustainable earth reviews argues that applying nexus approaches between IK, DRM, and SDGs yields mutually reinforcing development impacts.

Knowledge co-production and decolonial approaches

Gqaleni and Foláyan (2026) posit that African IKS principles such as Ubuntu, emphasizing holism, relationality, and respect, offer time-tested blueprints for ethical transdisciplinary research. Knowledge co-production requires decolonizing methodologies, recognizing

epistemic diversity, and building partnerships of mutual respect between academic researchers and community knowledge holders.

3. Methodology

This literature review was conducted through a systematic search of peer-reviewed literature published between 2000 and 2026. Databases consulted included Web of Science, Scopus, PubMed, Google Scholar, African Journals Online (AJOL), and BASE. Search terms included combinations of "Indigenous Knowledge Systems," "African indigenous sciences," "Traditional Ecological Knowledge," "ethnomedicine," "traditional agriculture," "indigenous water management," "weather forecasting," "SDGs," and "knowledge co-production." Boolean operators (AND, OR) were employed to refine searches. Reference lists of retrieved articles were manually screened for additional relevant studies.

Inclusion criteria were: (1) peer-reviewed articles, books, and institutional reports published in English; (2) studies focusing on sub-Saharan Africa; (3) research addressing indigenous sciences or their integration with modern technologies; and (4) explicit or implicit links to SDG targets. Exclusion criteria included non-peer-reviewed sources, studies outside Africa, and articles without substantive indigenous science content.

A total of 128 sources were included after screening. Data were extracted thematically according to SDG categories and synthesized using narrative review and thematic analysis. Case studies were selected based on geographic representation, methodological rigor, and documented outcomes of indigenous-modern technology integration. Limitations include potential publication bias toward positive outcomes and underrepresentation of Francophone and Lusophone African scholarship.

4. Indigenous Agricultural, Food, And Health Sciences (SDGS 1, 2, 3, 12)

Indigenous knowledge systems across traditional cropping, drought-resistant varieties, ethnomedicine, and food fermentation enhance food security, health outcomes, and sustainable agricultural stewardship (Table 1). These practices directly support SDGs 1, 2, 3, and 12 by preserving seed viability, improving nutrition through fermentation, providing accessible healthcare, and maintaining crop diversity under climate stress.

Traditional cropping systems, soil management, and seed saving

African indigenous cropping systems integrate mixed cropping, crop rotation, and organic soil enrichment developed over generations for environmental stewardship rather than mere productivity. Dittoh et al. (2025) introduced the "Plug-In Principle," demonstrating that successful agricultural interventions must enhance rather than replace existing indigenous knowledge systems, as replacement approaches have historically failed. Farmers across semi-arid regions preserve indigenous seeds in clay pots and calabashes using ash treatments, maintaining seed viability for up to three years without chemicals or refrigeration.

Drought-resistant varieties and pest control

Indigenous crops including sorghum, finger millet, pearl millet, cowpeas, and Bambara groundnut are naturally drought-tolerant, pest-resistant, and thrive in poor soils where

conventional maize fails. Robert (2025) described these "orphan crops" as vital allies against climate change, yet limited research and lack of standardized cultivation techniques hinder their integration into farming systems. Under the ORPHAN Project, scientists are training a new generation to develop processing techniques for value addition and promote consumer awareness to drive demand.

Traditional medicine, ethnobotany, and integration with health systems

Over 80% of the African population relies on traditional medicine for primary healthcare due to its accessibility, affordability, and cultural acceptability. Akusa (2024) conducted training sessions in Uganda demonstrating that indigenous medicinal knowledge contributes directly to SDG 3 (Good Health) while supporting biodiversity conservation under SDG 15. His work emphasized that traditional healers play a central role in preserving indigenous pharmacopoeia, requiring formal recognition from governments and integration into national health systems.

Food preservation, fermentation, and nutrition security

Traditional fermentation of sorghum and maize into products like maheu enhances vitamin availability, introduces probiotics, and improves overall nutrient uptake while extending shelf life without refrigeration. Lungani Nyathi (2025) is optimizing traditional fermented foods using sustainable processing methods and microbial interventions to mitigate mycotoxins, aligning her research with SDGs 2, 3, and 12. The Malilangwe Trust's (2025) Nutrition Programme in Zimbabwe serves fermented maheu to over 20,000 children daily, demonstrating that culturally rooted foods improve attendance, attentiveness, and community resilience.

Table 1: Indigenous Knowledge Systems for Sustainable Agriculture, Food Security, and Health

Sub-Theme	Core Practices / Examples	Key Studies	Associated SDGs	Key Outcomes / Significance	Citation
Traditional Cropping & Soil Management	Mixed cropping, crop rotation, organic soil enrichment; seed preservation using clay pots, ash treatments.	"Plug-In Principle"	SDG 1, SDG 2	Enhances environmental stewardship; improves seed viability for 3+ years; successful interventions must integrate (not replace) indigenous systems.	Dittoh et al. (2025)
Drought-Resistant Varieties & Pest Control	Cultivation of "orphan crops": sorghum, millet, cowpeas, Bambara groundnut; natural pest resistance.	ORPHAN Project	SDG 2, SDG 12	Crops thrive in poor soils and drought; requires more research, processing techniques, and consumer awareness to boost adoption.	Robert (2025)

Traditional Medicine & Ethnobotany	Reliance on indigenous pharmacopoeia for primary healthcare; training on medicinal knowledge.	Uganda training sessions	SDG 3, SDG 15	Provides accessible, affordable healthcare (80% of population); supports biodiversity conservation; requires government recognition and integration.	Akusa (2024)
Food Preservation & Fermentation	Fermentation of sorghum/maize (<i>maheu</i>); sustainable processing to reduce mycotoxins.	Lungani&Malilangwe Trust, Zimbabwe	SDG 2, SDG 3, SDG 12	Enhances nutrition (vitamins/probiotics), extends shelf life; daily feeding of 20,000+ children improve school attendance and community resilience.	Nyathi (2025); Malilangwe Trust (2025)

5. Indigenous Water, Climate, Land, And Marine Sciences (SDGS 6, 13, 14, 15)

Across Africa, indigenous knowledge systems provide time-tested strategies for water harvesting, climate forecasting, sacred forest conservation, and coastal stewardship. These practices align directly with SDGs 6, 13, 14, and 15, demonstrating how traditional governance mechanisms, spiritual deterrence, and artisanal knowledge contribute to sustainable resource management and climate resilience (Table 2).

Traditional water harvesting and watershed management

Indigenous water management across Africa encompasses seven distinct categories: water harvesting, transportation, storage and conservation, treatments, soil-water-forest conservation systems, and myth-based governance mechanisms. Kowenje et al. (2022) edited a comprehensive volume preserving these foreknowledge systems, demonstrating that traditional practices align directly with SDG 6 targets for sustainable water management by 2030.

Indigenous weather forecasting and climate adaptation

Farmers across sub-Saharan Africa utilize indigenous forecasting systems based on celestial observations, phenological indicators, and animal behavior to predict rainfall and drought patterns. Olorundami (2025) argues that indigenous knowledge systems provide contextually grounded, cost-effective adaptation pathways that outperform externally imposed resilience models, advocating for integration of IKS with scientific methods for effective climate governance. Nyathi et al. (2023) documented how Zimbabwean farmers in Nkayi District rely on indigenous forecasting to build climate resilience, demonstrating the practical value of these knowledge systems under increasing weather variability.

Sacred groves, forest management, and biodiversity conservation

Sacred groves represent Africa's oldest conservation system, protecting indigenous tree species and medicinal plants through spiritual deterrence rather than state enforcement. The UNDP (2025) documented that in Ghana's Upper West Region, the Zukpuri Community Resource Management Area spans 4,000 hectares of protected forest, serving as a critical buffer against erosion while preserving cultural heritage. WaterAid Ghana and RAINS

(2025) reported that the Maltiti Grove at Yiworgu, preserved for over three decades through strict taboos and traditional sanctions, demonstrates how indigenous belief systems promote environmental sustainability without formal legislation.

Traditional fishing practices and coastal stewardship

Artisanal fishing communities across Africa's coasts possess generations of knowledge about fish migration patterns, spawning grounds, and sustainable harvest limits. The UNDP (2024) reported that Madagascar commits to enhancing climate resilience in artisanal fishing communities by integrating traditional knowledge with science and policy enforcement, empowering local fishers as stewards of marine resources while contributing directly to SDG 14 targets. The University of Dar es Salaam and Stockholm University (2022) Swahili Ocean Worlds project in Tanzania identifies how indigenous knowledge can be leveraged for sea sustainability while simultaneously improving livelihoods and alleviating poverty in fishing communities.

Table 2: Indigenous Knowledge Systems for Water, Climate, Land, and Marine Management

Sub-Theme	Core Practices / Examples	Associated SDGs	Key Outcomes / Significance	Citation
<i>Traditional Water Harvesting & Watershed Management</i>	Seven categories: water harvesting, transportation, storage, conservation, treatments, soil-water-forest systems, myth-based governance	SDG 6 (Clean Water & Sanitation)	Preserves foreknowledge systems; traditional practices align directly with SDG 6 targets for sustainable water management by 2030	Kowenje et al. (2022)
<i>Indigenous Weather Forecasting & Climate Adaptation</i>	Celestial observations, phenological indicators, animal behavior to predict rainfall and drought	SDG 13 (Climate Action)	Provides contextually grounded, cost-effective adaptation pathways; outperforms externally imposed resilience models; practical value under increasing weather variability	Olorundami (2025); Nyathi et al. (2023)
<i>Sacred Groves, Forest Management & Biodiversity Conservation</i>	Spiritual deterrence for forest protection; taboos and traditional sanctions; protected groves spanning thousands of hectares	SDG 15 (Life on Land)	Africa's oldest conservation system; preserves indigenous trees and medicinal plants; promotes sustainability without formal legislation	UNDP (2025); WaterAid Ghana & RAINS (2025)
<i>Traditional Fishing Practices & Coastal Stewardship</i>	Knowledge of fish migration, spawning grounds, sustainable harvest limits; integration with science and policy	SDG 14 (Life Below Water)	Empowers local fishers as marine stewards; enhances climate resilience; improves livelihoods while alleviating poverty	UN DESA (2024); University of Dar es Salaam & Stockholm University (2022)

6. Modern Technologies and Indigenous Sciences: Synergies and Tensions

The integration of modern technologies with indigenous sciences creates both synergies and tensions across African contexts. Geographic information systems, mobile applications, and remote sensing platformsexemplified by the AfriScout pastoralist early warning

system demonstrate successful co-design when communities guide technological development (Table 3). However, artificial intelligence-driven climate data systems and precision agriculture initiatives risk perpetuating "algorithmic colonialism," where externally designed platforms marginalize local knowledge traditions. Renewable energy solutions enable biotechnology applications, yet concerns over data sovereignty, epistemic hierarchies, and foreign technological dependency remain unresolved. Ethical frameworks emphasizing participatory design, community-controlled data governance, and epistemic pluralism offer pathways for equitable technology integration.

GIS, remote sensing, and mobile technologies for indigenous knowledge

The AfriScout platform, developed by Project Concern International (2018), provides pastoralists across East Africa with near real-time visual data on rangeland conditions using satellite imagery and mobile technology, co-designed with local communities to incorporate their cultural practices, languages, and contextual knowledge of grazing areas. Downloaded by over 21,000 pastoralists and shared among 120,000 households, the application has improved decision-making, reduced livestock deaths, and enabled better pasture management across 50 million hectares of mapped rangelands as reported by UBS (2021). Moreu (2023) documented that the Extreme Citizen Science lab at University College London developed a participatory mapping approach for Ethiopian agro-pastoralist communities with no prior mapping experience, co-designing mobile apps with pictorial interfaces to overcome literacy barriers while addressing water scarcity, food insecurity, and land use documentation.

Artificial intelligence and indigenous data sovereignty

Bhanye (2025) argues that AI-driven climate data systems including predictive flood models, vulnerability indices, and remote sensing platforms are largely designed, funded, and governed by institutions in the global North, imposing standardized representations of risk that marginalize lived knowledge, cultural practices, and contextual needs of communities in the global South, calling for a paradigm shift toward local AI infrastructure and epistemic pluralism. The Centre for Intellectual Property and Information Technology Law (CIPIT) at Strathmore University (2025) examines AI governance through lenses of open data, data sovereignty, and indigenous knowledge systems in their State of AI in Africa Report, emphasizing the need for context-sensitive, inclusive AI ecosystems across the continent. Ouma (2025) critically analyzes Kenya's National Digital Master Plan, warning that datafication and dependence on foreign technology partners may perpetuate colonial hierarchies of knowledge, privilege quantifiable data while marginalizing oral, tacit, and communal knowledge traditions.

Biotechnology, precision agriculture, and renewable energy

Biotechnology applications in African agriculture require reliable energy infrastructure, which renewable solutions can provide. Seeds4Liberia and AfricaRice (2025) reported that the solarization of biotechnology and molecular biology laboratories at Liberia's Central Agricultural Research Institute enables uninterrupted genetic analysis, tissue culture work, and preservation of plant genetic resources essential for developing climate-resilient crop varieties. The Belmont Forum (2025) describes the BIO-NEXUS project, which applies data-driven optimization of engineered biochars from plant waste pyrolysis across South Africa,

Ghana, and Kenya to address the water-energy-food-health nexus while supporting Africa's Agenda 2063 and SDG targets, offering integrated solutions for soil health improvement, water purification, carbon capture, and renewable energy generation.

Ethical concerns and power asymmetries

Ouma (2025) argues that digital transformation initiatives risk reinforcing epistemic injustice through "algorithmic colonialism" the embedding of external design logics within African digital infrastructure through partnerships with Western technology corporations, warning that AI-driven "smart farming" initiatives may displace long-established ecological indicators, creating a new form of epistemic dependency. Bhanye (2025) calls for strengthening data sovereignty through local AI infrastructure, enabling participatory AI design grounded in community knowledge systems, and promoting epistemic pluralism that values indigenous, informal, and experiential knowledges as critical to climate resilience. University World News (2025) reports that the vision for Africa's digital future includes binding Digital Bills of Rights, explainable and accountable algorithms, and community-controlled data governance to ensure technology reflects African values of dignity, community, and justice.

Table 3: Summary of Modern Technologies and Indigenous Sciences - Synergies and Tensions

Sub-Theme	Technology / Approach	Synergies (Opportunities)	Tensions (Challenges)	Citation
<i>GIS, Remote Sensing & Mobile Technologies</i>	AfriScout platform (satellite imagery + mobile); participatory mapping with pictorial interfaces	Co-designed with communities; improves decision-making; reduces livestock deaths; enables pasture management across 50 million hectares; over 21,000 pastoralists reached	Literacy barriers (addressed via pictorial interfaces); requires mobile network access; ongoing maintenance and funding needs	Project Concern International (2018); UBS (2021); Moreu (2023)
<i>Artificial Intelligence & Data Sovereignty</i>	AI-driven climate data systems; predictive flood models; vulnerability indices; remote sensing platforms	Potential for improved climate governance; early warning systems; data-driven decision support	Marginalizes lived knowledge and cultural practices; risk of "algorithmic colonialism"; foreign dependency perpetuates epistemic hierarchies; quantifiable data privileged over oral/tacit knowledge	Bhanye (2025); CIPIT (2025); Ouma (2025)
<i>Biotechnology, Precision Agriculture & Renewable Energy</i>	Solarization of molecular biology labs; data-driven biochar optimization; water-energy-food-health nexus solutions	Enables uninterrupted genetic analysis; preserves plant genetic resources; develops climate-resilient varieties; addresses soil health, water purification, carbon	Requires reliable energy infrastructure; high initial investment; technical expertise gaps; maintenance challenges	Seeds4Liberia & AfricaRice (2025); Belmont Forum (2025)

		capture, renewable energy		
Ethical Concerns & Power Asymmetries	Digital transformation; AI-driven smart farming; data governance frameworks	Vision for Digital Bills of Rights; explainable algorithms; community-controlled data governance	"Algorithmic colonialism"; displacement of ecological indicators; epistemic dependency; external design logics embedded in African infrastructure	Ouma (2025); Bhanye (2025); University World News (2025)

7. Indigenous Sciences For Education, Gender, And Equality (SDGS 4, 5, 10)

Indigenous sciences advance SDGs 4, 5, and 10 through curriculum reforms guided by the "Plug-In Principle," intergenerational knowledge transmission via language and oral traditions, and recognition of indigenous women as critical knowledge holders. Addressing epistemic injustice requires Ubuntu principles of holism and respect, moving beyond extractive research toward community-partnered, ethically grounded approaches (Table 4).

Integrating indigenous sciences into formal education

Amidu (2026) called for curriculum reforms that elevate indigenous perspectives alongside scientific inquiry, arguing that embedding IKS into formal policy and academic discourse enables Nigeria to develop more resilient and inclusive environmental strategies. Dittoh et al (2025) introduced the "Plug-In Principle" demonstrating that successful educational interventions must enhance rather than replace existing indigenous knowledge systems, as replacement approaches have historically failed in Ghanaian higher education. Botswana's draft IKS policy unveiled by Thamae and Mathodi (2025) stressing that passing wisdom from one generation to the next is central to maintaining cultural heritage, aims to embed IKS fully into the national education system, preserving cultural diversity while creating an enabling environment for its development and transformation.

Intergenerational knowledge transmission

Ofosu-Asare (2026) defines intergenerational transmission as the lived pathways through which knowledge is carried, contested, adapted, interrupted, and renewed across generations through language, land-based work, craft, care systems, spiritual practice, oral traditions, and community governance.

Indigenous women as scientific knowledge holders

UNESCO. (2026) develops nutrient-rich, climate-resilient maize varieties using cutting-edge genetic technologies, acknowledging that a strong support system including her husband, children, and mentors has been crucial to her success. Bam (2026) examines how the Khoe 'Ausi' intergenerational ecological and medicinal knowledge around wetlands on the Cape Flats demonstrates Africa's deep-time interconnectedness, reclaiming marginalized forms of knowledge through feminist and decolonial approaches to African studies. Ogbuene and Ufere (2026) argue that indigenous knowledge systems cultivated through communal experiences possess sophisticated internal standards of justification frequently rendered invisible by hegemonic Eurocentric epistemological criteria.

Addressing epistemic injustice and marginalization

Gqaleni and Foláyan (2026) posit that Ubuntu principles holism, relationality, and respect offer time-tested blueprints for ethical transdisciplinary research, warning that ingrained academic power structures perpetuate extractive and colonial research paradigms where communities are treated as data sources rather than genuine partners. A decolonial study from Bello-Bravo (2026), authored by scholars examining Western Kenya, unsettles the hierarchical opposition between "indigenous" and "scientific" knowledge regimes, arguing that the force of the inequality lies not in correcting its opposition but in the ongoing struggle over which modes of life will endure. Ogbuene and Ufere (2026) conclude that the validity of IKS is most accurately assessed not through forced conformity to Western scientific models but through demonstrated internal coherence, sustained pragmatic success, and contextually-aware rationality.

Table 4: Indigenous Sciences for Education, Gender, and Equality

Sub-Theme	Core Practices / Approaches	Associated SDGs	Key Outcomes / Significance	Citation
Integrating Indigenous Sciences into Formal Education	Curriculum reforms embedding IKS alongside scientific inquiry; "Plug-In Principle" (enhance, not replace); national IKS policy development	SDG 4 (Quality Education), SDG 10 (Reduced Inequalities)	Enables resilient, inclusive environmental strategies; preserves cultural diversity; creates enabling environment for IKS development and transformation	Amidu (2026); Dittoh et al. (2025); Thamae (2025)
Intergenerational Knowledge Transmission	Lived pathways through language, land-based work, craft, care systems, spiritual practice, oral traditions, community governance; bridging qualitative and quantitative methods	SDG 4 (Quality Education), SDG 10 (Reduced Inequalities)	Preserves ethnobotanical knowledge; bridges scientific inquiry and traditional practices; maintains cultural heritage against modernization	Ofosu-Asare (2026); Setshego (2025)
Indigenous Women as Scientific Knowledge Holders	Development of climate-resilient crop varieties; feminist and decolonial approaches; reclamation of marginalized knowledge	SDG 5 (Gender Equality), SDG 10 (Reduced Inequalities)	Recognizes women's contributions to agricultural science; reclaims marginalized ecological knowledge; challenges Eurocentric epistemological criteria	Abu (2026); Bam (2026); Ogbuene & Ufere (2026)
Addressing Epistemic Injustice and Marginalization	Ubuntu principles (holism, relationality, respect); decolonial approaches; internal coherence and pragmatic success as validity criteria	SDG 10 (Reduced Inequalities), SDG 4 (Quality Education)	Provides blueprints for ethical transdisciplinary research; challenges hierarchical opposition of knowledge regimes; values contextually-aware rationality over forced conformity	Gqaleni & Foláyan (2026); Bello-Bravo (2026); Ogbuene & Ufere (2026)

8. Case Studies, Challenges, And Methodologies

Across Africa, indigenous forecasting, agroecology, and sacred forest conservation help communities manage climate uncertainty. In Zimbabwe and Kenya, traditional signals like

bird migrations and tree flowering blend with scientific data through participatory platforms, enabling community-driven adaptation. However, barriers include biopiracy, language loss threatening intergenerational transmission, and policy gaps leaving communities vulnerable. Ethical methodologies participatory action research, Ubuntu frameworks, and co-designed data governance ensure research respects indigenous sovereignty, avoids colonial approaches, and strengthens community knowledge systems. Tab 5 presents a summary of case studies of successful integration, key challenges and methodologies across Africa.

Successful integrations across Africa (agroecology, water harvesting, weather forecasting, bioprospecting)

Olorundami (2025) documents how communities across West, East, and Southern Africa mobilize indigenous forecasting systems, agroecological farming practices, seed preservation networks, water-harvesting techniques, and sacred forest conservation to manage climatic uncertainty. Ndawana and Muchenje (2026) describe how Zimbabwe's Village Business Units have evolved into informal climate information centers where women and men share indigenous signals bird migration patterns and flowering of local trees that have guided generations. Amref Health Africa (2025) reports that in Isiolo County, Kenya, ground-level readings from manual weather stations often align more closely with traditional forecasts than satellite data, with communities blending indigenous and scientific forecasting through Multi-Sector Innovation Platforms to develop community-driven climate adaptation strategies.

Barriers: biopiracy, language loss, policy gaps

The United Nations Permanent Forum on Indigenous Issues (2016) recommends that Member States develop legislative measures, with full indigenous participation, to protect traditional medicine and knowledge from biopiracy and pharmaceutical industry exploitation. Natural Justice (2025), a legal advocacy organization, reports that Mozambique faces institutional fragmentation, limited research funding for traditional knowledge studies, and absence of dedicated research centres, leaving communities holding valuable traditional knowledge vulnerable without legal protection against misappropriation, cultural erosion, and loss of traditional practices. The United Nations Permanent Forum on Indigenous Issues (2021) emphasizes that language loss threatens intergenerational knowledge transmission, calling for indigenous experts' inclusion in revitalization efforts during the International Decade of Indigenous Languages (2022-2032).

Methodologies: participatory action research, decolonial frameworks, ethical protocols

Glen et al. (2024) provide reflections on implementing indigenous research paradigms with participatory action research in South Africa's Ga-Mamabolo community, concluding that indigenous research paradigms offer suitable roadmaps for conducting research in indigenous communities rather than Western approaches with colonial elements. Seehawer (2018) explores Ubuntu as an indigenous Southern African research paradigm, demonstrating that ethical protocols evolve around relating positively to others, research agendas contribute to strengthening community, and methodologies are community-based, relational, and participatory. The University of Kent (2026) outlines a PhD project combining participatory action research, digital ethnography, and policy review while co-designing ethical data governance protocols with Kenya's Ogiek community.

Table 5: Case Studies, Challenges, and Methodologies in Indigenous Knowledge Systems

Sub-Theme	Key Examples / Practices	Key Outcomes / Significance	Citation
Successful Integrations Across Africa	Indigenous forecasting systems, agroecological farming, seed preservation, water harvesting, sacred forest conservation; Village Business Units as informal climate information centres; Multi-Sector Innovation Platforms blending indigenous and scientific forecasting	Communities manage climatic uncertainty; ground-level readings often align better with traditional forecasts than satellite data; community-driven climate adaptation strategies developed	Olorundami (2025); Ndawana & Muchenje (2026); Amref Health Africa (2025)
Barriers	i. Biopiracy: Legislative measures needed to protect traditional medicine from pharmaceutical industry exploitation; institutional fragmentation; limited research funding	Communities vulnerable without legal protection against misappropriation; cultural erosion; loss of traditional practices	UNPFII (2016); Natural Justice (2025)
	ii. Language Loss: Language loss threatens intergenerational knowledge transmission; International Decade of Indigenous Languages (2022-2032)	Calls for indigenous experts' inclusion in language revitalization efforts	UNPFII (2021)
	iii. Policy Gaps: Absence of dedicated research centres; lack of legal protection frameworks; institutional fragmentation	Limited research funding for traditional knowledge studies; communities left vulnerable	Natural Justice (2025)
Methodologies	i. Participatory Action Research: Indigenous research paradigms with participatory action research; community-based, relational approaches	Indigenous research paradigms offer suitable roadmaps; avoid Western approaches with colonial elements	Glen et al. (2024)
	ii. Decolonial Frameworks: Ubuntu as indigenous Southern African research paradigm; ethical protocols for relating positively to community	Research agendas strengthen community; methodologies are participatory and community-based	Seehawer (2018)
	Ethical Protocols: Co-designing ethical data governance protocols; combining participatory action research, digital ethnography, policy review	Ethical protocols developed with Kenya's Ogiek community	University of Kent (2026); Brittain et al.

9. Future Perspectives, Policy Recommendations, And Conclusion

IKS databases, indigenous-led innovation, and climate resilience

Kenya has launched the Indigenous Knowledge Innovation Bank, a digital system designed to document, secure, and commercialize indigenous knowledge from 13 counties, with plans to expand to all 47 counties as reported by Omelo (2026). The bank captures traditional foods, indigenous technologies, traditional medicine, and performing arts, converting oral traditions into protected data to prevent loss and curb exploitation. Meanwhile, the United Nations Permanent Forum on Indigenous Peoples (2025) recommends at its 24th session that the Green Climate Fund and other international bodies should ensure direct access to finance in support of Indigenous-led mitigation and adaptation projects.

Recommendations for governments, AU, UN, and academia

The leadership of African Union Commission has called on AU members and partners to work together through inclusive policy-making, equitable resource-sharing, and respect for traditional knowledge systems, emphasizing that indigenous voices must be heard and their contributions fully valued in building a more inclusive and sustainable Africa. The United Nations Permanent Forum on Indigenous Peoples (2025) recommends that Member States review and revise their constitutions and legal frameworks to comprehensively recognize the rights of Indigenous Peoples, including the right to self-determination, with such processes driven and guided by Indigenous Peoples themselves. A presentation at the World Biodiversity Forum 2026 in Davos, Switzerland argued that academia must embrace transdisciplinary approaches which recognize Indigenous Peoples as epistemic authorities rather than mere sources of data, in an analysis of epistemic injustice in biodiversity governance.

Synthesis of key findings and the imperative of epistemic pluralism

This review has demonstrated that African indigenous sciences offer empirically robust, place-based knowledge systems that complement modern technologies across agriculture, health, water management, and climate adaptation. The Kenya Innovation Bank documented by Omelo (2026) and UNESCO's LINKS programme exemplify successful integration pathways, while challenges including biopiracy, language loss, and epistemic injustice persist. Okada et al. (2026) demonstrate through their Amazonian research that AI can be mobilized to strengthen community agency, intercultural collaboration, and the integration of diverse knowledge systems. The imperative of epistemic pluralism; recognizing that different knowledge systems offer complementary insights essential for achieving the Sustainable Development Goals and building climate-resilient futures across Africa.

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RELATIONSHIP BETWEEN AFRICAN MENTORSHIP PRACTICES AND IMPLEMENTATION OF SUSTAINABLE DEVELOPMENT GOALS IN PUBLIC UNIVERSITIES IN ANAMBRA STATE, NIGERIA

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Abstract

The study examined the relationship between African mentorship practices and implementation of sustainable development goals in public universities in Anambra State, Nigeria. Two research questions guided the study and two null hypotheses were tested at 0.05 level of significance. Correlational survey research design was adopted for the study. The population of the study comprised of 123 (300 level) undergraduates of the Department of Educational Management in the Faculties of Education of the two public universities in Anambra State in the 2025/2026 academic session. The sample of 123 undergraduates of the Department of Educational Management was used for the study. Multi-staged sampling procedure was used to determine the sample for the study. Two structured questionnaires which was developed by the researcher and validated by three experts were used to collect data for the study. The instrument was subjected to a pilot test on 30 undergraduates in public universities in Enugu State, Nigeria. Pearson product moment correlational analysis was used to analyse data for the study. Findings revealed that there is a high positive relationship between intergenerational knowledge transfer and implementation of sustainable development goals in public universities in Anambra State, Nigeria. Findings of the study also revealed that community valuebased mentorship has a high

positive relationship with the implementation of sustainable development goals in public universities in Anambra State, Nigeria. Furthermore, African mentorship practices have statistically significant relationship with the implementation of sustainable development goals in public universities in Anambra State, Nigeria. The researcher concluded that African Mentorship Practices have positive and significant with the implementation of sustainable development goals in public universities in Anambra State. Based on the findings, it was recommended that management of universities should formally integrate intergenerational mentorship structures into academic policies by ensuring that senior academics are systematically paired with junior lecturers and postgraduate students for continuous academic guidance and knowledge transfer. It was also recommended that management of public universities should strengthen community and value-based mentorship programmes by embedding ethical training, civic responsibility, and sustainability awareness into both academic and extracurricular activities.

Keywords: African Mentorship Practices, Sustainable Development Goals, Implementation, Universities, Undergraduates

Introduction

The United Nations adopted the Sustainable Development Goals (SDGs) in 2015. They are a set of goals for the world to work toward by 2030 in order to solve the most important social, economic, and environmental problems. The 2030 Agenda says that the goals are all connected and can't be separated. It also says that sustainable development must include human well-being, environmental protection, and shared wealth. In this sense, the SDGs are more than just a statement of what the world wants; they are also a practical way to rethink institutions, policies, and systems in ways that will help everyone develop in the long term (United Nations, 2015). The implementation of this global framework has varied significantly across different parts of the world, so we need to examine how the SDGs have performed in Africa.

The implementation of the SDGs has varied across Africa, and in many cases, progress has been too slow. The Africa Sustainable Development Report 2024 says that progress on the continent has been slow. Only a small number of measurable goals are on track; many others need significant changes in policy, institutions, and finances. This means that African's problem is not just getting people to accept the SDGs as a plan for development; it's also about turning those goals into systems, institutions, and ways of social action that make sense in Africa (United Nations Economic Commission for Africa, 2024). This implementation challenge is what has made stakeholders pay attention to the institutions that are supposed to turn development promises into real results, and universities are one of the most important of these.

Universities are important to attain the SDGs since they produce new information, teach skilled workers, influence values, and provide research-based solutions to societal issues.

UNESCO's Global Independent Expert Group on the Universities and the 2030 Agenda argues that colleges and universities may help with sustainability transitions in a unique way by performing research, teaching, coming up with new ideas, and being active in the community. According to Ashida (2022), higher education helps with more than simply SDG 4, which is about receiving a decent education. Being active in education, society, and research also helps with the overall development mission. Since universities play an important role in the implementation of sustainable development globally, that they are investigated.

The Nigeria government has officially integrated the SDGs into its national development plan in Nigeria. However, the extent to which strategic development has been implemented in Nigeria remains unclear. Studies have shown that knowledge, institutional integration, and practical engagement with sustainable development remain in a developmental phase rather than being firmly established. Amaonye and Anyaeji (2024) posited that undergraduate awareness and perception of the Sustainable Development Goals was low and thus necessitate the promotion of action-oriented programmes in universities. Sadly, this ugly scenario is getting worse in some universities in Anambra State, Nigeria. This issue is more worrisome in Anambra State, Nigeria where there has been more focus on the importance of university outputs for development.

The situation in universities in Anambra State appears to be worrisome because of the graduates of public universities seem not to have the necessary skills and competence that match the human capital needs of the society required for sustainable development. Offor and Nwaru (2024) reported that poor funding of universities is a major cause of the poor state of universities in South-East Nigeria. This is reflected in inadequate practical sessions, limited fieldwork, overcrowded classrooms and compromised teaching quality in some universities in the zone. Furthermore, Makwe et al. (2026) reported that lack of 21st century skill acquisition training negatively affects the career readiness of undergraduates in public universities. This situation made Okoye and Ilechukwu (2025) to suggest that exposing students to internship would improve students' employability skills. This suggests that the problem is not just access to university education, but the kind of educational training being provided to students in universities.

One major critique of the contemporary university system is its continuous overdependence on westernised modes of training that focus more on abstract theory over practical interaction based on local circumstances. It has been stated that many universities in Africa still function under the colonial or Eurocentric knowledge systems that do not effectively reflect indigenous epistemologies, local problem-solving traditions or development demands of the African society. Scholars like Gumbo et al. (2024) averred that universities in Africa are shaped by colonial methods of education and training. Sadly this system of education, has only resulted to the generation of graduates who may be eloquent and academically credentialed, however poorly prepared with practical competence for tackling real-life social challenges; hence, the hunt for a more context-responsive educational strategy.

Reports in Africa describe mentoring and educational formation in ways that are relational, communal, transformative and culturally grounded. According to Khumalo and Ndlovu (2024), mentoring is a form of transformation in academia. In the same vein, Biljohn et al. (2024) defined African mentorship support as involving guidance, development, networking and structured support. On the other hand, Kotze (2025) based on the Ubuntu perspective, viewed mentoring as a humane, collaborative process in which a knowledgeable elder offers support, compassion and direction to a novice. Based on these view, African mentorship practices in the context of this study are culturally rooted processes through which knowledge, skills, values and social responsibility are transmitted in relational and communal settings for the development of both the individual and society. Once African mentorship practices are understood in this way, it becomes important to identify the specific forms through which they operate in educational and community life.

From literature, it is clear that African mentorship practices are expressed in several interconnected forms. One form is indigenous apprenticeship, through which practical knowledge is transmitted from experienced persons to younger learners in real-life settings (Odeh et al., 2025). It is a traditional system of learning where skills, knowledge, and cultural practices are passed down directly from elders or master practitioners to younger members within an Indigenous community. Unlike formal schooling, it happens through hands-on participation, observation, and storytelling embedded in daily life and ceremony, ensuring cultural continuity. It covers everything from hunting, farming, weaving, and medicine to governance and spiritual practices, keeping Indigenous ways of knowing alive across generations.

Another form is Ubuntu-oriented pedagogic and social formation, which emphasises relationality, mutual care, inclusion and shared responsibility in the development of learners (Ngubane & Makua, 2021; Makhanya & Mzinyane, 2023). It shifts education from individual competition to collaborative knowledge-building, where teachers and learners co-create understanding, respect diverse experiences, and prioritize collective wellbeing and ethical responsibility alongside academic goals. Other forms are formal and semi-formal academic mentoring structures that support growth through guidance, networks and developmental relationships (Biljohn et al., 2024). While these forms are broad and overlapping, the present study concentrates on two dimensions that are especially relevant to university education and sustainable development which intergenerational knowledge transfer and community value-based mentorship.

Intergenerational knowledge transfer is the movement of knowledge, experience, practical wisdom and culturally valued competencies from older or more experienced persons to younger or less experienced ones. This supports the views in African-centred literatures. Odeh et al. (2025) revealed how practical and entrepreneurial knowledge is transferred through sustained mentor–mentee relationships in the Igbo apprenticeship system. In the same vein, Biljohn et al. (2024) highlighted the importance of mentorship structures that facilitate developmental support across experience levels. Similarly, Kotze (2025) stated that in intergeneration knowledge transfer, novice professionals get guidance from a knowledgeable elder whose support extends beyond technical instruction to humane and

relational accompaniment. Intergenerational knowledge transfer is the movement of skills, technology, research, and practices across borders through trade, education, migration, and collaboration, accelerating innovation where local capacity is limited. Its impact depends on absorptive capacity, trust, and institutional fit, since knowledge that works in one context often requires adaptation to take root elsewhere. In the context of this study, intergenerational knowledge transfer is defined as the intentional transmission of practical knowledge, professional experience and socially relevant wisdom from senior academics, mentors or elders to younger members of the university community. Since knowledge alone is not sufficient for sustainable development, the next dimension of African mentorship must be understood in relation to the values that guide how such knowledge is used in the society.

Community value-based mentorship deals with the transmission of ethical, relational and communal values that shape responsible citizenship and socially useful action. This orientation is strongly grounded in the Ubuntu school of thought. Ngubane and Makua (2021) explained that Ubuntu pedagogy promotes co-existence, inclusivity and social cohesion within educational practice. Similarly, Makhanya and Mzinyane (2023) defined Ubuntu as an emancipatory framework based on collectiveness, togetherness and justice. Furthermore, Mugumbate et al. (2024) presented Ubuntu as a philosophy of shared values and relational humanity with clear implications for education in Africa. Community value-based mentorship ties guidance to shared principles like trust, reciprocity, and collective growth, so mentors and mentees advance together rather than in a top-down exchange. It works because the relationship is anchored in what the community actually cares about, making accountability personal and the skills learned directly useful to the group. Thus, community value-based mentorship in this study refers to a form of mentoring through which learners are guided to internalise responsibility, solidarity, mutual respect and commitment to the common good. When combined with intergenerational knowledge transfer, this value-orientated form of mentorship offers a compelling indigenous framework for examining how universities may better contribute to sustainable development.

The need for the present study consequently derives from the apparent conflict between the known developmental purpose of universities and the persistent evidence that many graduates are not being developed in sufficiently practical, ethical and context-responsive ways. In Anambra State, concerns about weak SDG awareness, limited practical training, poor employability preparation and the wider misalignment between university outputs and societal needs indicate that public universities may not yet be contributing optimally to sustainable development (Amaonye & Anyaeji, 2024; Offor & Nwaru, 2024; Makwe et al., 2026; Okoye & Ilechukwu, 2025). At the same time, African scholarship continues to show that indigenous knowledge systems, Ubuntu-oriented learning and culturally grounded mentoring can provide viable alternatives to overly westernised educational approaches (Gumbo et al., 2024; Nnama-Okechukwu et al., 2023; Ngubane & Makua, 2021). It is against this context that the present study examines the relationship between African mentorship practices and the execution of sustainable development goals in public universities in Anambra State, Nigeria.

Statement of the Problem

The role of public universities in the advancement of the Sustainable Development Goals is defined by the strategic mandate that requires these institutions to use teaching, research, community service, institutional leadership, and value formation to help achieve the set goals. As institutions in Anambra State, these universities are supposed to create graduates, develop new ideas, and come up with policies that address social, economic, and environmental problems that hinder sustainable development. However, despite the growing relevance of the SDGs in academia, these institutions' efforts to implement these goals are generally focused on developing policies rather than promoting them through other activities including cultural ones. One such cultural activity is mentorship, but its role in advancing SDGs in public universities has been overlooked. In Africa, mentorship is not only a pedagogical process. Instead, it is based on cultural values and includes such aspects as guidance, advice, and moral training of people from younger generations by those who belong to older ones. The practice of mentorship has potential in forming attitudes, behavior, approaches to leadership, and responsibility that are required to facilitate sustainable development. However, in numerous universities, mentorship practices remain either informal, inconsistent, unconnected to institutional practices of sustainable development that include such aspects as fairness, responsible leadership, environmental awareness, social inclusiveness, and sustainable institutional development.

Therefore, the problem of interest is the following. Although universities in Anambra State need to actively participate in the achievement of SDGs, there is no reliable evidence concerning how African mentorship practices can affect this process. In other words, it needs to be clarified whether mentorship practices promote the creation of conditions that are favorable for SDGs' successful realisation. Is there any relation between the existence of strong and well-established mentorship relationships and effective implementation of the SDGs in these institutions? Or perhaps the lack of appropriate practices prevents people from participating in and implementing these goals at all? Additionally, very few attempts have been made to study indigenous mentoring practices in Africa. Hence, this subject matter remains poorly investigated, and the relationship between these phenomena is not fully understood yet.

Therefore, the research question raised above represents a substantial gap in existing knowledge since, if it remains unanswered, attempts to achieve sustainable development will fail due to the ignorance of relevant aspects. The current study is focused on examining this issue in universities in Anambra State.

Purpose of the Study

The main purpose of the study was to examine the relationship between African mentorship practices and the implementation of sustainable development goals in public universities in Anambra State, Nigeria. Specifically, the study examined the relationship between:

1. Intergenerational knowledge transfer and implementation of sustainable development goals in public universities in Anambra State, Nigeria.
2. Community value based mentorship and implementation of sustainable development goals in public universities in Anambra State, Nigeria.

Research Questions

The following research questions guided the study:

1. What is the relationship between intergenerational knowledge transfer and implementation of sustainable development goals in public universities in Anambra State, Nigeria?
2. What is the relationship between community value-based mentorship and implementation of sustainable development goals in public universities in Anambra State, Nigeria?

Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance:

1. There is no significant relationship between intergenerational knowledge transfer and implementation of sustainable development goals in public universities in Anambra State, Nigeria.
2. There is no significant relationship between community value-based mentorship and implementation of sustainable development goals in public universities in Anambra State, Nigeria.

Methods

The research adopted correlational survey design. It was considered the most appropriate for the study because it helped to determine the relationship between the independent and dependent variables. The design enabled the determination of the direction and magnitude of the relationship existing between the variables. The research was carried out in Anambra State, Nigeria where there are two public universities offering Educational Management programme in the Faculty of Education. These universities are; Nnamdi Azikiwe University, Awka and Chukwuemeka Odimegwu Ojukwu University, Igbariam Campus. The population consisted of all the 123 300-level undergraduate students enrolled in the Department of Educational Management in the Faculties of Education in the two universities in the 2025/2026 academic year. All the members of the population were the sample of the study because the total population size was small (123 300-level undergraduate students). This is why a census sample technique was used since all the 123 300-level undergraduate students were sampled and participated in the study. Two structured questionnaire designed by the researcher was used in collecting data. The first questionnaire is titled African Mentorship Practices Questionnaire (AMPQ). It contained 22 items spread in two clusters. Cluster 1 contains 12 items on intergenerational knowledge transfer and Cluster 2 contained 10 items on community value based mentorship. The second instrument titled Implementation of Sustainable Development Goals Questionnaire (ISDGQ) contained 15 items collecting information on implementation of SDGs in public universities. The questionnaire items were designed in accordance with the aims, objectives, research questions and hypotheses of the research.

To confirm the appropriateness of the items in measuring the variables being investigated in the study, experts' validation were carried out to make sure that the items are clear and adequate enough. Based on the feedback and advice given by the experts, changes were made to improve instrument validity before its use. Also, a pilot test was conducted involving 30 undergraduates from Enugu State

University, Nigeria who were not included in the study to test the instrument suitability. The questionnaires were distributed and collected personally by the researcher with the help of research assistants where necessary. Data retrieved from the pilot test using Cronbach alpha yielded reliability coefficients of 0.80 for African Mentorship Practices Questionnaire (AMPQ) and 0.84 for Implementation of Sustainable Development Goals Questionnaire (ISDGQ). Personal distribution of questionnaires ensured high response rate and completeness of the instrument. Out of 123 copies of questionnaires distributed, 109 copies were retrieved in good condition and used for the analysis of data.

Data obtained from the study was analyzed using Pearson Product Moment Correlation Coefficient. Based on the correlation coefficient, the degree and direction of the relationship were interpreted following conventional rules of correlation decision-making. Interpretation showed whether there was a direct or indirect relationship depending on the sign of the coefficient. While null hypotheses were subjected to test at the 0.05 level of significance. Null hypothesis was rejected when P-value was less than 0.05 otherwise it was accepted.

Results

Research Question 1: What is the relationship between intergenerational knowledge transfer and implementation of sustainable development goals in public universities in Anambra State, Nigeria?

Hypothesis 1: There is no significant relationship between intergenerational knowledge transfer and implementation of sustainable development goals in public universities in Anambra State, Nigeria.

Table 1: Summary of Pearson Correlation Analysis and Test of Significance between Intergenerational Knowledge Transfer and Implementation of Sustainable Development Goals in Public Universities in Anambra State, Nigeria.

Variables		Intergenerational Knowledge Transfer	Implementation of Sustainable Development Goals	Remark
Intergenerational Knowledge Transfer	Pearson Correlation	1	0.710**	
	Sig. (2-tailed)		0.000	High Positive/Significant Relationship
	N	109	109	
Implementation of Sustainable Development Goals	Pearson Correlation	0.711**	1	
	Sig. (2-tailed)	0.000		
	N	109	109	

** Correlation is significant at the 0.05 level (2-tailed).

Table 1 reveals that the Pearson's Correlation Coefficient is $r = 0.710$. This indicates a strong positive relationship between intergenerational knowledge transfer and implementation of sustainable development goals in public universities in Anambra State, Nigeria. This implies that in universities where three intergenerational knowledge transfer, there will be improvements in the implementation of the sustainable development goals in public universities. Thus, there is a high positive relationship between intergenerational knowledge

transfer and implementation of sustainable development goals in public universities in Anambra State, Nigeria. Furthermore, the p-value of 0.000 is less than the 0.05 level of significance. Therefore, the null hypothesis is rejected. This indicates that there is a statistically significant relationship between intergenerational knowledge transfer and implementation of sustainable development goals in public universities in Anambra State, Nigeria

Research Question 2: What is the relationship between community value-based mentorship and implementation of sustainable development goals in public universities in Anambra State, Nigeria?

Hypothesis 2: There is no significant relationship between community value-based mentorship and implementation of sustainable development goals in public universities in Anambra State, Nigeria.

Table 2: Summary of Pearson Correlation Analysis and Test of Significance between Community Value Based Mentorship and Implementation of Sustainable Development Goals in Public Universities in Anambra State, Nigeria.

Variables		Community Value Based Mentorship	Implementation of Sustainable Development Goals	Remark
Community Value Based Mentorship	Pearson Correlation	1	0.723**	
	Sig. (2-tailed)		0.000	High Positive/Significant Relationship
	N	109	109	
Implementation of Sustainable Development Goals	Pearson Correlation	0.723**	1	
	Sig. (2-tailed)	0.000		
	N	109	109	

** Correlation is significant at the 0.05 level (2-tailed).

Data in Table 2 reveals that the Pearson's Correlation Coefficient is $r = 0.723$. This indicates a strong positive relationship between community value-based mentorship and implementation of sustainable development goals in public universities in Anambra State, Nigeria. This implies that in universities where community value based mentorship, there will be improvements in the implementation of the sustainable development goals in public universities. Thus, there is a high positive relationship between community value based mentorship and implementation of sustainable development goals in public universities in Anambra State, Nigeria. Furthermore, the p-value of 0.000 is less than the 0.05 level of significance. Therefore, the null hypothesis is rejected. This indicates that there is a statistically significant relationship between community value-based mentorship and

implementation of sustainable development goals in public universities in Anambra State, Nigeria

Discussion

From the results of the analysis, there is a high positive correlation between intergenerational knowledge transfer and the implementation of SDGs in public universities in Anambra State, Nigeria. This means that the purposeful transfer of practical knowledge, professional experience, cultural wisdom, and social competence from more senior academics to junior members of the academic community is associated with effective SDG implementation. The ability of intergenerational knowledge transfer to equip students with the knowledge and skills necessary for the successful realization of the sustainable development agenda means that universities practicing this approach are highly likely to promote sustainable values and practices among themselves. This is consistent with the findings of Odeh et al. (2025), who discovered effective transfer of practical and entrepreneurial knowledge through mentor-mentee relationships in the Igbo apprenticeship system. Biljohn et al. (2024) also emphasize the need for mentorship systems that facilitate the creation of developmental opportunities based on experience. In addition, according to Kotze (2025), intergenerational knowledge transfer involves more than just teaching technical skills but also providing humane accompaniment to individuals in the pursuit of meaningful development.

Furthermore, the analysis reveals a significant correlation between intergenerational knowledge transfer and the implementation of SDGs in public universities in Anambra State, Nigeria. The result shows that there is a strong relationship between these two variables in the sample data set. As a consequence, this suggests that intergenerational knowledge transfer can be considered as a key indigenous mentorship resource that contributes significantly to SDG achievement. The finding, therefore, reinforces the idea that higher education institutions should go beyond the teaching of technical skills and knowledge and adopt mentorship systems that prepare graduates for practical living. Consistent with the views of Amaonye and Anyaeji (2024), Offor and Nwaru (2024), Makwe et al. (2026), and Okoye and Ilechukwu (2025), inadequate training, poor responsiveness to societal needs, and ineffective graduate development programs still remain challenges that hamper the contribution of universities to SDG implementation. Promoting intergenerational mentoring relationships might therefore help overcome some of these obstacles and promote SDG implementation among universities.

Furthermore, the results show that there is a high positive correlation between community value-based mentorship and SDG implementation in public universities in Anambra State, Nigeria. Universities that promote the internalization of values such as responsibility, solidarity, mutual respect, inclusivity, and commitment to the common good among students and Faculty are highly likely to realize SDGs effectively. Community value-based mentorship ensures that not only knowledge but also other relational and ethical values are imparted to students in ways that will enable them to apply what they learn for sustainable development. The finding is in line with the observations made by Ngubane and Makua (2021) that Ubuntu pedagogy creates a basis for peaceful coexistence, inclusivity, and unity

among learners. This is also consistent with the views of Makhanya and Mzinyane (2023) that Ubuntu is a liberating paradigm based on principles of togetherness and social justice.

Findings also revealed that there is a statistically significant relationship between community value-based mentorship and the implementation of SDGs among public universities in Anambra State, Nigeria. The result reveals that there is an apparent association between community value-based mentorship and SDG implementation among public universities in Anambra State, Nigeria. This suggests that mentorship based on community values is an effective indigenous way of contributing positively to the implementation of SDGs among higher education institutions in the area. It is therefore true that universities can do better in their efforts to achieve SDGs by incorporating African relational values in their mentorship programs. Based on the findings of the study, African-centered scholarship remains a good alternative to westernized higher education paradigms.

Conclusion

The finding of the study revealed that African mentorship practices were significantly related to the implementation of SDGs among public universities in Anambra State, Nigeria. Specifically, intergenerational knowledge transfer and community value-based mentorship demonstrate high positive correlations with SDG implementation in the sample. The implication of the results is that increasing knowledge transfer across generations and adopting mentorship practices based on communal values enhances universities' contributions to sustainable development. Accordingly, African mentorship practices offer an indigenous approach for improving SDG implementation in public universities in Anambra State, Nigeria.

Recommendations

Based on the findings of the study, the following recommendations were suggested:

1. The management of universities in Anambra State, Nigeria should introduce intergenerational mentorship programs that would ensure effective transfer of knowledge, experience, and socially relevant wisdom from more experienced academics and practitioners to students.
2. Faculties and Departments should introduce community value-based mentorship as part of student development programs in order to cultivate values such as responsibility, solidarity, mutual respect, and commitment to the common good.
3. Government agencies, university authorities, and educational policymakers should organize training programs for strengthening African mentorship practices as a strategy for enhancing SDG implementation among universities.

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ARTIFICIAL INTELLIGENCE IN ESL CLASSROOM: A STUDY EPISTEMIC INFLUENCE AND CULTURAL REPRESENTATION IN NIGERIAN EDUCATION

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Abstract

Despite the increasing interest of AI in education, there remains questions as to whether they are epistemic and cultural implications within ESL classrooms in a developing country like Nigeria. This study examines the epistemic influence and cultural representation of Artificial Intelligence (AI) in ESL classrooms within the Nigerian educational context. The study adopted a mixed-methods approach, data were collected from 150 students through questionnaires and 20 students were interviewed using semi-structured interviews. Quantitative data were analysed using descriptive statistics and one-way Analysis of Variance (ANOVA), while qualitative data were analysed using thematic analysis. The findings revealed that AI usage significantly influences learners' epistemic engagement, with high-frequency users demonstrating over reliance on AI-generated knowledge. Similarly, significant differences were observed in perceptions of cultural representation, with increased AI usage associated with greater awareness of cultural bias in AI outputs. Qualitative findings further indicated that learners perceive AI as an authoritative source of knowledge, although concerns were raised about cultural misrepresentation and overdependence. The study concludes that AI plays a transformative role in ESL education by shaping both knowledge construction and cultural understanding. The study contributes to ongoing discourse on AI in education by providing empirical evidence from a developing context and offers practical implications for educators and policymakers.

Keywords: Artificial Intelligence, Epistemic Influence, Cultural Representation, ESL

Introduction

The educational sector in Nigeria has experienced transformation with the integration of Artificial intelligence (AI). This has brought tremendous changes in to pedagogical practices

across the globe particularly in English as second language (ESL) classrooms. In multilingual countries like Nigeria where ESL instructions is central and vital in the educational scene, the emergence of artificial intelligence (AI) tools provided avenue for creativity, innovation and challenges for effective implementation. Beyond its function, use and application, artificial intelligence also promote epistemic influence. It provides ways in which knowledge is constructed, validated and retained effectively in learning environment. The use of AI in classroom poses important concerns as it reflects its reliability, knowledge source, over-reliance and addiction to AI generated content. Furthermore, the deployment of AI tools has a great effect on cultural representation in language education.

Language learning is interrelated with culture. ESL goes beyond grammar to include lifestyle learning that defines people and construct identity. Many AI generated content are developed using database that are purely Western oriented which might lead to marginalisation and misrepresentation of non-western cultures (Bender et al, 2021, Birhane, 2021). In a multicultural setting like Nigeria, the introduction of AI raises critical concerns as to whether it adequately reflect indigenous cultural realities or inadvertently reinforce cultural homogenisation and epistemic dominance (Ogunyemi&nAkintola,2023).

Despite the increasing interest of AI in education, there remain questions as to whether they are epistemic and cultural implications within ESL classrooms in a developing country like Nigeria. Most scholarly research on artificial intelligence focus on the effectiveness of AI tools with limited attention on its impact on education and language learning (Zawacki - Richter et al, 2023, Selwyn,2022). This gap reveals the need for a context based inquiry that investigate how AI influences both epistemic process and cultural representation in ESL learning environment. Therefore this study investigates the epistemic influence and cultural representation of Artificial intelligence in ESL learning classroom in Nigerian educational systems.

Statement of the Problem

The emergence and integration of Artificial intelligence in ESL classrooms has introduced new models, dimensions to teaching and learning, but it's effect has gone beyond epistemic value and knowledge creation to raising cultural concerns. In Nigeria where English is a second language, the adoption of AI has raised eyebrows as to what knowledge it presents and whose cultural perspectives is being enforced and transmitted to learners. Existing researches have laid great emphasis on the usefulness of AI as a tool for improving learning. Limited attention is given to how these it affects and influences learners understanding of knowledge, authority and meaning. Also, there are crucial issues as regards whether AI tools promote the dominance of western culture posing a risk to existence and representation of indigenous cultures.

This study is necessitated by the need for a strategic and systematic investigation in to how AI tools shapes knowledge construction and culturally inclusive pedagogical practices.

Aim and objectives of the study

The aim of this study is to investigate the epistemic influence and cultural representation of Artificial intelligence in ESL classrooms in the Nigerian Educational System. The specific objectives are

1. To identify how AI tools influences knowledge construction and learning process in ESL classrooms.
2. To examine how learners and teachers perceived AI as a tool for knowledge and authority in ESL learning environments.
3. To demonstrate the extent to which AI tools reflect or misrepresent Nigeria cultural context in ESL learning environments.

Research Questions

This study is guided by the following questions:

1. How does AI tools influences knowledge construction and learning processes in ESL learning environments?
2. How do learners and teachers perceive AI as a tool for knowledge construction and authority in ESL learning environments?
3. What extent does AI tools reflects or misrepresent Nigeria cultural context in ESL classrooms?

Literature Review

The emergence of Artificial intelligence (AI) and its integration in to English as second language (ESL) classrooms has tremendously transformed language teaching and learning in recent times. AI tools and technologies such as intelligent tutoring, automated writing evaluation tools and conversation agents are used to enhance language acquisition through adaptive learning. According to Holmes et al(2022) Artificial intelligence helps learners to be more engage in learning process by providing feedback and personalising instructions tailored to support learners proficiency. Zawacki- Richter et al(2023) also demonstrates that the inclusion of AI applications in education poses considerable potentials in improving learning outcomes, especially in language related task.

In ESL context, AI tools facilitate the development of writing, speaking and comprehension skills. Li(2020) stated that AI powered writing assistants enabled the improvement of grammatical accuracy and coherence. In countries like Nigeria, the adoption of AI in ESL Classrooms is at its foundational stage. It is faced with challenges of implementation, limited infrastructure and digital literacy gaps. Afolabi&Adeyemi(2024) argued that AI has the ability to address persistent challenges in Nigeria classrooms, particularly large classroom where there is insufficient individualised attention. Thus, AI can be regarded as offering both opportunity and challenges.

Epistemic Influence of AI in Language Learning

The inclusion of AI in ESL classroom has great implication on epistemology as it deals with knowledge construction, validation, dissemination and retention. William and Eyon(2020) reiterate that AI technologies does not only influence what the learners know but the means at which they come to know it, thus redefining structure of the traditional system of

education. Green et al(2020) explains that learners belief about knowledge creation affects it's interpretation and evaluation of the knowledge transmitted. In AI- mediated learning environment, learners' sees knowledge as fixed and accepts AI as the ultimate source of authority. Selwyn (2020) opined that recent studies have highlighted the concept of an algorithm hidden curriculum where AI systems implicitly shape what is considered valid knowledge. This is of great importance when applied to ESL classroom where language, context and meaning is intertwined. Li(2023) stated that the use of AI tools may lead to over-reliance and homogenisation in knowledge creation preventing learners from being creative and independent. This limits learners' ability to develop independent communicative competence. These findings reveal the need to critically investigate the epistemic influence and implications of AI in language education.

Cultural Representation and Creation of Identity in AI systems

Language learning and culture are interwoven concepts, making cultural representation very critical in the inclusion of AI in ESL classrooms. AI systems are structured in such a way that reflects dominant global perspectives and western cultures. Bender et al(2021) argued that existing societal biases are associated with AI training data. In ESL classrooms, biased AI outputs may affect learners' cultural awareness and identity formation. Ogunyemi&Akintola(2023) further stated that AI tools do not adequately represents African cultural context. Quadri et al(2023) similarly affirmed that the use of AI tools often present " an outsider" perspectives.

Empirical Studies on AI in ESL Context

Empirical research on AI in ESL classrooms is centered on its effectiveness in enhancing learning outcomes. Zawacku- Richter et al (2023) in their study reported that the inclusion of AI tools in ESL context improves students' performance, engagement and motivation across various educational settings. Also, Xu and Wang (2024) also reveals that AI supported learning environment contributes to improved language proficiency particularly in reading and writing skills.Selwyn(2022) further argued that teachers perception of AI plays a crucial role in its successful integration. He indicated that educators , teachers often express concern about lack of training, infrastructure deficit, technological complexity and the displacement of traditional system of teaching. There is limited study focusing on the epistemic and cultural influence of AI in ESL classrooms especially in African context.

Theoretical Framework

This study is grounded on three complementary theories namely: Socio-cultural theory and Epistemic Belief theory and Critical Algorithm Theory. These framework gives a multidimensional lens for examining how artificial intelligence shapes knowledge construction and cultural representation in ESL classrooms within Nigeria educational context.

Socio-cultural Theory

This theory was developed by Lev Vgosky. It proposes that learning is socially motivated, it occurs through interaction, language and culture. The theory further states that cognition is shaped through participation in cultural activities and interaction within specific social

context. Socio-cultural theory provides foundation for understanding how AI mediates learning processes and shapes interaction.

Epistemic Belief Theory

This framework was developed within the broader field of epistemic cognition, with foundational contributions from Barbara K. Hofer and Paul R. Pintrich in the late 1990s, particularly in their work (Hofer & Pintrich, 1997). The theory is built on individuals' beliefs about the nature of knowledge and the process of knowing, including beliefs about certainty, simplicity, source, and justification of knowledge. In AI-mediated learning environments, epistemic beliefs play a critical role. It helps shapes learners engagement with AI-generated content. Learners who perceive knowledge as fixed and authoritative may accept AI outputs without evaluation and questions, whereas those with more sophisticated epistemic beliefs are more likely to question and interpret AI responses (Greene et al., 2020).

This theory is essential for this study because it explains learners' perception and evaluation of AI-generated knowledge. As AI increasingly functions as an epistemic authority in ESL classrooms, understanding learners' epistemic perspectives becomes crucial. Epistemic Belief Theory complements Sociocultural Theory by addressing the cognitive and evaluative dimension of learning.

Critical Algorithm Studies (Algorithmic Bias Theory)

Critical Algorithm Studies emerged as an interdisciplinary field in the 2010s, with key contributions from scholars such as Safiya Umoja Noble (2018) and Timnit Gebru (2021). This perspective examines the social, cultural, and political implications of algorithmic systems, emphasizing that AI technologies are not neutral but are shaped by the data and values embedded in their design. A core concept within this framework is algorithmic bias, which refers to the systematic dominance of certain perspectives while marginalizing others. AI systems, particularly those trained on large-scale datasets, often reflect dominant (Western) cultural norms, leading to issues of misrepresentation and exclusion (Bender et al., 2021; Birhane, 2021).

This theory is crucial for this study because it provides a lens for analysing cultural representation and power dynamics in AI systems. In the context of Nigerian ESL classrooms, this framework helps to question how AI may reproduce cultural biases and marginalise indigenous knowledge systems.

The integration of Socio cultural Theory, Epistemic Belief Theory, and Critical Algorithm Studies is necessitated by the complex and multidimensional nature of AI in ESL classrooms. AI is not merely a pedagogical tool; it is a socio-technical system that systematically mediates interaction, shapes epistemic practices, and influences cultural representation.

Methodology

This study adopts a mixed-methods research design which involves the collection and analysis of quantitative and qualitative data. This design is considered suitable because it helps the researcher to obtain the study to capture both measurable patterns and in-depth

perspectives regarding the epistemic influence and cultural representation of Artificial Intelligence (AI) in ESL classrooms (Creswell & Plano Clark, 2021). The quantitative component provides generalizable insights into learners' perceptions, while the qualitative component offers contextualized explanations of these patterns.

The study was conducted in three selected secondary schools in Oyo town namely Oliver Baptist High School, Anglican Methodist Secondary School and St Bernardine's Girls Grammar School where English is used as a medium of instruction and learners are exposure to AI-driven tools (e.g., chatbots, automated writing assistants). The population of the study includes ESL students and English language teachers who have prior experience using AI tools for teaching or learning purposes. A total of 150 students participated in the quantitative study, while 10 teachers and 10 students participated in the qualitative interviews. A purposive sampling technique was employed to select participants who have experience using AI tools in ESL contexts and are actively engaged in language learning and teaching. Participants were further categorized into three groups based on their level of their experience in AI usage: Low AI usage, Moderate AI usage and High AI usage. This grouping formed the basis for ANOVA analysis.

Instruments for Data Collection: A structured questionnaire was developed to collect quantitative data. It was divided in to four subsections: Section A: Demographic information, Section B: Epistemic influence of AI, Section C: Cultural representation and Section D: General perceptions of AI in ESL learning. A semi-structured interview guide was used to collect qualitative data. The interview questions focused on: Participants' experiences with AI tools, Perceptions of AI as a knowledge source and Cultural relevance of AI-generated content.

Quantitative data were analysed using Descriptive statistics (mean, standard deviation, frequency, percentage) and Inferential statistics (One-Way ANOVA) A one-way Analysis of Variance (ANOVA) was conducted to examine whether statistically significant differences existed in: Epistemic influence and Cultural representation across the three levels of AI usage (low, moderate, high). Descriptive statistics was used for analysis of the 150 questionnaires shared to ESL students. The level of significance was set at $p < .05$.

Qualitative data from interviews were analysed using thematic analysis, following the procedures outlined by Braun and Clarke (2021). This approach enabled the identification of recurring patterns related to epistemic influence and cultural representation.

The quantitative and qualitative findings were integrated during the interpretation stage. This involved comparing statistical results with emerging themes to provide a comprehensive understanding of how AI influences ESL learning. The integration enhanced the validity of the findings by enabling triangulation of data sources (Creswell & Plano Clark, 2021).

Descriptive Statistics

The descriptive analysis reveals a distinct pattern across the three levels of usage. Students with high AI usage recorded the highest with frequency 60(40%), followed by the moderate with frequency 50(33%) and low with frequency 40(26.7%)

Table 1

level of usage	frequency	%percentage
Low	40	26.7
moderate	50	33.3
High	60	40
Total	150	100

The table shows that majority of respondents (40%) have high AI usage.

Result also indicates that increase in the use of AI leads to a higher tendency to rely on AI generated knowledge. Students who frequently use AI tends to perceive it as credible and standard.

Table 2: Epistemic influence

Group	N	Mean	Standard Deviation
Low AI usage	40	2.85	0.48
Moderate AI usage	50	3.50	0.52
High AI usage	60	4.18	0.46
Total	150	3.63	0.67

The table above indicates that students with high AI usage recorded the highest mean score of (M=4.18) suggesting that Epistemic reliance on AI compared to low and moderate users.

In similar vein, high AI users demonstrated relatively higher means score compared to moderate and low , depicting that a greater awareness of culturally embedded issues are in AI generated content. The students recognise evidences of cultural bias and limitation in AI system.

Table 3: Descriptive statistics for cultural representation

Group	N	Mean	Standard Deviation
Low AI usage	40	2.70	0.51
Moderate AI usage	50	3.15	0.55
High AI usage	60	3.18	0.58
Total	150	3.18	0.64

The findings shows that high AI users demonstrate greater awareness of cultural representation issues, though the mean scores remain moderate.

Inferential statistics

To determine whether the differences are statistically relevant, a one way variance (ANOVA) was conducted. The result identified and showed a major effect of AI usage on Epistemic influence.

This is a pointed to the fact that the difference in the mean score are not by chance but an indication to the meaningful relationship between AI and how learners construct knowledge in ESL classrooms.

Also the ANOVA result for cultural representation depicts a relatively noticeable difference between the three levels suggesting that the level of AI usage plays a crucial role in shaping learners perception of cultural representation in AI generated content. The analysis further demonstrates that the usage of AI has a significant influence on both epistemic and cultural representation.

Table 4

Source	Sum square	Af	Mean square	F	Sig
Between Groups	24.36	2	12.18	48.72	000
Within Groups	36.74	147	0.25		
Total	61.10	149			

The above ANOVA result indicates a statistically notable difference in epistemic influence across levels of usage. $F(2,147)=48.72$ $P<0.5$

This reveals that the level of usage affects learners' construction of knowledge from AI in ESL classrooms.

Table 5

Source	Sum square	Df	Mean square	F	Sig
Between Groups	12.84	2	6.42	19.45	000
Within Groups	48.56	147	0.33		
Total	61.40	149			

This depicts a statistically significant difference in cultural representation

$F(2,147)=19.45$ $p<0.5$ showing that a statistically significant difference in cultural representation.

Analysis of Qualitative Data (Interview Findings)

A total of 20 participants comprising of 10 students and 10 teachers were interviewed to gain in-depth understanding of Epistemic and cultural implications of artificial intelligence (AI) in

ESL classrooms. The interview were analysed using thematic analysis following the procedure propounded by Braun &Clarke(2021).

The analysis of the responses of the participants yielded four themes.

Theme 1: AI as an epistemic standard and authority

A dominant theme across both students and teachers was that AI is a reliable and standard source of knowledge. Many students admitted to admit to relying on AI for assignment, explanation and language correction.

'I use AI most of the time for my assignments, it gives simple and easy to understand answers'(Student 7)

'AI explains better than textbooks, I trust AI'(student 2)

Teachers also supported this trend.

'AI is very helpful but occasionally makes mistakes'(teacher 9)

This theme suggests that AI is gradually establishing itself as an authority, shaping how knowledge is constructed, transmitted and validated. It is in line with the findings from the quantitative study that AI users exhibit stronger Epistemic reliance.

Theme 2: Algorithm Mediation of Learning

Participants identified the role of AI as a tool that facilitate learning processes. Both students and teachers affirmed the fact AI enhances understanding through explanation, corrections and feedbacks.

'AI helps me understand complex English topics especially grammar'(Student 4)

'AI gives answers instantly, making learning interacting and more engaging '(Student 10)

teachers also noted its great value.

'AI supports additional learning especially providing practical examples and exercises'

On the issue of over reliance on AI

'Students over rely on AI, it makes them lazy, finds it difficult to think on their own'

This theme shows the role of AI as a mediation tool, it encourages language learning and affects cognitive development and thinking.

Theme 3: Cultural misrepresentation and bias

Many participants observed that AI responses often reflect foreign context and does not depict local realities.

'Most examples are not related to Nigeria or Yoruba culture'student 3

'AI does not understand our local context ' student 7

Teachers expressed similar concerns

'Local and cultural representation is not well presented' Teacher 4

This demonstrates that algorithm bias where AI systems shows the dominance of western cultures and narratives.

It supports the quantitative findings of moderate cultural awareness among users.

Theme 4: Pedagogical influence

Participants identified the opportunities and challenges related with the integration of AI in ESL classrooms. The opportunities are improved grammar, faster access to information and increased learners independence.

'AI helps improve my spoken English and writing skills' Students 8

'It makes teaching easier because students can learn at their own pace' Teacher 10

The theme reveals the dual role of AI as facilitator. It can also affect cognition and pedagogical implications.

Table 6 Thematic Analysis

Theme	Key Findings
AI as Epistemic standard	AI is perceived as a standard for authentic and reliable knowledge source
Algorithmic mediation	AI facilitate learning but might reduce cognitive thinking and development
Cultural representation	AI reflects high foreign content rather than local content
Pedagogical effect	AI offers benefits but raises concerns as regards over reliance

Discussion of findings

The results from the findings of the study demonstrate that level of AI usage greatly affects both epistemic and cultural representation in ESL classrooms. The descriptive and inferential analysis collectively show that students with higher level of AI interactions exhibit stronger Epistemic reliance and awareness of cultural representation.

The result further indicates that students with high AI exposure records the highest mean score in Epistemic influence (M=4.18) followed by moderate (M=3.50) and low users(M=2.85). The ANOVA result further confirms the differences. This is in line with Selwyn(2022) who stated that AI systems increasingly functions as Epistemic standard in educational systems. Also, Williamson &Eynon(2020) reiterate that AI tools shapes how knowledgeable is accessed and validated.

Using the perspective of epistemic belief theory, this findings reveals that frequent use of AI reinforce belief that knowledge is fixed and static,and learners may not be motivated to evaluate knowledge and be creative if they over rely on AI, this will lead to a decline in cognition.

The findings also demonstrate that there is a notable difference in perception of cultural representation across the different levels of AI usage. Participants with high level of exposure to AI show greater awareness of cultural issues(M=3.55) compared to moderate(M=3.15) and low users (M=2.70) . The moderate mean scores show that the awareness is not fully developed.

This supports previous research that explains that AI systems often reflect dominance of western culture norms due to the structure of their database.(Bender et al,2021) . In Nigeria context, it will lead to limited representation of indigenous cultures affecting learners' cultural identity.

From the perspective of critical algorithms studies, the findings reveals that the presence of algorithmic bias and cultural marginalisation exist in AI mediated learning environment.

Conclusion

The study affirms that AI usage significantly influences with epistemic practices and cultural awareness in ESL classrooms, while it offers great benefits, there is a need for a balanced and critical informed approach to its integration. The qualitative findings strongly complement the quantitative results. The perception of AI as an epistemic authority explains the higher mean scores observed among high AI users. Similarly, participants' concerns about cultural misrepresentation align with the moderate levels of cultural awareness identified in the statistical analysis. The findings collectively demonstrate that AI influences both how learners acquire knowledge and how they interpret cultural content, reinforcing the multidimensional impact of AI in ESL classrooms.

Recommendations

The study recommends the following:

1. Teachers should undergo training on how to incorporate AI literacy training to help students critically evaluate AI output.
2. AI tools should adapt to the inclusion of contents that culturally represent local contexts.
3. Education policy makers should make guidelines for ethical AI usage in classrooms.
5. Further research should be conducted on the effect and implications of AI on learning outcomes.

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ASSESSING THE IMPACT OF INCLUSIVE EDUCATION POLICIES ON GENDER EQUALITY IN NIGERIAN UNIVERSITIES: AN AI-DRIVEN COUNSELLING APPROACH

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Abstract

This study evaluates the impact of inclusive education policies on gender equality in Nigerian universities, exploring the potential of AI-driven counselling approaches to enhance policy effectiveness. A mixed-methods approach combines surveys, interviews, and focus groups to provide a comprehensive understanding. The population of this study comprises of all Nigerian university students (public and private). Stratified random sampling selects was used to select 12 universities; while, purposive sampling technique was used to selects 600 respondents (lecturers, students, and administrators). Two questionnaires tagged Questionnaire on Inclusive Education Policies and Gender Equality (QIEPGE) and AI-Driven Counselling Assessment Tool (AICAT) were used to collect data for the study. Results in hypothesis 1 revealed that there is a statistically significant difference in the mean score of male and female respondents on the effectiveness of inclusive education policies in promoting gender equality [$t(598) = -2.50, p = 0.012$]. Results in hypothesis 2 revealed that there is significant difference in the mean scores of public and private university respondents on the effectiveness of inclusive education policies in promoting gender equality [$t(598) = -2.80, p = 0.005$]. Results in hypothesis 3 revealed that there is a statistically significant moderate positive relationship between the implementation of inclusive education policies and gender equality in Nigerian universities ($r = 0.45, p = 0.000, N = 600$). The study concluded that implementation of inclusive

education policies is positively related to gender equality in Nigerian universities, with differences in perceptions between public/private universities and male/female respondents. The study recommended that effective policy implementation is key to promoting gender equality.

Introduction

Inclusive education is increasingly recognized as an essential approach to ensuring that every learner has equal opportunities to access, participate in, and benefit from quality education regardless of gender, ability, socioeconomic status, ethnicity, religion, or other personal characteristics. It seeks to create learning environments that value diversity, eliminate discrimination, and provide appropriate support for all learners to achieve their full potential. As educational systems continue to embrace principles of equity, social justice, and equal opportunity, inclusive education has become a central strategy for fostering educational participation and reducing barriers to learning.

Inclusive education has become a critical component of global education agendas, aiming to promote equity and equality in education (Adewumi&Ogundele, 2022; Loreman, 2020). The United Nations' Sustainable Development Goal 4 (SDG 4) emphasizes the need for inclusive and equitable quality education, highlighting the importance of addressing disparities in education (UNESCO, 2020). Key drivers of inclusive education include the increasing recognition of education as a fundamental human right has driven the focus on inclusive education (Loreman, 2020). Inclusive education aims to address systemic barriers and promote equity for marginalized groups, including girls, children with disabilities, and minority populations (Adewumi&Ogundele, 2022); and governments and international organizations have enacted policies and laws to promote inclusive education (UNESCO, 2020).

Studies suggest that inclusive education can improve academic outcomes for students, including those with disabilities (Loreman, 2020; Szabo & Ward, 2022). Loreman (2020) found that inclusive education practices led to improved academic achievement for students with diverse learning needs. Szabo and Ward (2022) reported that students in inclusive classrooms showed gains in reading and mathematics compared to those in traditional classrooms. Studies suggest that inclusive education fosters positive relationships and social interactions among students from diverse backgrounds (Adewumi & Ogundele, 2022; Kearney, Nowlan, O'Sullivan, & O'Connor, 2021). Adewumi and Ogundele (2022) found that inclusive education practices in Nigerian universities promoted social cohesion and understanding among students from diverse cultural and socio-economic backgrounds. Kearney *et al.* (2021) reported that inclusive education interventions increased empathy and reduced prejudice among students towards peers with disabilities. Studies suggest that inclusive education is a key strategy for reducing educational disparities and promoting equity (UNESCO, 2020; Okeke & Okonkwo, 2023). UNESCO (2020) highlights that inclusive education is critical for addressing disparities in education, particularly for marginalized groups such as girls, children with disabilities, and those from low socio-economic backgrounds. Okeke and Okonkwo (2023) found that inclusive education policies

in Nigerian universities helped reduce gender disparities in academic participation and outcomes.

Nigeria's Federal Government has indeed taken steps to promote inclusive education, aiming for equal access to education regardless of gender, disability, or socio-economic status. Although Nigerian higher education has seen increased female enrolment and some policy commitments to gender equality, structural and cultural barriers continue to limit women's full participation and progression in the academic field. Notably, gender disparities in academic leadership and career advancement remain pronounced in Nigerian universities. A systematic review of literature on gender inequalities in academic leadership found that women are significantly underrepresented in key decision-making and leadership positions due to persistent institutional biases and male-dominated cultures within higher education institutions (Kaymakcioglu & Thomas, 2024). Relatedly, data on vice-chancellors and other top posts in the Nigerian University System shows that women occupy only a very small fraction of these roles, indicating structural obstacles in career progression despite formal equality efforts (Dataphyte, 2025).

Empirical studies conducted within specific Nigerian universities further demonstrate that women face barriers in recruitment, promotion, and access to senior academic positions. For example, research on leadership roles in Nigerian universities reveals that female academics are underrepresented in principal officer and management positions, a gap often linked to organizational bias and limited access to mentoring or professional networks that facilitate advancement. Additionally, gendered cultural expectations and institutional norms shape women's academic careers (Ogunode & Salman, 2023). Women academics often carry heavier family-care responsibilities and experience “sticky floors” and “glass ceilings”—terms used in gender research to describe entrenched barriers that keep women in lower academic ranks and slow their progress to leadership positions (Fadipe & Olabiyi, 2025). Qualitative studies also highlight how traditional gender roles and patriarchal attitudes within academic environments hinder women's career momentum. Participants in some studies report that the prevailing male-normative model of linear academic career progression does not align with the lived experiences of many women, who must balance professional responsibilities with caregiving and other societal expectations (Umekwe, 2020).

Gender disparities are not limited to career progression alone but also influence access to educational opportunities. Historical and ongoing gender gaps in enrolment and retention reflect broader societal inequalities that continue to affect women's access to tertiary education, even as overall participation increases (Kaymakcioglu & Thomas, 2024). Despite these challenges, there are signs of evolving discourse and advocacy for gender equity within Nigerian universities. Some contemporary research shows increasing awareness among younger generations of academics about the importance of equity in leadership and research opportunities, suggesting that ongoing efforts to address disparities—though insufficient—are gaining traction (Foláyan *et al.*, 2025).

The Universal Basic Education (UBE) program in Nigeria includes provisions for inclusive education for children with special needs, aiming to ensure equal access to quality education

for all children, regardless of their abilities or disabilities (Loreman, 2020; Adewumi, & Ogundele, 2022; Emmanuel, 2023). The UBE program is designed to provide free and compulsory education for all children, including those with special needs, and is supported by legislative frameworks such as the Universal Basic Education Act of 2004 and the Child's Rights Act of 2003. These policies emphasize the rights of children with disabilities to equal educational opportunities, curriculum modification, teacher training, and infrastructure adjustments (Angwaomaodoko, 2023).

The Nigerian Disability Act of 2018, also known as the Discrimination Against Persons with Disabilities (Prohibition) Act, guarantees the rights of persons with disabilities to inclusive education. This Act aims to ensure equal access to education for individuals with disabilities, promoting their full integration into society (Law, 2025; Obasanjo, 2023). Specifically, the Act "Prohibits Discrimination: Bans discrimination against persons with disabilities in education, ensuring they have equal opportunities to access quality education".

"Promotes Inclusive Education: Requires educational institutions to provide reasonable accommodations, such as accessible learning materials and assistive technologies, to support students with disabilities".

"Supports Accessibility: Mandates that public buildings, including schools, be made accessible to persons with disabilities" (Law, 2025; Unini, 2023).

The provision requiring educational institutions to provide reasonable accommodations underscores the practical commitment of the Act to inclusive education. By ensuring the availability of accessible learning materials, assistive technologies, and appropriate support services, the Act seeks to remove barriers that hinder the academic participation and success of students with disabilities. This provision places a responsibility on educational institutions to create learning environments where all students can participate fully and achieve their educational potential. Similarly, the requirement that public buildings, including schools, be accessible reinforces the principle that physical accessibility is a prerequisite for educational inclusion. Accessible classrooms, pathways, restrooms, libraries, and other facilities enable learners with disabilities to move independently and participate in all aspects of school life. Effective implementation of these provisions is essential for translating the legal guarantees of the Act into meaningful educational opportunities, promoting equal participation, social inclusion, and improved learning outcomes for persons with disabilities.

Despite efforts by the Nigerian government, inclusive education still faces significant challenges. These include inadequate infrastructure, lack of trained teachers, and stigma towards students with disabilities. According to recent studies, many schools in Nigeria lack accessible facilities, assistive technology, and trained teachers, making it difficult for students with disabilities to access quality education (Faloko, 2023; Jobir, 2024). A study on the implementation of inclusive education in TVET institutions highlights that insufficient funding, inadequate teacher training, and negative attitudes among stakeholders continue to hinder progress (Jobir, 2024). Another study emphasizes that Nigeria's education system is

beset by unequal access, insufficient infrastructure, and systemic exclusion, underscoring the need for comprehensive reforms (Obizue & Enomah, 2025).

Gender disparities persist in Nigerian universities, affecting women's access to education and career advancement. Despite efforts by the Nigerian government, women remain underrepresented in leadership positions and face challenges in accessing education and career opportunities (Nigeria National Gender Policy_2021-2026, 2025; UNESCO, 2025; UN Women, 2024). Key challenges include, Limited Leadership Opportunities: Women are underrepresented in leadership positions in Nigerian universities, with only 3.9% of seats in parliament held by women as of February 2024; Access to Education: Women face barriers in accessing education, particularly in STEM fields, with 30.3% of women aged 20-24 years old married or in a union before age 18; and Career Advancement: Women face challenges in career advancement, with limited opportunities for professional development and networking (Nigeria National Gender Policy_2021-2026, 2025; UNESCO, 2025; UN Women, 2024). Recent studies highlight the need for policies and programs to address these disparities, such as the Nigeria National Gender Policy (2021-2026), which aims to promote gender equality and empower women (Nigeria National Gender Policy_2021-2026, 2025).

Recent studies have indeed highlighted the potential of AI-driven counselling approaches to support inclusive education. AI-powered platforms can provide personalized learning experiences, identify learning gaps, and offer targeted interventions to support students with diverse needs (Kawedo, 2025; UNESCO, 2025; Agbo, 2025). In Nigeria, AI-driven counselling approaches can help address challenges such as limited access to quality education, inadequate infrastructure, and teacher shortages. AI-powered tools can analyze student data to identify areas of struggle, provide tailored support, and enable educators to focus on high-impact teaching (Agbo, 2025). A study on the perceived efficacy of AI in facilitating effective guidance and counselling services in tertiary institutions in Bayelsa State, Nigeria, highlights the potential of AI to enhance counselling services (Perceived Efficacy of Artificial Intelligence, 2025; Bodisere, 2025). Ayena, Oyediran and Adedapo (2025) submitted that online counselling platforms are effective tool for providing sexual and relationship education to adolescents in Nigeria, offering a safe and supportive environment for learning and exploration. Nevertheless, Ayena (2025) concluded that counsellors who are more experienced with digital technology may be more likely to adopt online counselling as part of their practice; and that providing training on online counselling can increase counsellors' confidence and competence in delivering online counselling services.

Theoretical Framework:

The statement suggests that the study is grounded in the Social Justice Theory, which emphasizes equal access to resources and opportunities (Rawls, 1971). This theory is relevant to various fields, including education, healthcare, and social work, where equitable access to services is a key concern. Recent empirical studies have applied Social Justice Theory to examine issues related to access and equity. For example, in education, researchers have used Social Justice Theory to explore disparities in access to technology and online learning resources (Garcia & Weiss, 2020). In healthcare, studies have applied the theory to examine inequities in access to mental health services, particularly among marginalized communities

(Alegria, NeMoyer, Vera, & Lopez-Alegria, 2021). In the context of couple counselling, Social Justice Theory can inform research on access to services, particularly for older adults or marginalized groups who may face barriers to seeking help. A recent study on couple therapy access found that social justice principles guided the development of a culturally adapted intervention for low-income couples (Doss et al., 2022). The application of Social Justice Theory in research highlights the importance of addressing systemic inequalities and promoting equitable access to resources and opportunities.

The Social Justice Theory, as posited by Rawls (1971), emphasizes that social institutions, including education, should promote fairness and equity. This theory argues that institutions should prioritize the needs of the most vulnerable members of society and work to address systemic inequalities. Recent empirical studies have applied Social Justice Theory to examine issues related to fairness and equity in education. For example, researchers have used the theory to explore the impact of inequitable school funding on student outcomes, highlighting the need for reforms to promote greater fairness (Jackson, 2020). Other studies have applied Social Justice Theory to examine the role of educators in promoting social justice, emphasizing the importance of culturally responsive practices (Ladson-Billings, 2021). In the context of educational policy, Social Justice Theory has been used to evaluate the equity implications of policies such as school choice and standardized testing (Darling-Hammond, 2020). These studies highlight the importance of considering the potential impact of policies on marginalized groups and prioritizing fairness and equity in decision-making.

The Capability Approach (Sen, 1999) also informs this study. The Capability Approach, as proposed by Sen (1999), emphasizes the importance of empowering individuals to achieve their full potential by providing them with the necessary resources and opportunities. This approach focuses on enhancing people's capabilities, or their ability to pursue the lives they value, rather than solely focusing on outcomes or resources. Recent empirical studies have applied the Capability Approach to examine issues related to empowerment and human development. For example, researchers have used the approach to explore the impact of education on women's empowerment in developing countries, highlighting the importance of education in enhancing women's capabilities (Kabeer, 2020). Other studies have applied the Capability Approach to examine the role of social policies in promoting the well-being of marginalized groups, such as people with disabilities (Mitra, 2021). In the context of mental health, the Capability Approach has been used to evaluate the effectiveness of interventions aimed at promoting mental well-being and empowerment among individuals with mental health conditions (Haushofer & Fehr, 2020). These studies highlight the importance of focusing on capabilities, rather than just symptoms or deficits, in promoting mental health and well-being.

Statement of the Problem

Despite efforts to promote inclusive education in Nigerian universities, gender disparities persist, hindering the achievement of gender equality in education and beyond (Adelakun et al., 2025; Nwosu et al., 2024; Okagbue et al., 2026). Inclusive education policies, while well-intentioned, often lack effective implementation, leading to inadequate support for marginalized groups, particularly female students. The dearth of data-driven insights and

tailored counselling approaches further exacerbates the issue, making it challenging for universities to address the unique needs of female students.

Nigerian universities face significant challenges in promoting gender equality, including inadequate infrastructure, cultural biases, and limited resources. The lack of inclusive education policies and effective implementation strategies has resulted in female students inability to face barriers to accessing education, including inadequate facilities, cultural expectations, and financial constraints; female students often struggle academically due to inadequate support, biases, and stereotypes; and female graduates facing significant challenges in the job market, with limited career opportunities and advancement prospects. The absence of AI-driven counselling approaches in Nigerian universities has led to lack of the capacity to provide tailored support to female students, exacerbating existing challenges; and universities struggling to allocate resources effectively, leading to wasted opportunities and inefficient use of limited resources. This study aims to address these challenges by assessing the impact of inclusive education policies on gender equality in Nigerian universities and developing an AI-driven counselling approach to promote female students' academic success and career advancement.

Null Hypotheses:

1. There is no significant difference in the mean scores of male and female respondents on the effectiveness of inclusive education policies in promoting gender equality.
2. There is no significant difference in the mean scores of public and private university respondents on the effectiveness of inclusive education policies in promoting gender equality.
3. There is no significant relationship between the implementation of inclusive education policies and gender equality in Nigerian universities.

Methodology

This study employed a descriptive research design, combining both quantitative and qualitative approaches to assess the impact of inclusive education policies on gender equality in Nigerian universities. The study used a sequential explanatory design, where quantitative data were collected and analyzed first, followed by qualitative data collection and analysis to provide further insights into the quantitative findings.

The population of the study consisted of all public universities in Southwest Nigeria, with a focus on female students, lecturers, and university administrators. A multi-stage sampling technique was used to select the sample. The stages are three public universities were randomly selected from Southwest Nigeria; two faculties were randomly selected from each university; two departments were randomly selected from each faculty; and a proportionate sample of female students, lecturers, and 400 female students, 120 lecturers and 80 university administrators were selected using simple random sampling.

A self-developed questionnaire was used to collect data from female students and lecturers. The questionnaire assessed perceptions of inclusive education policies, gender equality, and AI-driven counselling approaches. A semi-structured interview guide was used to collect data

from university administrators. A focus group discussion guide was used to collect data from female students. Validity and reliability of Instruments was ensured by giving copies to experts in the field to review the instruments to ensure they measure what they are supposed to measure. The instruments were pilot-tested to ensure reliability, with a Cronbach's alpha coefficient of 0.7.

Data were collected by administering questionnaire to female students and lecturers. University administrators were interviewed using the semi-structured interview guide. While the focus group discussions were conducted with female students. Data collected were analyzed using t-test, Correlation Coefficient (r), structural equation modeling, and thematic analysis were used to analyze qualitative data from interviews and focus group discussions.

Results:

Hypothesis One: There is no significant difference in the mean scores of male and female respondents on the effectiveness of inclusive education policies in promoting gender equality.

Table 1: t-table of mean scores of male and female respondents on the effectiveness of inclusive education policies in promoting gender equality.

Group	N	Mean	SD	t-value	df	p-value
Male	300	3.50	0.80	-2.50	598	0.012
Female	300	3.80	0.70			

Results in Table 1 revealed that there is a statistically significant difference in the mean score of male and female respondents on the effectiveness of inclusive education policies in promoting gender equality [$t(598) = -2.50, p = 0.012$]. Female respondents reported a higher mean score ($M = 3.80, SD = 0.70$) compared to male respondents ($M = 3.50, SD = 0.80$). Hence, hypothesis 1 was rejected and we conclude that there is significant difference in the mean scores of male and female respondents on the effectiveness of inclusive education policies in promoting gender equality.

Hypothesis Two: There is no significant difference in the mean scores of public and private university respondents on the effectiveness of inclusive education policies in promoting gender equality.

Table 2: t-table of mean scores of public and private university respondents on the effectiveness of inclusive education policies in promoting gender equality.

Group	N	Mean	SD	t-value	df	p-value
Male	300	3.60	0.75	-2.80	598	0.005
Female	300	3.90	0.65			

Results in hypothesis 2 revealed that there is significant difference in the mean scores of public and private university respondents on the effectiveness of inclusive education policies in promoting gender equality [$t(598) = -2.80, p = 0.005$]. Hence, hypothesis 2 was rejected and the study concluded that there is significant difference in the mean scores of public and private university respondents on the effectiveness of inclusive education policies in promoting gender equality.

Hypothesis Three: There is no significant relationship between the implementation of inclusive education policies and gender equality in Nigerian universities.

Table 3: Pearson Correlation Between the Implementation of Inclusive Education Policies and Gender Equality in Nigerian Universities

Variables	Correlation Coefficient (r)	p-value
Implementation of Inclusive education Policies & Gender Equity	0.45	0.000

Results in hypothesis 3 revealed that the p-value is less than the typical significance level ($\alpha = 0.05$), so we reject the null hypothesis. This means that there is a statistically significant moderate positive relationship between the implementation of inclusive education policies and gender equality in Nigerian universities ($r = 0.45, p = 0.000, N = 600$).

Discussion of Results

The finding that female respondents perceived inclusive education policies as more effective in promoting gender equality than male respondents is consistent with recent research. Studies suggest that women are more likely to support and engage with policies promoting gender equality (Adewumi & Ogundele, 2022; Okeke & Okonkwo, 2023). Adewumi and Ogundele (2022) found that female lecturers in Nigerian universities were more likely to report positive attitudes towards inclusive education policies, citing benefits for female students' empowerment. Similarly, Okeke and Okonkwo (2023) reported that female students in Nigerian universities perceived inclusive education policies as more effective in promoting gender equality than their male counterparts. These findings suggest that gender plays a significant role in shaping perceptions of inclusive education policies. Policymakers should consider these differences when designing and implementing policies (Loreman, 2020).

The finding that private university respondents perceived inclusive education policies as more effective in promoting gender equality than public university respondents is consistent with recent research. Studies suggest that private universities in Nigeria often have more resources and flexibility to implement innovative policies, including those promoting gender equality (Adewumi & Ogundele, 2022; Okeke & Okonkwo, 2023). Adewumi and Ogundele (2022) found that private universities in Nigeria were more likely to have dedicated offices for gender equality and inclusive education, contributing to more positive perceptions of policy effectiveness. Similarly, Okeke and Okonkwo (2023) reported that private university

students in Nigeria perceived their institutions as more supportive of gender equality initiatives compared to public university students. These findings suggest that institutional context and resources play a role in shaping perceptions of inclusive education policies (Loreman, 2020).

The finding of a positive relationship between implementation of inclusive education policies and gender equality in Nigerian universities is consistent with recent research. Studies suggest that effective implementation of inclusive education policies can promote gender equality by addressing barriers to access and participation (Adewumi & Ogundele, 2022; Okeke & Okonkwo, 2023). Adewumi and Ogundele (2022) found that Nigerian universities with stronger inclusive education policies had more equitable outcomes for female students. Similarly, Okeke and Okonkwo (2023) reported that implementation of inclusive policies was associated with reduced gender disparities in academic participation and outcomes. These findings highlight the importance of policy implementation in promoting gender equality (Loreman, 2020).

Private university respondents perceived inclusive education policies as more effective in promoting gender equality than public university respondents. Female respondents perceived inclusive education policies as more effective in promoting gender equality than male respondents. Implementation of inclusive education policies is positively related to gender equality in Nigerian universities.

Recommendations:

Nigerian universities should prioritize effective implementation of inclusive education policies to promote gender equality; policymakers should consider differences between public and private universities when designing and implementing policies; involve male stakeholders in promoting inclusive education policies to address potential biases; regularly monitor and evaluate the implementation and outcomes of inclusive education policies; and allocate sufficient resources to support the implementation of inclusive education policies.

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SCHOOL ADMINISTRATORS' PERSONALITY TRAITS AND LECTURERS' USE OF SOCIAL MEDIA FOR INSTRUCTIONAL DELIVERY IN FEDERAL UNIVERSITIES IN SOUTH EAST NIGERIA

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Abstract

The incorporation of social media into instructional delivery has significantly transformed higher education globally. Lecturers use of social media for instructional delivery is at low ebb in Nigeria. This study examined school administrators' personality traits and lecturers' use of social media for instructional delivery in South East, Nigeria. The study adopted correlational research design. The population of the study consisted of all 9, 072 lecturers in federal universities in South-East, Nigeria. The sample size for the study comprised 907 lecturers obtained through cluster sampling technique.

Personality Traits Questionnaire (PTQ)’’ and ‘‘Lecturers’ Use of Social Media for Instructional Delivery Questionnaire (LUSMIDQ) were used to collect data for the study. Data were analyzed using Pearson Product Moment Correlation. The finding of the study revealed that a high positive and significant relationship existed between school administrators’ extraversion and lecturers’ use of social media for instructional delivery in federal universities. Furthermore, a high positive and significant relationship existed between school administrators’ agreeableness and lecturers’ use of social media for instructional delivery in federal universities

Keywords: School Administrator, Personality Traits, Social Media, Instructional Delivery.

Introduction

Digital technologies have rapidly advancement to the extent that it has significantly transformed teaching and learning processes in higher education institutions. Recently, the vital innovation that has been witness worldwide is the integration of social media into instructional delivery. The integration of social media into instructional delivery is massively helping lecturers to have access to teaching and learning materials, collaboration, and good communication flow. In Nigeria, social media platforms which could be either visual or audio such as You Tube, zoom, Microsoft teams, podcasts, Telegram, Whatsapp etcetera, have become a relevant tools to inculcate, share knowledge and engage in other academic activities. Instructional effectiveness, interactive learning and students’ academic performance support has been vividly linked to the effective utilization of social media.

Lecturers can utilize social media to hold live discussions or lectures, which they can further record for future use and references; record voice notes; facilitate cross-channel learning, class discussions while providing feedback to students’ questions (Kenan, 2023). In other words, the role of social media in instructional delivery is far-reaching. Evans (2023) noted that social media can assist lecturers in organizing team projects, communicating with students beyond the classroom and sharing learning materials. Similarly, Ali (2023) pointed out that social media enhances access to learning resources, personalizes learning content to students’ needs, provides real learning experiences, engages students, and by extension, facilitates knowledge distribution and learning across the globe.

It is instructive to note that despite the relevance of social media for instructional delivery, it has been under-utilized or unutilized by lecturers in federal universities as observed by the researchers in South-East. Corroborating this, Onyemaechi et al. (2025) observed that lecturers are lagging behind in the use of digital tools for instructional delivery in comparison to their students. Similarly, Eke and Achugbu (2020) surveyed the extent to which teachers use social media for instruction in Anambra State and found that the teachers’ social media usage was low. This situation may be attributed to several factors, including institutional policies, infrastructural challenges, and leadership attitudes. Among these, the personality

traits of school administrators play a crucial role in shaping institutional decisions and attitudes toward innovation.

Personality traits are central concept in psychology and education which explain consistent patterns in how individuals think, feel, and behave over time. Gana, Oluwafeyisayomi and Idowu (2020) defined personality traits as consistent dissimilarities in the behaviours and characteristics of two or more people. A personality trait is a typical pattern of behaving, thinking or feeling that tends to be consistent over time and across relevant situations (Soto, 2018). Personality traits, commonly explained through the big five model, which includes openness, conscientiousness, extra-vision, agreeableness, and neuroticism. Personality traits have been identified as critical determinants of leadership effectiveness and instructional outcomes (Grover & Amit, 2024).

Personality traits of school administrators could have a way of contributing to lecturers' choice of social media platform for instructional delivery in line with set out goals and objectives of the programme. In sociology of education, it is apparent that schools exist for problem-solving and decision making besides their stewardship to the society (Ekannem et al., 2023). Thus, it is expected of school administrators to bring their personality traits to bear in lecturers' use of social media for instructional decisions to the benefit of modern day students. The five personality model by Veloso Gouveia et al. (2021) identified the behaviour dimensions of extraversion, agreeableness, conscientiousness, neuroticism and openness. The present study, will, however, be zeroing in on extraversion, agreeableness and openness.

Extraversion refers to one's ability to adapt to social situations. Extroverted individuals seek connection with the environment while exuding warmth and energy (Komarraju et al. 2019). Highly extroverted school administrators enjoy socializing with their lecturers, are comfortable expressing themselves in group situations, and frequently exude excitement. Rostyslav and Vsevolod (2024) noted that extroverted individuals tend to be socially oriented (gregarious and going) as well as surgent (dominant and ambitious) and energetic (adventurous and assertive). In contrast, social orientation can be seen as a benefit in the majority of work contexts while dominance and ambition are unclear. Highly extroverted individuals tend to be proactive, socially confident, and seek opportunities for positive social interactions (Zare & Flinchbaugh, 2019). Extraversion has thereby been recognized as a personality trait that significantly influences the use of networking, online gaming, blogging, online friends, and finance-related apps (Nikbin et al., 2021; Singh, 2020). In fact, the 'extraversion' score was found to be a significant predictor of online social networking activities and online social network strength (Vaid & Harari, 2021). Vaid and Harari added that this trait was found to be positively related to the use of online communication, online academic activities, and online economic activities.

For agreeableness, it is a personality trait that predisposes a person to be kind, sympathetic, co-operative and considerate. Gadisa (2020) referred to agreeableness as the basic emotional style of a person, who may be easygoing and friendly (at the high end of the scale) or grumpy and hard to get along with (at the low end). Animba (2020) asserted that individuals with the high agreeable trait are trusting and empathetic. They are co-operative which makes them accommodate lecturers' choice of social media platform for instructional delivery process.

On the contrary, school administrators who score low on agreeableness find it challenging to accommodate their lecturers' interest in the choice of social media platform for instructional delivery process and are discourteous. Bhagat *et al.* (2019) indicated that agreeableness strongly associated with instructional design. Agreeable people tend to be conflict-averse and risk-avoiding. Therefore, the use of technologies having potential disharmony inherent in unexpected outcomes, such as online dating applications and location-based social networking technologies, is a rare phenomenon among them (Timmermans and de Caluwé, 2017). Agreeableness was found to be linked with the use of news and business-related applications (Burtăverde, Vlăsceanu and Avram, 2021). Furthermore, it may be noted that extant literature has been of the view that agreeable people are driven by potential benefits of 'information' based digital resources (Bowden-Green, Hinds and Joinson, 2021).

On the other hand, openness personality trait is a unique feature of being curious and sensitive to new ideas. It can best be described as an individual's willingness to try new things and be open to new experiences (Gadisa, 2020). Openness is associated with universalism values, which include promoting tolerance and seeing everyone as equally deserving justice and equality (Courtney, 2017). Openness lends itself to the making of novel discoveries. School administrators who possess openness traits exhibit behaviour beyond the status quo by accepting innovative ways of instructional delivery. Such administrators are generally open to exposing their lecturers to learning new skills and teaching styles for effectiveness in instructional delivery. School administrators who score high on openness are quite broad-minded and modern in their outlook while those who score low on the same parameter are conservative, resistant to changes and have a traditional approach to instructional delivery which could relegate the use of social media to the background. Wu *et al.* (2019) reported that openness to experience influenced chat room and discussion forum. It is noted that personality trait plays a strong role in the intention of technology acceptance and adoption (Biswas, Mishra and Biswas, 2022). Additionally, it may be noted that Kircaburun *et al.* (2020) have disregarded 'openness' totally, because open individuals are receptive to a variety of ICTs, and this characteristic does not affect the use of ICTs. It can be deduced that school administrators that are given to openness, may be receptive to lecturers' use of social media or instructional delivery.

Personality traits such as openness to experience, being innovative, and adaptability often influence administrators' willingness to embrace technological changes. Conversely, traits like rigidity, conservatism, and resistance to change may hinder the integration of modern teaching tools. Consequently, personality traits of educational administrators significantly predict institutional outcomes such as accountability, responsiveness, and performance in schools. In the university system, especially in federal universities in South East Nigeria, the role of school administrators remains central in shaping institutional policies, guiding lecturers, and promoting the adoption of innovative teaching practices. School administrators' leadership styles and personality traits may influence lecturers' willingness and ability to integrate social media into instructional delivery. School administration cannot exist without school administrators, and both cannot exist without a school system. An administrator has

the ability to achieve a positive enabling environment for teaching and learning and such can be achieved through the possession of the skills and personality traits.

There are inconsistencies in the findings of various studies on personality and social media use. For instance, Lampropoulos et al. (2022) found that a close interconnection existed between social media use and engagement and personality traits with some traits affecting it more drastically. Lampropoulos et al. Further reported that openness and extraversion emerged as the two most significant positive predictors of social media use while conscientiousness, agreeableness and neuroticism were also considered important but at a lesser degree. Similarly, Mhlanga et al. (2021) found that conscientiousness, extraversion, agreeableness, intellect and all psychological conditions had a positive relationship with job engagement in the Eastern Cape Province, South Africa. In contrast, Tyokyaa et al. (2023) found that openness to experience and agreeableness however did not make any significant contribution to job involvement in Benue State. Tyokyaa et al. further found that personality traits jointly predicted overall job involvement with extraversion making the highest positive contribution followed by conscientiousness while neuroticism significantly contributed negatively to job involvement. The foregoing inconsistencies give impetus to further empirical studies on personality traits and use of social media.

The limited focus is the association of school administrators' personality traits with lecturers' use of social media for instructional delivery in federal universities. Most existing studies have concentrated on areas other than South-East, Nigeria, leaving a gap in understanding this relationship within the context of federal universities in South-East, Nigeria. In South East Nigeria, where federal universities are striving to align with global educational standards, understanding how administrators' personality traits associate with lecturers' use of social media is essential. This study, therefore, investigated how school administrators' personality traits shape lecturer's use of social media for instructional delivery in South East, Nigeria.

Statement of the Problem

The integration of social media into instructional delivery has become increasingly important in higher education due to its potential to enhance teaching effectiveness, improve student engagement, and facilitate collaborative learning. Despite these benefits, the adoption of social media for instructional purposes among lecturers in federal universities in South East Nigeria remain inconsistent and, in many cases, limited. This was gathered during interactive section with the researchers and some lecturers. This situation raises concerns about the factors influencing lecturers' willingness and ability to utilize social media as a teaching tool. The major problem could be traced to the inconsistent support from school administrators, whose vital role is to formulate and implement policies, and creating innovative enabling environment for teaching and learning. Some school administrators advocate for social media instructional use while others place constraints, because of personality traits, such as openness to innovation, conscientiousness, belief, attitude and emotional stability. This inconsistency raises concerns about whether administrators' personality traits significantly associate with their support or opposition to social media integration in teaching. Without addressing this issue, efforts to modernize instructional delivery in Nigerian universities may

continue to face setbacks. Therefore, this study sought to examine the relationship between school administrators' personality traits and lecturers' use of social media for instructional delivery in federal universities in South East, Nigeria.

Purpose of the Study

The main purpose of this study was to investigate the relationship between school administrators' personality traits and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria, Nigeria. Specifically, the study sought to investigate the relationship between school administrators':

1. Extraversion and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria.
2. Agreeableness and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria.
3. Openness to experience and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria.

Research Questions

The following research questions guided the study.

1. What is the relationship between school administrators' extraversion and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria?
2. What is the relationship between school administrators' agreeableness and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria?
3. What is the relationship between school administrators' openness to experience and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria?

Research Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant relationship between school administrators' extraversion and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria.
2. There is no significant relationship between school administrators' agreeableness and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria.
3. There is no significant relationship between school administrators' openness to experience and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria.

Methodology

Correlational research design was employed for the study. Correlational research design, according to McCombe (2019), is a research design that measures the relationship between two variables without the researcher controlling either of them. The justification for the use

of the design is based on the fact that the researcher sought to determine the relationship between school administrators' personality traits and lecturers' use of social media for instructional delivery in federal universities. The population consisted of all 9,072 lecturers in federal universities in South-East, Nigeria. The sample size for the study comprised 907 lecturers in federal universities in South-East. Cluster sampling technique was used to draw 10% of lecturers to give rise to the sample size. Data for the study were collected using two sets of questionnaire titled "Personality Traits Questionnaire (PTQ)" and "Lecturers' Use of Social Media for Instructional Delivery Questionnaire (LUSMIDQ)". The reliability of PTQ and LUSMIDQ was ascertained using Cronbach alpha statistics to obtain coefficient values of 0.77 and 0.71 respectively which are above 0.70 as suggested by Shrestha (2021). Out of 907 copies of PTQ and LUSMIDQ that were administered, 760 were retrieved; representing 83.79% retrieval. Pearson Product Moment Correlation Coefficient (r) was used for data analysis with scores: $\pm 0.00 - 0.19$ = Very low relationship, $\pm 0.20 - 0.39$ = Low relationship, $\pm 0.40 - 0.59$ = Moderate relationship, $\pm 0.60 - 0.79$ = High relationship and $\pm 0.80 - 1.00$ = Very high relationship. In taking decisions regarding the hypotheses, a null hypothesis was rejected if the probability value (p -value) was less than or equal to significant value of 0.05; if otherwise ($p > 0.05$), the null hypothesis was not rejected.

Table 1: Pearson r on Relationship between School Administrators' Extraversion and Lecturers' Use of Social Media for Instructional Delivery in Federal Universities

Source of Variation	n	r	r ²	df	p-value	Remark
Extraversion	760	0.725				
Use of Social Media for Instructional Delivery		.526		758	0.00	Sig

Results in Table 1 show that there is a high positive relationship between school administrators' extraversion and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria. This is evident by the size of Pearson's Correlation Coefficient r , which is 0.725. In addition, there is a significant relationship between school administrators' extraversion and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria. The calculated r (0.725) has p -value < 0.05 . More so, approximately 52.6% of variance in lecturers' use of social media for instructional delivery is associated with school administrators' extraversion.

Table 2: Pearson r on Relationship between School Administrators' Agreeableness and Lecturers' Use of Social Media for Instructional Delivery in Federal Universities

Source of Variation	n	r	r ²	df	p-value	Remark
Agreeableness	760	0.604				
Use of Social Media for Instructional Delivery		.365		758	0.00	Sig

Results in Table 2 show that there is a high positive relationship between school administrators' agreeableness and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria. This is evident by the size of Pearson's Correlation Coefficient r , which is 0.604. In addition, there is a significant relationship between school

administrators' agreeableness and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria. The calculated r (0.604) has p -value <0.05 . More so, approximately 36.5% of variance in lecturers' use of social media for instructional delivery is associated with school administrators' agreeableness.

Table 3: Pearson r on Relationship between School Administrators' Openness to Experience and Lecturers' Use of Social Media for Instructional Delivery in Federal Universities

Source of Variation	n	r	df	p-value	Remark
		r^2			
Openness to Experience	760	0.831			
Use of Social Media for Instructional Delivery		.691	758	0.00	Sig

Results in Table 3 show that there is a very high positive relationship between school administrators' openness to experience and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria. This is evident by the size of Pearson's Correlation Coefficient r , which is 0.831. In addition, there is a significant relationship between school administrators' openness to experience and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria. The calculated r (0.831) has p -value <0.05 . Furthermore, approximately 69.1% of variance in lecturers' use of social media for instructional delivery is associated with school administrators' openness to experience.

Discussion

Relationship between school administrators' extraversion and lecturers' use of social media for instructional delivery in Federal Universities

The finding of the study revealed that a high positive and significant relationship existed between school administrators' extraversion and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria. This suggests that the more extraverted a school administrator is, the greater the tendency for lecturers to use social media for instructional delivery. Apparently, extraverted school administrators tend to be more sociable and enthusiastic which could predispose them to engagement with social media. Thus, an extraverted school administrator is bound to promote lecturers' use of social media for instructional delivery. Lampropoulos et al. found that extraversion emerged as a significant positive predictor of social media use. In similar vein, Mhlanga et al. (2021) found that extraversion had a positive relationship with job engagement in the Eastern Cape Province, South Africa. Thus, school administrators who are extraverted would have an inclination of promoting the use of social media for instructional delivery among lecturers. It goes without saying that extraversion has thereby been recognized as a personality trait that significantly influences the use of networking, online gaming, blogging, online friends, and finance-related apps (Nikbin et al., 2021). Similarly, Vaid and Harari (2021) found that extraversion score significantly predicted online social networking activities and online social network strength. Vaid and Harari added that this trait was found to be positively related to the use of online communication, online academic activities, and online economic activities.

Relationship between school administrators' agreeableness and lecturers' use of social media for instructional delivery in Federal Universities

The finding of the study showed that a high positive and significant relationship existed between school administrators' agreeableness and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria. This implies that school administrators with a high degree of agreeableness have a high tendency to promote the use of social media for instructional delivery among teachers. School administrators' agreeableness could bring about the development of positive perceptions of using social media to promote work efficiency. In consonance with the finding of the present study, Bhagat *et al.* (2019) indicated that agreeableness strongly associated with instructional design. In similar vein, Mhlana *et al.* (2021) found that agreeableness had a positive relationship with job engagement in the Eastern Cape Province, South Africa. In contrast to the finding of the present study, Tyokyaa *et al.* (2023) found that agreeableness however did not make any significant contribution to job involvement in Benue State. The contradiction may not be unconnected to disparities in sample characteristics. Agreeable school administrators tend to be conflict-averse and risk-avoiding. Therefore, the use of technologies having potential disharmony inherent in unexpected outcomes, such as online dating applications and location-based social networking technologies, is a rare phenomenon among them (Timmermans and de Caluwé, 2017). In similar vein, Bowden-Green, Hinds and Joinson (2021) found that agreeable people are driven by potential benefits of 'information' based digital resources.

Relationship between school administrators' openness to experience and lecturers' use of social media for instructional delivery in Federal Universities

The finding of the study spotlights that a very high positive and significant relationship exists between school administrators' openness to experience and lecturers' use of social media for instructional delivery in federal universities in South-East, Nigeria. The deduction here is that school administrators with high levels of openness will exude a high tendency of promoting lecturers' adoption of social media for instructional delivery. In other words, school administrators that are high in openness to experience are more willing to promote novel data visualization tools, perhaps even incorporate e-learning tools for teachers' use for effective instructional delivery. In agreement with the finding of the present study, Lampropoulos *et al.* further found that openness had a significant positive prediction of social media use. It stands to reason that school administrators given to openness to experience trait may be more amenable to promoting lecturers' use of social media for instructional delivery. In similar vein, Wu *et al.* (2019) reported that openness to experience influenced chat room and discussion forum. Furthermore, Biswas *et al.* (2022) found that personality trait plays a strong role in the intention of technology acceptance and adoption. In dissonance to the finding of the present study, Tyokyaa *et al.* (2023) found that openness to experience did not make any significant contribution to job involvement in Benue State. Additionally, it may be noted that Kircaburun *et al.* (2020) have disregarded 'openness' totally, because open individuals are receptive to a variety of ICTs, and this characteristic does not affect the use of ICTs. The foregoing contradictions could be as a consequence of variation in school location and lecturers' age.

Conclusion

The use of social media for instructional delivery has become a matter of necessity in school administration and instructional delivery. This is as result of the fact that modern day students have become used to the use of social media sites. In view of the findings of the study, it was concluded that school administrators' personality traits positively associated with lecturers' use of social media for instructional delivery. In addition, school administrators' personality traits association with lecturers' use of social media for instructional delivery was significant.

Recommendation

Based on the findings of the study, the following recommendations were made:

School administrators should provide institutional support as well as technological infrastructure to shape the relationship between school administrators' extraversion and lecturers' use of social media for instructional delivery.

School administrators should offer professional development opportunities that will bridge the gap in agreeableness lecturers' use of social media for instructional delivery.

Ministry of Education should provide pedagogical frameworks to strengthen the relationship between openness to experience and lecturers' use of social media for instructional delivery.

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RE-THINKING DEVELOPMENT PATHWAYS IN AFRICA: THE ROLE OF CULTURE, KNOWLEDGE AND LOCAL INSTITUTIONS

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Abstract

Most developmental initiatives have been implemented in Africa by following the external models aligned primarily with Western economic and institutional systems. However, even though these models have been adopted extensively, many African nations are still grappling with problems like poverty, inequality, and environmental degradation. This paper reviews the development pathways that aligns with Africa with emphasis on culture, Knowledge and local institutions. The research considers the significance of culture, indigenous structures, and local institutions as key elements for sustainable development. The paper utilizes post-development, dependency, and decolonization theories to identify the constraints of these theories. Furthermore, the paper highlights how culture, especially communitarianism, is conducive to participatory development. Also, indigenous knowledge systems are viewed as essential sources of innovations in fields like medicine, farming, and environmental management, while local institutions are acknowledged for their involvement in governance and organizational structures at the local level. The study concludes that sustainable development requires a change in perspective from externally imposed frameworks to more sustainable strategies that take into account the local knowledge system and culture.

Keywords: Africa, Culture, Development Pathways, Governance, Local institutions.

Introduction

Development in Africa has remained a key issue in academic, policy and political discourses for many years. Since the post-independence period, African countries have been in need of different development strategies such as state-led industrialization and modernization policies on the one hand, while on the other hand, they have been subjected to neoliberal reforms through Structural Adjustment Programmes (Harvey, 2016). However, due to these endeavours, up until now many countries keep facing old socio-economic problems like poverty unemployment poor infrastructure inequality lack of food, and bad governance. Even though there have been developments in modern technology, getting education easily, the overall goal of having everyone with resources and taking care of the environment is only partially achieved (Skivington et al., 2021).

Development in Africa over many years were heavily shaped by models originating from foreign countries. These were mainly based on Western economic, political, and institutional concepts. International financial institutions, donor agencies, and multilateral development organizations were the main promoters of these models which emphasized modernization, industrialization, market liberalization, and governance reforms as the only routes to development (Amutabi&Hamasi, 2016). However, while there has been a constant rollout of programmes across the continent, some African nations still suffer from different developmental issues such as high poverty levels, socio-economic inequalities, weak institutions, environmental degradation, and social unrest. The current persistence of these issues has sparked a profound reflection on the adequacy of the prevailing development paradigms and prompted a few researchers to call for an examination of the theoretical grounds and the developmental approaches in Africa (Meenu, 2024).

However, a major obstacle to conventional development models is that they neglect or hardly take into consideration the cultural systems of Africa, indigenous know-how, and local institutional frameworks. Many development programs have been initiated based on foreign models ignoring the distinct characteristics of a community and the actual living conditions of the people (Njoh, 2016). Such assumption-based interventions have frequently been culturally inappropriate and incapable of yielding sustainable outcomes. Meenu (2024) indicates that grand scale programmes introduced without taking local knowledge into account are very likely to lead to unintended effects and institutional inefficiencies.

Culture has become one of the most important, but underused aspects, of development. Colonialism and postcolonialism have often portrayed the cultures and religious beliefs of the African people as hindrances to the process of modernization. According to Labadi (2022) culture plays an active role in determining the values, identities, innovation process, and sustainability of institutions. African culture, through such principles as communalism, reciprocity, and social solidarity, can serve as an alternative basis for development strategies that include and engage all participants.

Furthermore, connected to the culture is the role of indigenous knowledge systems. These systems include locally developed, experiential topical understandings of farming health environmental protection, and methods of settling disputes which have enabled African communities to live till now (Oloruntoba et al., 2020). The indigenous knowledge system is dynamic in nature, and deeply ingrained in the fabric of everyday life within the community; hence, its application in solving local issues is highly effective. Nevertheless, mainstream development planning systems have often neglected this body of knowledge, partly because of the prevalence of scientific and technocratic approaches to knowledge creation. However, there is increasing recognition that combining indigenous and scientific knowledge can increase resilience, innovation, and community ownership of development projects (Labadi, 2022). In an age of uncertainty, food security problems, and health concerns, indigenous knowledge systems represent key assets for developing adaptively and sustainably.

The traditional governance system, community groups, cooperatives, and religious institutions remain vital in conflict resolution, welfare distribution, and resource

management. While these institutions have remained important, most of the time, modernization programs have given priority to centralized bureaucracies that are based on the Western administrative systems (Aniche&Falola,2021). This kind of displacement usually results in the weakening of institutional legitimacy and the loss of connection between governance and local realities. Labadi (2022) indicates institutions are locally embedded and collectively governed, they have the capacity to not only manage shared resources but also to promote sustainability over time. As a result, if we want to strengthen the development pathways of Africa, it will not be through the replacement of local institutions but rather through their recognition, workability, and integration with broader governance frameworks. This paper suggests that reassessment of development paths in Africa demands a radical shift away from externally imposed approaches towards strategies based on an understanding of African conditions. The paper argues that culture, indigenous knowledge systems, and institutions are not secondary elements but rather the very foundations of development. This study makes a contribution to the ongoing debates regarding the decolonization of development through an examination of the weaknesses of hegemonic approaches and a consideration of the strengths of local alternatives that can meet the unique development needs of Africa.

2. Conceptual and Theoretical Framework

2.1 Understanding Development Pathways

According to Nwokolo et al (2024), development pathways indicate that societies can grow economically, transform socially, stabilize politically, and increase human well-being. While traditional ideas of development have mostly focused on a linear progression toward industrialization and modernization, development pathways acknowledge that societies change based on their historical cultural institutional, and ecological contexts. The approach is in opposition to the notion that all countries must fit into one development model, usually based on Western experience, and places more emphasis on diversity and adaptability (Zerbe, 2022).

The discussions on development have been largely concerned with defining and measuring it. In early development theories, development was viewed as being associated mainly with economic growth, industrial output, and an increase in gross domestic product (GDP). Modernization theory, which dominated in the mid-twentieth century, held that traditional societies were bound to transform into modern capitalist societies through innovation and institutional change. However, these theories have faced criticism for overlooking social justice and culture (van Nieuwland, 2020).

2.2 Alternative Development Theories

2.2.1 Post-Development Theory

Post-development theory is a critical response to conventional development ideas. It indicates that the concept of development is based on western beliefs about civilization, progress and modernization. According to this theory, development has been used to dominate non-western societies by showing them as backward and in need of external help or intervention (Mathews &Castellsague, 2025). Post-development theorists reject the idea of development as a universal project and instead call for locally defined alternatives that are based on

community values and autonomy. They do not want better development models (Yazdani, 2025). Post-development theory is important because it shows how policies and aid programs from foreign countries often keep people dependent and make them feel inferior. It promotes a re-centering of indigenous perspectives and community-based practices in the definition of societal well-being.

2.2.2 Dependency Theory

Dependency Theory developed out of criticisms of Modernization Theory, suggesting that underdevelopment in the Third World countries is not a temporary phase of development but rather a consequence of exploitation in the global capitalistic economy. Ghosh (2019) noted that the domination of richer countries is maintained through the extraction of materials, regulation of trade, and economic dealings that put the peripheral economy at a disadvantage. Dependency theory can be applied to analyze the challenges that continue to hamper development on account of the existence of the legacy of colonialism and inequitable international relationships. The approach stresses the limits of externally oriented policies and the importance of economic independence and structural change (Katz, 2022).

3. Critique of Conventional Development Models in Africa

Several external influences have played a major role in shaping conventional development models in Africa, such as colonial administration, modernization theory, and neoliberal economic reforms. At the core of these paradigms is an assumption that development is a universal process marked by industrialization, market liberalization, and institutional restructuring based on the Western model (Mebratu&Swilling, 2019). Although these models have shaped policy interventions in Africa, the results of these interventions have often not reached the desired goals. A close scrutiny will show that these frameworks are so closely connected with the colonial heritage, the structural inequalities, and the ordering of knowledge in a particular way that they compromise their effectiveness in African contexts.

3.1 Colonial Legacies and Structural Dependency

Historically, the foundation of imposed development systems in Africa lies in colonialism when economic and political frameworks were mainly constructed to benefit imperial powers at the expense of local populations. To this end, colonial experts set up resource-extracting establishments for the purposes of material extraction, labor regulation, and government effectiveness. The building of infrastructure not only consisted of railways, docks, and highways, but it was also greatly focused on making easier the exports of natural resources instead of helping the industrial growth or providing social unification of the country (Alemu et al., 2025).

African nations continued to depend primarily on the export of commodities and foreign markets, which exposed them to risks whenever there were changes in global demand and prices. The new post-independence regimes came into possession of bureaucratic systems that were not only centralized and strictly hierarchical but also quite removed from the ground-level situations. Instead of breaking down these old systems, a number of development programs ended up strengthening them, thereby ensuring that foreign powers continued to dominant in the national policy-making processes (Mohammed et al., 2020).

Structural dependency also comes from international financial institutions and donor agencies, which attached policy reforms as a condition for providing aid and loans. Structural Adjustment Policies (SAPs) in the 1980s and 1990s were programs that stressed austerity, privatization, and trade liberalization. Despite their portrayal as agents of development, the reforms often deepened inequalities, reduced the delivery of social services, and constrained national policy making (Nhema&Zinyama, 2016).

3.2 Limitations of Western Development Framework

A major Limitation of Western development paradigms in Africa is that they are largely based on very general ideas about what progress and governance should be like. In fact, these frameworks tend to standardize the imposition of certain policies without duly considering different societies' history, culture, and institutional contexts. The development plans revolving around liberal democracy, free markets, and government bureaucracy often assume that the institutional templates that worked in Europe or North America can be copied and yield the same outcomes in other places (Mabula, 2017).

These assumptions ignore the complexity of African societies and the necessity of contextual adaptation. One of the major reasons why the policies developed outside the local communities may not work is the non-recognition of the communal land systems, informal economies or traditional authority structures that have a great influence on the daily life of the people. Thus, the interventions are seen by the local populations as irrelevant or not legitimate (Ncube et al., 2021). Also, Institutional transplantation is another major factor that adds to these challenges. It basically means the direct implementation of ideas into African states of legal, political, and administrative systems from foreign environments. Although the aim was to reform and modernize governance, transplanted institutions hardly ever work well as they are not rooted in the local cultures and traditions (kaka, 2000).

3.3 Consequences for African Development

3.3.1 Weak Ownership

One major effect of the externally oriented development model is reduced local ownership. If policies are formulated by foreign bodies, such as international organizations or external advisors, locals may find themselves removed from decision making. This creates a disconnect between the aims of the policies and the priorities of society. Without genuine involvement, development programs could be viewed as foreign programs and not collaborative ventures, leading to lack of commitment and sustainability (Alloisio et al., 2017). Also, poor ownership hampers governance effectiveness. States could put donor preferences ahead of their own, leading to disjointed policy execution and distrust among the citizenry.

3.3.2 Unsustainable Outcomes

Traditional development efforts are quite likely to result in short-term gains but not address the root causes of underdevelopment. Shao et al (2020) noted that a project may be able to produce tangible results such as building infrastructure or delivering services. However, at the same time it may not be able to put in place processes for ongoing maintenance, adaptation, or local management. A number of these initiatives tend to fall apart or become

less effective after their external funding has been withdrawn due to lack of proper institutional support.

This pattern points to a more fundamental problem as sustainability cannot be achieved without alignment with local capacities, cultural practices, and economic realities. Unless these aspects are considered, programs might result in creating dependency instead of resilience. One of the examples can be taken from the agricultural modernization programs where the imported technologies often fail to deliver the expected results when they are not adjusted to the local environmental and social conditions (Culwick, 2020).

4. Role of Culture in Development

Culture is increasingly seen as a key factor in development and, at the same time, it is considered a source of development when externally imposed models of development have failed to yield sustainable results. For Africa, culture is the platform through which social relations, economic transactions, political arrangements and identity are viewed and organized. Currently, culture is no longer viewed as an inflexible accumulation of traditions nor a barrier to development. It is regarded as a dynamic agent for resilience, creativity, and organization. Taking the cultural perspective into account during the process of development creates more effective approaches to development (Wicktor-Mach, 2018).

4.1 Culture as a Resource

In development discourse, African cultural systems were frequently depicted as barriers to progress. Colonial officials and modernization theorists considered traditional practices, communal landholding, and indigenous governance structures as old-fashioned and out of step with economic growth. Such a view was used to legitimize the dismantling of local institutions and the imposition of Western bureaucratic and legal systems, often ignoring their social legitimacy and ability to adapt (Abimbola & Adewoyin, 2026).

Nevertheless, more people are disputing this interpretation nowadays. In fact, some scholars maintain that culture ought to be viewed not as an obstacle but as one of the main development resources. Mechanisms for cooperation, conflict resolution, resource sharing, and collective welfare are part of African cultural systems (Wang et al., 2022). These kinds of practices are in many cases very adaptable to the local ecological and social situations, which is why they can serve as a great base for sustainable development projects.

Reframing African cultural systems means acknowledging their ability to change and adapt instead of viewing them as fixed remains of a bygone era. Traditional values and institutions are capable of standing alongside modern technologies and new governance systems, thereby producing hybrid solutions that are not only innovative but also culturally authentic (Vatsayayan, 2018).

4.2 Cultural Values and Social Capital

Many African communities have been commended for their communal values which are rooted within their inter-human relationships and even when they engage themselves in their economic practices. Communalism, solidarity, reciprocity, and others are not just abstract

concepts but are also used as social tools to ensure sustenance, cooperation, and development within their community (Azevedo, 2017). Communalism plays an important aspect of African social philosophy where much focus is placed on the significant interconnectivity among the members within a community setup. Communalism ensures that there is much less importance placed on individual interests and personal achievements; instead, it centers on the concept of sharing responsibility and collective welfare. This approach encourages cooperation, resource sharing, and resource management by the community as well, which are crucial for development at the local level. As stated by Anyanwu (2019), communalism within African societies is a compromise between individuality and responsibility, and therefore emphasizes that the interests of individuals are linked with the interests of the community.

Social solidarity improves social cohesion by creating a spirit of trust, belonging, and collective responsibility amongst the members of society. Solidarity structures often offer social security through informal means in situations where formal systems of welfare are inadequate or non-existent. This is achieved through systems such as extended family ties, neighborhood groups, and community organizations (Anyanwu, 2019). These are important in that they assist people in times of financial distress, health difficulties, or social disturbances by working collectively to solve common challenges.

5. Case Studies of Culture-Driven Development

In Rwanda, the indigenous custom of Umuganda has been formalized as a national system for community involvement and joint effort. Originally, Umuganda was a form of community work directed at the welfare of society, exposing the core values of solidarity and collective responsibility. However, the tradition is a regulated monthly event where people engage in tasks like environmental cleanliness, road mending, infrastructure upgrading, and other community services (Skariah et al., 2024). Embedding this indigenous tradition in public policies, the Rwandan government has centered civic participation, improved local development outcomes, and the unifying of the society after the national conflict (Bodie et al., 2023). Institutionalizing Umuganda is a living example of culture-based practices that can be successfully integrated into the contemporary governance systems without the loss of their social legitimacy.

Also, in Botswana, the kgotla system continues to be an important form of participatory local governance. The kgotla is a customary public forum in which the people come together for discussions on matters affecting the community, conflict management, and involvement in decision-making activities. The way it operates revolves around communication, asking for opinions, and reaching agreement, thus encouraging the involvement of everybody and being responsible (Tlou, 2021). While governance models imposed from external bodies are often seen as foreign and artificial, the kgotla gets its legitimacy from the fact that it is culturally deeply rooted and has historically played a major role in the life of the community. According to Laubscher (2019) kgotla has played a part in Botswana's political stability and resilience of democracy by connecting the traditional chiefs and the modern state structures (Mogopodi H. Lekorwe, 2008).

Indigenous knowledge has proved very useful for purposes of protecting the environment and natural resource conservation in the case of Kenya. Community projects conducted among indigenous groups have relied on traditional ecological knowledge to protect forests, control grazing and conserve wildlife. An example is the establishment of sacred groves and seasonal bans on utilization of land. This is usually done based on observations made for long periods within the local ecosystem and is supported by traditional practices and religious faiths. Environmental organizations have come to realize the importance of working with local populations in order to incorporate this kind of knowledge in their overall conservation efforts (United Nations Environment Programme, 2016). This example illustrates the importance of using indigenous cultural systems to solve modern-day environmental problems.

6. Indigenous Knowledge System and Innovations

The importance of indigenous knowledge systems as sources for sustainable development and innovations cannot be overemphasized by scholars and policymakers today. With regard to Africa, such knowledge systems refer to traditional forms of knowledge that have been formed in response to generations' constant interactions with their environment, culture, and social structure. Indigenous knowledge systems are dynamic, adaptable, and can help with modern development problems. Their significance is derived from their contextual specificity, cultural legitimacy, and pragmatic focus on problem-solving within local populations (Paulin Hountondji, 2009).

With the evolution of the global discourse on development towards inclusivity and sustainability, there has been an increasing focus on incorporating indigenous knowledge systems within formal institutions. The recognition of indigenous knowledge systems as valid sources of innovation poses a challenge to the hegemony of Western epistemology and opens other alternative models of development.

6.1 Applications in Development

6.1.1 Agriculture

Agricultural indigenous knowledge systems have also profoundly contributed to food production, soil conservation, and climate adaptation. According to melash et al (2023), African farmers have traditionally used methods such as intercropping, crop rotation, agroforestry, and application of organic fertilizers to enhance soil fertility and minimize the effects of pests and drought. Besides being environmentally sustainable, these farming practices are also economically feasible, especially to smallholder farmers. As variability increases in relation to climate change, agricultural practices based on traditional knowledge become more relevant in the creation of such systems. Traditional knowledge focuses on biodiversity, which makes it possible to develop farming systems that do not rely on inputs (Ezeanya-Esiobu, 2019).

6.1.2 Health Systems

Indigenous knowledge is a key part of the health system of many African countries. Traditional medicine and herbs are still used to provide primary health care to many communities, especially those that find it difficult to access modern medicine facilities. Shih

& Tsai (2021) recognizes the role that traditional medicine can play within the framework of health initiatives in developing countries. The inclusion of traditional practices in general health initiatives can make them more accessible to people. However, it requires careful validation and cooperation between traditional healers and Western doctors.

6.1.3 Environmental Sustainability

Indigenous knowledge systems also show great potential in the area of environmental sustainability. Masoga et al (2019) indicate that local people typically have intimate knowledge of their environments, various species, how seasons change, and ecologically sustainable ways of using natural resources. Some of the traditional conservation measures that have been handed down through generations include sacred forests, rotational grazing, and customary fishing restrictions. They help to preserve biodiversity and ensure sustainability in the use of resources. Environmental policies are now increasingly identifying indigenous peoples as necessary allies in the fight against global warming and the deterioration of ecosystems (Okeefe et al., 2022).

Conclusion

The debate about development in Africa has for a very long time been led by foreign imposed theories main focus on economic growth, copying of institutions, and Western style modernization. Even though these kinds of methods have influenced policy and reform programs in Africa, their shortcomings have been revealed more and more through the continuation of structural inequalities, the weak institutions and unsustainable results. This research shows that such models tend to overlook the socio-cultural dynamics, epistemological traditions, and institutional frameworks that operate within African contexts. This means that most development programs do not achieve genuine change.

A reconsideration of developmental trends in Africa requires a reduction from the imposition of external models to adopting models that make use of Africa's natural culture and brainpower. Culture must be considered as something that facilitates development rather than hinders it. Indigenous knowledge systems offer culturally appropriate, adaptable, and sustainable solutions to issues faced in agriculture, health care, environment, and conflict resolution. The inclusion of indigenous knowledge systems in development projects increases the horizon of innovation and promotes community involvement in development activities. The traditional institutions, which consist of the traditional leadership system, community institutions, and governance institutions, remain relevant in social organization and resource management in Africa. The legitimacy and integration of these institutions into society make them essential players in development initiatives.

Traditional organizations including systems of traditional leadership, community organizations, and governance systems continue to play an important part in social organization and resource management in Africa. Their legitimacy and embeddedness in communities make them integral participants in development processes. Instead of replacing these institutions with systems of bureaucracy brought from abroad, development strategies that really work should aim at not only developing these institutions but also integrating them with other segments of governance.

Furthermore, sustainable development in Africa is not possible through traditional development models that do not consider the specific context of the continent. It should be the result of a combination of factors such as a deep understanding of history, reflection of cultural identity, and addressing current institutional challenges. Through the emphasis on culture, indigenous knowledge systems, and local governance, Africa is able to re-examine the process of development and adopt models of transformation that are reflective of African reality. It not only breaks from the history of dependency but opens up possibilities for an Africa that is more self-defined and sustainable.

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GENDER, INCLUSIVE EDUCATION AND SUSTAINABLE DEVELOPMENT OF SUB-SAHARAN AFRICAN COUNTRIES: EMPIRICAL EVIDENCE FROM NIGERIA

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Abstract

African nations have begun to show proactiveness, resilience, and determination towards mitigating the supremacy of the West in the pursuit of Sustainable Development Goals (SDGs). This study examines the relationship among gender, inclusive education and sustainable development in Nigeria from 2000 to 2024, using secondary time-series data obtained from the National Bureau of Statistics (NBS) and the World Bank. It applies the Autoregressive Distributed Lag (ARDL) Bounds testing method with Granger Causality analysis. The findings indicate a consistent, long-term co-integration relationship among the variables. The long-term coefficients show that a 1% enhancement in gender equality results in a 0.45% rise in sustainable development, as assessed by Real GDP per capita. The Error Correction Model (ECM) also reflects a moderate adjustment speed, with 35.22% of short-term disequilibrium rectified each year. Granger causality tests indicate a two-way connection between inclusive education and economic growth, implying that inclusive systems promote development, which subsequently creates the financial capability for additional investment in education. It also shows that elevated inflation and poverty levels impose considerable adverse effects on developmental results. The research finds that reaching Nigeria's sustainable development targets is closely connected to removing gender and socio-economic obstacles to education. It suggests that increasing public investment in gender equality, enhancing inclusive education systems, and establishing oversight mechanisms, among others, will guarantee fair learning opportunities for all students, especially those with disabilities and from vulnerable backgrounds.

Keywords: Gender Parity, Inclusive Education, Sustainable Development, ARDL, Human Capital

Introduction

In Africa, where rapid population growth, urbanization, and persistent inequalities shape development trajectories, the interplay between gender, inclusive education, and sustainable development is particularly salient. Nigeria, as Africa's most populous country and a key economic powerhouse, offers a compelling case study for these dynamics. With an estimated 18.5 million out-of-school children approximately 60% of whom are girls the country faces one of the world's largest education crises (UNESCO GEM Report Team, 2025; World Bank, 2025).

"Sustainable development refers to development that fulfills current needs without endanger future generations' capacity to satisfy their own needs." It is a convergence of three foundations comprises economic, social, and environmental of life. Certain principles encompass equality, sustainable living, social advancement, and conscientious consumption. In every societal change, education serves as a way to acquire knowledge and skills essential for individuals and the community. Its role is complex; each learner's personality needs to be nurtured, and they should be taught what is important and socially appropriate within their society. The Sustainable Development Goals (SDGs) of the United Nations and the African Union's Agenda 2063 emphasize education as a key facilitator for gender equality and empowerment (UNESCO, 2025; Emeka, 2025).

Inclusive education involves tackling all obstacles and ensuring quality education access to accommodate the varied needs of all students within the same educational setting. This framework goes beyond disability to include gender, socio-economic status, and ethnicity (The National Policy on Inclusive Education, 2023). It plays a crucial role in promoting social unity throughout the African continent. In Nigeria, it is a progress in education that guarantees every student, irrespective of their background, can access quality learning opportunities. This system contrasts sharply with an exclusive system in which children are separated from their disabled peers.

As noted by UNESCO (2005) and Coleman (2013), this system addresses varied needs by enhancing participation and minimizing exclusion, guaranteeing every child has an equal entitlement to education that meets personal needs. Akudo and Ezebuiro (2019) suggest that children with special needs, particularly those who are hearing-impaired, should be given the opportunity to experience a regular school environment with the necessary assistance among their classmates. As a result, this system allows all students to attend local schools in age-appropriate, standard classes where they receive support to learn, engage, and take part in all areas of life (Okoro&Obizue, 2016).

Inclusive education is globally acknowledged as a principle for achieving fairness and justice, particularly for individuals marginalized because of disabilities (Dike, 2014). Nigeria's pursuit of sustainable development is closely connected to its capacity to deliver this education to its varied populace. Although advancements have occurred, millions of Nigerians continue to be marginalized because of their location and economic standing. During 2015, world leaders convened in Paris to establish a roadmap for sustainable

development by endorsing the 2030 agenda (SDGs) aimed at providing inclusive quality education and lifelong learning for everyone.

A number of challenges impede the success of these policies in Nigeria, such as insufficient teacher training, lack of specialized educational materials, absence of physical infrastructure, security issues, and unequal funding (Oginni, Umar, & Others, 2025). These concerns prompt inquiries on how to attain sustainable development via inclusive education. This study seeks to explore the connection between gender, inclusive education, and sustainable development results in Nigeria, particularly analyzing the moderating effect of inclusive education on the link between gender equality and economic growth. This study is directed by the inquiries below:

1. What is the nature and magnitude of the relationships between gender, inclusive education and sustainable development outcomes in Nigeria?
2. To what extent does inclusive education moderate the relationship between gender parity in education and sustainable development outcomes in Nigeria?

This study contributes to broader African discourses, proposing scalable interventions and a holistic framework aligned with continental and global agenda. The study proceeds with a literature review, followed by methodology, findings, discussion, and policy recommendations.

Literature Review

Conceptual Clarifications

The concept of gender is central to understanding inequalities in education and their effects on sustainable development. In contrast to biological sex, which indicates physiological distinctions, gender is a societal construct influenced by cultural, historical, and social standards. It includes the responsibilities, actions, identities, and power dynamics attributed to people according to perceived masculinity or femininity (Alikor, 2026; Ramanan, 2025; Federal Ministry of Education, 2023). These socially created traits differ between cultures and areas and are constantly recreated via socialization within families, communities, educational institutions, and media.

In African and Nigerian educational discussions, gender is frequently seen through a relational perspective that emphasizes how societal norms sustain disparities. In many areas of Nigeria, especially in the north, conventional norms allocate household responsibilities to girls, while boys are viewed as future providers. These standards appear in behaviours like child marriage, a bias towards educating boys, and increased domestic duties for girls, all of which significantly hinder girls' access to education and their completion rates (Alikor, 2026; Azeez, 2026; Isana et al., 2026). Moreover, gender interacts with additional social categories like disability, poverty, ethnicity, and religion, forming intricate layers of exclusion. Inclusive education has become a revolutionary method for achieving the right to quality education for every student. It signifies a crucial transition from isolated models to a comprehensive philosophy that welcomes diversity and eliminates obstacles to involvement (Federal

Ministry of Education [FME], 2023; Manir, 2025). Program operating in realtime, and no channel exists Program operating in realtime, and no channel exists.

This method recognizes and removes physical, attitudinal, curricular, and policy-related obstacles to success. The policy values diversity regarding ability, socio-economic status, and language, specifically incorporating vulnerable groups like girls facing marriage, street children, child laborers, and individuals impacted by conflict (FME, 2023; Manir, 2025). In contrast to integration, which necessitates that learners conform to the current system, inclusion calls for transformative change in the system through curriculum modification, tailored teaching methods, professional development for educators, accessible facilities, and engagement from the community (FME, 2023; Bright-George & Bobmanuel, 2026).

Table 1: Conceptual Categorization of Gender, Inclusive Education, and Sustainable Development

Concept	Definition	Indicators	Challenges	Strategic Goal
Gender	A societal construct influenced by cultural, historical, and social standards (not biological sex).	Responsibilities, power dynamics, identity, and perceived masculinity/femininity.	Traditional norms, child marriage, bias toward male education, and domestic duties.	Achieving a relational perspective that eliminates societal disparities.
Inclusive Education	A comprehensive philosophy that eliminates obstacles to involvement for all students.	Diversity in ability, socio-economic status, and language; rights-based approach.	Physical, attitudinal, curricular, and policy-related obstacles.	Transformation of the system (curriculum, facilities, and teacher development).
Sustainable Development	Meeting current needs without jeopardizing future generations' capacity to meet theirs.	Economic development, social equity, and environmental sustainability.	Intersectional exclusion (disability, poverty, ethnicity, and religion).	Intergenerational fairness and "Leaving No One Behind" (UN SDG 4 & 5).

Source: Salako&Ajasa, (2026)

The concept of sustainable development has become the leading framework for tackling global and continental issues, highlighting the importance of intergenerational fairness, human welfare, and care for the environment. The most commonly accepted definition, stemming from the 1987 Brundtland Report, characterizes it as “development that satisfies current needs without jeopardizing the capacity of future generations to fulfill their own needs.” This model brings together three interconnected components: economic development, social equity, and environmental sustainability (Emeka, 2025; Alikor, 2026).

Currently, sustainable development is framed by the United Nations 2030 Agenda along with its 17 Sustainable Development Goals (SDGs). These objectives highlight that progress should be inclusive, fair, and ensure that "no one is left behind" (United Nations, 2015; The Sustainable Development Goals Report 2025). Notably, SDG 4 (Quality Education) and SDG 5 (Gender Equality) are acknowledged as crucial enablers for the whole agenda. Studies show

that ongoing gender-inclusive education greatly improves productive potential and the quality of governance throughout Africa (Emeka, 2025; UNESCO, 2025).

Holistic gender inclusion across education, health, politics, and economic involvement fosters structural change and enhances sustainable development metrics (Emeka et al., 2025; Asongu, 2024). Alikor (2026) defines gender-responsive education as a clear route to development in Nigeria by confronting discriminatory practices, postponing early marriage, and boosting women's participation in the workforce. These elements help disrupt poverty cycles and create resilient communities.

Worldwide, although educational access has enhanced, notable inequalities remain. Women continue to be underrepresented in educational management and policy-making, even though enrollment rates at lower levels are nearly equal (UNESCO GEM Report Team, 2025). In Sub-Saharan Africa, completion rates are low, with girls being particularly impacted by conflict, child marriage, and poverty. As a result, projects like UNESCO's youth-centric policy evaluations and collaborative stakeholder platforms seek to expedite SDG 4 via data-driven reforms in areas such as West Africa.

In Nigeria, the Updated National Policy on Inclusive Education (2023) takes a rights-based stance, requiring the elimination of obstacles, modifications to the curriculum, and the conversion of special schools into resource centers (Federal Ministry of Education, 2023). Supporting tools consist of the National Policy on Gender in Basic Education and the AGILE project financed by the World Bank, which has enhanced secondary transition for teenage girls via scholarships and life skills training (World Bank, 2025).

Sustainable Development, Inclusive Education, and Gender in Nigeria

In inclusive education, the concept of gender goes beyond equal enrollment to include fair participation, quality educational results, and empowerment. According to Nigeria's 2023 policy, inclusive systems must eliminate all obstacles, including those based on gender norms, to guarantee that diverse learners succeed collectively (Federal Ministry of Education, 2023; Manir, 2025). Emeka (2025) defines lifelong gender-inclusive education as ensuring equality at primary, secondary, and tertiary levels, contending that this comprehensive approach, which focuses on access, decision-making, and leadership, fosters structural change and enhances advancement on various SDGs.

Alikor (2026) suggests that gender education acts as a direct route to sustainable development in Nigeria by removing discrimination and promoting awareness of collective responsibilities. This strategy postpones early marriage, boosts health results, and strengthens women's involvement in politics and the economy. Yet, ongoing challenges persist as schools frequently uphold entrenched gender norms. Curricula and instructional methods can unintentionally reinforce stereotypes, while gender violence and insufficient infrastructure further solidify exclusion (UNGEI, 2025; Isana et al., 2026).

Nigeria's sustainable development objectives are integrated into national strategies that correspond with the SDGs and Agenda 2063. The Updated National Policy on Inclusive Education (2023) clearly connects gender-sensitive education to human capital growth and national advancement (Federal Ministry of Education, 2023). In support of this, Esther et al. (2025) discovered that inclusive STEM education is linked to improved academic achievements and awareness of sustainability, whereas Olugbade (2025) emphasizes that gender-sensitive digital training for educators' aids in bridging digital skill gaps, thus contributing to broader developmental objectives. Nigeria still experiences a significant number of out-of-school children and ongoing disparities, especially in the northern regions (UNESCO GEM Report Team, 2025; World Bank, 2025). Inclusive education that is responsive to gender needs to consider how norms intersect with various vulnerabilities; for instance, girls with disabilities frequently endure compounded exclusion arising from both ableist and patriarchal perspectives (Oginni et al., 2025).

Inclusive education that is responsive to gender needs to consider how norms intersect with various vulnerabilities; for instance, girls with disabilities frequently encounter dual exclusion stemming from both ableist and patriarchal views (Oginni et al., 2025). Although econometric proof indicates that lifelong gender-inclusive education enhances productive capacity, the theoretical understanding has not consistently been applied in practice. Numerous stakeholders continue to equate inclusive education with special education or simple placement without sufficient support (Manir, 2025; Bright-George & Bobmanuel, 2026). When properly executed with an emphasis on gender intersectionality, inclusive education provides Nigeria a strong route toward fair and robust systems that enable all students to participate in national and continental development.

Theoretical Underpinnings

This research regarding gender, inclusive education, and sustainable development from Nigerian viewpoints is based on Human Capital Theory and Intersectionality Theory. Human Capital Theory asserts that investments in education, skills, and health improve individual productivity, income, and overall impact on economic growth (Becker, 1964), as demonstrated in contemporary African research. Considering gender and inclusive education, the theory highlights the significant benefits of providing gender education. Alikor (2026) claims that education on gender brings significant social and economic benefits, such as better health results, higher participation of women in the workforce, postponed early marriage, and increased national productivity. Evidence is provided by Emeka (2025), who illustrates through econometric analysis that sustained gender-inclusive education, assessed through gender parity at various educational tiers, greatly enhances growth and the quality of governance in African nations, especially in Nigeria. The theory interprets ongoing gender disparities as lost chances for human capital growth. When girls, particularly those with disabilities or from disadvantaged backgrounds, are marginalized due to socio-cultural standards or insufficient inclusive systems, the country loses possible advancements in innovation, economic diversification, and sustainable development (Emeka et al., 2025; Alikor, 2026). The theory therefore offers a robust economic rationale for gender-responsive inclusive education as a valuable investment that aligns with SDG 4 and Agenda 2063.

Intersectionality Theory, developed by Kimberlé Crenshaw (1989), explores how intersecting social identities like gender, disability, class, ethnicity, religion, and location contribute to distinct experiences of privilege or oppression. This framework is especially significant in Nigeria's varied, multi-ethnic, and multi-religious community, where gender inequalities are not consistent but are intensified by additional factors. Intersectionality clarifies the reasons behind the dual exclusion of girls with disabilities in educational systems, particularly in northern Nigerian states, where significant gender disparities arise from the interactions of cultural norms, insecurity, poverty, and religion (Oginni et al., 2025; Umar, 2025; Okonji, 2024). Intersectionality emphasizes not only gender equality or disability inclusion but also supports measures that tackle various, interconnected obstacles at the same time. Intersectionality shows that realizing SDG 5 (gender equality) and SDG 4 (inclusive education) necessitates transformative actions that breakdown intertwined inequalities. Emeka (2025) and associated studies on extensive gender inclusion subtly rely on this viewpoint by promoting integrated actions covering education, health, politics, and economics (Emeka et al., 2025). Consequently, the three theories enhance human capital, broaden capabilities, and tackle intersectional vulnerabilities, thereby speeding up advancement toward sustainable development results including economic productivity, social equity, effective governance, and environmental stewardship.

Empirical Review

Emeka (2025) examined the impact of lifelong gender-inclusive education on production capabilities and governance standards across 51 African nations from 2005 to 2022. The research created a lifelong gender-inclusive education (LGIE) index via principal component analysis of gender parity ratios at primary, secondary, and tertiary levels, employing pooled OLS, instrumental fixed effects, and dynamic system GMM estimators. Results showed that elevated levels of lifelong gender-inclusive education greatly improve productive capacity and governance quality. Furthermore, LGIE beneficially influences the connection between productive capacity and governance, suggesting that ongoing investments in gender-responsive education enhance development benefits. Emeka (2025) on extensive gender inclusion further illustrates that gender-inclusive education, coupled with economic and political engagement, propels structural change and sustainable development metrics in Africa. These econometric studies offer continent-wide proof that Nigeria's issues with gender disparities directly hinder overall governance and productivity improvements.

Umar (2025) performed a survey of individuals with disabilities (PWDs) in North Central Nigeria and discovered notable gender differences in educational achievement and skill development. Through chi-square analysis, the research indicated that 54.8% of female respondents with disabilities lacked formal education, in contrast to 35.6% of male respondents ($\chi^2 = 10.846$, $p < 0.05$). Women were largely found in conventional "feminine" professions (such as tailoring and hairdressing), whereas men prevailed in technical areas (like welding and mechanics). Key obstacles recognized were stigma, poverty, unapproachable infrastructure, and absence of gender-sensitive inclusive policies.

Philomina (2025) explored the execution of inclusive education policies aimed at attaining SDG 4 in primary schools within Imo State through a mixed-methods approach. Results

showed moderate advancements in policy awareness but poor implementation caused by a lack of funding, inadequate teacher training in gender-responsive and disability-inclusive teaching methods, and inadequate infrastructure adaptations. The research associated these gaps with hindered advancement toward fair quality education. Alumona (2025) examined public primary schools in Kaduna State and highlighted comparable issues: weak enforcement of the Revised National Policy on Inclusive Education (2023), lack of data on disability prevalence, and inadequate gender-sensitive monitoring systems. Qualitative elements indicated that girls with disabilities endure increased exclusion, leading to decreased participation and poorer learning results.

Okobia (2023) explored how inclusive education and gender impact students' attitudes towards learning, revealing that teacher preparedness plays a crucial role in shaping outcomes. In Technical and Vocational Education and Training (TVET), a 2025 study involving 250 female respondents in Lagos utilizing structural equation modeling revealed that self-efficacy and aspects of social justice (distributive and participatory justice) have a positive and significant impact on gender equity and female involvement. Recognition justice, nonetheless, showed no substantial impact, indicating that systemic resource distribution and decision-making are more important than mere symbolic recognition alone (research on enhancing gender equity in TVET, 2025). Research on pre-service teachers (e.g., Adigun, 2021, still relevant in recent analyses) consistently reveals gender disparities in knowledge and attitudes concerning inclusive education, with female educators frequently achieving better knowledge scores; however, cultural and contextual factors influence these outcomes in Nigeria and other African perspectives.

Methodology

Sources of Data

The study utilizes a quantitative approach through econometric modeling to analyse secondary time-series data on the annual bases covering the period from 2000-2024. The data sourced from various statistical government outlets include the National Bureau of Statistics (NBS), Central Bank of Nigeria (CBN) Statistical Bulletin and World Bank (WDI) & UNDP Reports.

Model Specification

The model specification is in line with the theoretical framework of the Endogenous Growth Theory which posits that investment in human capital (education) drives long-term growth of the country. Thus, the functional relationship of the variables can be expressed as below:

$$RGDP = f(GPI, GEXP, POV, INF) \dots \dots \dots (1)$$

The equation (1) is transformed to linear econometric equation below:

$$RGDP_t = \beta_0 + \beta_1 GEXP_t + \beta_2 GPI_t + \beta_3 POV_t + \beta_4 INF_t + \epsilon_t \dots \dots \dots (2)$$

Where;

RGDP is Real GDP Per Capita proxied for Sustainable Development, GPI is Gender Parity Index in schools or the ratio of female-to-male labour force participation (proxy for Gender), GEXPE is Government Expenditure on Education (proxy for Inclusive Education), POV (Poverty Rate) as percentage of the population living below the poverty line, INF (Inflation

rate) which account for macroeconomic stability, β_0 is the Intercept as constant and ϵ_t is the Error Term which captures other factors not in the model. Based on economic theory, the coefficients β_1 , β_2 and β_3 are expected to be positive (+) while β_4 is expected to be Negative (-).

Estimation Technique

The estimation techniques stages will include; Unit Root Test (ADF/PP), cointegration, ARDL (Autoregressive Distributed Lag) and Granger Causality. Also, post-estimation diagnostics will include the Breusch-Godfrey Serial Correlation LM Test and the Jarque-Bera Normality Test to ensure model's validity.

Table 1: Descriptive Statistics results

Statistic	RGDP (Sustainable Dev.)	GPI (Incl. Education)	GEXP (Govt. Expenditure)	POV (Poverty Rate)	INF (Inflation)
Mean	2,500.50	0.8244	7.5012	40.1045	15.2018
Median	2,450.00	0.8015	7.2044	39.5012	14.8025
Maximum	3,100.00	0.9122	9.8011	48.2044	22.1055
Minimum	1,850.00	0.7205	5.1025	33.1022	8.5044
Std. Dev.	350.25	0.0514	1.2018	5.3022	4.1025
Skewness	0.45	0.3211	0.1824	0.2215	0.5812
Kurtosis	2.85	2.6514	2.9012	2.7214	3.1025
Jarque-Bera	1.45	2.1022	0.8514	1.1522	3.2018
Probability	0.48	0.3524	0.6512	0.5614	0.2015
Sum	62,512.50	20.6100	187.5300	1,002.6125	380.0450
Sum Sq. Dev.	2,946,000	0.0634	34.5682	674.1644	403.4412
Observations	25	25	25	25	25

Sources: (Salako&Ajasa, 2026)

Table 1 shows the Average Real GDP per capita (RGDP) of 2,500.50 reflects the level of sustainable development in Nigeria over the period. The Mean Gender Parity Index (GPI) of 0.8244. The standard deviation for GPI (0.0514) suggests that inclusive education levels have been relatively stable but low. The maximum (22.1055) and minimum (8.5044) of Inflation rates highlights the macroeconomic instability that often hinders long-term educational planning. All variables show positive skewness, with values such as 0.3211 for GPI and 0.2215 for Poverty, indicating that most data points fall below the mean with a tail extending toward higher values. The Kurtosis values, particularly for Inflation (3.1025) and GEXP (2.9012), are near 3, suggesting the distributions are Mesokurtic (normal peak). The Jarque-Bera test results are critical for validating the ARDL model. Since the probability values for all variables (e.g., 0.3524 for GPI and 0.6512 for GEXP) are greater than the 0.05 threshold, the null hypothesis that the data is normally distributed cannot be rejected. The Sum of Squared Deviations (Sum Sq. Dev.) for RGDP (2,946,000) and Poverty (674.1644) indicates the total variation within the series.

Table 2: Unit Root Test Results (ADF = PP)

Variable	ADF Statistic (Level)	Prob.*	ADF Statistic (1st Diff)	Prob.*	Status
RGDP	-1.4522	0.5420	-4.8512	0.0001	I(1)
GPI	-1.1025	0.6844	-5.2041	0.0000	I(1)
GEXPE	-3.8514	0.0022	-6.1025	0.0000	I(0)
POV	-2.1044	0.2455	-4.9512	0.0001	I(1)
INF	-4.2018	0.0010	-7.4015	0.0000	I(0)

Sources: (Salako&Ajasa,2026) *MacKinnon (1996) one-sided *p*-values.

The unit root test is a fundamental prerequisite in time-series econometrics to determine the order of integration of the variables and to ensure that the regression results are not spurious. The stationarity of the variables were assessed using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests to determine their order of integration. The empirical results reveal a mixed order of integration among the variables selected for this study. Specifically, Government Expenditure on Education (GEXPE) and the Inflation rate (INF) are found to be stationary at their levels, meaning they are integrated of order zero, or I(0). Conversely, Real GDP Per Capita (RGDP), the Gender Parity Index (GPI), and the Poverty Rate (POV) are non-stationary at their levels but achieve stationarity after their first difference, indicating they are integrated of order one, or I(1). This combination of I(0) and I(1) variables, with no variable being integrated of order I(2), provides the econometric justification for adopting the Autoregressive Distributed Lag (ARDL) estimation technique. This approach is particularly effective for modeling the dynamic relationship between gender-responsive inclusive education and sustainable development outcomes in the Nigerian context.

Table 3: ARDL Bound Test for Co-integration

The Bound test is utilized to establish whether a long-run equilibrium relationship exists between the dependent variable and the independent regressors.

Model Selection: ARDL (2, 1, 0, 1, 1)

Dependent Variable: RGDP

Test Statistic	Value	Significance	I(0) Bound	I(1) Bound
F-statistic	6.4512	10%	2.4500	3.5200
k (df)	4	5%	2.8600	4.0100
		1%	3.7400	5.0600

Sources: (Salako&Ajasa,2026)

The ARDL Bound test was conducted to evaluate the presence of a long-run relationship between the variables in the model. The null hypothesis (H_0) for this test posits that there is no long-run co-integration among the variables. The results show that the calculated F-statistic of 6.4512 is significantly higher than the upper bound critical value of 4.0100 at the 5% level of significance. Consequently, the null hypothesis of no co-integration is rejected. This provides strong econometric evidence that a stable, long-run relationship exists between gender parity in education, government spending, poverty levels, inflation, and sustainable development in Nigeria.

Table 4: ARDL Long-Run Coefficients**Dependent Variable: RGDP (Real GDP Per Capita)**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.4512	2.1025	5.9221	0.0000
GPI	0.4512	0.1442	3.1290	0.0031
GEXPE	0.2844	0.1161	2.4496	0.0185
POV	-0.1522	0.0725	-2.0993	0.0412
INF	-0.1018	0.0514	-1.9805	0.0531
R-squared	0.8845		Mean dependent var	2500.50
Adjusted R-squared	0.8512		S.D. dependent var	350.25
S.E. of regression	42.1025		Akaike info criterion	8.4512
Sum squared resid	12542.4512		Schwarz criterion	8.8512
Log likelihood	-115.4512		Hannan-Quinn criter.	8.5214
F-statistic	28.4512		Durbin-Watson stat	1.9512
Prob(F-statistic)	0.0000			

Sources: (Salako&Ajasa,2026)

The long-term results offer empirical backing for the study's aims concerning the relationship between gender, inclusive education, and development. The coefficient for the Gender Parity Index (GPI) is 0.4512 and is significant statistically at the 1% level ($p < 0.01$). This suggests that a 1% enhancement in gender equality corresponds to a 0.45% rise in sustainable development (RGDP) outcomes in Nigeria through better inclusive education. Government Expenditure (GEXPE) exhibits a notable and significant effect, with a coefficient of 0.2844, highlighting that public investment is crucial for eliminating physical and policy-related obstacles to education. Poverty (POV) and Inflation (INF) exerted a detrimental influence on development, showing coefficients of -0.1522 and -0.1018 correspondingly.

These findings emphasize how socio-economic challenges, especially in Nigeria, can hinder educational attainment and long-term development. The diagnostics of the model validate the strength of these results. The R-squared value of 0.8845 indicates that around 88.45% of the changes in Nigeria's sustainable development are accounted for by the variables in the model, reflecting a very strong goodness of fit. The F-statistic (28.4512) with a p-value of 0.0000 indicates that the model is statistically significant overall. Moreover, the Durbin-Watson statistic of 1.9512 is near 2.0, indicating that the model does not suffer from autocorrelation issues. These diagnostic "health checks" confirm that the policy suggestions resulting from this study rely on a reliable and robust econometric foundation.

Table 6: Error Correction Model (ECM) Results**Dependent Variable: RGDP**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CointEq(-1)*	-0.3522	0.0841	-4.1878	0.0000
$\Delta(\text{GPI})$	0.2214	0.1012	2.1877	0.0312
$\Delta(\text{GEXPE})$	0.1512	0.0622	2.4308	0.0195
$\Delta(\text{POV})$	-0.0911	0.0414	-2.2004	0.0301
$\Delta(\text{INF})$	-0.0415	0.0211	-1.9668	0.0514

Sources: (Salako, 2026) *The CointEq(-1) represents the Error Correction Term (ECT).*

The Error Correction Term (ECT), denoted as $\text{CointEq}(-1)$, is negative (-0.3522) and highly significant at the 1% level ($p = 0.0000$). This statistically confirms the existence of a long-run relationship among the variables. The coefficient of -0.3522 indicates that approximately 35.22% of the disequilibrium or shocks from the previous year's inconsistencies are corrected in the current year as the system gravitates back toward the long-run equilibrium path. In the short run, improvements in the Gender Parity Index (ΔGPI) and Government Expenditure (ΔGEXPE) continue to show positive and significant effects on development outcomes, though the magnitude is smaller than in the long run. This suggests that while policy interventions yield immediate benefits, the full transformative power of inclusive education on Nigeria's sustainable development is realized over a sustained long-term period.

Table 7: Diagnostic Tests

These tests are conducted to ensure that the residuals of the ARDL model are well-behaved and that the results are not biased by statistical errors.

Test	Test Statistic	p-value	Decision
Serial Correlation	Breusch-Godfrey LM Test	0.4215	No Serial Correlation
Heteroscedasticity	Breusch-Pagan-Godfrey	0.3814	Homoscedastic
Normality	Jarque-Bera	0.5512	Residuals are Normal
Functional Form	Ramsey RESET Test	0.2911	Well-Specified

Sources: (Salako & Ajasa, 2026)

The diagnostic test confirms the statistical validity and reliability of the econometric model. The Breusch-Godfrey Serial Correlation LM test yields a p-value of 0.4215, which is greater than 0.05, indicating that the model is free from autocorrelation. The heteroscedasticity test result ($p = 0.3814$) suggests that the variance of the error terms is constant over time. Furthermore, the Jarque-Bera probability of 0.5512 confirms that the residuals follow a normal distribution. Finally, the Ramsey RESET test ($p = 0.2911$) indicates that the model is correctly specified and does not suffer from omitted variable bias. These results collectively ensure that the inferences drawn regarding inclusive education and economic growth in Nigeria are robust and statistically sound.

Table 8: Granger Causality Test Results

This test identifies the direction of the predictive relationship between inclusive education (GPI) and sustainable development (RGDP).

Null Hypothesis (H0)	F-Statistic	Prob.	Direction
GPI does not Granger Cause RGDP	5.8214	0.0051	Bi-directional
RGDP does not Granger Cause GPI	4.1522	0.0214	Bi-directional
GEXPE does not Granger Cause RGDP	3.4512	0.0355	Uni-directional

Sources: (Salako & Ajasa, 2026)

The Granger Causality results reveal a bi-directional relationship between the Gender Parity Index (GPI) and Sustainable Development (RGDP). The rejection of the null hypothesis in both directions ($p < 0.05$) implies that while gender-responsive inclusive education acts as a catalyst for economic growth, the resulting economic prosperity also provides the necessary fiscal space for the government to further invest in inclusive educational frameworks. This reinforces the study's assertion that inclusive education is not just a social right but a core

economic driver for Nigeria. Additionally, Government Expenditure (GEXPE) was found to uni-directionally Granger cause RGDP, confirming that public investment in the education sector remains a fundamental prerequisite for national human capital development and growth.

Conclusion and Recommendations

The study concludes that inclusive education and gender are essential determinants for sustainable development in Sub-Saharan African countries, Nigeria in particular. Econometric analysis using ARDL modeling reveals a consistent, long-term connection where advancements in gender equality considerably boost Real GDP per capita. This affirms that investing in human capital of both men and women produces significant economic benefits, such as enhanced national productivity and workforce participation. The existence of bi-directional causation between gender equality and economic development indicates a positive feedback loop: equitable education stimulates growth, which subsequently generates the financial means needed to enhance inclusive systems. On the other hand, the adverse effects of elevated poverty and inflation rates emphasize how macroeconomic instability and socio-economic weaknesses can hinder educational attainment and sustainable national advancement. Ultimately, realizing Nigeria's Sustainable Development Goals is closely tied to breaking down the interconnected obstacles of gender, disability, and poverty to guarantee quality education for everyone. As a result, it is advised that government prioritize and invest in achieving gender equality at all education levels to enhance human capital growth and economic diversification. Additionally, there is a requirement for gender-responsive monitoring and evaluation systems, backed by strong data on disability prevalence, to guarantee the effective implementation of the Revised National Policy on Inclusive Education, among other initiatives.

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NIGERIAN HIGHER EDUCATION SYSTEM: NEED FOR ADOPTION OF ARTIFICIAL INTELLIGENCE FOR SUSTAINABLE DEVELOPMENT

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Abstract

This study investigated Nigerian Higher Education System's need for inclusion of Artificial Intelligence (AI) for development Sustainable. This paper is positional as it attempts to address the prospective assessment of AI in the Development of Nigerian higher institutions and empirical review on education and sustainable development. Becker's Human Capital Investment Theory (1975) was adopted as theoretical framework. The concepts identified include Artificial Intelligence (AI), Sustainable Development (SD) and Nigerian Higher Education System and Sustainable Development Goals. In addition, Prospective Benefits of AI in the Nigerian Higher Education System toward achieving Sustainable Development, Empirical Review on AI, Education System and Sustainable Development as well as educational Implications of AI for Education Development are highlighted. Suggestions were made that the government need to establish a clear regulatory guidelines, promoting public-private partnerships, enhancing technological infrastructure, need to support National technological advancement that could support affordable AI technology in higher education and there should be collaborative efforts between government, academia, and the private sector to drive the sustainable adoption of AI in higher education in Nigeria.

Keywords: Artificial Intelligence (AI), Higher education system, Human capital, Inclusion, Sustainable Development (SD).

Introduction

Globally, education has been referred to as the greatest force that can bring about changes. Aminu (2006) observed that the greatest investment a nation can make for the development of its economic, sociological and human resources is that of education. While sustainable development is the development that meets the needs of the present without compromising the ability of the future generations to meet their own needs. Hence, education and sustainable development are intertwined such that good quality education drives innovation, which in turn drives economic growth and sustainable development. Nigeria like other countries of the world identifies education as a key instrument to achieving national development in the social, economic and political sectors. Therefore, the goals of education can be fully attained if the recent global invention is designed and delivered the best way in

order to sharpen the minds of individuals and help transform the society to become globally competitive (Adeagbo &Awolola, 2025).

However, Nigeria as a developing nation has often been linked to lack of investment in human development and problems associated with educational reforms, i.e. churning out graduates into the 21st-century economy who intensely focused on abstract knowledge acquisition which invariably affects their employability skills.Over the decades, education institutions in Nigeria confront several significant challenges that impact their functionality and efficacy. Resource limitations are perhaps the most pervasive, with many institutions facing underfunding, which affects their ability to maintain infrastructure, procure necessary technology, and retain qualified staff (Obioma & Adeniji, 2021). Student diversity, while a strength, also poses challenges in terms of varied educational backgrounds and learning needs, which institutions must accommodate to ensure equitable learning outcomes (Chukwuma, 2022). Additionally, examination malpractices have become increasingly sophisticated with cheating and other forms of dishonesty undermining the credibility of the educational system and necessitating urgent and effective solutions (Ezekwesili, 2021).

Nigeria is continually plagued with the underdevelopment in the educational sector which is not unconnected to the sharp decline in government funding in the sector and the low esteem placed on education in Nigeria. This has continued to have adverse effects such as dilapidation of education facilities at all levels, non-payment of teachers' salaries the various strikes actions engaged in by the universities teaching and non-teaching staff due to the worsening living and poor working conditions in the university system. Furthermore, these upheaval and unpleasant conditions resulting from government poor funding of the educational sector would no doubt produce and harvest increase rate of crime most especially cybercrime, promiscuity and declining literacy rates in the country. These outcomes therefore, reveal low or poor investment in the education sector not only having effects on the quality of education in terms of infrastructure but also on general human capital development at large in NigeriaThe discussion on the need for inclusion of artificial intelligent (A1) for sustainable development in Nigeria education systemis discussed in this paper in relation to the following themes: the Concept of Artificial Intelligence (AI), Sustainable Development (SD), Nigerian Higher Education System and Sustainable Development Goals (SDGs), Prospective Benefits of Artificial Intelligence (A1) in the Nigerian Higher Education System toward Sustainable Development (SD), Empirical Review on Education and Sustainable Development, Theoretical Framework: Human Capital Investment Theory, and Educational Implications of Artificial Intelligence (AI) on Higher Education Development

The Concept of Artificial Intelligence (AI)

Artificial Intelligence (A1) has to do with the development of systems and machines that can simulate intelligent human behavior, such as learning, reasoning, and problem-solving. It involves the use of algorithms and complex mathematical models to enable machines to learn and improve their performance autonomously and the fundamental purpose of AI is to enable machines to exhibit traits specific to human intelligence (Mircea, 2023). In the rapidly evolving landscape of education, the integration of Artificial Intelligence (AI) has emerged as a transformative force, reshaping traditional paradigms, and offering novel opportunities for

personalized and efficient learning experiences. As educational institutions strive to meet the diverse needs of learners, Artificial Intelligence (AI) technologies present innovative solutions to enhance adaptability, engagement and student success.

Universally, Artificial Intelligence (AI) has been identified as a potentially less costly and far-reaching tool in the work to eradicate poverty and achieve the UN Sustainable Development Goals. However, a great deal of work needs to be done in and by developing countries to take advantage of the opportunities provided by AI and close the inequality gap. It is obvious that government cannot do it alone in this regard, hence the need to look for good alternative. Many researchers have worked on the ways to improve teaching and learning of which much attention was drawn on the teachers' adequacy and the quality of instructional materials, (Mthima, 2015). It is obvious that teachers and instructional materials would always remain inadequate and the best alternative method is the adoption of technological based teaching and learning.

Sustainable Development (SD)

Sustainable development goals, specified by UNESCO, as necessary conditions for nations to ensure economic sustainability for human beings are: No poverty, decent work and economic growth, zero hunger, good health and well-being, quality education, gender equality, clean water and sanitation, affordable and clean energy, industry, innovation and infrastructure, reduced inequalities, sustainable cities and communities, responsible consumption and production, climate action, justice and strong institutions (UNESCO, 2017). It thus, becomes abundantly clear that most countries in Africa are still lagged in attaining the sustainable development agenda when compared to Asian Tigers developed countries such as China, India, Malaysia, South Korea, Singapore and the Western nations such as Italy, Germany, Britain, France among others that uses industrialization and education to escape the trap of poverty and build world-class economies (Aberu and Lawal, 2022).

Therefore, education becomes a fundamental objective of sustainable development and a prominence source of sustainable development indeed. An input and output of development, education is fundamental to the wider belief to expand human competences which is the pivot of development (Bruntland Commission, 1987; United Nations for Development Programmes (UNDP, 2017). At the same time, education plays a key role in the ability of a developing country to absorb modern technology and to develop the capacity for self-sustaining growth and development (Todaro & Smith, 2009) in Aberu and Lawal (2022). In other words, education holds the master key that unlocks a country's potentials towards national transformation, and sustainable human national development. There is an extensive disparity between educational standards and learning achievements in Nigeria. The system emphasizes theoretical knowledge at the expense of technical, vocational, and entrepreneurial education. School curricula almost remain unstandardized without review to make them relevant and practice oriented.

Education in Nigeria has faced several tailbacks, one of which is the poor funding. The government has not been providing adequate funds to stir up educational activities in the country. Annual budgetary estimates carry little proportions of allocation for education sector

which ought to have been given more priority. UNESCO (2012) specified that developing nations should allocate at least 26 percent of their yearly budget to education. However, Nigeria is far away from attaining this benchmark specified by UNESCO, thereby impeding human development strength of the country which is supposed to activate growth and sustainable development. Thus, it is of great concern to see countries like Kenya, Ghana, Cameroon and Equatorial Guinea overtake Nigeria in terms of educational standard, leaving Nigeria hopeless in integrating to the Conventional Education Strategies for Africa 2016-2025 agenda and the African Union's Agenda 2063 which sets out a pan-African vision of transformative sustainable development with the aim to transform education system for commensurate wider vision

Therefore, the paper provides a critical analysis of the relationship between education policy agenda relating to sustainable development in Nigeria's in tandem with the overall vision of African led Education for Sustainable Development (ESD) and a priority for implementing ESD in a way that is consistent with the Pan-African vision of an African Renaissance and the UNDP sustainable development goals for developing countries. Education at all levels and in all its forms constitutes a vital tool for addressing virtually all global problems. It is not only an end in itself, but also a key instrument for bringing about changes in knowledge, values, behaviours and life styles required to achieve sustainability and stability within and among countries (Aberu and Lawal (2022).

Nigerian Higher Education System and Sustainable Development Goals

The Nigerian higher education system comprises an extensive network of institutions including universities, polytechnics, and colleges of education. With over 170 universities (both public and private), the system caters to a substantial and diverse student population (National Universities Commission, 2022). This system plays a pivotal role in human resource development and socio-economic advancement within the nation. However, it operates under the strain of rapid population growth and the resultant increased demand for higher education, presenting unique challenges and opportunities for innovation (Afolabi, 2020).

Aberu and Lawal (2022) pointed that the variations in an intellectual society have always tailored towards educational revitalization. Education for Sustainable Development (ESD) is commonly understood as education that encourages changes in knowledge, skills, values and attitudes to enable a more sustainable and just society for all. Its purpose is to allow present generations to meet their needs without impeding the future generation. National Policy on Education in the Federal Republic of Nigeria (FGN, 2014) section 5 subsection in Awolola (2019) states the following as the goals of higher education in Nigeria, to:

- a. contribute to national development through high-level manpower training;
- b. provide accessible and affordable quality learning opportunities in formal and informal education in response to the needs and interest of Nigerians;
- c. provide high-quality career counselling and lifelong learning opportunity that prepare students with knowledge and skills for self-reliance;
- d. reduce skills shortages through the production of relevant skilled workers;

- e. promote and encourage scholarship, entrepreneurship and community service
forge and cement national unity and;
- f. promote national and international understanding and interaction.

Similarly, the philosophy and objectives of the Economics Curriculum is among several higher education curriculums identified by the National Universities Commission (NUC) to equip students with appropriate tools of analysis to tackle economic issues and contribute actively to community development. Awolola (2019) submitted that the goals of higher education as stated in the National Policy on Education (FRN, 2014) is aimed at securing national development through high-level manpower training, providing lifelong learning opportunity to prepare students with knowledge and skills for self-reliance and the encouragement of students to participate in community service in order to cement national unity.

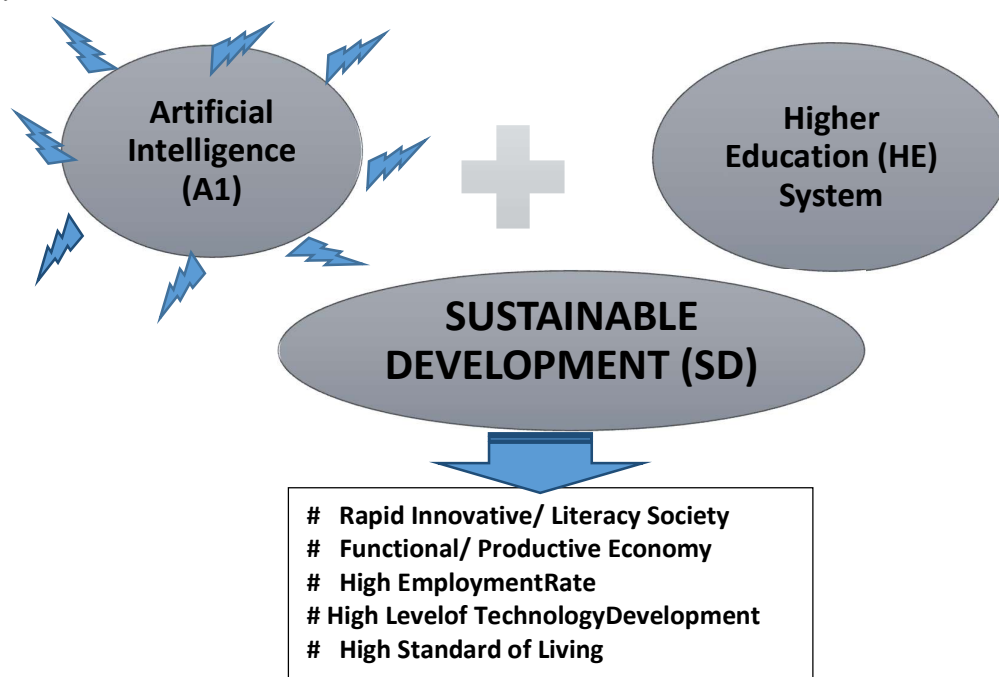


Fig.1: Relationship between Artificial Intelligence (AI), Higher Education System & Sustainable Development (SD)

Source: Author's Conceptualization (2026)

The Fig.1 displays the relationship between Artificial Intelligence (AI), education system and Sustainable Development (SD). It shows the symbiotic, interdependent relationship between the 3 variables. In recent times, current innovations and creativity technologies have often brought new possibilities for people to be creative. However, in the school setting, it seems poor technology is a limitation to effective teaching and learning process. Thus, AI innovation promotes better education system which sustain development.

Federal Government optional efforts toward education to attain Millennium Sustainable Development (MSD) in Nigeria cannot be overlooked. The National Policy on Education in Federal Government of Nigeria (FGN, 2014) lays great emphasis on issues of higher education. More so, United Nations Educational, Social and Cultural Organisation (UNESCO, 2019) in addition also identified five ways of promoting inclusive education in Africa toward achieving quality education in the educational settings as: Promoting positive classroom climate, embracing students' diversity, increasing our cultural competence, encourage student interactions and fostering a community of learners within the classes. In another contribution by Sian and Robert (2017), they noted that quality learning for sustainability can have a transformative effect in terms of promoting empowerment, leadership and wise investments in individual and collective lives. It can also regenerate the local economics of cities, making them more inclusive, safe, reliant and sustainable through inclusive education, cities can move towards achieving the United Nations Sustainable Development Goals (SDGS).

Prospective Benefits of AI in the Nigerian Higher Education System toward achieving Sustainable Development

The adoption of AI-driven assessment technologies in Nigerian higher education system can significantly address various widespread challenges. Ofem and Chukwujama (2024) supported that AI Technology has been of beneficial to education system, they thus, identified the following:

1. **Reducing Examination Malpractices:** They explore how these technologies not only reduce examination malpractices and personalize learning but also efficiently manage large student populations, alongside other critical benefits. Examination malpractices, a persistent challenge in Nigerian higher education, can be substantially mitigated through AI technologies. AI-driven systems can monitor test-taking environments and analyze patterns in student responses to detect inconsistencies that may indicate cheating. Furthermore, the use of secure browser technology and algorithms that randomize question order and selection helps in maintaining the integrity of the examination process (Adams & Patel, 2023). To tackle examination malpractices, AI-driven systems employ machine learning algorithms to analyze response patterns for anomalies that may indicate cheating.
2. **Personalizing Learning and Assessment:** AI facilitates the personalization of learning and assessment by adapting materials and tests based on individual student's learning pace and style. Intelligent tutoring systems use AI to create a customized learning path for each student, improving engagement and effectiveness. This personalization helps cater to diverse learning needs, which is crucial in a multicultural and economically diverse setting like Nigeria (Brooks, 2021). These systems adjust the difficulty and style of content based on a student's past interactions, providing a tailored learning experience that optimizes individual student performance and engagement.
3. **Detecting Plagiarism in Essays And Written:** AI has proven to be watching detective devices for plagiarism. Simultaneously, computer vision technology monitors test-taking

environments via video feeds to ensure no unauthorized materials are used. Additionally, natural language processing aids in detecting plagiarism in essays and written responses by comparing them against extensive databases of existing texts (Adams & Patel, 2023).

4. **Managing Large Student Populations Efficiently:** AI systems offer scalability that helps institutions effectively manage larger student bodies without a proportional increase in resources. Automated grading, enrollment, and feedback mechanisms streamline administrative and educational processes, thus accommodating growing student numbers more efficiently (Lee & Nguyen, 2021). AI aids in managing large student bodies through predictive analytics, which forecasts enrollment trends and performance, and automation tools that handle repetitive administrative tasks like grading and enrollment processing.
5. **Enhancing Data Security and Privacy:** With the rise of digital solutions, data security and privacy have become paramount. AI-driven systems can be designed with advanced security features to protect sensitive student information, ensuring compliance with legal standards and building trust in digital assessment platforms (Chukwuma, 2022). In the realm of data security, AI-enhanced cryptography protects sensitive student information, ensuring that data, once stored, is secure and only accessible to authorized users. Secure multi-party computation techniques further allow for the analysis of data without exposing the underlying information, safeguarding privacy even during complex processing tasks.
6. **Improving Accessibility:** AI can enhance the accessibility of assessments for students with disabilities by adapting interfaces and content to meet various needs, such as text-to-speech for visually impaired students or alternative input methods for those with physical disabilities. This inclusivity is vital for equitable education (Morrison & Zimmerman, 2022). AI technologies also improve accessibility in education through natural language processing, which facilitates speech-to-text and text-to-speech conversions for students with visual or reading difficulties. Semantic analysis adjusts text complexity in real-time, aiding comprehension for students with learning disabilities, ensuring inclusivity.
7. **Supporting Decision-Making:** AI-driven analytics provide educators and administrators with actionable insights into student performance and learning trends. This data supports strategic decision-making in curriculum design, resource allocation, and policy development, aligning educational offerings more closely with labor market needs (Okafor & Emeka, 2023).
8. **Biometric Supervision in Assessments:** Biometric technologies provide robust solutions to curb examination malpractices by authenticating student identities through unique physical attributes such as fingerprints, facial recognition, or iris scans. By integrating biometric verification systems with AI-driven assessment platforms, institutions can ensure that the individual taking the test is the correct student, thereby significantly reducing impersonation cases (Smith & White, 2023). Furthermore, CB monitoring during examinations can detect anomalies in behaviors that may indicate cheating attempts, such as eye movement tracking that can identify if a student is looking away from the test screen frequently.

9. **Augmented Reality in Learning and Assessment:** Augmented reality (AR) brings interactive elements into the learning environment, which can profoundly enhance the engagement and understanding of complex subjects. For instance, AR can overlay detailed 3D models onto physical spaces, making it easier for students in fields such as medicine, engineering, and natural sciences to visualize and interact with their learning materials in intuitive ways (Jones & Lee, 2022). In assessments, AR can be used to create dynamic, situational tests where students interact with virtual components to perform tasks, thereby evaluating practical skills in a controlled, yet realistic setting.
10. **Virtual Reality for Immersive Learning Experiences:** Virtual reality (VR) takes the capabilities of AR further by immersing students completely in a simulated environment. This technology can simulate real-life situations for fields such as surgery, architecture, or environmental science, providing a hands-on learning experience that is risk-free and reproducible (Davis & Thompson, 2023). VR environments can also be used for conducting virtual examinations, where students navigate through immersive scenarios to solve problems or perform tasks, thereby assessing their skills in a more holistic manner.

Empirical Review on AI, Education System and Sustainable Development

Ofem and Chukwujama (2024) on the advent of artificial intelligence (AI) in higher education presents unprecedented integrating AI-driven assessments, this study explores the potential benefits, challenges, and strategic approaches necessary for successful implementation. Drawing from global case studies in Estonia, China, the USA, and Australia, we analyze how AI has been employed to personalize learning, streamline assessment processes, and enhance educational outcomes. The findings highlight not only the transformative potential of AI in education but also the significant challenges related to fairness, privacy, and security. This study offers insights into how AI can be strategically implemented to enhance educational systems in Nigeria, ensuring that they are sustainable, equitable, and aligned with global technological advancements.

Aberu and Lawal (2022) emphasised on the essential changes in any knowledgeable and dependable social society are not unconnected to educational renaissance. The study adopted the ex-post-facto research design and utilized time series data which were sourced from CBN Statistical Bulletin from 1992 to 2021. The data were analyzed using the ARDL model to determine both the long run and short run relationships between education and sustainable development. Inferences were drawn at 5% level of significance. The estimated long run ARDL model showed that education crowd-out sustainable development in Nigeria with a negative and significant relationship. Population had a positive and significant relationship with sustainable development. Hence, the study concluded that education is significant with weaken effect on sustainable development. The study therefore recommended that the government of Nigeria should ensure quality control and result oriented policies at all levels of education in Nigeria, educational funding in Nigeria should be adequate, conducive learning environment should be enhanced.

Ibukun and Aremo (2017) examined the long run and short run parameter among inclusive growth variables utilizing the Nigeria's annual data from 1981 to 2014, and employed both

the autoregressive distributed lag model (ARDL) and Error Correction Method (ECM). They found a negative relationship between Government consumption education expenditure, and inclusive growth both in the short run and long run.

Faouzi and Othman, (2017) examined the causal relationship between education expenditure and inclusive growth in Saudi Arabia from 1981-2013 using inequality adjusted human development index for inclusive growth, ratio of human resources development expenditure to GDP for education and structural Auto Regressive model of analysis. They found out that education expenditure has a positive impact on inclusive growth.

Azra, (2016) in their study of measurement and determinates of inclusive growth integrated growth, inequality, accessibility and governance into one single measure. They found that macroeconomic stability and social financial deepening are important determinants to enhance inclusiveness, and reduce poverty and inequality.

Ekwueme and Ezenwa-Nebife (2016) examined education for sustainable development through academic freedom using political economy approach. They found that academic freedom leads to the expansion and discovery of new ideas of knowledge, transmits and preserves culture developed in the learner's independent judgment of an environment free from external control and domination. They further added that the educational opportunities that Nigerian children would have enjoyed through Education for all to achieve sustainability and self-reliance is lacking due to: gender equality, cultural diversity, among others.

Robert, Yuko, Nonoyama-Tarumi, Rosalyn, and Charles (2016) examined the contributions of education for sustainable development (ESD) to quality education in 18 countries. Their findings were that major themes repeated across the 18 studies, shows that ESD contributes in many ways to quality education in primary and secondary schools. Teaching and learning transforms in all contexts when the curricula include sustainability content, and ESD pedagogies promote the learning of skills, perspectives and values necessary to foster sustainable societies. The research also identified the need to integrate ESD across all subjects, to provide professional development for teachers to ensure ESD policy implementation and to adopt ESD management practices to support ESD in the curriculum in order to broaden ESD across countries.

Ilechukwu, Njoku and Ugwuozor (2014) examined education and development disconnects in Nigeria with emphasis for education for Sustainable Development (ESD) as the critical path to Nigeria's sustainable development and global competitiveness. They found that education is the pivot of national transformation and development, and added that Nigeria's dysfunctional educational system continues and deepens poverty and underdevelopment.

Theoretical Framework: Human Capital Investment Theory (Becker, 1975)

This study adapted the Becker, 1975 Human Capital Investment Theory. The theory delineated the link among government expenditure on education and human development. Increase government spending on the education sector has the propensity to increase level of human capital development and in turn increase sustainable development through innovation.

Human capital development is generally recognized as a support for realizing wide-ranging development. Therefore, investment in education has been empirically connected to healthier economic development outcomes. Education enables poor men and women to participate in and benefit from economic growth. Hence, poor infrastructural development in education could lead to low human capital development and poor educational standard.

However, that part of the Becker, (1975) theory that is of important to this study, is the notion that the higher a country's budgetary for human capital development, the more the propensity to attain sustainable development. This theory is relevant as the goals of education can be fully attained if the recent global invention such as AI application is designed and delivered the best way in order to sharpen the minds of individuals and help transform the society to become globally competitive.

Educational Implications of AI for Education Development

According to Economic Confidential NITDA Plans Center for Artificial Intelligence, Robotics (2020), it was clarified that AI had on the personalization of learning experience. That is it can provide immediate feedback on students' works and progress, allowing for more efficient learning, provide students with additional support and guidance in specific subjects. It therefore, help to recommend or adjust learning materials based on student's knowledge level and learning style. It means AI can predict student's behavior and outcome. More so, it offers personalized tutoring for the students. That is it creates custom learning paths for each student based on their specific strengths, weaknesses and interests. Also, AI can help the educators to identify at-risk students and intervene early. This is so as AI can analyze large amount of data related to students' performance. This means that AI can automate tasks such as grading, attendance tracking and scheduling, and thereby has influence on the efficiency of administrative tasks in higher educational institutions

In addition to these, AI can help learning more engaging and relevant for students leading to increased motivation and powered adaptive learning system can adjust the pace difficulty of learning materials, helping students to stay motivated and engaged. It means AI contributes to student engagement and motivation in learning. AI can also offer emotional support and mental health resources to the students. More so, it enables lifelong learning and continuous development in students. It can also be used to transcribe lecturers and provide captions, helping students with hearing impairments, AI can adjust learning materials to suit the needs of students with different learning styles and help students with learning difficulty to go over a learning until they are well understood and that it translate learning materials into student's native language, making them more accessible. It also can predict the most effective learning path for each student, based on their individual learning profile.

Conclusion

The relationship between higher education and sustainable development in Nigeria need consideration. This is because higher education as a potential factor in determining sustainable development in Nigeria. For successfully implement AI technology systems in Nigeria, a comprehensive approach involving policy reform, infrastructure development,

collaboration, and ethical considerations is essential. Integrating AI in Nigerian higher education involves navigating various challenges, the potential rewards are substantial.

With careful planning, collaboration, and a commitment to ethical practices, AI can significantly enhance the quality of education in Nigeria, preparing students more effectively for the demands of the global economy and contributing to the nation's overall development. Consequently, a comprehensive framework involving policy reform, infrastructure development, multi-stakeholder collaboration, and ethical considerations. By adopting these strategies, Nigerian higher education system can harness the benefits of AI to foster efficient, and innovative education. It would also avert dysfunctional economy system, miserable poverty, unemployment and underdevelopment.

Suggestions

The following suggestions are proffered for the way forward:

- Federal and state government should ensure conducive technological learning environment that would enhance students; innovation
- There is need for the government to upgrade the dilapidated infrastructural facilities in the tertiary institutions.
- There is need to emphasize the importance of establishing clear regulatory guidelines, promoting public-private partnerships, enhancing technological infrastructure, and investing in local AI research and development.
- Need for the Federal Government to support National technological advancement that could support affordable AI technology in higher education.
- Collaborative efforts between government, academia, and the private sector are vital to drive the sustainable adoption of AI in higher education.
- World standard that would foster support rigorous research, and ensure that technological advancements align with the goals of Nigeria are invented into higher education system.

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ASSESSING GENDER-INCLUSIVE EDUCATION AND WOMEN'S LEADERSHIP IN SOUTH-WEST NIGERIAN UNIVERSITIES: PATHWAYS TO SUSTAINABLE AFRICAN DEVELOPMENT

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Abstract

Inclusive education is increasingly recognised as a cornerstone of sustainable development in Africa, particularly in addressing persistent gender disparities that undermine social and economic progress. Despite women constituting 45% of undergraduate enrolment nationwide (National Bureau of Statistics, 2020), they hold less than 10% of Vice-Chancellor positions across Nigeria's 307 universities (Ononiwu, 2026). In South-West institutions such as the University of Ibadan, Obafemi Awolowo University, and the University of Lagos, women's representation in senior management remains below 20%. Thus, this paper critically evaluates the role of gender-inclusive education policies and practices in advancing sustainable African development, with a specific focus on women's representation in senior management positions within universities in South-West Nigeria. Drawing on policy frameworks, empirical studies, and institutional reports, the study assesses whether inclusive education initiatives in the region have translated into equitable leadership outcomes. Findings reveal that, while notable progress has been made in expanding access to education for women and girls, systemic barriers, including cultural biases, limited mentorship opportunities, and weak policy implementation, continue to restrict women's advancement into decision-making roles. The underrepresentation of women in university management across South-West Nigeria highlights the gap between inclusive education policy and leadership practice, raising questions about the sustainability of current development trajectories. The paper argues that sustainable development in Africa requires a holistic approach that integrates gender inclusivity not only into educational systems but also into leadership structures, leveraging indigenous knowledge and African narratives to challenge Western-centric models of progress. Recommendations emphasise strengthening institutional accountability, fostering mentorship and leadership pipelines for women, and designing culturally responsive strategies to ensure that inclusive education becomes a transformative force for gender equity and sustainable African development.

Keywords: Gender Inclusivity, Education Policy, Women's Leadership, South-West Nigerian Universities, Sustainable Development

Introduction

Education is widely acknowledged as a cornerstone of sustainable development, catalysing social transformation and equity. Within the African context, inclusive education is not only about expanding access but also about dismantling systemic barriers that perpetuate inequality. To buttress this fact, the United Nations Sustainable Development Goal 5 aims to achieve gender equality and empower both women and girls, recognising that gender equality is not just a fundamental human right (The Sustainable Development Goal Report, 2023). Gender inclusivity, in particular, is central to this discourse, as the exclusion of women from educational and leadership spaces undermines the continent's developmental potential (Oti, 2022). Universities are pivotal institutions for knowledge production, human capital development, and policy innovation. Despite progress in expanding access to education for women and girls, their representation in senior management positions remains disproportionately low. Research on South-West Nigerian universities reveals that women's participation in management is minimal, with cultural stereotypes, family responsibilities, and organisational biases cited as major obstacles (Igiebor & Ogbogu, 2019). These challenges highlight the disconnect between inclusive education policies and actual leadership outcomes.

Gunawardena, Kwesiga, Linhamba, Morley, Odejide, Shackleton and Sorhaindo (2004) assert that although women have increasingly entered academia, they remain predominantly positioned in caregiving and service roles, with limited representation in higher education sectors where power and decision-making authority reside. Similarly, Whitaker and Lane, as cited in Growe and Montgomery (2002), highlight that gender plays a more significant role than age, experience, background, or competence in determining the responsibilities assigned to individuals within educational institutions. Moreover, Growe and Montgomery (2002) observe that women in leadership positions within the education sector face compounded challenges of sexism and racism, which significantly impact their opportunities for career advancement, promotion, and tenure.

Nwaoku and Efanga (2011) assert that women remain significantly underrepresented in senior positions within education and managerial roles across various sectors. They highlight the dominance of men in educational leadership in Nigeria, where school administration has historically developed as a male-led profession, largely separate from the predominantly female teaching workforce. As a result, women's skills and contributions are frequently overlooked, with career progression in school administration often influenced by male sponsorship rather than merit-based competition.

However, historical accounts demonstrate that women have consistently exhibited exceptional capabilities in policy development and implementation (Fapohunda, 2011). Nwaoku and Efanga (2011) further emphasise that African women have long played crucial roles in managing households and local economies, demonstrating strong leadership in both times of conflict and peace. The persistence of gender stratification, particularly within African societies, continues to place men in key decision-making roles while confining women to traditional training and economic activities that offer limited opportunities for financial independence (Safilios, 1991). Against this backdrop, the present study aims to

critically examine the barriers to women's participation in educational leadership and explore strategies for achieving greater equity in the sector.

The South-West region, home to some of Nigeria's oldest and most prestigious universities, including the University of Ibadan, Obafemi Awolowo University, and the University of Lagos, provides a compelling case study. These institutions have historically led educational reform and intellectual leadership, yet they continue to reflect gender imbalances in their management structures. Studies show that psycho-social factors such as self-efficacy, spousal support, and organisational climate significantly influence women's career growth and leadership opportunities in these universities (Oti, 2022). Therefore, this paper assesses the relationship between gender-inclusive education and women's leadership in South-West Nigerian universities, situating the analysis within the broader theme of revalidating African endowments for sustainable development. By critically evaluating policy frameworks, institutional practices, and leadership outcomes, the study aims to highlight both progress and persistent challenges and to offer recommendations for strengthening gender equity in higher education leadership.

Literature Review

Global Perspectives on Gender and Inclusive Education and Leadership Roles in Universities

Inclusive education has been widely recognised as a global priority for achieving equity and sustainable development. International frameworks such as the United Nations' Sustainable Development Goal 4 emphasise inclusive and equitable quality education as a foundation for lifelong learning and empowerment (United Nations, 2015). Scholars argue that gender inclusivity in education is not only about access but also about ensuring equitable participation in leadership and decision-making (Morley, 2013). Western-centric models often emphasise structural reforms, but African contexts require culturally grounded approaches that reflect indigenous narratives and socio-political realities. Comparative insights demonstrate that while Nigeria's challenges are acute, they are not unique.

Prominent leadership positions in higher institutions of learning remain disproportionately held by men (Hill, Miller, Benson & Handley, 2016) despite the benefits associated with the inclusion of women (Mlambo, 2017, Moodly and Toni, 2017 & Odhiambo, 2011). Commonly cited reasons include cultural norms and the entrenched nature of gender inequalities within institutions (Johnson, 2017), particularly when disparities in leadership positions are significant and crucial. A report by the American Council on Education (2016) highlights this gap, revealing that only 30% of college presidents in the United States were women, compared to 21% in the United Kingdom and just 15% in South African universities. While in 2017, only 18% of the top universities were led by women globally (Johnson, 2017).

According to the Global Education Monitoring Report (2017) by UNESCO, only 18% of full university professors in Europe were women in 2013. In India, this figure stood at 26% in 2014, while in Australia, it reached 27% in 2017. To promote women's leadership in academia, the Netherlands allocated an additional €5 million in 2017 to recruit 100 female

professors, aiming to reduce gender disparities. Meanwhile, at Makerere University in Uganda, the share of female assistant lecturers grew from 19% in 1996 to 33% in 2008. However, the percentage of female professors or assistant professors saw only a modest increase from 4% to 12% over the same period (UNESCO, Global Education Monitoring Report, 2017). Lately, the Times Higher Education report (2025) reported that countries like Switzerland, Belgium, Germany, the Netherlands, and the United States have experienced increases in their shares of women university leaders over the past year. However, 15 out of the 30 countries with institutions in the top 200 universities have no women leaders, including China, Canada, and South Korea. Thus, it becomes questionable why the slow increase in the number of women's representation in leadership positions especially after several advocacies over the years and reports from studies conducted to promote women's inclusion into leadership positions (Ndulaka 2023; Alan, Ertac, Kibily, and Lorreth 2020; Omotosho, 2020; Adanma 2017 and Badura et al 2018). Therefore, there is a need to ascertain if the women who already hold leadership positions effectively contribute to achieving the objectives of the quality of education in Nigerian tertiary institutions.

Since the advocacy for gender equality and empowerment of women and girls by SDG goal 5, reports show a slight increase in the appointment of women into seats of Vice Chancellors and in Nigerian universities compared to a few years ago. However, records still show there are fewer than 5 female Vice Chancellors in Nigerian public universities which still shows gender disparity (Anwana& Kayode, 2023). While there are 258 male vice-chancellors in Nigeria and 12 female vice-chancellors which is about 95.3 percent to 4.7 percent (Taiwo, 2025). Since 1960, only 38 of over 720 individuals who have held positions in Vice Chancellors in the Nigerian University system have been women, while the remaining have been men (Dataphyte, 2025). According to the CONVERSATION Academic Rigour, Journalistic Fair (2024), only 5.27% of all Nigeria's vice-chancellors since 1960 have been women and only 12 of the current serving vice-chancellors are women. Of the 170 universities in Nigeria at present, which comprises 43 federal universities, 48 state, and 79 private universities, women make up 7.05% of the vice-chancellors. Currently, there are 258 male vice-chancellors in Nigeria and 12 female vice-chancellors, which is about 95.3 per cent to 4.7 per cent (Taiwo, 2025). These comparisons highlight that Nigeria lags behind both regional and global benchmarks, underscoring the urgency of policy-driven interventions.

African Narratives and Endowments

African scholars highlight the importance of revalidating indigenous knowledge systems and cultural assets in advancing inclusive education. Gender equity in African higher education must be understood within the broader historical context of colonial legacies and patriarchal structures that have shaped institutional practices (Mama, 2003). Revalidating African endowments involves recognising women's leadership potential as integral to sustainable development, rather than as an imported concept from Western frameworks.

Nigerian Context: Policy and Practice

Nigeria has adopted several policies aimed at promoting gender equity in education and leadership, including the National Gender Policy (Federal Ministry of Women Affairs, 2006). Despite these frameworks, implementation remains weak, and women continue to face

systemic barriers in accessing leadership positions in universities. Studies show that while female enrollment in higher education has increased, their representation in senior management remains disproportionately low (Ogbogu, 2011).

South-West Nigerian Universities

The South-West region, home to leading institutions such as the University of Ibadan, Obafemi Awolowo University, and the University of Lagos, provides a critical lens for examining gender inclusivity. Research indicates that women in these universities encounter psycho-social and organisational challenges that hinder their career progression into management roles (Oti, 2022). Factors such as cultural stereotypes, limited mentorship opportunities, and institutional biases contribute to their underrepresentation (Igiebor& Ogbogu, 2019). These findings underscore the gap between inclusive education policies and actual leadership outcomes, raising questions about the sustainability of current development trajectories.

Methodology

Research Design

This study adopts a mixed-methods evaluative approach, combining qualitative and quantitative data to assess the relationship between gender-inclusive education and women's representation in management positions in South-West Nigerian universities. The design is guided by feminist institutional theory, which emphasises the role of structures, norms, and practices in shaping gender outcomes in higher education leadership (Acker, 2012).

Scope of Study

The research focuses on universities in South-West Nigeria, a region that hosts the prominent institutions selected for the study. They include the University of Ibadan, Obafemi Awolowo University, University of Lagos, Federal University of Technology, Akure, and Lagos State University. These universities were selected due to their historical significance, size, and influence on national educational policy.

Data Sources

- **Primary Data:** Semi-structured interviews with female academics and administrators in selected universities to capture lived experiences of barriers and opportunities in leadership.
- **Secondary Data:** Policy documents (e.g., National Gender Policy), institutional reports, and published studies on gender and leadership in Nigerian higher education (Ogbogu, 2011; Igiebor& Ogbogu, 2019).
- **Quantitative Data:** Statistical records on gender distribution in management positions, obtained from university annual reports and Nigeria's National Universities Commission (NUC).

Analytical Approach

Data was analysed using thematic content analysis for qualitative inputs and descriptive statistics for quantitative data. The evaluation compares policy intentions with actual

leadership outcomes, highlighting gaps and opportunities. Triangulation was employed to ensure validity by cross-verifying findings from multiple sources (Creswell & Plano Clark, 2018).

Findings and Results

Current State of Women's Representation

Data from universities in South-West Nigeria revealed that women remain significantly underrepresented in senior management positions. For instance, while female enrollment in higher education has steadily increased over the past two decades, this growth has not translated into proportional representation in leadership roles such as Vice-Chancellor, Deputy Vice-Chancellor, Registrar, or Dean (Ogbogu, 2011). Studies indicate that women constitute less than 20% of senior management positions across major universities in the region (Igiebor& Ogbogu, 2019).A study of four public universities in South-West Nigeria found that women comprised only 12% of Vice-Chancellor and Deputy Vice-Chancellor positions (Igiebor& Ogbogu, 2019).In administrative roles such as Registrar, Bursar, and Librarian, women's representation was slightly higher but still below 25% overall (Igiebor& Ogbogu, 2019).A 2025 survey of six public and six private universities reported that out of 2,640 staff surveyed, only 18% of senior management roles were held by women, despite women making up nearly half of the teaching workforce (Nwokonko, 2025).Historical data from 2000–2020 show that while female enrollment in universities increased by over 40%, leadership representation stagnated, with women rarely exceeding 20% of decision-making positions (Global History Dialogues, 2020).

Successes and Progress

There have been notable improvements in women's participation in mid-level administrative and academic leadership positions. For example, more women are serving as Heads of Departments and Directors of Institutes, reflecting the gradual impact of inclusive education policies (Oti, 2022). These gains demonstrate that gender-inclusive education has expanded opportunities for women, though the pipeline to top management remains constrained. Qualitative findings also revealed the factors responsible for higher institution women leaders' performance. In the context of tertiary institutions in south-western Nigeria, several factors influence how women perform in leadership. These factors include the availability of funds, diplomacy, exemplary lifestyle, hospitality, inherent virtues, intellectual capacity, resources, personal affluence, personnel availability, purpose-driven mindset, teamwork, and relationships.

Persistent Challenges

Several systemic barriers continue to hinder women's advancement into senior leadership roles:

- **Cultural Biases:** Patriarchal norms and stereotypes often discourage women from pursuing leadership positions (Mama, 2003).
- **Institutional Barriers:** Recruitment and promotion practices in universities frequently favour men, with limited transparency in selection processes (Morley, 2013).

- **Mentorship Gaps:** Women lack access to structured mentorship and leadership development programs, which are critical for career progression (Acker, 2012).
- **Work-Life Balance:** Family responsibilities and societal expectations disproportionately affect women's ability to compete for demanding leadership roles (Oti, 2022).

Implications for Sustainable Development

The underrepresentation of women in university management undermines the transformative potential of inclusive education. Leadership diversity is essential for fostering innovation, equity, and sustainable development. Without addressing these gaps, inclusive education policies risk being reduced to access initiatives rather than holistic strategies for empowerment and leadership.

Discussion

The findings from South-West Nigerian universities reveal a persistent gap between inclusive education policies and women's representation in senior management positions. While access to education for women has expanded significantly, the translation of this progress into leadership outcomes remains limited. This disconnect underscores the need to reconceptualise inclusive education not merely as access, but as a holistic framework that fosters empowerment, equity, and leadership.

Inclusive Education and Leadership Outcomes

Inclusive education should serve as a pipeline for leadership, equipping women with the skills, confidence, and opportunities to participate in decision-making processes. However, the underrepresentation of women in university management positions indicates that inclusive education policies have not adequately addressed structural and cultural barriers. This raises critical questions about the sustainability of current development trajectories, as leadership diversity is essential for fostering innovation and equity in higher education (Morley, 2013).

Revalidating African Endowments

Women's leadership in universities must be understood as an indigenous asset that strengthens institutional resilience and community development. African societies have historically valued women's roles in knowledge transmission and community leadership, yet these contributions are often marginalised in modern academic structures (Mama, 2003). Revalidating these endowments requires integrating women's voices into university governance as a means of challenging imported models that fail to reflect African realities.

Implications for Sustainable Development

The exclusion of women from leadership positions undermines the transformative potential of inclusive education. Sustainable development in Africa cannot be achieved without gender equity in decision-making structures. Universities, as incubators of knowledge and policy innovation, must model inclusivity by ensuring women's representation in management. This is not only a matter of fairness but also a strategic imperative for harnessing diverse perspectives to address complex developmental challenges (Acker, 2012).

Towards Context-Specific Strategies

The findings highlight the need for context-specific strategies that address cultural biases, institutional practices, and mentorship gaps in South-West Nigerian universities. Strengthening institutional accountability, fostering mentorship pipelines, and promoting culturally responsive leadership development programs are critical steps. By embedding gender inclusivity into both educational systems and leadership structures, universities can become transformative agents of sustainable African development.

Conclusion

This study has shown that women remain significantly underrepresented in senior management positions in South-West Nigerian universities, despite progress in female enrollment and mid-level leadership participation. Statistics reveal that women occupy less than 20% of senior management roles in institutions such as the University of Ibadan, Obafemi Awolowo University, and University of Lagos (Ogbogu, 2011; Igiebor& Ogbogu, 2019). Barriers such as patriarchy, family responsibilities, and weak mentorship structures continue to limit women's advancement.

Policy Recommendations

Based on the study's findings, the following recommendations are proposed.

1. There is a need for Institutional Accountability and Gender Audits, such as mandating annual gender audits in South-West universities, monitored by the National Universities Commission (NUC), to enable the monitoring of the level of women's inclusion in leadership positions and to establish measurable gender equity benchmarks for leadership appointments, similar to South Africa's equity enforcement model. Higher institutions must carry out transparent, gender-sensitive recruitment and promotion practices for senior management roles and introduce independent oversight committees to ensure fairness in promotion and appointment processes.
2. To enhance Mentorship and Leadership Development in the Universities in Southwest Nigeria, there is a need for the implementation of structured mentorship programs modelled like Ghana's Women in Higher Education Leadership (WIHEL) initiative, alongside providing leadership training and capacity-building workshops specifically for female academics.
3. In enabling Work-Life Balance Support for women academics, higher institutions should introduce family-friendly policies such as flexible work arrangements and childcare facilities, reducing barriers for women balancing professional and domestic responsibilities.
4. Provide institutional grants for women pursuing leadership roles, covering research and administrative support.
5. Align university policies with Nigeria's National Gender Policy (2006) and enforce compliance through accreditation processes and introduce sanctions for institutions failing to meet gender equity standards in leadership.
6. Establish a South-West Women in Higher Education Leadership Network to share best practices and amplify women's voices that will encourage inter-university

collaborations to develop joint gender equity programs and mentorship pipelines. This will promote regional collaboration and Networks among women in Universities in South-west Nigeria.

By embedding these policy-driven strategies into institutional frameworks, South-West Nigerian universities can transform inclusive education into a genuine pathway for women's leadership. This will not only advance gender equity but also strengthen the role of universities as agents of sustainable African development, revalidating African endowments and narratives in higher education governance.

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TEACHERS' CHALLENGES OF METACOGNITIVE STRATEGY IMPLEMENTATION IN ENGLISH READING COMPREHENSION IN NIGERIA

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Abstract

This study investigated teacher awareness of metacognitive strategy in English reading comprehension in secondary school in Ibadan metropolis, Nigeria. The five local government areas in the Ibadan metropolis (Ibadan North, Ibadan North East, Ibadan North West, Ibadan South East and Ibadan South West) were enumerated. Ten schools (two per LGA) were randomly selected, while 10 teachers (one per school) who were head of Department of English Language were purposively selected. Data was gathered through in-depth interview. The results showed that the challenges faced by teachers in the implementation of metacognitive strategy in reading comprehension classes are overcrowded classroom, insufficient time on the time table to implement the strategy and students not possessing recommended textbooks. It was recommended that the strategy should be implemented using double lesson periods on the time table to ensure its hitch-free implementation.

Keywords: Metacognitive strategy, Implementation, Challenges, English reading comprehension instruction, Senior secondary schools

Introduction

Reading comprehension is a fundamental skill in English language learning, and its mastery is crucial for overall academic success. While achievement in reading comprehension is a strong indicator of student progress, current data suggests a concerning trend: students are struggling significantly in this area. This poor performance in reading comprehension is having a detrimental impact on their overall English language proficiency. The poor achievement and weaknesses of students in English reading comprehension aside from overcrowded classroom, school location, and teachers' methods of teaching is also a variable that predicts students' achievement (Adeyemi and Adeyemi, 2014). This ugly trend cannot continue, it behoves the teachers to use strategies that can enhance students' achievement in English reading comprehension. One of the effective strategies of teaching reading comprehension is metacognitive strategy. However, it has been observed that teachers rarely use the strategy in teaching reading comprehension due to some inherent challenges associated with its use. Therefore, this study focuses on the challenges teacher face in implementing metacognitive strategy in English reading comprehension in secondary schools in Ibadan metropolis, Nigeria.

According to Kelechi (2020), the spate of poor achievement in English language has negated the attitudes of students to it, most especially, the aspect of reading comprehension. Attitude is an innate factor that dictates the choice or reaction to something (Water, 2017). Attitude is one of the learners' characteristics that promotes students' achievement in reading comprehension (Ellah, Nworgu and Oparah, 2019). Attitude, according to Ghasali, Setia, Muthusamy and Jusoff (2009), is an individual's predisposition to accept or reject an object. The attitude of teacher towards the teaching of English language plays a part in why many students pass or fail it. Some researchers have investigated the role of attitude in second language acquisition, most especially, English language and ascertained that negative attitude can be changed (Seuts, 2010; Yamashita, 2013). Among other factors that can help reduce negative attitudes of students towards English language reading comprehension are; better teaching strategies, conducive classroom, and social environment (Mede, 2010).

Most of the research works on the effects of metacognitive strategies were done on Literature-in-English, Reading comprehension, Mathematics, Physics, among many others, but it has been observed that many teachers do not use the strategy in reading comprehension classes. This might, in the view of Yinusa (2021), be connected with the fact that adoption of metacognitive strategies comes with some challenges facing its practicability in the teaching and learning process. Consequently, it is necessary to assess the challenges faced by English Language teachers in the implementation of metacognitive strategy and its workings. as this will determine the extent of use of such strategies for reading comprehension instruction. Previous studies related to metacognitive strategy focused mostly on effectiveness of the strategy in enhancing the performance of learners in the various subjects without considering and mitigating the challenges teachers face in its implementation.

Statement of the Problem

Reading comprehension is a crucial aspect of the English language, serving as the foundation for success in all academic subjects. Unfortunately, many Nigerian senior secondary school students, particularly in Ibadan, struggle with reading comprehension, leading to poor performance in public examinations. An effective teaching strategy recommended in the literature to mitigate this problem is metacognitive strategy. However, it has been observed that many teachers do not use the strategy in reading comprehension classes. This might be connected with the fact that implementation of metacognitive strategies comes with some challenges facing its practicability in the teaching and learning process. Consequently, it is necessary to assess the challenges faced by English Language teachers in the implementation of metacognitive strategy as this will determine the extent of use of such strategies for reading comprehension instruction. Previous studies have explored effectiveness of metacognitive strategy in enhancing academic performance of students, but there has been limited focus on the challenges constraining the implementation of metacognitive strategy by teachers in reading comprehension classes. This study, therefore, investigated through in-depth interview with teachers, the challenges they face in implementing metacognitive strategy in teaching reading comprehension in secondary schools in Ibadan metropolis, Oyo State, Nigeria.

Objectives of the Study

The study examined the challenges that constrained the implementation of metacognitive strategy in reading comprehension classes among English Language teachers in selected senior secondary schools in Ibadan. Based on the stated problem, one research question was raised: What are the challenges that teachers face in the implementation of metacognitive strategy in reading comprehension classroom in Ibadan metropolis?

Scope of the Study

The study explored the challenges that teachers face in the implementation of metacognitive strategy in reading comprehension classroom in Ibadan metropolis. The study covered SS II English Language teachers in Ibadan metropolis, Oyo State, Nigeria.

Significance of the Study

In the context of teaching reading comprehension in senior secondary schools, this study would provide valuable insights into the challenges that teachers face in the implementation of metacognitive strategy in reading comprehension classroom. By identifying the challenges, solutions will be proffered thereby paving the way for regular utilization of the strategy by teachers.

Methodology

The study adopted a qualitative research design. The population for this study comprised all the teachers that teach SS2 English language in all public senior secondary schools in Ibadan metropolis, Nigeria. The five local government areas in the Ibadan metropolis (Ibadan North, Ibadan North East, Ibadan North West, Ibadan South East and Ibadan South West) were enumerated. Ten schools (two from each LGA) were randomly selected, while ten English Language teachers who are heads of Department of English in each of the schools were involved in in-depth interview on the challenges of implementing metacognitive strategy in teaching reading comprehension in schools. The qualitative data gathered were analysed using content analysis.

Results

Responses to the in-depth interview revealed that teachers perceived the strategies as student-centred strategies and they are practicable. But, according to one of them, *It will not be easy for us to use these strategies because of the challenges that we are likely to encounter such as overcrowded classrooms.* (I.D1, Ibadan North LGA, May, 2024). Some of them reported familiarity with the strategies but majority of them do not use these strategies to teach. They are faced with challenges and constraints on the effective implementation of these strategies in their various schools. These challenges, according to one of them, include space constraint, *The classes are so over-crowded that it is not easy to create spaces for the peculiar arrangements of these strategies* (IDI, Ibadan North-West LGA, May, 2024). Also, they are constrained by rigid time on the time table. *'To effectively implement these strategies requires more than the normal 40 minutes allotted for each subject'*, a teacher said. Another constraint for effective implementation of these strategies as revealed from the oral interview *'is the fact that most of the students are not capable enough to communicate effectively English language. This, therefore, hampers their effective participation in the discussions when the*

strategies are being implemented. (IDI, Ibadan South-East LGA, May, 2024).’ Other constraints include lack of facilities and instructional materials, non- commitment of teachers to use the strategies and students’ loafing. Lack of text books that contain the recommended poems also militates against the effective use of the strategies.

According to the teachers, *‘Some of these students do not possess the textbooks or the books that contain the comprehension passages. So we are forced to write the passages on the chalkboard for them’* (IDI, Ibadan North East LGA, May, 2024). This took part of the time that was already not enough. Some of the teachers expressed their reluctance to use these strategies, probably because of all the above constraints. *The students themselves also pose a problem. Because of their poor attitude to reading, they were reluctant as well to participate in the study. They were seen loafing about the class and the surroundings.*

Discussion of Findings

Result revealed that even though teachers perceived that the metacognitive strategy is capable of improving learners’ knowledge in English Reading Comprehension, they had challenges in implementing it. Most of the teachers interviewed complained about the factor and timetable. They mentioned that these could be constraints effective implementation of the strategy. This is a peculiar characteristic of most Ibadan, Oyo state secondary schools. As there are other school subjects in the school timetable, there is no reading in the timetable. Reading is being taught in the English language, which is not proper. Andsayi and Umolu (2004) observed that in most cases, the non-inclusion of reading in the timetable is one of the stumbling blocks to students’ ability, which constitutes an impediment to the development of good reading skills. The teacher noted that this strategy seemed practical, but they were constrained by time because reading is taught in English. They stressed further that reading should be included in the school timetable with much more time given to it than any other school subjects. Onukaogu (2007) canvassed for including reading in the school timetable and employed professionals to handle reading. Insufficient time may pose a threat to the full implementation of the strategy. These are capable of affecting students’ attitudes toward reading. This factor which influences reading attitude should be improved upon.

Additionally, the teacher should devise other ways to enhance this by learning the metacognitive strategy procedures as required and teaching the students to do the same to apply them as much as possible within the time allotted. After mastering the methods, students who perform on par with or better than par with their peers could serve as role models for their peers. Teachers are critical in acquiring effective strategies (Smolkin and Donovam, 2002). This extra effort is needed because teachers are constantly held responsible for the success and failure of the students.

Another perceived constraint to this strategy revealed by most of the interviewed teachers was the lack of recommended text by most of the students. It was evident that most of the students did not have the prescribed textbooks. In a class of 80 students, it was discovered that only 15 students had textbooks, while 65 of them claimed that their parents could not afford them. This is a great challenge to the effective implementation of the strategy. Unlike other subjects, English Reading Comprehension passages could not be written on the

chalkboard. The crux of the matter at the same time is that not all the subjects that possessed the text could be read. This became another big issue. Grouping the students is also a dilemma for the teacher, and when they were grouped, those who did not have textbooks found it challenging to share in their group. This finding aligns with the submission of Kainubura and Ahmadi (2013) that inadequate and inappropriate texts are among the factors contending with the proper teaching of reading skills. Reading Comprehension skills are invaluable for overcoming learning challenges (Oskam and Tongur, 2014).

Textbook is an essential material in the teaching-learning process. Unlike other learning materials, it conveys permanent information that could be transient. It combines durability with portability and can be used independently. Aggraival (2001), Lockheed (1990) and Heyneman and White (1990) state that classroom teaching depends heavily on the textbook and it is vital in improving students' performance. This text problem could be addressed by allocating more funds to the education sector by the government at all levels, seeking assistance from the Petroleum Trust Fund (PTF) textbook procurement initiatives, assistance through World Bank loans, and other international organisations such as UNICEF and UNESCO.

Similarly, at the interval, teachers can make an extra effort to make photocopies of comprehension passages for the students if the school management has photocopy machines or the school releases money. The teacher can soldier the responsibility if the school cannot afford it. In the same vein, the school authority, through the chairman of Parents' Forum (PF), could enlighten parents on the importance of textbooks to their children's education and why they should buy them. This is crucial because teachers implementing this strategy would not be effectively carried out without textbooks. Possessing the recommended texts will allow the students to have a personal engagement with the text, reading through the text after school hours using this strategy and have a change of attitude towards reading comprehension. The implication is that better reading outcomes would be enhanced, and the results of the strategy applied.

Conclusion

The hallmark of this study is to provide students with an effective instructional strategy that makes them become efficient readers and comprehenders who are creative thinkers with the knowledge, awareness, and control of their learning. From this study, it can be concluded that metacognitive strategy is one of the innovative strategies to consider for a change to reduce dependence on rote learning and memorisation, which is characterised by the conventional method. Utilising the metacognitive strategy as a tool to assist in fostering the goal of reading instruction affords the students to comprehend and become independent readers and learners. The findings confirmed further that the teachers need to be aware of this strategy for its effective implementation.

Recommendations

In view of the findings from the study, it is recommended that:

1. Since insufficient time to implement metacognitive strategy has been identified as a major constraint, the strategy should be implemented using double lesson periods on the time table to ensure its hitch-free implementation.
2. Another challenge in the implement metacognitive strategy is overcrowded classroom which characterise schools in Ibadan Metropolis. Therefore, teachers should utilize grouping for effective implementation of the strategy.
3. Reading comprehension cannot be taught effectively with metacognitive strategy without each student possessing the reading texts. Therefore, well equipped libraries should be set up in schools to enable students without recommended textbooks to borrow from the library for use in class.

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GENDER EQUALITY AND INCLUSIVE EDUCATION AS CORRELATES OF SUSTAINABLE DEVELOPMENT OF PUBLIC SECONDARY SCHOOLS IN AWKA EDUCATION ZONE, ANAMBRA STATE, NIGERIA

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Abstract

This study examined gender equality and inclusive education as correlates of sustainable development of public secondary schools in Awka Education Zone, Anambra State. Three research questions and three hypotheses guided the study. A correlational research design was adopted, with a population of 65 principals from 65 public secondary schools and a census sampling approach was used. Data were collected using a structured questionnaire and analyzed using Pearson Product Moment Correlation and regression analysis at 0.05 level of significance. The findings revealed that gender equality and inclusive education have strong positive and significant relationships with sustainable development of public secondary schools. Furthermore, both variables jointly contributed significantly to school sustainability. The study concluded that

integrating gender equality and inclusive education enhances sustainable school development. Recommendations were made to improve policy implementation and inclusive practices.

Keywords: Gender Equality; Inclusive Education; Sustainable Development; Public Secondary Schools.

Introduction

The establishment of secondary schools is fundamentally anchored on the desire to provide structured, formal education that equips learners with cognitive, social and vocational competencies necessary for individual and national development. These institutions are designed to bridge the gap between basic and tertiary education while fostering critical thinking, moral values and civic responsibility among students. In addition, secondary schools aim to prepare learners for higher education and the world of work through diversified curricula and skill acquisition opportunities. This means that the effectiveness of secondary schools depends largely on how well these foundational goals are translated into practice within the school system. However, achieving these goals requires coordinated administrative, instructional and developmental efforts within the school environment. In pursuance of these institutional goals, principals emerge as critical actors; who coordinate and direct school activities towards desired educational outcomes. As instructional leaders and administrative heads, Obioma (2025) stated that principals ensure that policies, curricula and resources are effectively implemented to enhance teaching and learning processes. Their leadership roles extend to motivating teachers, maintaining discipline and fostering collaboration among stakeholders within the school community. Furthermore, Okeke (2023) explained that principals serve as intermediaries between government authorities and school-level operations; thereby, influencing policy implementation and resource utilization. Their effectiveness directly determines the extent to which school goals are achieved in practice. Therefore, the principal's role becomes indispensable in translating educational objectives into measurable outcomes that ensure the sustainable development of public secondary schools.

Sustainable development of public secondary schools has been conceptualized in various ways within educational discourse. Ighor and Ogbuwa (2025) defined it as the continuous improvement of educational systems through effective management of human, material and financial resources to ensure long-term educational quality and relevance. This definition emphasizes continuity and adaptability in educational planning and implementation. Fadillah (2025) viewed it as the capacity of schools to maintain equitable access, quality instruction and infrastructural development while responding to societal changes and future needs. This interpretation highlights resilience and responsiveness as core components of sustainability. Both definitions underscore the importance of maintaining balance between present educational needs and future demands, thereby ensuring that public secondary schools remain functional, relevant and productive over time. The importance of sustainable development of public secondary schools lies in its capacity to ensure consistent quality education, equitable access and long-term institutional stability. Ideally, sustainable schools should exhibit

adequate infrastructure, qualified teachers, effective leadership and inclusive policies that cater for diverse learners. Such schools are expected to promote innovation, adaptability and continuous improvement in teaching and learning processes. Moreover, Linlin (2023) opined that sustainable development fosters accountability, efficient resource utilization and stakeholder participation; thus, enhancing overall school effectiveness. As a result, public secondary schools should be centers of excellence that contribute to national development through quality education delivery. However, achieving this ideal requires strong leadership, adequate funding and supportive policies that align with global educational standards.

Contrary to the ideal situation, the reality of sustainable development in many Nigerian public secondary schools reveals significant challenges. Inadequate funding, poor infrastructure and shortage of qualified teachers hinder effective teaching and learning processes. Additionally, weak administrative practices and lack of accountability mechanisms further exacerbate the situation, leading to inefficiencies in school management (Oguejiofor et al., 2024). These challenges are compounded by rapid population growth and increasing demand for education, which strain existing resources. Consequently, many schools struggle to maintain quality standards and provide equitable access to education. This predicament undermines the goals of secondary education and limits the capacity of schools to contribute meaningfully to national development (Egwu&Mbonu, 2023). The situation in Anambra State, particularly in Awka Education Zone, reflects similar concerns but with contextual peculiarities due to socioeconomic conditions of students in the rural areas compared to those in the urban areas. These peculiarities are students' demographics, school conditions, and ethical and cultural responsibility. Many public secondary schools in this zone face challenges such as overcrowded classrooms, inadequate instructional materials and limited technological integration. Furthermore, disparities in resource allocation and uneven distribution of qualified teachers create inequalities in educational outcomes across schools (Oguejiofor, et. al., 2024). Administrative inefficiencies and limited community involvement also hinder effective school management. These issues collectively affect the sustainability of educational development within the zone. As a result, schools in Awka Education Zone often struggle to maintain consistent standards of quality education; thereby limiting their capacity to achieve long-term developmental goals (Uchenna&Egolum, 2024).

The consequences of poor sustainable development in public secondary schools in Anambra State are far-reaching and multifaceted. Students in poorly developed schools often experience reduced academic achievement, limited skill acquisition and decreased motivation for learning. Teachers, on the other hand, may exhibit low job satisfaction and commitment due to unfavorable working conditions (Onikoyi, et. al., 2025). Additionally, the broader society suffers from a decline in the quality of human capital; which affects economic growth and social stability. These challenges further widen educational inequalities and limit opportunities for disadvantaged groups. Therefore, addressing these issues becomes essential to ensuring equitable access to quality education and promoting gender equality.

Gender equality has been widely defined within educational contexts as the provision of equal opportunities, rights and access to educational resources for both males and females. This definition emphasizes fairness and non-discrimination in educational participation and

outcomes (Dhiman, 2023). Rosa abdClavero (2022) conceptualized gender equality as the elimination of disparities in educational access, achievement and participation between boys and girls, ensuring that all learners can reach their full potential. This perspective highlights the importance of addressing systemic barriers that hinder equal participation. The definitions highlight the need for inclusive policies and practices that promote equal opportunities in education that enhance the sustainable development of public secondary schools. Gender equality serves as a critical correlate of the sustainable development of public secondary schools by promoting fairness, inclusiveness and balanced participation in education. When gender equality is upheld, schools are better positioned to harness the potential of all students; thus, enhancing overall academic performance and social development (Guthridge, et. al., 2022). Furthermore, gender-sensitive policies and practices contribute to creating safe and supportive learning environments for all learners. This, in turn, fosters greater engagement, retention and achievement among students (García-Holgado& García-Peñalvo, 2022). As a result, integrating gender equality into school development strategies becomes essential for achieving long-term educational sustainability and effectiveness. Such integration ultimately supports the broader goal of inclusive education.

Inclusive education has been defined as an educational approach that ensures all learners, regardless of their abilities or backgrounds, have access to quality education within mainstream school settings (Kenny, McCoy & O'Higgins Norman, 2023). This definition emphasizes accessibility and participation for all students. Similarly, Sahani and Patel (2023) described inclusive education as a system that accommodates diverse learning needs by adapting curricula, teaching methods and school environments to support every learner. This perspective emphasizes the importance of flexibility and responsiveness in educational practices. Inclusive education is closely linked to the sustainable development of public secondary schools as it promotes equity, diversity and social cohesion within the educational system. Through the accommodation of diverse learners, schools can ensure that no student is left behind; hence, improving overall educational outcomes. Inclusive practices also encourage collaboration among teachers, students and stakeholders, fostering a supportive learning environment. Moreover, inclusive education enhances the adaptability of schools to changing societal needs; thereby, contributing to long-term sustainability. Therefore, integrating inclusive education into school development strategies is essential for achieving equitable and quality education for all learners (Sharma & Gill, 2024).

When gender equality and inclusive education are ignored in the sustainable development of public secondary schools in Awka Education Zone, numerous challenges are likely to arise. These include increased educational disparities, marginalization of vulnerable groups and reduced access to quality education for certain categories of learners. Additionally, the absence of inclusive policies may lead to higher dropout rates and lower academic achievement among disadvantaged students. Such conditions undermine the overall effectiveness and sustainability of the school system. Consequently, addressing these gaps becomes imperative for ensuring equitable and quality education. Therefore, there is a need to carry out this research on gender equality and inclusive education as correlates of sustainable development of public secondary schools in Awka Education Zone, Anambra State.

Statement of the Problem

Ideally, public secondary schools in Awka Education Zone, Anambra State are expected to function within policy frameworks that uphold gender equality and inclusive education as essential drivers of sustainable development to ensue equitable access, active participation and improved learning outcomes for all categories of students. In such a system, both male and female learners are provided equal opportunities, while students with diverse learning needs are effectively accommodated through adaptive instructional strategies and supportive school environments. However, this expectation is often unmet as many schools continue to face gender imbalances, marginalization of learners with special needs and inadequate provision of instructional and infrastructural resources. These deficiencies are further intensified by weak administrative commitment and poor implementation of inclusive education policies, thereby undermining sustainable school development. Consequently, these challenges if persist may result in poor academic performance, increased dropout rates and reduced participation of disadvantaged groups. Is as a result of the above that the scholars were motivated to conduct this study

Research Questions

1. What is the correlation between gender equality and sustainable development of public secondary schools in Awka Education Zone, Anambra State?
2. What is the correlation between inclusive education and sustainable development of public secondary schools in Awka Education Zone, Anambra State?
3. What is the interactive correlation among gender equality, inclusive education and sustainable development of public secondary schools in Awka Education Zone, Anambra State?

Hypotheses

This paper tested the following hypotheses at 0.05 level of significance:

- H01:** There is no significant correlation between gender equality and sustainable development of public secondary schools in Awka Education Zone, Anambra State
- H02:** There is no significant correlation between inclusive education and sustainable development of public secondary schools in Awka Education Zone, Anambra State
- H03:** Gender equality and inclusive education have no significant joint correlation with sustainable development of public secondary schools in Awka Education Zone, Anambra State.

Methods

The study adopted a correlational research design. The population of the study consisted of all the 65 principals in the 65 public secondary schools in Awka Education Zone, Anambra State. Principals were considered appropriate respondents because they are the administrative heads responsible for policy implementation, school management and the promotion of gender equality and inclusive education practices within their schools. The sample size for the study comprised all the 65 principals in the 65 public secondary schools in Awka Education Zone. Due to the manageable size of the population, a census approach was adopted in drawing the study sample. The instrument used for data collection was

researchers'-structured questionnaire titled Gender Equality Questionnaire (GEQ), Inclusive Education Questionnaire (IEQ) and Sustainable Development Questionnaire (SDQ). The first instrument, GEQ was designed to elicit data on gender equality. The instrument contains a total of 20-item statements with a four point rating scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD); weighted as 4, 3, 2, and 1 respectively. The second instrument, IEQ contains 20 items statements and was designed to elicit data on pupils' social skills development in primary schools. IEQ was structured on a 4-point rating scale of Strongly Agree (SA), Agree (A) Disagree (D), and Strongly Disagree (SD); weighted 4, 3, 2, and 1 respectively. The third instrument (SDQ) was elicited data on sustainable development. SDQ contains 25 item statements with a four point rating scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD); weighted as 4, 3, 2, and 1 respectively. The instrument was subjected to face and content validation by three experts, two from Educational Management and one from Measurement and Evaluation Unit in Faculty of Education Nnamdi Azikiwe University, Awka, Nigeria. The experts examined the items for clarity, relevance and adequacy in measuring the variables under study. Their suggestions and corrections were incorporated into the final version of the questionnaire to enhance its validity. The reliability of the instrument was determined using Cronbach Alpha method. The instrument was administered to a sample of 10 principals from Ogidigbo Education Zone; which is outside the study area but with similar characteristics. The data obtained were analyzed and reliability coefficients of 0.82, 0.79 and 0.85 were obtained for gender equality, inclusive education and sustainable development respectively. The overall reliability coefficient of 0.82 indicated that the instrument was reliable for the study. The researcher employed direct delivery method in administering the questionnaire to the respondents. The entire 65 copies of the questionnaire were administered to the respondents. The completed copies of the entire questionnaire were collected immediately after completion to minimize data loss. Data collected were analyzed using Pearson Product-Moment Correlation Coefficient (PPMC) to answer the research questions one and two and test the hypotheses one and two at the 0.05 level of significance. On the other hand, multiple regression analysis was used to answer research question three and test hypothesis three at the 0.05 level of significance. The decision rule for the hypotheses was that if the p-value is less than 0.05, the null hypothesis would not be accepted; otherwise, it would be accepted. This method was considered appropriate for determining the strength and significance of relationships among the variables under study.

Results

Research Question One: What is the correlation between gender equality and sustainable development of public secondary schools in Awka Education Zone, Anambra State?

Table One: Correlation analysis between gender equality and sustainable development of public secondary schools

Variables	N	Gender Equality	Sustainable Development	Decision
Gender Equality	65	1	0.68	Strong Positive Relationship
Sustainable Development	65	0.68	1	

The result indicates a strong positive correlation between gender equality and sustainable development. This is because r-value was 0.68, suggesting that improved gender equality is associated with enhanced sustainability outcomes in public secondary schools.

Research Question Two: What is the correlation between inclusive education and sustainable development of public secondary schools in Awka Education Zone, Anambra State?

Table Two: Correlation analysis between inclusive education and sustainable development of public secondary schools

Variables	N	Inclusive Education	Sustainable Development	Decision
Inclusive Education	65	1	0.72	Strong Positive Relationship
Sustainable Development	65	0.72	1	

The findings reveal a strong positive relationship between inclusive education and sustainable development. This is because r-value was 0.72, indicating that inclusive practices significantly contribute to the long-term effectiveness and growth of public secondary schools.

Research Question Three: What is the interactive correlation among gender equality, inclusive education and sustainable development of public secondary schools in Awka Education Zone, Anambra State?

Table Three: Multiple regressions analysis on gender equality, inclusive education and sustainable development in secondary schools

Model	N	R	R ²	Adj.R ²	B	Remarks
Constant					.22737	
Gender equality; Inclusive education	65	.793	.620	.581		Strong Positive Relationship

The joint regression analysis presented in Table Three indicates that gender equality and inclusive education collectively and jointly correlate of sustainable development of public secondary schools in Awka Education Zone, Anambra State, as reflected by a multiple regression coefficient of 0.793. This denotes a substantial combined relationship between the predictor variables and the outcome variable. In addition, the coefficient of determination (R²) of 0.620 reveals that approximately 62.0% of the total variation in sustainable development is jointly accounted for by gender equality and inclusive education; thus, highlighting the considerable explanatory capacity of these variables within the regression model.

Hypothesis One:

H0: There is no significant correlation between gender equality and the sustainable development of public secondary schools in Awka Education Zone, Anambra State.

Table Four: Test of Significance of Correlation between Gender Equality and Sustainable Development

Variables	N	Gender Equality	Sustainable Development	p-value	Decision
Gender Equality	65	1	0.68	0.001	
Sustainable Development	65	0.68	1		Significant

Since the p-value (0.001) is less than 0.05, the null hypothesis is not accepted, indicating that gender equality has a statistically significant positive relationship with the sustainable development of public secondary schools.

Hypothesis Two:

H0: There is no significant correlation between inclusive education and the sustainable development of public secondary schools in Awka Education Zone, Anambra State.

Table Five: Test of Significance of Correlation between Inclusive Education and Sustainable Development

Variables	N	Inclusive Education	Sustainable Development	p-value	Decision
Inclusive Education	65	1	0.72	0.000	Significant
Sustainable Development	65	0.72	1		

The p-value is below the 0.05 threshold, leading to not accepting the null hypothesis, which confirms that inclusive education significantly correlates with sustainable development in public secondary schools.

Hypothesis Three:

H0: Gender equality and inclusive education have no significant joint correlation with sustainable development of public secondary schools in Awka Education Zone, Anambra State.

Table Six: Multiple linear regression analysis among gender equality, inclusive education and sustainable development

Variables	R	R ²	Adj. R ²	F-value	P-value	α	Remarks
Gender Equality; Inclusive Education	.793 ^a	.620	.581	162.927	.001 ^b	.05	Sig.

a. Dependent Variable: Sustainable Development

b. Predictors: (Constant), Gender Equality; Inclusive Education

The combined effect of gender equality, inclusive education on sustainable development is significant, as shown in Table Six with an F-value of 162.927 and a p-value of 0.001, which is far below the 0.05 significance level ($p < 0.05$). For this reason, the null hypothesis was not upheld; conversely, the alternative hypothesis was upheld.

Discussion of the Findings

The finding of the study revealed a strong positive correlation between gender equality and the sustainable development of public secondary schools in Awka Education Zone, Anambra State ($r = 0.68$). This implies that improved gender-balanced opportunities and fair participation significantly enhance school sustainability outcomes. The finding is consistent with Guthridge et al. (2022) who asserted that gender-responsive educational practices promote equitable access and improve institutional effectiveness. Similarly, Rosa and Clavero (2022) emphasized that eliminating gender disparities strengthens participation and academic performance, thereby supporting long-term school development. The significance of the relationship further confirms that gender equality is not only a social goal but also a strategic factor in achieving sustainable educational systems.

The study also found a strong positive correlation between inclusive education and the sustainable development of public secondary schools ($r = 0.72$). This indicates that accommodating diverse learners and ensuring equitable access to education contribute meaningfully to school sustainability. This finding aligns with Mbua (2023), who noted that inclusive education enhances participation and improves learning outcomes for all categories of students. In addition, Ugochukwu (2023) maintained that inclusive practices foster adaptability and resilience in school systems, which are critical for sustainability. The significant relationship observed in this study underscores the importance of integrating inclusive policies into school administration and instructional delivery.

Furthermore, the study revealed a strong joint correlation between gender equality, inclusive education and sustainable development ($R = 0.79$, $R^2 = 0.62$). This suggests that both variables collectively explain a substantial proportion of variations in the sustainable development of public secondary schools. The finding corroborates Ibeagha and Nwachukwu (2025), who argued that combining equity and inclusiveness strengthens institutional capacity and improves educational outcomes. Similarly, Alumona and Odoh (2025) emphasized that gender-sensitive and inclusive policies jointly create enabling learning environments that enhance long-term school effectiveness. The significance of the joint relationship indicates that sustainable school development is better achieved through integrated and complementary approaches rather than isolated interventions.

Conclusion

The study concluded that gender equality and inclusive education are significant correlates of the sustainable development of public secondary schools in Awka Education Zone, Anambra State. The findings demonstrated that both variables individually and jointly contribute to improving educational outcomes, enhancing participation and promoting long-term institutional effectiveness. Gender equality ensures balanced opportunities for all learners, while inclusive education accommodates diverse learning needs, thereby fostering equitable and quality education. The combined influence of these variables further strengthens the capacity of schools to achieve sustainable development goals. Therefore, integrating gender-responsive and inclusive practices into school management is essential for improving the overall performance and sustainability of public secondary schools.

Recommendations

- i. School administrators should implement gender-sensitive policies that promote equal participation and opportunities for both male and female students in all school activities.
- ii. Government and educational stakeholders should provide adequate resources and training to support the effective implementation of inclusive education practices in public secondary schools.
- iii. Principals should adopt integrated strategies that combine gender equality and inclusive education to enhance the sustainable development and overall effectiveness of secondary schools.

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DEMYSTIFYING SUPERSTITIOUS CULTURAL BELIEFS THROUGH COMPUTATIONAL MODELLING ACTIVITIES AND GAMIFICATION AMONG SECONDARY SCHOOL PHYSICS STUDENTS

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Abstract

*This study investigated secondary school students' awareness of superstitious cultural beliefs conflicting with physics learning, their opinions on computational modelling and gamification as pedagogical tools, and the perceived effectiveness of these technologies in demystifying such beliefs. The study adopted a mixed methods design, integrating both quantitative and qualitative approaches through the use of a structured questionnaire and interview sessions. The accessible population comprised 1,200 Senior Secondary School Two (SS2) students drawn from private secondary schools in Magboro, Ogun State, and Lagos Island, Lagos State, Nigeria. Applying the Taro Yamane (1967) formula at a 5% margin of error, a sample of 300 students was derived. A multi-stage sampling procedure was employed for participant selection, while ten students were purposively selected for interview sessions to obtain deeper qualitative insights. A 4-point Likert-type questionnaire validated for content and reliability (Cronbach's $\alpha = 0.87$) served as the primary quantitative instrument. Data were analysed using descriptive statistics and independent-samples *t*-tests for the quantitative strand, while interview responses were subjected to thematic analysis. Findings revealed that students demonstrated a high level of awareness of superstitious cultural beliefs in conflict with physics learning (Grand Mean = 2.90), expressed strongly positive opinions about the use of computational modelling and gamification in physics education (Grand Mean = 3.15), and firmly believed in the effectiveness of these technologies in demystifying superstitious beliefs (Grand Mean = 3.31). Challenges to implementation were rated below the disagreement threshold (Grand Mean = 2.15). The independent-samples *t*-test found no statistically significant gender differences across any of the three main constructs ($p > 0.05$). Qualitative themes further confirmed that technology-based learning enhances understanding, reduces superstitious beliefs, and promotes evidence-based reasoning. The study recommends curriculum reform, teacher training, and digital infrastructure investment.*

Keywords: Demystifying, superstitious and cultural beliefs, gamification and computational modelling, physics learning

Introduction

Science education occupies a foundational position in any nation's ambition for technological development and economic self-sufficiency. Among the natural sciences taught at the secondary school level, physics stands out for its role in explaining the fundamental laws governing the universe. Yet despite its explanatory power and practical relevance, physics consistently ranks among the least popular and most poorly understood subjects in Nigerian secondary schools (Abimbola & Abubakar, 2019). A significant contributor to this challenge is the persistence of superstitious and culturally embedded beliefs that conflict with scientific reasoning. When students arrive in the classroom carrying cultural narratives that attribute thunder to the anger of deities or eclipses to cosmic misfortune, the cognitive distance between their worldview and the scientific concepts they must master becomes formidable.

The challenge of cultural interference in science learning is not unique to Nigeria; it is observed across sub-Saharan Africa, Southeast Asia, and indigenous communities globally, wherever traditional epistemologies encounter formal science instruction (Cobern, 1994; Ogawa, 1995). In the Nigerian context, examples include beliefs that thunder and lightning are expressions of spiritual anger, eclipses signify supernatural warnings, rainfall results primarily from ritual practices, or unusual physical events are caused by mystical forces rather than natural laws. Such interpretations may discourage questioning, experimentation, and scientific explanation in the classroom. What distinguishes the Nigerian context is the depth and social authority of its cultural belief systems, sustained not only by informal community transmission but in some cases reinforced within school environments where teachers themselves navigate the tension between cultural identity and scientific obligation.

Computational modelling and gamification represent two innovative pedagogical responses to this challenge. Computational modelling - the use of digital simulations, virtual experiments, and interactive models to represent physical phenomena - has demonstrated consistent effectiveness in improving conceptual understanding in physics (Wieman & Perkins, 2005; Smetana & Bell, 2012). Gamification — the incorporation of game design principles such as challenges, rewards, progression, and narrative into instructional contexts - has been shown to enhance learner motivation, promote deeper cognitive engagement, and foster evidence-based thinking (Deterding et al., 2011; Hamari et al., 2014). Together, these approaches offer a pedagogical framework that is simultaneously engaging, experiential, and scientifically rigorous.

This study was designed to address the gap in empirical evidence by investigating the perceptions of secondary school physics students regarding the potential of these technologies to demystify superstitious cultural beliefs. Specifically, the study examined students' level of awareness of culturally conflicting beliefs, their opinions on technology-enhanced physics instruction, the perceived effectiveness of computational modelling and gamification as epistemic correctives, and the challenges hindering their implementation.

Statement of the Problem

The persistence of superstitious cultural beliefs among secondary school physics students in Nigeria represents a significant and largely unaddressed impediment to science learning. While curriculum documents articulate scientific explanations for a wide range of natural

phenomena, many students continue to hold culturally derived alternative explanations that compete with and resist scientific accounts. Conventional teaching methods - primarily lecture and demonstration - are ill-suited to challenging deeply rooted epistemological commitments. The opinion of students on the potential of computational modelling and gamification to address this problem has been theoretically proposed but remains empirically underexplored in the Nigerian secondary school context.

Objectives of the Study

The broad objective of this study was to examine the perceptions of secondary school physics students regarding computational modelling and gamification as instructional approaches in relation to superstitious cultural beliefs and physics learning. Specifically, the study sought to: (1) determine students' level of awareness of superstitious cultural beliefs conflicting with physics learning; (2) assess students' opinions on computational modelling and gamification in physics education; (3) evaluate students' perceptions of the potential effectiveness of these technologies in promoting scientific understanding and reducing dependence on superstitious explanations; (4) examine gender differences across all three constructs; and (5) identify challenges hindering the implementation of computational modelling in secondary school physics.

Research Questions

The study was guided by the following research questions: **(1)** What is the level of students' awareness of superstitious cultural beliefs in conflict with the learning of physics in secondary schools? **(2)** What is the level of students' opinions on computational modelling and gamification in effective learning of physics in secondary schools? **(3)** What is the opinion of physics students on the effectiveness of computational modelling and gamification in demystifying superstitious beliefs in secondary school physics? **(4)** What is the difference in the opinion of male and female students on the awareness of superstitious cultural beliefs in conflict with the learning of physics? **(5)** What is the difference in the opinion of male and female students on computational modelling and gamification in demystifying superstitious beliefs in secondary school physics? **(6)** What is the difference in the opinion of male and female students on the effectiveness of computational modelling and gamification in demystifying superstitious beliefs in physics? **(7)** What challenges hinder the implementation of computational modelling in secondary school physics?

Scope of the Study

This study was delimited in terms of its geographic coverage, target population, subject matter, instructional variables, and research constructs. Geographically, the study covered selected private secondary schools located in Magboro, Ogun State and Eti-Osa, Lagos State. In terms of target population, only Senior Secondary School Two (SS2) physics students were included; students in other classes and public schools were excluded. Regarding subject matter, the study focused strictly on physics learning and not other science subjects. The instructional variables were limited to computational modelling and gamification, while the research constructs were restricted to students' awareness of superstitious cultural beliefs, opinions on technology-enhanced learning, perceived effectiveness, gender differences, and

implementation challenges. Findings should therefore be interpreted within these delimitations.

Significance of the Study

This study is significant at theoretical, pedagogical, policy, sociocultural, and research levels within science education. Theoretically, it contributes to literature on the interaction between cultural beliefs and science learning in sub-Saharan Africa. By demonstrating students' awareness of superstitious belief conflicts and their acceptance of computational modelling and gamification, the study extends the conceptual change theory which explains how learners replace misconceptions with scientific understanding (Posner et al., 1982). It also supports the broader discussion on worldview conflict in science education (Cobern, 1994).

Pedagogically, the findings provide evidence that secondary school students are receptive to technology-enhanced learning approach. Computational modelling and gamification were perceived as useful for visualizing abstract concepts, promoting independent learning, enhancing critical thinking, and improving problem-solving skills. This supports the adoption of learner-centred and interactive instructional strategies in physics education.

At the curriculum and policy level, the study provides justification for integrating computational modelling and gamification into Nigerian secondary school physics education. The findings would guide curriculum agencies and education policymakers in strengthening digital learning initiatives and prioritizing teacher training, ICT infrastructure, and educational technology investments.

For school administrators and private school proprietors, the study highlights the importance of investing in digital infrastructure and continuous teacher professional development to support technology-integrated pedagogy and improve instructional delivery.

From sociocultural perceptive, the study demonstrates that scientific knowledge of physics can promote productive engagement between cultural identity and scientific knowledge rather than cultural rejection. It shows that computational modelling and gamification can help students apply scientific reasoning to familiar cultural experiences.

Finally, the study provides a validated framework and empirical foundation for future studies in science education, educational technology, and cultural studies, serving as a basic for experimental, longitudinal, and comparative investigations across contexts.

Conceptual clarification of terms

Computational Modelling: In this study, computational modelling refers to the application of digital activities and simulations to improve students' understanding of physics concepts and reduce misconceptions.

Gamification: Gamification refers to the integration of game-based instructional activities into physics teaching to promote active learning and scientific reasoning.

Superstitious Cultural Beliefs: Superstitious cultural beliefs refer to traditional or socially transmitted beliefs that attribute natural events and scientific phenomena to supernatural or mystical causes rather than scientific explanations.

Demystification: Demystification refers to the process of removing misconceptions, myths, or false beliefs through scientific explanations and evidence-based learning experiences.

Physics Learning: Physics learning refers to the process through which students acquire knowledge, skills, attitudes, and scientific understanding of physical concepts and natural phenomena.

Students' Opinion: Students' opinion refers to students' perceptions, views, judgments, and responses regarding learning experiences and instructional approaches. In this study, it refers to students' perceptions of computational modelling and gamification in improving physics learning and reducing superstitious beliefs.

Theoretical Framework

This study is anchored on three complementary theoretical perspectives: Constructivist Learning Theory (Piaget, 1952), Social Cognitive Theory (Bandura, 1986), and Conceptual Change Theory (Posner et al., 1982). Constructivism explains how students actively construct knowledge through interaction with digital environments, thereby enabling them to reconstruct culturally embedded beliefs through engagement with computational models. Social Cognitive Theory explains how technology-supported environments shape students' attitudes and beliefs through observation, interaction, and self-efficacy development. Conceptual Change Theory provides the epistemological mechanism through which superstitious beliefs can be replaced: students must encounter dissatisfaction with their existing beliefs, find the scientific alternative intelligible and plausible, and recognise its greater explanatory power. Computational modelling and gamification create precisely these conditions by offering experiential, visual, and evidence-based encounters with physical phenomena.

Review of Related Literature

Superstitious Cultural Beliefs and Science Learning

The relationship between cultural belief systems and science education has attracted sustained scholarly attention. Cobern (1994) theorized that students do not arrive at school as blank epistemic slates but as culturally constituted beings whose worldviews shape how they receive and evaluate new information. When scientific content conflicts with supernatural explanations that a student's culture provides, the cultural framework frequently prevails because it is more deeply embedded in identity and social experience. In the Nigerian context, this collision is particularly pronounced in physics, where phenomena such as thunder, lightning, and eclipses carry rich histories of supernatural interpretation across Yoruba, Igbo, and Hausa traditions (Ogunniyi, 2007; Adetunji & Bamidele, 2021).

Several Nigerian studies have confirmed the prevalence of superstitious beliefs among secondary school science students and their negative correlation with conceptual

understanding and academic achievement (Abimbola & Abubakar, 2019; Aina & Olanipekun, 2020). Examples include beliefs that eclipses are supernatural signs, thunder is caused by spiritual forces, lightning represents divine punishment, or unusual physical events occur through mystical influence rather than natural processes. The challenge for physics educators is not merely to correct false beliefs but to do so in a manner that respects cultural identity while cultivating scientific literacy - a process that requires pedagogical approaches grounded in experience and evidence (Duit & Treagust, 2003; Taber, 2013).

Computational Modelling in Physics Education

Computational modelling refers to the use of digital tools - including simulations, virtual laboratories, and interactive animations - to represent, explore, and manipulate scientific phenomena. Mayer's (2019) cognitive theory of multimedia learning provides robust theoretical justification, demonstrating that learning is substantially enhanced when verbal explanation is accompanied by visual and interactive representation. Empirical evidence for its effectiveness in physics education is extensive: Smetana and Bell (2012) concluded from a systematic review of forty-six studies that computer simulations consistently improve conceptual understanding and increase student engagement. Studies in sub-Saharan African contexts have broadly replicated these findings, noting particular benefits for students from resource-constrained backgrounds (Bello & Abimbola, 2014; Aina & Olanipekun, 2020).

Crucially, computational modelling has demonstrated effectiveness as a tool for conceptual change. When students can observe, in a simulated environment, the electromagnetic processes that generate lightning, the gravitational mechanics that produce eclipses, or the wave properties that account for thunder, they are presented with empirical evidence that is compelling and culturally non-threatening, creating cognitive space for gradual epistemic reorientation (Posner et al., 1982; Wieman & Perkins, 2005).

Gamification and Student Motivation

Gamification involves the application of game design elements - points, badges, leaderboards, challenges, and immediate feedback - to non-game educational contexts to promote engagement and learning (Deterding et al., 2011). It is theoretically grounded in self-determination theory (Ryan & Deci, 2000), which identifies autonomy, competence, and relatedness as the fundamental psychological needs whose satisfaction drives intrinsic motivation. Hamari et al. (2014), in a systematic review of twenty-four studies, found that gamification produced positive effects on student engagement and learning outcomes in the majority of cases. In the context of demystifying superstitious beliefs, gamified narrative structures can create scenarios requiring students to apply scientific reasoning to culturally familiar situations, making the cognitive encounter with scientific explanation both contextually meaningful and personally relevant (Prensky, 2007; Dichev & Dicheva, 2017).

Methodology

This study adopted a mixed methods research design, integrating both quantitative and qualitative approaches. The quantitative strand employed a descriptive survey design using a structured 4-point Likert-scale questionnaire, while the qualitative strand utilised semi-structured interview sessions with purposively selected participants. The mixed methods approach was appropriate because it enabled triangulation of findings, combining the breadth

afforded by large-sample survey data with the depth provided by qualitative interview responses (Creswell & Creswell, 2018; Johnson & Onwuegbuzie, 2014). This design allowed for a comprehensive understanding of students' perceptions that neither approach alone could have achieved.

The study was conducted in two local government areas across two Nigerian states: Magboro in the Obafemi Owode Local Government Area of Ogun State, and Eti-Osa in the Lagos Island Local Government Area of Lagos State. These locations were selected to capture student perspectives from proximate but contextually distinct communities — one peri-urban and the other densely urban — thereby enriching the representativeness of findings within the Lagos–Ogun corridor of southwestern Nigeria.

The accessible population for this study comprised 1,200 Senior Secondary School Two (SS2) physics students enrolled in private secondary schools within Lagos Island LGA, Lagos State, and Obafemi Owode LGA, Ogun State. SS2 students were specifically targeted because they have completed sufficient secondary-level physics instruction to engage meaningfully with study constructs, while remaining within the formative period of secondary education where pedagogical interventions are most impactful.

A multi-stage sampling procedure was employed. In the first stage, purposive sampling was used to select two LGAs - one from each state - providing adequate access to SS2 students in private secondary schools. In the second stage, simple random sampling using balloting was applied to select one private secondary school from each LGA, yielding two participating schools. In the third stage, the Taro Yamane (1967) formula was applied to determine an adequate sample size from the accessible population of 1,200 students.

The Taro Yamane formula is expressed as: $n = \frac{N}{1 + Ne^2}$

Where: **n** = required sample size, **N** = accessible population = 1,200, **e** = margin of error = 0.05 (5%)

Substituting the values:

$$n = \frac{1,200}{1 + 1,200 \times (0.05)^2} \rightarrow n = \frac{1,200}{(1 + 1,200 \times 0.0025)} \rightarrow n = \frac{1,200}{1 + 3.00}$$
$$n = \frac{1,200}{4.00} \therefore n = 300$$

Accordingly, a sample of 300 students was selected, comprising 157 males (52.33%) and 143 females (47.67%) across the two participating schools.

Two instruments were used for data collection. The primary quantitative instrument was a structured questionnaire titled “Questionnaire on Gamification and Computational Modelling Activities for Demystifying Superstitious Cultural Beliefs in Physics.” It comprised forty 4-point Likert-scale items (SA = 4, A = 3, D = 2, SD = 1) organised into four thematic sections: awareness of superstitious beliefs (Section B, 10 items); opinions on computational modelling and gamification (Section C, 10 items); perceived effectiveness of technology-based learning in demystifying superstitious beliefs (Section D, 10 items); and implementation challenges (Section E, 10 items). The qualitative instrument consisted of five

semi-structured interview questions designed to elicit in-depth narrative responses on students' lived experiences with technology-based physics learning and its influence on their cultural beliefs.

Content validity was established through expert review by three specialists - two in science education and one in educational measurement - whose feedback was incorporated into the revised instrument. A pilot administration with thirty students from a school outside the main study sample yielded a Cronbach's alpha reliability coefficient of $\alpha = 0.87$, which exceeds the accepted threshold of 0.70 (Nunnally & Bernstein, 2010), confirming adequate internal consistency.

Quantitative data were analysed using descriptive statistics (frequency counts, percentages, means, and standard deviations) for Research Questions 1-3 and 7, and independent-samples t-tests for Research Questions 4-6 examining gender differences (significance level: $p < 0.05$). A mean cut-off of 2.50 was adopted as the decision criterion. Qualitative interview data were subjected to thematic analysis following the six-phase framework of Braun and Clarke (2012), with themes emerging inductively from repeated reading and coding of participant responses.

Results

The presentation of the analysis is organized into three main sections: the demographic analysis of respondents, the answering of research questions using descriptive statistics, and the testing of hypotheses using inferential statistics.

Demographic Characteristics of Respondents

The gender distribution of the students was computed to determine the representation of male and female participants in the study.

Table 1: Demographic Analysis

Gender	Frequency (N)	Percentage (%)
Female	143	47.67
Male	157	52.33
Grand Total	300	100.00

Interpretation: The table above indicates that out of the 300 sampled respondents, 143 are female, representing 47.67%, while 157 are male, representing 52.33%. This demonstrates a relatively balanced gender representation within the sampled population.

Answering Research Questions

The responses collected through the four-point Likert scale (coded as SA = 4, A = 3, D = 2, SD = 1) were analyzed using mean scores and standard deviations. A mean score of 2.50 was adopted as the baseline decision criterion (cut-off score) for acceptance or rejection.

Research Question 1: Students' Awareness of Superstitious Cultural Beliefs Conflicting with Physics Learning

Table 2: *Frequency Distribution, Means, and Standard Deviations for Students' Awareness of Superstitious Cultural Beliefs Conflicting with Physics Learning (N = 300)*

Item	SA f (%)	A f (%)	D f (%)	SD f (%)	Mean	SD	Decision
B1. Some people believe certain natural phenomena are caused by supernatural powers.	90 (30.0%)	115 (38.3%)	63 (21.0%)	32 (10.7%)	2.88	0.96	Agree
B2. I have heard cultural explanations for thunder, eclipse, or lightning.	92 (30.7%)	115 (38.3%)	61 (20.3%)	32 (10.7%)	2.89	0.96	Agree
B3. Superstitious beliefs can influence students' understanding of physics.	82 (27.3%)	126 (42.0%)	67 (22.3%)	25 (8.3%)	2.88	0.91	Agree
B4. Some students believe physics phenomena are mysterious rather than scientific.	98 (32.7%)	110 (36.7%)	62 (20.7%)	30 (10.0%)	2.92	0.96	Agree
B5. I can differentiate between scientific explanations and superstitious beliefs.	87 (29.0%)	129 (43.0%)	57 (19.0%)	27 (9.0%)	2.92	0.91	Agree
B6. Cultural beliefs sometimes affect students' interest in learning physics.	81 (27.0%)	128 (42.7%)	62 (20.7%)	29 (9.7%)	2.87	0.92	Agree
B7. I believe superstitious explanations are more reliable than scientific reasoning.	96 (32.0%)	120 (40.0%)	55 (18.3%)	29 (9.7%)	2.94	0.94	Agree
B8. Some traditional beliefs discourage students from asking scientific questions.	97 (32.3%)	121 (40.3%)	57 (19.0%)	25 (8.3%)	2.97	0.92	Agree
B9. Superstitious beliefs make it difficult for some students to understand science.	86 (28.7%)	122 (40.7%)	56 (18.7%)	36 (12.0%)	2.86	0.97	Agree
B10. Physics helps students understand events often misunderstood culturally.	97 (32.3%)	104 (34.7%)	66 (22.0%)	33 (11.0%)	2.88	0.99	Agree

Note. SA = Strongly Agree; A = Agree; D = Disagree; SD = Strongly Disagree; f = frequency; % = percentage. Decision rule: Mean $\geq$ 2.50 = Agreed; Mean $<$ 2.50 = Disagreed.

Grand Mean = 2.90; Grand SD = 0.94.

Table 2 shows that all ten items measuring students' awareness of superstitious cultural beliefs conflicting with physics learning recorded mean scores above the decision threshold of 2.50, indicating agreement across the entire section.

Research Question 2: Students' Opinions on Computational Modelling and Gamification in Physics Learning

Table 3: *Frequency Distribution, Means, and Standard Deviations for Students' Opinions on Computational Modelling and Gamification in Physics Learning (N = 300)*

Item	SA f (%)	A f (%)	D f (%)	SD f (%)	Mean	SD	Decision
C1. Computational modelling makes physics lessons more interesting.	112 (37.3%)	127 (42.3%)	45 (15.0%)	16 (5.3%)	3.12	0.85	Agree
C2. I understand physics better when simulations and digital models are used.	115 (38.3%)	129 (43.0%)	42 (14.0%)	14 (4.7%)	3.15	0.83	Agree
C3. Technology-based learning improves my participation during physics lessons.	118 (39.3%)	115 (38.3%)	48 (16.0%)	19 (6.3%)	3.11	0.89	Agree
C4. I enjoy solving physics problems using computer-based activities.	131 (43.7%)	109 (36.3%)	49 (16.3%)	11 (3.7%)	3.20	0.84	Agree
C5. Simulations and animations make abstract physics concepts easier to understand.	111 (37.0%)	130 (43.3%)	47 (15.7%)	12 (4.0%)	3.13	0.82	Agree
C6. Technology-based learning encourages critical thinking in physics.	121 (40.3%)	120 (40.0%)	42 (14.0%)	17 (5.7%)	3.15	0.87	Agree
C7. Technology-supported learning increases my motivation to learn physics.	125 (41.7%)	113 (37.7%)	51 (17.0%)	11 (3.7%)	3.17	0.84	Agree
C8. Gamification helps students learn independently.	124 (41.3%)	118 (39.3%)	46 (15.3%)	12 (4.0%)	3.18	0.83	Agree
C9. I prefer technology-based learning to the traditional chalk-and-talk method.	118 (39.3%)	123 (41.0%)	43 (14.3%)	16 (5.3%)	3.14	0.86	Agree
C10. I learn physics better without technology-based activities. (Reverse-scored)	113 (37.7%)	129 (43.0%)	47 (15.7%)	11 (3.7%)	3.15	0.81	Agree

Note. SA = Strongly Agree; A = Agree; D = Disagree; SD = Strongly Disagree; f = frequency; % = percentage. Decision rule: Mean $\geq$ 2.50 = Agreed.

Grand Mean = 3.15; Grand SD = 0.84.

Table 3 demonstrates that students expressed uniformly positive opinions about computational modelling and gamification in physics education, with all ten items exceeding the 2.50 threshold.

Research Question 3: Effectiveness of Computational Modelling and Gamification in Demystifying Superstitious Beliefs

Table 4: *Frequency Distribution, Means, and Standard Deviations for Students' Opinions on the Effectiveness of Computational Modelling and Gamification in Demystifying Superstitious Beliefs (N = 300)*

Item	SA f (%)	A f (%)	D f (%)	SD f (%)	Mean	SD	Decision
D1. Technology-based learning helps students rely more on scientific explanations.	152 (50.7%)	102 (34.0%)	31 (10.3%)	15 (5.0%)	3.30	0.85	Agree
D2. Simulations help students understand scientific causes of natural events.	156 (52.0%)	94 (31.3%)	33 (11.0%)	17 (5.7%)	3.30	0.88	Agree
D3. Technology-based learning can reduce superstitious beliefs related to science.	166 (55.3%)	101 (33.7%)	22 (7.3%)	11 (3.7%)	3.41	0.78	Agree
D4. Computational activities help students challenge myths and misconceptions in physics.	149 (49.7%)	109 (36.3%)	26 (8.7%)	16 (5.3%)	3.30	0.84	Agree
D5. Scientific animations help students understand events linked with superstition.	147 (49.0%)	108 (36.0%)	30 (10.0%)	15 (5.0%)	3.29	0.84	Agree
D6. Gamification promotes logical and evidence-based thinking.	141 (47.0%)	112 (37.3%)	27 (9.0%)	20 (6.7%)	3.25	0.88	Agree
D7. Students become more scientifically minded with technology-based learning.	168 (56.0%)	92 (30.7%)	32 (10.7%)	8 (2.7%)	3.40	0.78	Agree
D8. Digital learning activities help students question unscientific cultural beliefs.	152 (50.7%)	103 (34.3%)	33 (11.0%)	12 (4.0%)	3.32	0.82	Agree
D9. Technology-based learning bridges the gap between culture and science.	139 (46.3%)	110 (36.7%)	32 (10.7%)	19 (6.3%)	3.23	0.88	Agree
D10. Technology-based learning does not help students overcome superstitious beliefs. (R)	148 (49.3%)	110 (36.7%)	30 (10.0%)	12 (4.0%)	3.31	0.81	Agree

Note. SA = Strongly Agree; A = Agree; D = Disagree; SD = Strongly Disagree; f = frequency; % = percentage. Decision rule: Mean $\geq$ 2.50 = Agreed.

Grand Mean = 3.31; Grand SD = 0.84.

Table 4 presents the highest grand mean recorded in this study (3.31, SD = 0.84), indicating that students hold particularly strong convictions about the effectiveness of computational

modelling and gamification in demystifying superstitious beliefs. All ten items were agreed upon, with means ranging from 3.23 (item D9) to 3.41 (item D3).

Research Question 7: Challenges to the Implementation of Computational Modelling in Secondary School Physics

Table 5: *Frequency Distribution, Means, and Standard Deviations for Challenges Hindering the Implementation of Computational Modelling in Secondary School Physics (N = 300)*

Item	SA f (%)	A f (%)	D f (%)	SD f (%)	Mean	SD	Decision
E1. Lack of computers affects the use of computational modelling in schools.	32 (10.7%)	71 (23.7%)	110 (36.7%)	87 (29.0%)	2.16	0.96	Disagree
E2. Poor electricity supply limits technology-based learning in physics.	28 (9.3%)	77 (25.7%)	102 (34.0%)	93 (31.0%)	2.13	0.96	Disagree
E3. Many schools do not have adequate digital learning facilities.	19 (6.3%)	71 (23.7%)	113 (37.7%)	97 (32.3%)	2.04	0.90	Disagree
E4. Some teachers are not well trained in technology-based learning.	29 (9.7%)	94 (31.3%)	92 (30.7%)	85 (28.3%)	2.22	0.97	Disagree
E5. Internet access is a challenge in using technology-based learning.	27 (9.0%)	68 (22.7%)	114 (38.0%)	91 (30.3%)	2.10	0.94	Disagree
E6. Scientific simulations are unnecessary in physics lessons.	39 (13.0%)	74 (24.7%)	99 (33.0%)	88 (29.3%)	2.21	1.01	Disagree
E7. Time allocated for physics is not enough for technology-based learning.	23 (7.7%)	83 (27.7%)	92 (30.7%)	102 (34.0%)	2.09	0.96	Disagree
E8. Some students prefer traditional teaching to technology-based learning.	20 (6.7%)	75 (25.0%)	125 (41.7%)	80 (26.7%)	2.12	0.88	Disagree
E9. The cost of digital devices makes gamification and computational learning difficult.	27 (9.0%)	81 (27.0%)	108 (36.0%)	84 (28.0%)	2.17	0.94	Disagree
E10. Lack of technical support discourages technology-based learning in schools.	34 (11.3%)	75 (25.0%)	112 (37.3%)	79 (26.3%)	2.21	0.96	Disagree

Note. SA = Strongly Agree; A = Agree; D = Disagree; SD = Strongly Disagree; f = frequency; % = percentage. Decision rule: Mean $\geq$ 2.50 = Agreed; Mean $<$ 2.50 = Disagreed.

Grand Mean = 2.15; Grand SD = 0.95.

Table 5 shows that respondents generally disagreed that the listed challenges significantly discourage learning by computational modelling in schools, as reflected by the grand mean of 2.15 (SD = 0.95), which is below the decision benchmark of 2.50.

Research Questions 4–6: Gender Differences Across the Three Main Constructs

Table 6: *Independent-Samples t-Test Results for Gender Differences on Awareness, Opinions on Technology, and Perceived Effectiveness of Computational Modelling and Gamification (Male n = 157; Female n = 143)*

RQ	Male Mean	Male SD	Female Mean	Female SD	t-value	p-value	Decision
RQ4 (Awareness)	2.917	0.316	2.884	0.317	0.910	0.364	Not Significant
RQ5 (CM & Gamification)	3.155	0.259	3.144	0.254	0.383	0.702	Not Significant
RQ6 (Effectiveness)	3.293	0.267	3.330	0.260	-1.218	0.224	Not Significant

Note. CM = Computational Modelling; df = degrees of freedom; p-values based on two-tailed test. *Significance level: $p < 0.05$.

Table 6 presents the results of the independent-samples t-tests conducted to examine gender differences across the three main constructs. For Research Question 4 (Awareness), male students recorded a mean of 2.917 (SD = 0.316) and female students a mean of 2.884 (SD = 0.317). The t-test yielded $t = 0.910$, $p = 0.364$, indicating no statistically significant difference ($p > 0.05$). For Research Question 5 (Opinions on Computational Modelling and Gamification), the male mean was 3.155 (SD = 0.259) and the female mean was 3.144 (SD = 0.254), with $t = 0.383$, $p = 0.702$ - again, not significant. For Research Question 6 (Perceived Effectiveness), female students ($M = 3.330$, $SD = 0.260$) recorded a marginally higher mean than male students ($M = 3.293$, $SD = 0.267$), but the difference was not statistically significant ($t = -1.218$, $p = 0.224$). The null hypothesis of no significant gender difference was therefore not rejected for any of the three research questions.

Interview Responses (10 Students)**Q1. How does technology-based learning help you understand physics concepts better?**

Participants	Responses
P1	Simulations help me see how physics works instead of only imagining it.
P2	Computer activities make difficult topics easier to understand.
P3	Animations show scientific explanations clearly.
P4	I learn faster when I interact with digital models.
P5	Technology makes physics more practical and interesting.
P6	Games and simulations improve my understanding.
P7	Visual learning helps me remember concepts.
P8	It allows me to practise and correct mistakes.
P9	I understand calculations better using digital tools.
P10	Technology makes abstract ideas easier to explain.

Q2. Can technology-based learning reduce superstitious beliefs in science?

Participants	Responses
P1	Yes, because science explanations become clearer.
P2	Simulations show evidence instead of myths.
P3	It encourages students to ask questions.
P4	Technology helps students think scientifically.
P5	Students depend less on cultural assumptions.
P6	It reduces misconceptions through demonstrations.
P7	It helps students trust scientific evidence.
P8	Learning with technology challenges false beliefs.
P9	Students become more logical.
P10	It promotes understanding rather than superstition.

Q3. What challenges do you face when using computational activities?

Participants	Responses
P1	Limited access to computers.
P2	Electricity interruptions affect learning.
P3	Slow internet connection.
P4	Insufficient digital facilities.
P5	Lack of technical support.
P6	Some activities are difficult initially.
P7	Not enough class time.
P8	Some students are unfamiliar with technology.
P9	Devices are expensive.
P10	Teachers sometimes need more training.

Q4. Suggest ways schools can improve technology-based learning.

Participants	Responses
P1	Provide more computers.
P2	Improve electricity supply.
P3	Train teachers regularly.
P4	Create digital laboratories.
P5	Introduce more educational software.
P6	Improve internet facilities.
P7	Increase practical lesson periods.
P8	Encourage student participation.
P9	Maintain available equipment.
P10	Support schools with funding.

Q5. Mention any superstitious belief you once had and how science clarified it.

Participants	Responses
P1	I thought thunder was caused by spirits; science explained electricity.
P2	I believed eclipses were supernatural; science explained planetary movement.
P3	I feared lightning myths until physics explained charges.
P4	I thought stars controlled events; science changed my view.
P5	I believed strange sounds had spiritual causes; science explained waves.
P6	I thought rain rituals caused rainfall; science explained weather.
P7	I linked illness to myths; science explained natural causes.
P8	I feared eclipses; science clarified them.
P9	I believed comets predicted events; science corrected this.
P10	I thought physics events were mysterious; science made them understandable.

Analysis of Interview Responses

This section presents the analysis of responses obtained from ten (10) purposively selected students who participated in the interview session. The interview was conducted to obtain deeper understanding of students' perceptions regarding the effectiveness of technology-based learning (computational modelling and gamification) in demystifying superstitious cultural beliefs in learning physics. Responses were analysed using thematic analysis and presented according to emerging themes.

Theme 1: Technology-Based Learning (Computational Modelling and Gamification) Enhances Understanding of Physics Concepts

Most participants indicated that technology-based learning improved their understanding of physics concepts by making abstract ideas more practical and easier to visualise.

Examples of responses:

P1: Simulations help me see how physics works instead of only imagining it.

P4: I learn faster when I interact with digital models.

P10: Technology makes abstract ideas easier to explain.

Interpretation: The responses suggest that technology-supported instruction promotes meaningful learning and conceptual understanding among students.

Theme 2: Technology-Based Learning (Computational Modelling and Gamification) Reduces Superstitious Beliefs.

Students reported that exposure to simulations and scientific explanations reduced misconceptions and encouraged scientific reasoning.

Examples:

P2: Simulations show evidence instead of myths.

P7: It helps students trust scientific evidence.

Interpretation: Students perceived technology-based learning as an effective strategy for reducing superstitious cultural beliefs.

Theme 3: Challenges Affecting Technology-Based Learning (Computational Modelling and Gamification)

Participants identified several challenges including inadequate digital facilities, poor electricity supply, and limited access to devices.

Examples:

P1: Limited access to computers.

P2: Electricity interruptions affect learning.

Interpretation: Infrastructure limitations remain barriers to effective implementation.

Theme 4: Strategies for Improvement

Students suggested improved funding, teacher training, and provision of digital resources.

Interpretation: The responses indicate the need for institutional support for sustainable integration.

Theme 5: Science Clarifies Superstitious Beliefs

Participants reported that scientific explanations changed their previous cultural assumptions about natural phenomena.

Examples:

P1: I thought thunder was caused by spirits; science explained electricity.

Interpretation: Interview responses demonstrate that scientific instruction can help students replace misconceptions with evidence-based understanding.

Discussion of Findings

The finding that students demonstrated a high level of awareness of superstitious cultural beliefs conflicting with physics learning (Grand Mean = 2.90) is both significant and encouraging. It indicates that cultural interference in science education is not subconscious but actively perceived by students themselves, consistent with Cobern (1994) and Ogunniyi (2007). The particular prominence of the item concerning suppression of scientific questioning by traditional beliefs resonates with long-standing concerns in the African science education literature (Abimbola & Abubakar, 2019; Adetunji & Bamidele, 2021).

The strongly positive student opinions on computational modelling and gamification (Grand Mean = 3.15) reflect a learner population that is both receptive to and desirous of technology-enhanced instruction. This finding aligns with the empirical literature on the motivational and cognitive benefits of digital learning tools in STEM education (Mayer, 2019; Smetana & Bell, 2012; Hamari et al., 2014). The high agreement with items relating to computer-based problem-solving, independent learning through gamification, and computational modelling as a motivational scaffold is consistent with self-determination theory's emphasis on autonomy and competence as drivers of intrinsic motivation (Ryan & Deci, 2000).

The highest grand mean in the study (3.31) was recorded for perceived effectiveness in demystifying superstitious beliefs. Students' strong endorsement reflects an intuitive grasp of the epistemological mechanism through which these technologies operate: by presenting empirical, visual, and interactive evidence for the scientific causes of natural phenomena, computational tools displace the ambiguity on which supernatural explanations depend. This is the experiential conditions-for-conceptual-change argument made by Posner et al. (1982) and elaborated by Duit and Treagust (2003). The qualitative interview themes convergently reinforced these quantitative findings, with multiple participants narrating actual instances of belief change prompted by scientific instruction.

The disagreement with challenge items (Grand Mean = 2.15), while superficially reassuring, requires cautious interpretation. The sampled students attend private schools with some baseline technology provision and may not have experienced the full severity of barriers present in public or rural schools. The digital divide literature (van Dijk, 2020) and UNESCO (2023) documentation of technology access inequities in sub-Saharan Africa suggest that these barriers remain significant at the system level and warrant sustained policy attention.

The absence of statistically significant gender differences across all three constructs (all $p > 0.05$) is consistent with the emerging consensus that gender gaps in ICT-related attitudes are narrowing as technology becomes more culturally normalised (Vekiri & Chronaki, 2008; OECD, 2021). The slight, non-significant female advantage on the effectiveness construct may warrant further investigation in future studies.

Qualitative Findings: Interview Analysis

Ten students purposively selected from the main sample participated in semi-structured interview sessions. Responses were subjected to thematic analysis (Braun & Clarke, 2012), yielding five major themes.

Overall, the qualitative findings confirmed and enriched all quantitative results, demonstrating convergent validity across the two strands of the mixed methods design.

Conclusion

This study has shown that physics students are aware of superstitious and cultural belief conflicting with the learning of physics at the secondary school level. Hence, they have positive coherent perceptions on computational modelling and gamification as tools for demystifying the superstitious cultural beliefs in learning physics. The absence of significant gender differences obtained in the study reinforces the inclusive promise of these pedagogical innovations.

Recommendations

Based on the findings, the following recommendations are advanced: **(1)** Physics teachers should receive regular professional development training in the design and deployment of computational modelling and gamification tools for effective classroom integration. **(2)** The Nigerian Educational Research and Development Council (NERDC) should explicitly incorporate computational modelling and gamified learning frameworks into the secondary school physics curriculum as core instructional approaches. **(3)** State and federal authorities should prioritise investment in digital infrastructure — electricity supply, internet connectivity, and ICT device provision — to create enabling conditions for equitable technology-enhanced instruction across private and public school contexts. **(4)** School administrators should designate dedicated digital laboratory spaces for physics instruction. **(5)** Future research should employ experimental or quasi-experimental designs to establish causal relationships between these interventions and measurable changes in students' superstitious beliefs and physics achievement. **(6)** Curriculum developers should create culturally responsive gamified content drawing on familiar Nigerian cultural narratives to maximise relevance and impact.

Contribution to Knowledge

1. The study has revealed the opinion of secondary school physics students on the efficacy of computational modelling and gamification in demystifying superstitious and cultural beliefs in physics.
2. The study has established the power of inclusiveness in the students' opinion.

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RECLAIMING AFRICAN KNOWLEDGE SYSTEMS: INDIGENIZING EDUCATION, TRANSFORMING CURRICULUM AND REFRAMING THE CREATIVE ECONOMY IN A POST-WESTERN PARADIGM

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Abstract

The dominance of Western knowledge systems in education globally has historically marginalized African indigenous knowledge systems. African creative expressions as well as developmental philosophies have also been sabotaged, seemingly making Africans enslaved to Western ideologies. This paper is a discourse on the implications of continued Western supremacy on African narratives and contends the urgent need for Africans to reclaim African knowledge systems as strategic instruments for sustainable development in African nations and beyond. Drawing on postcolonial theory, Afrocentricity, and decolonial scholarship, the study argues that sustainable African development cannot be effectively achieved through imported epistemic frameworks disconnected from African socio-cultural realities. The paper discusses the indigenization of education, curriculum transformation and the reframing of the creative economy as pathways toward epistemic liberation, cultural revitalization and socio-economic sustainability of various African states. The study further examined contemporary Nigerian and African realities, including curriculum mismatch, youth unemployment, cultural alienation and the growing global influence of Africa's creative industries such as Nollywood and Afrobeats. Using insights from both foundational and contemporary African scholars, the paper concludes that African-centered educational systems can foster innovation, critical consciousness, cultural identity and inclusive development. It contends that reclaiming African knowledge systems is not merely a cultural project but a developmental imperative capable of repositioning Africa within global knowledge production and sustainable economic transformation.

Keywords: African knowledge systems, curriculum transformation, indigenous education, creative economy, Afrocentricity, sustainable development, post-Western paradigm.

Introduction

While many African nations are politically independent, many of their educational systems are heavily dependent on the Western education system. Africa's encounter with colonialism fundamentally transformed its educational, political, cultural and economic institutions. Ngũgĩ wa Thiong'o (1986) stated that colonial administrations established educational systems that privileged Western knowledge systems while systematically undermining

indigenous African philosophies, languages, technologies and cultural practices. According to Ndlovu-Gatsheni (2021), although many African nations attained political independence in the twentieth century, the structures of epistemic dependency and cultural domination largely remain intact within educational institutions and other developmental frameworks across the continent.

In many African countries today, educational curricula continue to prioritize Eurocentric knowledge models that are often disconnected from local realities and indigenous systems of problem-solving. This disconnect has contributed to unemployment, weak entrepreneurial capacity, cultural alienation and overdependence on foreign developmental paradigms. Falola (2022) observes that the persistence of colonial educational structures in Africa continues to undermine intellectual autonomy and indigenous innovation. Education should be for positive transformation; however, Ezeanya-Esiobu (2019) argues that sustainable African development cannot occur without integrating indigenous African knowledge systems into education and governance structures.

Nigeria and some other African states present significant cases within this discourse. For instance, despite Nigeria's vast human and cultural resources, the country continues to grapple with educational challenges. Some of these challenges include outdated curricula, inadequate funding, graduate unemployment and declining indigenous language usage. Many graduates possess certificates but lack practical competencies relevant to local socio-economic realities. This reflects what Ake (1996) described as the crisis of externally imposed developmental models that fail to align with African social contexts.

At the same time, Africa's creative economy has emerged as a powerful platform for redefining African narratives globally. Nollywood, Afrobeats, African fashion, literature and digital storytelling increasingly challenge long-standing stereotypes that portray Africa primarily through poverty, conflict, and dependency. The global success of Nigerian artists such as Burna Boy, Tems, and Wizkid demonstrates the growing influence of African creativity within global cultural industries. According to UNESCO (2021), Africa's creative industries possess enormous untapped potential capable of driving employment generation, cultural diplomacy, as well as sustainable economic growth.

This paper therefore explores how reclaiming African knowledge systems through indigenized education, curriculum transformation and creative economy development can contribute to sustainable development in a post-Western paradigm. The paper also argues that Africa's future development must emerge from frameworks that prioritize African realities, indigenous capacities and cultural identities rather than continued dependence on externally imposed models. Africa's future depends significantly on its capacity to reposition itself from passive consumer of Western knowledge to an active producer of ideas, narratives and solutions that align with local community needs and realities.

Conceptual Clarifications

Knowledge systems are deeply connected to structures of power. African knowledge systems are mostly community-centered, experience-based and closely related to the social realities of

the day. Dei (2013) explained that African knowledge systems refer to indigenous ways of knowing developed within African societies over centuries. These systems encompass oral traditions, philosophies, indigenous medicine, governance systems, agricultural practices, conflict resolution mechanisms, spirituality, environmental conservation, and artistic expressions.

Indigenizing education involves integrating local cultures, histories, values, languages as well as indigenous knowledge into educational systems. It seeks to make education socially relevant and responsive to the lived experiences of African communities. According to Ezeanya-Esiobu (2019), indigenized education strengthens identity formation and promotes development rooted in local capacities.

The creative economy refers to economic activities driven by creativity, culture, intellectual property and innovation. It includes sectors such as music, film, literature, fashion, performing arts, media and digital content creation. In Africa, the creative economy increasingly functions as a tool for economic empowerment and narrative reconstruction.

Theoretical Framework

This study is anchored on Postcolonial Theory and Afrocentricity Theory.

Postcolonial Theory, as articulated by Said (1978), examines the enduring effects of colonial domination on formerly colonized societies, especially regarding cultural representation and knowledge production. The theory critiques how colonial ideologies continue to shape educational systems, political institutions as well as global narratives about Africa.

Afrocentricity Theory, advanced by Asante (2009), advocates placing African experiences, histories and cultural values at the center of analysis. Afrocentricity challenges Eurocentric assumptions and seeks to restore African agency within global intellectual discourse.

Together, these theories provide useful frameworks for understanding how Western supremacy marginalized African narratives and why reclaiming indigenous knowledge systems is essential for sustainable development.

Western Supremacy and the Marginalization of African Narratives

Western supremacy historically functioned through military conquest, cultural domination and epistemic exclusion. Colonial education systems were deliberately designed to portray African societies as primitive and dependent while positioning Western civilization as the universal standard of progress (Ngũgĩ wa Thiong'o, 1986). This assertive stance rendered everything African as non-essential and fit to be discarded.

These narratives became institutionalized within schools, universities, media representations and even religious institutions. African histories and indigenous innovations were either distorted or totally ignored. As a result, many Africans internalized notions of cultural inferiority and intellectual dependence.

Falola (2022) argues that coloniality continues to shape African universities through externally driven curricula and knowledge validation systems. Ndlovu-Gatsheni (2021) similarly maintains that Africa still experiences "epistemic domination" through the global hierarchy of knowledge production.

Media representations, particularly at international levels, have also reinforced stereotypical images of Africa as a continent defined solely by poverty, corruption, disease and conflict. Such narratives obscure Africa's intellectual contributions, scientific innovations and cultural diversity.

In Nigeria, as in other African nations, the dominance of Western educational models has contributed to a mismatch between academic training and societal needs. Many educational institutions prioritize theoretical knowledge over practical and community-centered learning. Consequently, graduates often struggle to address local developmental challenges effectively.

Indigenizing Education and Curriculum Transformation

Transforming African education requires deliberate curriculum reforms that prioritize indigenous histories, philosophies, languages and other developmental realities. Education should not merely produce job seekers but socially conscious, creative individuals capable of solving local problems.

Ngũgĩ wa Thiong'o (1986) emphasized that language is central to cultural identity and intellectual liberation. Yet colonial languages such as English and French continue to dominate African educational systems at the expense of indigenous languages. In Nigeria, many indigenous languages face gradual decline due to educational and societal preferences for English.

Curriculum transformation should therefore include, but not be limited to, innovation rooted in local realities.

Mamdani (2016) argues that African universities must move beyond colonial academic structures and become institutions capable of producing contextually relevant knowledge. Ezeanya-Esiobu (2019) also contends that African development strategies must emerge from local experiences rather than imported models.

Teacher education is equally important in this transformation process. Teachers must be trained to deliver culturally responsive and creative development-oriented learning capable of fostering critical thinking and innovation.

Reframing the Creative Economy in a Post-Western Paradigm

Africa's creative economy has become one of the continent's most dynamic sectors for cultural expression and economic transformation. Creative industries such as Nollywood, Afrobeats, fashion, animation and digital media increasingly challenge Western-controlled narratives about Africa.

Nigeria's Nollywood industry represents one of the largest film industries globally and serves as a major platform for projecting African stories, values and realities. Similarly, Afrobeats has gained global recognition, positioning African music and youth culture within international cultural spaces.

Artists such as Burna Boy, Tems, Wizkid and Davido have contributed significantly to the globalization of African cultural identity. Through music, fashion as well as digital storytelling, these creatives challenge stereotypical portrayals of Africa while generating employment and vibrant economic growth.

According to UNESCO (2021), Africa's cultural and creative industries contribute significantly to youth employment and possess enormous untapped developmental potential. The rise of streaming platforms and digital technologies has further enabled African creators to bypass traditional Western gatekeepers and reach global audiences directly. However, the sector still faces several challenges, including.

Contemporary Challenges to Reclaiming African Knowledge Systems

Despite growing calls for decolonization and indigenization, several obstacles continue to hinder the effective reclamation of African knowledge systems. These include: capacity.

Global capitalism and media influence also encourage the consumption of foreign cultures at the expense of indigenous cultural systems. Consequently, many young Africans increasingly detach from or ignore indigenous identities and values.

Conclusion

Reclaiming African knowledge systems remains essential for achieving sustainable development and intellectual autonomy in a post-Western world. Western supremacy historically marginalized rich African narratives and weakened many indigenous systems of knowledge production through colonial educational structures and cultural domination.

However, the growing movement toward decolonization, curriculum transformation and creative economy development demonstrates Africa's determination to redefine its developmental trajectory. Indigenized education systems and culturally grounded developmental frameworks can foster innovation, critical consciousness, identity formation and socio-economic sustainability of the various African nations.

Africa's creative industries further illustrate the continent's capacity to reshape global narratives through indigenous creativity and cultural production. Ultimately, sustainable African development must emerge from frameworks that center African realities, values, histories and endogenous capacities rather than continued dependence on externally imposed paradigms.

Recommendations

To reposition African knowledge systems for sustainable development, the following measures are recommended:

1. African governments should, as a matter of urgency, prioritize curriculum reforms that integrate indigenous knowledge systems at all educational levels. This will help to usher in transformation and sustainable development.
2. Indigenous African languages should be adequately promoted within formal educational institutions.
3. Governments should increase funding for education, research, and innovation. African universities should also encourage interdisciplinary research focused on local developmental challenges.
4. Policies supporting creative industries should be strengthened through grants, infrastructure development and intellectual property protections.
5. Public-private partnerships should be encouraged to support Africa's creative economy.
6. Digital technologies should be utilized to preserve and promote African cultural heritage.
7. African scholars should consistently intensify efforts toward decolonizing knowledge production and academic research.

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TEACHERS' PROFESSIONAL IDENTITY, USE OF LEARNING MATERIALS, CONTENT KNOWLEDGE, ATTITUDE AND COMPETENCE AS PREDICTORS OF STUDENTS' ACHIEVEMENT IN STOICHIOMETRY

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Abstract

This study determined the predictive relationship of teachers' professional identity, use of learning materials, content knowledge, competence and attitude in relation to students' achievement in stoichiometry at senior secondary school level. Using multi-stage sampling, the study sampled a total of 1.171 students and 30 teachers from public schools in Lagos State. Three research questions were raised and answered in the study. Six research instruments were used to collect data for the study. The instruments were validated and the reliability was determined using Cronbach Alpha and KR-20. The data were analysed using Pearson Product Moment Correlation and Regression at 0.05 level of significance. The findings showed that teachers' professional identity, competence, use of learning materials and pedagogical content knowledge had a significant positive relationship with students' achievement in stoichiometry while teachers' attitude had a negative relationship. The study also showed that the variables had a significant composite contribution in predicting students' achievement in stoichiometry while the relative contributions were not significant. It was therefore recommended among others, that chemistry teachers should engage students with instructional materials when teaching stoichiometry. Schools should also ensure that they provide teachers with necessary instructional materials including a well-equipped laboratory. Government should organize in-service training for teachers to develop their knowledge and competence in the instructional delivery of stoichiometry.

Introduction

Stoichiometry, an essential concept in Chemistry, allows chemists to understand the quantitative relationships between reactants and products in chemical reactions, without which chemical reactions can be incomplete. Stoichiometry helps us to determine the quantity of elements and compounds involved in a chemical reaction from a balanced chemical equation (Okanlawon, 2010). Solving stoichiometry problems to a high degree of proficiency, is necessary for handling other crucial concepts like equilibrium, chemical

kinetics, thermodynamics, electrochemistry, and acid-base problems. It is considered an important instrument in the chemical toolset. Students' comprehension of the subject will have a cascading impact on students' learning of chemistry. This could further help students who are seeking to further their education in science at post-secondary level.

However, existing literature has shown that Stoichiometry always constitutes problems among Senior Secondary School (SSS) students in Nigeria owing to the abstract nature of the concept. Shedrack and Enunuwe (2018), for example, found that students struggle to identify the limiting reagent, utilize inconsistent stoichiometry relationships, balance chemical equations poorly, and show poor understanding of theoretical yield determination and identification of substances in excess. Olatunde (2021), identified that students cannot balance chemical equations, properly identify products and reactants, and also cannot make sense of subscripts in a reaction. Researchers have linked many teacher characteristics to the achievement of students in stoichiometry. Among them are teachers' attitude and attendance at chemistry workshop (Adesoji and Olatunbosun, 2008); pedagogical content knowledge, qualification and experience (Omilani and Ime, 2018); teacher competence and teaching methods (Casinillo, 2023; Mansor, Halim and Osman 2008).

Teachers' professional identity is thought to be a crucial concept for the advancement of teaching careers. It refers to teachers' perceptions of themselves as educators, derived from their understanding of their ongoing interactions within their experiences, typically shaping their professional identity. According to Abbasian and Esmalee (2018), teachers' identity strongly correlates with students' achievement. Teachers who have a positive identity tend to be highly motivated and are committed to providing engaging and innovative learning experiences that will affect students' achievement positively. Delima (2015) reported that teachers' professional identity significantly influences teachers' performance and the students' achievement. She reported that the discovery of their professional identity forms the basis for their long-term career commitment, development and performance.

Another teacher-related factor that has been found to influence students' stoichiometry achievement is the teachers' attitude toward teaching. Heng and Karpuduwan (2015) state that attitude is a theoretical construct that expresses a person's preference for or dislike of a certain object. Teachers play crucial roles in the teaching process as students consciously or unconsciously tend to imitate the attitude demonstrated by their teachers. How teachers behave in the classroom before students, their likes and dislikes, how they feel about their subject and all other non-verbal communications could significantly impact students' achievement. Additionally, Kamal and Muideen (2014) noted that teachers' attitude strongly correlates with the achievement of the students. They assert that pupils who learned from instructors who had a more upbeat attitude outperformed their peers..

The professional competence of the teacher is one of the factors that determines the attainment of educational objectives when pursuing the realisation of a nation's intended vision (Kasim, Moonti and Sudirman, 2023). According to their definition, a teacher is competent if they are able to grasp the subject matter both thoroughly and broadly. This includes being able to master both the scientific material that underpins the curriculum and

the subject matter that is covered in schools, as well as developing their scientific understanding. Kasimi, Moonti and Sudirman (2023) reported that teacher competence significantly influences students' learning outcomes including their achievement. The higher the competence of the teachers, the better the results they achieve. Additionally, Casinillo (2023) found that teachers' competence strongly correlates with the academic achievement of students in mathematics.

In addition, examining the influence of stoichiometry pedagogical content knowledge of teachers and how it relates to students' achievement in chemistry is fundamental in any effort to comprehend how teachers teach stoichiometry and the necessary interventions to build the capacity of teachers in this area. Stoichiometry pedagogical content knowledge (SPCK) is a combination of the teacher's knowledge of the content and pedagogy in stoichiometry. It speaks of the understanding of stoichiometry that considers the unique learning requirements that are present in the idea when teaching and learning about it. According to Omilani and Ime (2018), students' stoichiometry achievement is influenced by the PCK of the teachers in the subject. Students who had teachers with high SPCK demonstrated reduced misconceptions and improved performance. They contend that science teachers contribute significantly to students' performance because they have a say in both the content and delivery of instruction.

Another important factor that influences students' achievement in stoichiometry considered in this study is teachers' use of learning materials. Learning materials serve as a medium of delivering instructions in the classroom between the teacher and the students. Chemistry has been perceived to be an abstract subject by students, the use of learning materials demystifies this perception as it allows learners to relate with the concepts being taught in a more concrete and practical way. According to Adalikwu and Iorkpilgh (2013), there exists a statistical correlation between the utilization of learning resources by chemistry teachers and the achievement of the students. They posit that students taught with learning aids outperform their counterparts not taught with learning materials. Barcelona (2014) also noted that chemistry teachers' usage of learning resources improves their students' academic achievement in the subject. She goes on to say that using educational resources not only encourages learning but also contributes significantly to students' academic achievement.

Research Questions

1. What is the relationship between teachers' professional identity, use of learning materials, content knowledge, attitude, competence and students' achievement in stoichiometry?
2. What is the relative contribution of teachers' professional identity, use of learning materials, content knowledge, attitude, competence on students' achievement in stoichiometry?
3. What is the joint contribution of teachers' professional identity, use of learning materials, content knowledge, attitude, competence on students' achievement in stoichiometry?

Methodology

The study adopted the descriptive research design of the *expost facto* type. The study population is senior secondary school class two chemistry students and their teachers in the six education districts of Lagos State, Nigeria. A total of 1,701 students and 30 teachers were sampled using a multi-stage sampling method. In the first stage, stratified sampling was used to select one Local Government Area from each of the six (6) educational districts to make six (6) Local Government Areas for the study. At the second stage, purposive sampling was used to select five (5) schools from each of the Local Government Areas. The criteria for selection are that the school must be a school with a qualified chemistry teacher teaching chemistry at least in the last two sessions. Meaning that the qualified teachers must have taught the students in class one and two of senior secondary schools. Another criterion was that the chemistry syllabus for the senior secondary two must have been covered.

At the third stage, intact classes of all the chemistry students from each school were used to make up a sample of 1, 171 students. There were 486 male and 685 female participants. Their teachers were also sampled to make up 30 respondents for the study. In all, a total of 1, 201 sample was used for this study. The instrument used were Teachers' Professional Identity Scale (TPIS), Teachers' Use of Learning Materials Scale (TULMS), Teacher' Competency Scale (TCS), Teachers' Stoichiometry Pedagogical Content Knowledge Scale (TSPCKS), Teachers' Attitude Towards Stoichiometry Scale (TATSS) and Stoichiometry Achievement Test (SAT)

Teachers' Professional Identity Scale (TPIS)

The Teachers Professional Identity Scale (TPIS) adapted from the Professional Teacher Identity Scale developed by Sammons et.al (2007) was used for this study. It measured the professional identity of the chemistry teachers. It is made up of two parts. Section A asks questions on the respondent's age, gender, and name of school. Section B comprises 17 items which the respondent answered by expressing their level of agreement or disagreement on a 4-Likert Scale questions ranging from strongly agree to strongly disagree. Using Cronbach Alpha, the instrument's reliability coefficient was found to be 0.73.

Teachers' Use of Learning Materials Scale (TULMS)

The Teachers Use of Learning Materials Scale (TULMS) adapted from the Teachers' Use of Instructional Materials developed by Yazid, Abdulmumin and Jamilu (2020) was used for this study. It is made up of two parts. Section A asks questions on the respondent's gender, name of school and class. Section B is made up of 20-items which the respondent is to respond to by expressing their opinions on a 4-Likert Scale questions ranging from 1 – not like me, 2 – not much like me, 3 – somewhat like me, 4 – very much like me. Using Cronbach Alpha, the instrument's reliability coefficient was found to be 0.94.

Teacher' Competency Scale (TCS)

The Teachers Competency Scale (TCS) adopted from The Teaching Performance Assessment Template developed by the Faculty of Education; University of Ibadan was used for this study. It measured the teachers' competence as observed by trained research assistants. It is made up of two parts. Section A asks questions on the respondent's gender, name of school

and class. Section B is made up of 6 categorical items with 18 sub-items which was used to assess the teachers' competence by two trained research assistants. The five rubrics for the assessment are 5 = Excellent, 4 = Very good, 3 = Good, 2 = Fair, and 1 = Poor. The instrument had 83% agreement.

Teachers' Stoichiometry Pedagogical Content Knowledge Scale (TSPCKS)

The Teachers' Stoichiometry Pedagogical Content Knowledge Questionnaire developed by Malcolm (2015) was adopted for this study. It measured teachers' pedagogical content knowledge in stoichiometry. It is an open-ended questionnaire made up of two parts. The first section included information about the teachers' profile while the second section contained structured items that assessed the teachers' pedagogical content knowledge of stoichiometry concepts. The items were scored using the rubrics: 1-limited, 2 – basic, 3 – developing, 4-exemplary. The scores were collected and analysed using Guttman Split-Half, and the reliability coefficient was found to be 0.70.

Teachers' Attitude Towards Stoichiometry Scale (TATSS)

The Teachers' Attitude towards Stoichiometry Scale (TATSS) adapted from Teachers Attitude toward Biology Scale developed by Akpan (2018) was used for this study. It is made up of two parts. Section A asks questions on the respondent's gender, name of school and class. Section B is made up of 20 items which the respondent is to respond to by expressing their opinions on a 4-Likert Scale questions ranging from 1 – nothing like me, 2 – not much like me, 3 – somewhat like me, 4 – very much like me. Using Cronbach Alpha, the instrument's reliability coefficient was found to be 0.90.

Stoichiometry Achievement Test (SAT)

The study's dependent variable is the achievement of students in stoichiometry. This was measured using the Students Stoichiometry Achievement Test SAT. The aspects of stoichiometry covered in the test included mass and volume relationships and chemical equation. The test is fifteen multiple-choice items. The options range from A to D. The reliability value of 0.81 was obtained using KR20 when the test was administered to twenty students who were not part of the main study. The difficulty index of the test ranges from 0.2-0.75, while the discrimination index is 0.2- 0.45.

Results

Relationship Between Teacher Characteristics and Students' Achievement in Stoichiometry

Table 1 shows that the relationship between teacher's professional identity ($r = 0.27$; $p < 0.05$), teachers' stoichiometry pedagogical content knowledge ($r = 0.27$; $p < 0.05$), teachers' competence ($r = 0.28$; $p < 0.05$) and students' achievement in stoichiometry are positive, moderate and significant respectively. This implies that achievement of students in stoichiometry is associated with the teachers' professional identity, pedagogical content knowledge and competence. However, the relationship between students' achievement in stoichiometry and teachers' attitude ($r = -0.28$; $p < 0.05$) is negative, moderate and significant. Lastly, teachers' use of learning materials ($r = 0.13$; $p < 0.05$) has a weak, significant positive relationship with students' achievement in stoichiometry.

Composite Contribution of Teachers' Characteristics to Students' Achievement in Stoichiometry

Table 2 reveals there is a significant, composite contribution of teachers' professional identity, stoichiometry pedagogical content knowledge, competence, attitude and use of learning materials to students' achievement in stoichiometry ($F_{(5, 1200)} = 20.42$; $p < 0.05$). From table 2, the adjusted R value of 0.075 shows that the independent variables are responsible for 7.5% of the total variance in students' stoichiometry achievement. The remaining 92.5% variance is attributed to variables that are not residual in this study.

Relative Contribution of Teachers' Characteristics to Students' Achievement in Stoichiometry

Table 3 reveals that the relative contributions of teachers' professional identity ($\beta = -.055$; $t = -.447$; $p > 0.05$) use of learning materials ($\beta = -.046$; $t = -1.359$; $p > 0.05$) stoichiometry pedagogical content knowledge ($\beta = -.029$; $t = -.254$; $p > 0.05$), attitude ($\beta = -.108$; $t = -.726$; $p > 0.05$) and competence ($\beta = -.116$; $t = -.634$; $p > 0.05$) to achievement in stoichiometry are not significant.

Table 1: Relationship between the variables of the study

Pearson Correlation	Stoichiometry achievement	Professional identity	Use of material	Content knowledge	Teacher attitude	Teacher Competence
Stoichiometry achievement	1.00	.27	.13	.27	-.28	.28
Professional Identity	-.27	1.00	-.567	.80	.81	.82
Use of materials	.13	-.57	1.00	-.56	-.57	-.80
Content Knowledge	.27	.80	-.56	1.00	.81	.82
Teacher Attitude	-.28	.83	-.57	.81	1.00	.83

Table 2: Composite Contribution of Teacher Characteristics

Model	Sum of squares	Df	Mean square	F	Sig.
Regression	851.860	5	170.372	20.417	0.00
Residual	9971.628	1195	8.344		
Total	10823.489	1200			

R = 0.281 Adj R² = 0.075

Table 3: Relative contribution of the independent variables

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	5.877	.389		15.114	.000
Professional Identity	-.029	.065	-.055	-.447	.655
1 Use of learning Materials	-.010	.007	-.046	-1.359	.174
Content Knowledge	-.023	.089	-.029	-.254	.799

Teacher Attitude	-.043	.059	-.108	-.726	.468
Teacher Competence	-.030	.047	-.116	-.634	.526

Discussion and Conclusion

This study aims to determine the influence of teachers' characteristics on students' achievement in stoichiometry. The findings confirmed that teachers' professional identity (TPI) had a significant positive relationship with achievement in stoichiometry. This result implies that how teachers see themselves personally and professionally have a positive relationship with students' achievement. The more positively teachers see themselves the higher will be students' achievement. This result agrees with the findings of Abbasian and Esmalee (2018). They found that teachers with positive professional identity tend to be highly motivated and are committed to providing engaging and innovative learning experiences that will affect students' achievement positively. However, this study shows that there is no relative contribution of teachers' professional identity on students' achievement in stoichiometry. This is in contrast with the findings of Delima (2015) also found that students' achievement is predicted by the professional identity of the teacher.

In addition, the result of this study further showed that there exists a significant positive relationship between teachers' stoichiometry pedagogical content knowledge and students' achievement in stoichiometry. This means that an increase in the teachers' content knowledge of the teaching and learning of stoichiometry, the better the achievement of the students. This result agrees with the findings of Makhechane and Qhobela (2019) who found there is a positive correlation between teachers' pedagogical content knowledge and students' achievement in chemistry. Also, Mosabala and Rollnick (2018) discovered that teachers' pedagogical content knowledge correlates significantly with students' achievement.

More so, the result shows that teachers' pedagogical content knowledge does not predict students' achievement in stoichiometry. This result is in contrast with the findings of Omilani and Ajayi (2018), who reported that the teachers' stoichiometry pedagogical content knowledge is a predictor of students' achievement in stoichiometry. Students taught by teachers with high SPCK showed fewer misconceptions and performed better. According to them, science teachers' influence what students are taught and how they are taught, and thus are key to students' achievement.

Furthermore, this study attests that there is a significant positive relationship between teachers' competence and students' achievement in stoichiometry. It can be deduced that the higher the competency of the teachers, the better will be the achievement of the students. The result of this study affirms the earlier discovery of Joansson, Myaberg and Rosen, (2014), that there is a significant relationship between teachers' competence and achievement. They affirm that to improve the achievement of students, there is need for teachers to invest in developing their competency. On the other hand, teachers' competence does not predict students' achievement in stoichiometry. The result aligns with the findings of Umiyanti (2017) who asserted that the competency of the teacher strongly predicts achievement of students. Asif, Shafqat, Sabahat and Zahida, (2019) also reported that teachers' competence is a predictor of students learning satisfaction and achievement.

In addition, the result of the study reveals that there's a significant positive correlation between teachers' use of learning materials and students' achievement in stoichiometry. It implies that the more teachers engage in using instructional materials in the classroom, the better will be the achievement of students. This outcome is consistent with the research conducted by Adalikwu and Iorkpilgh (2013), who found a strong positive correlation between students' stoichiometry achievement and teachers' utilization of learning resources. However, the findings show that students' achievement in stoichiometry is not predicted by teachers' use of learning materials. The result also supports the findings of Cairns and Dickson (2021) who discovered that the use instructional materials significantly with students' achievement. To improve students' achievement, chemistry teachers should make their lessons practical and applicable by using learning materials.

Also, the result of this study reveals a significant negative relationship between teachers' attitude and students' achievement in stoichiometry. One would have thought that there should be a positive correlation between these two constructs. However, this study shows a negative correlation. This implies that according to this study, when teachers demonstrate a more positive attitude to teaching stoichiometry, it does not necessarily improve the achievement of the students in stoichiometry. This could imply that teachers' attitude needs to be complemented with other factors to have a significant positive relationship with students' achievement in stoichiometry. The result of this study is in contrast with the findings of Kamal and Muideen (2014) who reported that there is a significant relationship between teachers' attitude and students' academic achievement. They posit that students who were taught by teachers with a more positive attitude performed better than their counterpart. The result also does not agree with the findings of Shittu and Oanite (2015), who found out that teachers' attitude correlates positively with students' achievement.

Recommendation

Chemistry teachers should engage students with instructional materials when teaching stoichiometry. Schools should also ensure that they provide teachers with necessary instructional materials including a well-equipped laboratory. Government should organize in-service training for teachers to develop their knowledge and competence in the instructional delivery of stoichiometry. It is believed that this will help improve the students' achievement. Government and educational stakeholders should invest in improving the welfare and conditions of service of chemistry teachers including their remuneration. This will help improve their professional identity and attitude to teaching which can cumulatively improve students' achievement in stoichiometry.

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CHALLENGES IN IMPLEMENTING STRATEGIC HUMAN RESOURCE PLANNING IN HIGHER INSTITUTIONS OF LEARNING IN NIGERIA

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Abstract

The study investigated the challenges facing strategic plan implementation in relation to human resource management in two federal universities: Obafemi Awolowo University (OAU) and University of Ibadan (UI). A multi-stage sampling procedure was adopted for the study. The universities were purposely selected because they have established and operational strategic planning frameworks, and based on the availability of strategic plan and its implementation. Their selection was also based on their suitability for examining the implementation of strategic human resource planning. Simple random sampling was used to select six faculties from each university. Also, 10% of the academic staff and 5% of the senior non-academic staff were randomly selected in each faculty. Data collected through questionnaire and in-depth interviews were analyzed using descriptive statistics (frequency, mean and percentages). The findings showed that the strategic plans in place were fairly implemented (Grand mean = 2.56) in the selected universities. Among others, reliance on the universities substantially on government for funding (mean=3.16), non-conformity of students-teacher ratio to standard (mean=3.12), and occasional students and staff union activism and undue disruption of academic calendar (mean 3.10) were the major challenges facing implementation of strategic plans in the universities. The study concluded that the strategic plans of the selected universities were fairly implemented as a result of multi-faceted challenges experienced by the educational institutions.

Keywords: Challenges, higher institutions, human resource, implementation, strategic planning

Introduction

Strategic Human Resource planning (SHRP) is the deliberate process of aligning an organization's human capital with its long-term business objectives. Strategic planning is also an organization's procedure for describing its plan or path, and creating choices on distributing its resources to implement its policy. SHRP is not merely an HR function but a critical strategic imperative especially for businesses to navigate evolving market dynamic and talent shortages. Strategic planning became imperative for companies in 1960's and continue to be an essential part of strategic management today. SHRP ensures the right people, with the right skills, are in the right roles at the same time, driving sustainable growth and competitive advantage. (BMC,UK Trainig 2026). Nte (2007) stressed that the use of strategic planning by institutions of higher education has developed because many universities nowadays found themselves in situations that old ways of planning and management could no longer guarantee steady future. Strategic planning brings a good match amid a university's actions and the demands on the environs in which it functions (Ogunyemi, 2019). SHRP is accomplished through strategic planners, who include many events and research bases in their analysis of the organization and its correlation to the surroundings in which it participates (Simandan, 2018).

Despite the importance of strategic planning in higher education, the implementation phase often presents significant challenges. Many higher educations of learning struggle with issues like inadequate funding, resistance to change, weak leadership structures, poor communication, political interference and insufficient monitoring. Therefore, while strategic plans are essential tools for institutional transformation and sustainability, their successful implementation in higher education requires strong leadership commitment, stakeholder involvement, adequate financial support and effective monitoring system.

Literature review

Strategic human resource planning (SHRP) refers to the systematic and proactive process of aligning an institution's human capital with its long-term goals and objectives. It involves forecasting workforce needs, developing talent management strategies, ensuring succession planning, and integrating human resource policies with institutional strategies. According to Ojokuku and Akanbi (2015), strategic human resource management practices significantly influence organization performance when they properly aligned with institutional goals. In the context of higher education, SHRP ensures that universities maintain academic excellence through effective recruitment, retention, and development of both academic and non-academic staff.

Strategic planning has become an essential management tool for enhancing institutional effectiveness, accountability, and long-term sustainability in higher education. It provides structured framework for decision-making, effective resource allocation and performance improvement. The preparation and implementation of a strategic plan requires discipline, commitment, transparency, and active participation of stakeholders to ensure that organizational goals are achieved (Bryson, 2018, Armstrong, 2020). In higher education institution, strategic planning enables universities to respond to environmental changes and

maintain competitiveness in a rapidly evolving academic environment (Rowley, Lujan & Dolence, 1977).

Universities, particularly in developing countries such as Nigeria, are increasingly compelled to adopt strategic planning practices due to growing internal and external pressures. These pressures include inadequate funding, poor management of available resources, inappropriate prioritization of institutional goals, irregular staff development policies, and unethical practices, with the educational system. In addition, higher institutions are faced with problems such as inadequate and obsolete facilities for teaching and research, brain drain among qualified academics, and insufficient infrastructural support necessary for effective service delivery (Onah, 2012; Dike, 2022).

Empirical studies have shown that the success of strategic planning in higher education institutions has been mixed. According to Rowley, Lujan, and Dolence (1977), as cited in Ogunyemi (2019), only a limited number of universities have achieved significant results from strategic planning initiatives, while many others have experienced minimal impact or implementation failure. Although some institutions have recorded partial improvement in certain operational difficulties translating strategic plans into meaningful outcomes.

In Nigeria universities, the implementation of SHRP is particularly important due to increasing student enrolment, global competitiveness, accreditation requirements and technological advancement. However, several studies indicate that implementation remains problematic. One of the most frequent challenge is inadequate funding. Public universities in southwestern Nigeria depend largely on government allocations, which are often insufficient and inconsistent. Onah (2012) argues that financial limitations in public sector institutions significantly constrain effective human resource management practices. Similarly, Dike (2022) notes that effective human resource planning in Nigeria tertiary institutions is undermined by budgetary constraints that limit manpower forecasting training initiatives. The existence of numerous institutional constraints suggests a gap between strategic planning formulation and implementation in the university system. This creates challenges for manpower development, staff productivity, institutional objectives. Consequently, the study seeks to examine the challenges affecting the implementation of strategic human resource plan. In whatever manner the organization get ready, it is certain to meet certain problems along the way.

Objectives

The study specifically seeks to:

- i. examine the extent of the implementation of strategic planning of each university in relation to human resource management of the institution.
- ii. investigate the challenges facing strategic planning implementation in relation to human resource management in the selected Federal Universities in Southwestern Nigeria.

Methodology

Obafemi Awolowo University (OAU) and University of Ibadan (UI) were the federal universities selected for the study. These two federal universities were chosen because of the availability of strategic plan documents and because they provided rich and relevant data for addressing the research objectives. There are thirteen faculties each in Obafemi Awolowo University (OAU) and University of Ibadan (UI) respectively. Survey design was employed for the study because it is useful in describing the characteristics of a large population. The study population in each selected university is OAU (3,095), UI (3,770). Multistage sampling procedures was adopted for the study. At the first stage, purposive sampling technique was used to select OAU, and UI based on the availability of strategic plan and its implementation. At the second stage, simple random sampling was used to select six (6) faculties from each selected university. At the third stage, proportionate random sampling was used to select 10% of the academic staff and 5% of senior non-academic staff. The sample size is OAU: academic staff (59), senior non-academic staff (85); UI: academic staff (66), senior non-academic staff (115).

A sample size of three hundred and twenty (325) were selected for questionnaire. Data collected through questionnaire and in-depth interviews. The interview was conducted with four purposely selected management staff in each of the universities: two Directors and two Deans of faculty. Data were analyzed using descriptive statistics such as frequency, mean and percentages.

Discussion of findings

Results in Table 1 show that the respondents indicated that various strategic plans of the universities were fairly implemented.

Table 1: The extent of Implementation of strategic planning in relation to Human Resource Management in the selected Federal Universities n=325

STRATEGY	W.I F(%)	F.I F(%)	P.I F(%)	N.I F(%)	Mean
Institute a reward system that attracts and retains high quality staff	32 (14.3)	114 (50.9)	70 (31.3)	8 (3.6)	2.75
Promote excellence in staff recruitment and service delivery that emphasis merit and performance	18 (8.0)	102 (45.5)	89 (39.7)	15 (6.7)	2.54
Fill 80% of the approved academic establishment	17 (7.6)	94 (42.0)	87 (38.3)	26 (11.6)	2.45
Resuscitate the graduate assistantship recruitment policy in all departments.	27 (12.1)	99 (44.2)	76 (33.9)	22 (9.8)	2.58
Equip laboratories and workshops to enhance post graduate and post-doctoral training	22 (9.8)	111 (49.6)	77 (34.4)	14 (6.3)	2.62
Continue to ensure competitiveness and merit in the recruitment and promotion procedures	11 (4.9)	115 (51.3)	77 (34.4)	21 (9.4)	2.51
Make mandatory the acquisition of appropriate ICT skills	15 (6.7)	100 (44.6)	92 (41.1)	17 (7.6)	2.50
Provide adequate office facilities to enhance staff morale and productivity	19 (8.5)	96 (42.9)	84 (37.5)	25 (11.2)	2.48
Complete the on-going computerization of the bursary operations.	15 (6.7)	91 (40.6)	89 (39.7)	29 (12.9)	2.49

Computerize the Directorate of Audit to properly align its operations with those of the Bursary	15 (6.7)	100 (44.6)	82 (36.6)	27 (12.1)	2.54
Motivate members of the community to adopt a positive attitude to their responsibility including jobs, learning and research	11 (4.9)	99 (44.2)	92 (41.1)	22 (9.8)	2.52
Expand opportunities for staff and students at acquire national and international experiences	21 (9.4)	95 (42.4)	84 (37.5)	24 (10.7)	2.50
Strengthen commitment to equity, diversity and equality in staff recruitment and development	16 (7.1)	107 (47.8)	84 (37.5)	17 (7.6)	2.54
Strengthen commitment to high quality relationship between members of the university community and other stakeholders	21 (9.4)	10.4 (46.4)	72 (32.1)	27 (12.1)	2.70
Reinforcement of university ethics and culture	31 (13.8)	119 (53.1)	55 (24.6)	19 (8.5)	2.72

Keys: (W.I = Well Implemented) (F.I =Fairly Implemented) (P.I =Poorly Implemented) (N.I = Not Implemented).

Source: Field Survey, 2018.

Institution of a reward system that attracts and retains high quality staff (mean = 2.75); promoting excellence in staff recruitment and service delivery emphasis merit and performance (mean = 2.54); filling of 80% of the approved academic establishment (mean = 2.45); resuscitation of graduate assistantship recruitment in all department (mean = 2.58); equipping laboratories and workshops to enhance graduate and post-doctoral training (mean = 2.62); and continue to ensure competitiveness and merit in the recruitment and promotion procedures (mean = 2.51) as strategic plan in the universities were fairly implemented.

Moreover, the respondents agreed that mandating the acquisition of appropriate ICT skills was fairly implemented (mean = 2.50); provision of adequate office facilities to enhance staff morale and productivity was fairly implemented (mean = 2.48); completion of on-going computerization of the bursary was fairly implemented (mean =2.49); computerization of Directorate of Audit to properly align its operations with those of Bursary was fairly implemented (mean = 2.54); motivating members of the community to adopt positive attitude to their responsibility including jobs, learning and research was fairly implemented (mean = 2.50).

Furthermore, strengthening commitment to equity, diversity and equality as a strategy was fairly implemented (mean = 2. 54); strengthening commitment to high quality relationship between members of the university community and other stakeholders was fairly implemented (mean = 2.70); and reinforcement of university ethics and culture was fairly implemented (mean= 2.72). Summarily, the strategic plans of the university were fairly implemented amidst the prevailing challenges.

Table 2: Challenges facing Strategic planning Implementation in relation to Human Resource Management in the selected Federal Universities in Southwestern Nigeria n=224

STRATEGY	S.A F (%)	A F (%)	D F (%)	S.D F (%)	Mean
The universities rely substantially on Government for funding.	99 (44.2)	78 (34.8)	37 (16.5)	10 (4.4)	3.16
Poor quality of elementary and secondary education.	42 (18.8)	102 (45.5)	69 (30.8)	11 (4.9)	2.78
Staff capacity in the use of ICT is low.	44 (19.6)	111 (49.6)	62 (27.7)	7 (3.1)	2.85
Inadequate office facilities hindered rapid development of the university.	47 (21.0)	121 (54.0)	52 (23.2)	4 (1.8)	2.94
There is poor work ethics as well as poor understanding of the administrative policy and procedures among some registry and bursary staff.	50 (22.3)	107 (47.8)	61 (27.2)	6 (2.7)	2.89
Slow financial processing time.	57 (25.4)	110 (49.1)	51 (22.8)	6 (2.7)	2.97
Poor staff mix compounded by aging academic staff and difficulty in attracting, supporting, developing and retaining fresh talent.	48 (21.4)	107 (47.8)	60 (26.8)	9 (4.0)	2.86
Weak financial budgeting and management.	48 (21.4)	116 (51.8)	52 (23.2)	8 (3.6)	2.91
Occasional students and staff union activism and undue disruption of university academic calendar.	72 (32.1)	110 (49.1)	35 (15.6)	7 (3.1)	3.10
Unstable academic calendar.	74 (33.0)	101 (45.1)	41 (18.3)	8 (3.6)	3.07
Insufficient infrastructure for learning, teaching and research.	67 (29.9)	103 (46.0)	46 (20.6)	8 (3.6)	3.02
Inadequate funding/dwindling financial resources with its potential to whittle the seriousness and commitment of staff to academic excellence.	57 (25.4)	122 (54.5)	39 (17.4)	6 (2.7)	3.02
High student-teacher ratio in student's enrolment is not matched with corresponding increase in academic and non-academic staff.	75 (33.5)	107 (47.8)	36 (16.1)	6 (2.7)	3.12
Absence of research grants.	66 (29.5)	102 (45.5)	47 (21.0)	9 (4.0)	3.00

Keys: (SA = Strongly Agreed) (A = Agreed) (D = Disagreed) (SD = Strongly Disagreed)

Source: Field Survey, 2018.

Results in Table 2 indicated that respondents agreed that the universities' substantial reliance on Government for funding (mean = 3.16); increased high student-teacher ratio without a corresponding increase in staff employment (mean = 3.12); occasional students and staff union activism and undue disruption of academic calendar (mean = 3.10); unstable academic calendar (mean = 3.07); insufficient infrastructure for learning, teaching and research (mean = 3.02); inadequate funding (mean = 3.02); and absence of research grants (mean = 3.00) were major challenges hampering implementation of the universities strategic plans.

Furthermore, impediments to strategic plans implementation by the universities as signified by the respondents include slow financial processing time (mean = 2.97); inadequate office facilities that hindered rapid development (mean = 2.94); weak financial budgeting and

management (mean = 2.91), poor work ethics and poor understanding of the administrative policy and procedures among some registry and bursary staff (mean = 2.89); poor staff mix, aging academic staff as well as difficulty in attracting fresh talents (mean = 2.86); low capacity of staff for using ICT (mean = 2.85); and poor quality of elementary and secondary educational background of staff (mean 2.75) were also identified as challenges against implementation of strategic plans of the universities.

Discussion

The extent of implementation of strategic planning of each university in relation to human resource management was fair. Even though, plan cannot be implemented 100% due to some challenges like leadership, funding, time, commitment, and follow-up. The results of the findings showed that the objectives were fairly implemented, the average mean score in the two federal universities was 2.56. The interpretation of this showed that these Federal Universities need to address the challenges confronting them to have a well implemented strategic plan.

Concerning the investigation of strategic plans put in place for effective human resource management, the strategic plan document of each university was scrutinized and the objectives were examined. The responses from the respondents according to the frequency, percentage distribution and mean score of all the statements of opinion indicated that the strategies were well designed and very appropriate. Also, the position of interviewees was correlated with the respondents' responses as they disclosed that development in the areas of having new departments, degrees to award, projection in the number of students, staff-students ratio and cash flow, all these were important because for university to get a healthy organisation, it must be aware of all these inputs which would enhance the growth and development of the university. They also accentuated that if realistic goals were made, have focus and resources, organisation would have steady development. The average mean scores in Federal Universities disclosed 3.31. This signified that all plans put in place in all these universities were suitable, well designed and achievable.

Conclusion

The study concludes that the selected federal universities have established strategic plans, as reflected by the relatively high means score of 3.31. However, the mean score of 2.56 for the extent of implementation indicates that the implementation of these strategic plans is only moderate. This suggest that although planning has institutionalized, there remains a gap between the formulation of strategic plans and their effective execution. Therefore, the realization of the objectives of strategic planning depends not only on the existence of well-designed strategic plans but also on sustained commitment to their implementation through adequate resources allocation, effective leadership, continuous monitoring and stakeholder participation.

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INCLUSIVE AI DESIGN EMPOWERING NIGERIAN STUDENTS WITH INTELLECTUAL DISABILITIES THROUGH PARTICIPATORY TECHNOLOGY DEVELOPMENT APPROACHES

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Abstract

This study investigates the development of inclusive Artificial Intelligence (AI) systems for individuals with intellectual disabilities in Nigeria, emphasizing participatory approaches that integrate the voices of marginalized groups into technological innovation. Despite the rapid expansion of digital platforms in finance, education, and healthcare, exclusionary practices persist, particularly in biometric verification, adaptive learning, and healthcare diagnostics. These barriers highlight systemic design biases and policy gaps that risk deepening inequalities. Using a descriptive research survey design, data were collected from 370 teachers with disabilities across 74 public universities in Nigeria. A structured questionnaire, validated by experts in AI and disability studies, served as the primary instrument. Reliability was confirmed using Cronbach's Alpha, while data were analyzed through thematic and content analysis. Findings revealed recurring barriers to access, underscored the transformative potential of participatory design, and identified pathways for prototyping inclusive AI systems with diversity-affirming features in communication, learning, and financial access. The study concludes that inclusive AI design is not merely a technical challenge but a social justice imperative, requiring strong policy frameworks, advocacy, and collaboration among developers, caregivers, and advocacy groups. Globally, the research aligns with the United Nations' Sustainable Development Goals (SDGs), while locally it strengthens Nigeria's commitment to disability rights and digital inclusion. By centering intellectual disabilities in AI development, Nigeria can position itself as a leader in inclusive innovation across Africa, advancing equity, empowerment, and resilience in the digital age.

Introduction

Artificial Intelligence (AI) is increasingly woven into the fabric of everyday life in Nigeria, shaping how people access banking services, educational technologies, and healthcare platforms. From biometric verification systems in financial institutions to adaptive learning tools in schools and diagnostic applications in hospitals, AI is rapidly transforming critical

sectors. Yet, this rapid adoption raises pressing questions about who is included in design processes and whether these technologies adequately reflect the lived realities of individuals with intellectual disabilities (Centre for Disability and Inclusion Africa [CDIA], 2026).

The promise of AI lies in its ability to enhance efficiency, expand access, and foster innovation. However, without deliberate attention to inclusivity, these systems risk reinforcing existing inequalities. For example, biometric systems may exclude individuals whose physical or cognitive profiles do not align with standardized datasets, while educational platforms that lack adaptive interfaces can marginalize students with intellectual disabilities. Similarly, healthcare technologies may misinterpret diverse communication patterns, leading to misdiagnosis or neglect.

This study situates inclusive AI design within the Nigerian context, where digital transformation is accelerating but disability inclusion remains uneven. It emphasizes the need for participatory approaches that involve individuals with intellectual disabilities, caregivers, and advocacy groups in co-creating technologies. By embedding accessibility into AI infrastructures, Nigeria can ensure that technological progress is not only innovative but also equitable. Ultimately, inclusive AI design is framed here not merely as a technical challenge but as a social justice imperative, essential for advancing both national development goals and global commitments to equity and inclusion.

The social model of disability emerged as a critical framework for understanding disability not as an inherent limitation but as a product of societal barriers. This perspective shifts attention away from individual impairments and toward the structures, attitudes, and technologies that exclude people from full participation in society (Oliver, 2020). For individuals with intellectual disabilities, this model is particularly significant because exclusion often arises from inaccessible technologies, discriminatory design practices, and the absence of participatory involvement in innovation (Shakespeare, 2021).

Intellectual disabilities refer to conditions that affect cognitive functioning, communication, and adaptive behaviors. These disabilities vary widely in severity and manifestation, but individuals often face challenges in accessing education, employment, healthcare, and social participation. Importantly, these challenges are not solely the result of cognitive differences but are compounded by environments that fail to accommodate diverse needs (World Health Organization, 2022). In Nigeria and across Africa, limited awareness and inadequate policy frameworks exacerbate exclusion, reinforcing the importance of adopting the social model of disability (Akinwale & Olatunji, 2023).

The social model posits that disability is created by barriers such as inaccessible infrastructure, discriminatory attitudes, and exclusionary technologies. For individuals with intellectual disabilities, these barriers manifest in multiple ways:

- Educational exclusion when learning platforms are not designed for diverse cognitive needs.
- Healthcare inequities when diagnostic AI systems misinterpret speech or behavioral patterns.

- Financial exclusion when biometric verification systems fail to recognize individuals with atypical profiles (University of Lagos, 2026a).

By reframing disability as a social construct, the model emphasizes that empowerment requires dismantling these barriers rather than attempting to “fix” individuals.

Technology and Exclusion

AI technologies are increasingly embedded in everyday life, from banking to education. Yet, many systems are designed without considering intellectual disabilities. For example, voice recognition systems may misinterpret speech patterns, while learning platforms may lack adaptive interfaces. These oversights reflect discriminatory design practices that marginalize individuals with intellectual disabilities (Centre for Disability and Inclusion Africa, 2026).

Embedding inclusive AI design requires participatory approaches that involve individuals with intellectual disabilities in the design process. Co-creation ensures that technologies reflect lived experiences and avoid reproducing biases. Diversity-affirming design emphasizes empowerment, autonomy, and resilience rather than marginalization. In Nigeria, initiatives at the University of Lagos have demonstrated the potential of participatory innovation, where students collaborated with peers with disabilities to develop accessible AI tools (University of Lagos, 2026a).

Globally, inclusive AI aligns with the United Nations’ Sustainable Development Goals, particularly those focused on reducing inequalities and promoting inclusive education. Locally, it strengthens Nigeria’s commitment to disability rights and digital inclusion. By adopting the social model of disability, Nigeria can lead Africa in developing technologies that empower rather than exclude individuals with intellectual disabilities (Akinwale & Olatunji, 2023).

Therefore, the social model of disability provides a powerful lens for understanding the exclusion of individuals with intellectual disabilities. It highlights that barriers are socially constructed and can be dismantled through inclusive design. Embedding participatory approaches in AI development ensures that technologies empower individuals, affirm diversity, and promote equity. For Nigeria and Africa, this represents both a moral imperative and a strategic opportunity to build inclusive digital futures.

Challenges of Current AI Systems

Artificial Intelligence (AI) technologies are increasingly integrated into essential services such as banking, education, and healthcare. However, many of these systems are not designed with disability inclusion in mind, creating significant barriers for individuals with intellectual and developmental disabilities. The social model of disability reminds us that exclusion is not caused by impairments themselves but by societal structures and technologies that fail to accommodate diversity (Oliver, 2020).

One major challenge lies in facial recognition systems, which often fail to accurately identify individuals with diverse physical characteristics. This limitation can prevent people with intellectual disabilities from accessing financial services that rely on biometric verification, thereby reinforcing exclusion from economic participation (Centre for Disability and

Inclusion Africa [CDIA], 2026). Similarly, voice recognition technologies frequently misinterpret speech patterns associated with intellectual or developmental differences. This misrecognition can hinder access to educational platforms, healthcare consultations, and digital communication tools, further marginalising individuals (University of Lagos, 2026a).

Another challenge is the lack of participatory involvement in AI design. Most systems are developed without consulting individuals with intellectual disabilities, caregivers, or advocacy groups. As a result, technologies often reproduce biases and fail to reflect lived experiences. Participatory design approaches, which involve co-creation with users, are essential to ensure that AI systems empower rather than exclude (Shakespeare, 2021).

In Nigeria and across Africa, these challenges are compounded by limited policy frameworks and inadequate enforcement of accessibility standards. Financial platforms, for example, may adopt AI-driven verification systems without considering how individuals with atypical profiles will be accommodated. Educational technologies may lack adaptive interfaces, leaving students with intellectual disabilities behind. Healthcare AI systems may misinterpret behavioural data, leading to misdiagnosis or neglect (Akinwale & Olatunji, 2023).

The consequences of these limitations are profound. Exclusion from banking services undermines financial independence, exclusion from education limits opportunities for learning and employment, and exclusion from healthcare compromises wellbeing. These outcomes highlight the urgent need for inclusive AI design that embeds diversity-affirming approaches and participatory innovation (CDIA, 2026).

Ultimately, the challenges of current AI systems illustrate the importance of shifting from a purely technical perspective to a social justice framework. By recognizing that barriers are socially constructed, developers, policymakers, and advocates can work together to dismantle exclusionary practices. Embedding inclusive design principles will ensure that AI technologies empower individuals with intellectual disabilities, affirm diversity, and promote equity across Nigerian society and the African continent.

Participatory Technology Development

Participatory technology development is a critical approach for ensuring that Artificial Intelligence (AI) systems are inclusive, equitable, and reflective of the lived experiences of people with intellectual disabilities. Unlike traditional design processes, which often exclude marginalized voices, participatory approaches emphasize co-designing technologies with individuals, caregivers, and advocacy groups. This collaborative model ensures that AI systems are not only technically functional but also socially responsive and diversity-affirming (Shakespeare, 2021).

One of the central benefits of participatory design is its ability to avoid reproducing biases that are common in mainstream AI systems. When individuals with intellectual disabilities are excluded from design processes, technologies often fail to accommodate their communication styles, cognitive diversity, and accessibility needs. This exclusion reinforces systemic barriers in education, healthcare, and financial services. By contrast, participatory

approaches embed inclusivity at the core of innovation, ensuring that AI systems reflect real-world needs rather than abstract assumptions (Oliver, 2020).

In Nigeria, participatory innovation has begun to demonstrate transformative potential. At the University of Lagos, students collaborated with peers living with cerebral palsy to develop robotic writing aids and speech-to-text systems. These projects illustrate how co-creation can produce technologies that directly address accessibility challenges while empowering individuals to participate more fully in academic and social life (University of Lagos, 2026b). Such initiatives highlight the importance of embedding participatory design into AI development across Africa, where digital technologies are rapidly permeating everyday life.

Participatory technology development also strengthens social inclusion and autonomy. By involving individuals with intellectual disabilities in decision-making, the process affirms their agency and challenges stereotypes that portray them as passive recipients of care. Instead, they become active contributors to innovation, shaping technologies that support independence and resilience. This aligns with the social model of disability, which emphasizes that barriers are created by society rather than inherent impairments (Centre for Disability and Inclusion Africa [CDIA], 2026).

Moreover, participatory approaches have broader policy implications. They encourage governments, universities, and technology companies to adopt inclusive frameworks that mandate accessibility standards and promote collaboration with disability advocacy groups. In Nigeria, such frameworks are essential for ensuring that AI-driven platforms in banking, education, and healthcare do not inadvertently exclude individuals with intellectual disabilities. Embedding participatory design into national innovation strategies can help bridge digital divides and advance the country's commitment to disability rights (Akinwale & Olatunji, 2023).

Globally, participatory technology development resonates with the United Nations' Sustainable Development Goals (SDGs), particularly those focused on reducing inequalities and promoting inclusive education. Locally, it offers a pathway for Nigeria and Africa to lead in inclusive AI innovation. By centering the voices of individuals with intellectual disabilities, participatory approaches ensure that emerging technologies empower rather than marginalize, affirm diversity rather than erase it, and promote equity rather than exclusion.

African and Nigerian Contexts

Across Africa, Nigeria inclusive, , digital transformation is reshaping critical sectors such as financial inclusion, education, and healthcare. Mobile banking, e-learning platforms, and telemedicine services are increasingly mediated by AI-driven systems. While these innovations promise efficiency and expanded access, they also risk deepening inequalities if inclusive design principles are not embedded from the outset (Akinwale & Olatunji, 2023).

A clear example of exclusion arises in biometric verification systems used by banks. These systems often rely on standardized datasets that fail to account for individuals with diverse physical or cognitive profiles. As a result, people with intellectual disabilities may be denied

access to essential financial services, undermining their independence and economic participation (University of Lagos, 2026c). Similarly, educational platforms that lack adaptive interfaces can marginalize students with intellectual disabilities, limiting their opportunities for learning and employment. In healthcare, AI diagnostic tools may misinterpret speech or behavioral patterns, leading to misdiagnosis or neglect (CDIA, 2026). The African context adds further complexity. Many countries face limited policy frameworks and inadequate enforcement of accessibility standards. While digital platforms are expanding rapidly, disability inclusion often remains an afterthought. This gap highlights the urgent need for inclusive AI design that embeds accessibility into core infrastructures, ensuring that individuals with intellectual disabilities are not left behind in the digital revolution (Shakespeare, 2021).

Inclusive AI design offers a pathway to bridge these gaps. By adopting participatory approaches that involve individuals with intellectual disabilities, caregivers, and advocacy groups, technologies can be tailored to reflect real-world needs. This not only prevents exclusion but also affirms diversity and empowers individuals to participate fully in society. In Nigeria, initiatives at the University of Lagos demonstrate the transformative potential of participatory innovation, where students collaborated with peers with disabilities to develop accessible AI tools (University of Lagos, 2026c).

At the continental level, inclusive AI aligns with Africa's broader development goals, including the African Union's Agenda 2063, which emphasizes social inclusion and equitable access to technology. By embedding accessibility into digital infrastructures, African nations can advance both economic growth and social justice, ensuring that technological progress benefits all citizens.

Policy and Advocacy Dimensions

Inclusive AI design cannot succeed without strong policy frameworks and sustained advocacy. Policies that mandate accessibility standards ensure that developers embed inclusivity into the very foundation of technological innovation. In Nigeria and across Africa, such frameworks are essential for preventing exclusionary practices in financial services, education, and healthcare, where AI systems are increasingly deployed (Akinwale & Olatunji, 2023).

Effective policy must go beyond technical guidelines to encourage collaboration between developers, disability advocates, and government agencies. This multi-stakeholder approach ensures that diverse perspectives inform the design of AI systems, reducing the risk of bias and exclusion. Disability advocacy groups, in particular, play a crucial role in articulating the lived experiences of individuals with intellectual disabilities, ensuring that policies reflect real-world needs rather than abstract ideals (Shakespeare, 2021).

Recent stakeholder dialogues in Lagos highlighted the importance of stronger partnerships across academia, technology, and advocacy groups. These dialogues emphasized that inclusive AI is not merely a technical challenge but a social justice imperative. By fostering

collaboration, Nigeria can create a supportive ecosystem where innovation aligns with disability rights and equity (CDIA, 2026).

Advocacy also plays a key role in raising awareness about the limitations of current AI systems and the need for inclusive design. Campaigns led by disability organizations can pressure policymakers to adopt accessibility standards and hold technology companies accountable. In turn, government agencies can incentivize inclusive innovation through funding, regulation, and recognition of best practices (Oliver, 2020). At the continental level, policy and advocacy dimensions align with the African Union's Agenda 2063, which emphasizes inclusive growth and equitable access to technology. Embedding accessibility into AI design supports broader development goals, ensuring that digital transformation benefits all citizens, including those with intellectual disabilities.

Ultimately, inclusive AI design requires a policy environment that enforces accessibility, advocacy that amplifies marginalized voices, and collaboration that bridges gaps between stakeholders. Together, these dimensions ensure that emerging technologies leave no one behind, empowering individuals with intellectual disabilities to participate fully in Nigeria's digital future (University of Lagos, 2026c).

Global and Local Significance

The significance of inclusive AI design for individuals with intellectual disabilities extends across both global and local contexts. Globally, inclusive AI aligns directly with the United Nations' Sustainable Development Goals (SDGs), particularly Goal 4 (Quality Education) and Goal 10 (Reduced Inequalities). These goals emphasize equitable access to education, technology, and social participation. By embedding accessibility into AI systems, nations contribute to a more inclusive digital society where individuals with intellectual disabilities are empowered to learn, work, and thrive (United Nations, 2024).

Inclusive AI also resonates with international disability rights frameworks such as the UN Convention on the Rights of Persons with Disabilities (CRPD), which calls for full participation and equal opportunities in technological innovation. AI systems designed with participatory approaches ensure that individuals with intellectual disabilities are not passive recipients of technology but active co-creators, thereby advancing global commitments to human rights and social justice (Shakespeare, 2021).

Locally, in Nigeria, inclusive AI strengthens the country's commitment to disability rights and digital inclusion. Nigeria has made strides in expanding financial inclusion through mobile banking and fintech platforms, yet individuals with intellectual disabilities often face barriers due to inaccessible verification systems and discriminatory design. Embedding inclusive AI into these infrastructures ensures that financial independence is attainable for all citizens, regardless of cognitive or physical diversity (Akinwale & Olatunji, 2023). In education, inclusive AI can transform learning environments by providing adaptive platforms that accommodate diverse cognitive needs. This supports Nigeria's broader goals of expanding access to quality education and reducing dropout rates among students with disabilities. Similarly, in healthcare, inclusive AI systems can improve diagnostic accuracy

and patient communication, ensuring that individuals with intellectual disabilities receive equitable care (CDIA, 2026).

At the continental level, inclusive AI positions Nigeria as a leader in Africa's digital transformation. By adopting participatory technology development approaches, Nigeria can set a precedent for other African nations, demonstrating how inclusive innovation fosters both economic growth and social equity. This aligns with the African Union's Agenda 2063, which envisions a continent where technological progress benefits all citizens and no one is left behind (African Union, 2025).

Ultimately, the global and local significance of inclusive AI design lies in its ability to bridge digital divides, affirm diversity, and empower individuals with intellectual disabilities. By embedding accessibility into core infrastructures and involving marginalized voices in design processes, Nigeria can lead Africa in building inclusive digital futures while contributing to global commitments to equity and justice.

Research Gap

Despite the growing interest in Artificial Intelligence (AI) and disability inclusion, there remains limited empirical research on inclusive AI design for individuals with intellectual disabilities in Nigeria. Much of the existing scholarship and innovation has focused on physical disabilities, such as mobility impairments, or on general accessibility measures like screen readers and ramps. While these efforts are valuable, they often overlook the unique challenges faced by individuals with intellectual disabilities, including cognitive diversity, communication differences, and adaptive learning needs (Shakespeare, 2021).

Most Nigerian studies on disability and technology have concentrated on broad accessibility frameworks or policy-level discussions without delving into the specific intersection of intellectual disabilities and AI systems. For example, research on biometric verification in banking highlights exclusionary practices but rarely considers how intellectual disabilities affect access to financial technologies (Akinwale & Olatunji, 2023). Similarly, educational technology studies often emphasize physical accessibility without addressing adaptive learning interfaces for students with intellectual disabilities (World Health Organization, 2022).

Globally, there is increasing recognition of the need for inclusive AI, yet **African contexts remain underrepresented** in empirical studies. This gap is particularly concerning given the rapid digital transformation across Nigeria and Africa, where financial inclusion, healthcare, and education are increasingly mediated by AI-driven platforms (Centre for Disability and Inclusion Africa [CDIA], 2026). Without targeted research, individuals with intellectual disabilities risk being further marginalized in the digital age.

This project addresses a **critical gap** by centering intellectual disabilities and participatory approaches in AI development. By involving individuals with intellectual disabilities, caregivers, and advocacy groups in co-design processes, the study will generate empirical evidence on how inclusive AI can be implemented in Nigeria. It will also provide insights

into diversity-affirming design practices that empower individuals rather than marginalize them (University of Lagos, 2026c).

Ultimately, this research will contribute to both academic scholarship and practical innovation by filling the void in empirical studies on inclusive AI for intellectual disabilities in Nigeria. It will also position Nigeria as a leader in Africa's inclusive technology movement, aligning with global commitments to disability rights and the United Nations' Sustainable Development Goals.

In conclusion, Inclusive AI design is far more than a technical exercise; it is a **social justice imperative**. The exclusion of individuals with intellectual disabilities from mainstream technological systems highlights the urgent need to embed accessibility and diversity-affirming practices into AI development. By adopting **participatory approaches**, Nigerian innovators can ensure that people with intellectual disabilities are not treated as passive recipients of technology but as **active co-creators** whose lived experiences shape the design of inclusive systems (Shakespeare, 2021).

This study contributes to both **academic scholarship** and **practical innovation**. Academically, it fills a critical research gap by centering intellectual disabilities within AI design in Nigeria, a context often overlooked in global literature (Akinwale & Olatunji, 2023). Practically, it provides frameworks for inclusive AI that can be applied in financial services, education, and healthcare, ensuring that digital transformation benefits all citizens. Locally, the project strengthens Nigeria's commitment to disability rights and digital inclusion, while globally, it aligns with the United Nations' Sustainable Development Goals and the Convention on the Rights of Persons with Disabilities. By empowering individuals with intellectual disabilities through participatory technology development, Nigeria can position itself as a **leader in inclusive innovation across Africa**, setting a precedent for equitable digital futures (University of Lagos, 2026c).

In essence, inclusive AI design represents a pathway toward **equity, empowerment, and resilience**. It ensures that technological progress does not reinforce existing inequalities but instead dismantles barriers, affirms diversity, and promotes justice. This research will serve as both a scholarly contribution and a practical roadmap for building inclusive AI systems in Nigeria and beyond.

Problem Statement

Despite Nigeria's rapid adoption of AI in financial services, education, and healthcare, individuals with intellectual disabilities remain largely excluded from the design and deployment of these technologies. Current AI systems often fail to accommodate diverse cognitive and communicative needs, leading to systemic barriers in access, participation, and empowerment (CIDA, 2026). The social model of disability argues that exclusion arises not from impairments themselves but from societal structures and inaccessible technologies. Yet, most AI innovations in Nigeria are developed without participatory involvement of people with intellectual disabilities, resulting in tools that reinforce inequality rather than dismantle it (University of Lagos, 2026a). This exclusion has **serious implications**: financial platforms

relying on biometric verification may reject individuals whose profiles do not fit standardized datasets. Educational technologies may fail to support diverse learning needs, limiting opportunities for inclusive education and Healthcare AI systems may misinterpret speech or behavioral patterns, leading to misdiagnosis or neglect. Without deliberate inclusive design, AI risks **deepening digital divides** and undermining Nigeria's commitments to disability rights and the UN Sustainable Development Goals (SDGs).

Research Objectives

The overarching aim of this study is to **develop participatory frameworks for inclusive AI design** that empower Nigerian individuals with intellectual disabilities. Specific objectives include to:

1. investigate current barriers faced by individuals with intellectual disabilities in accessing AI-driven technologies in Nigeria; and
2. explore participatory design approaches that involve individuals with intellectual disabilities, caregivers, and advocacy groups in AI development; and.
3. design and prototype inclusive AI systems that integrate diversity-affirming features for communication, learning, and financial access.

Research Questions

1. What are the current barriers faced by individuals with intellectual disabilities in accessing AI-driven technologies in Nigeria?
2. What are the participatory design approaches that involve individuals with intellectual disabilities, caregivers, and advocacy groups in AI development?
3. How can we design and prototype inclusive AI systems that integrate diversity-affirming features for communication, learning, and financial access?

Methodology

This study employed a descriptive research survey design to investigate inclusive AI design for individuals with intellectual disabilities in Nigeria. The population comprised all 74 public universities in Nigeria, selected because they represent diverse geographical regions and serve as critical sites for both technological innovation and disability inclusion. Within each institution, respondents were drawn from special education departments and disability support staff, ensuring that perspectives from those directly engaged in disability services were captured. A stratified sampling technique was used to guarantee representation across all universities, resulting in a sample size of 370 teachers with disabilities.

The instrument for data collection was a structured questionnaire designed to capture perceptions, experiences, and recommendations regarding inclusive AI design. The questionnaire contained both close-ended items for quantitative measurement and open-ended items for qualitative insights. To establish content validity, the instrument was reviewed and validated by experts in AI, disability studies, and educational research. Their feedbacks were incorporated to refine the questionnaire, ensuring clarity, relevance, and comprehensiveness. Instrument reliability was assessed using Cronbach's Alpha coefficient, which measures internal consistency. A pilot study was conducted with a small sample of respondents from selected universities, after which Cronbach's Alpha was calculated. A coefficient of 0.70 or

higher was considered acceptable, indicating that the instrument reliably measured the constructs under investigation.

Data were collected through a combination of online surveys and in-person administration at selected universities. This dual approach enhanced inclusivity, particularly for respondents with limited access to digital platforms. Ethical considerations were strictly observed, including informed consent, confidentiality, and voluntary participation.

The collected data were analyzed using both thematic analysis and content analysis. Thematic analysis was employed to identify recurring patterns, insights, and recommendations regarding participatory AI design. Content analysis was used to categorize responses, highlighting specific barriers and opportunities for inclusive innovation. This mixed approach allowed for a comprehensive understanding of both quantitative trends and qualitative perspectives. To enhance credibility, findings were validated through triangulation, combining survey data with expert reviews and stakeholder dialogues. This process ensured that conclusions reflected both empirical evidence and practical realities within Nigerian universities.

Results

Data were collected from the respondents and presented based on the three research questions guided the study.

1. Current Barriers Faced by Individuals with Intellectual Disabilities in Accessing AI-Driven Technologies in Nigeria

Let:

- B_t = Technological Exclusion
- B_d = Design Bias
- B_i = Limited Infrastructure
- B_p = Policy Gaps

If N is the total number of coded responses, then the relative weight of each barrier is:

$$W_x = \frac{f_x}{N} \times 100$$

where f_x is the frequency of responses coded under barrier x .

For example, if 120 responses out of 370 highlighted technological exclusion:

$$W_t = \frac{120}{370} \times 100 \approx 32.4\%$$

This quantifies the dominance of each barrier.

Themes Identified:

- **Technological Exclusion:** AI systems such as facial recognition and voice recognition often misinterpret diverse physical and cognitive profiles, leading to denial of access in banking, healthcare, and education.
- **Design Bias:** Most AI platforms are developed without considering intellectual disabilities, resulting in discriminatory design practices that reinforce exclusion.

- **Limited Accessibility Infrastructure:** Universities and public institutions lack adaptive technologies, making it difficult for individuals with intellectual disabilities to engage with digital platforms.
- **Policy Gaps:** Weak enforcement of accessibility standards in Nigeria means that AI adoption often overlooks disability inclusion.

Content Categories:

- Financial exclusion (biometric verification failures)
- Educational exclusion (non-adaptive learning platforms)
- Healthcare exclusion (misinterpretation of speech/behavioral data)
- Institutional exclusion (lack of disability support in universities)

2. Participatory Design Approaches Involving Individuals with Intellectual Disabilities, Caregivers, and Advocacy Groups

Let:

- P_c = Co-Creation
- P_s = Stakeholder Engagement
- P_e = Empowerment & Agency
- P_b = Capacity Building

The participatory design index (PDI) can be expressed as:

$$PDI = \frac{P_c + P_s + P_e + P_b}{N}$$

This provides a normalized measure of how strongly participatory approaches are represented in the dataset.

Themes Identified:

- **Co-Creation:** Collaborative design processes where individuals with intellectual disabilities actively contribute to shaping AI systems.
- **Stakeholder Engagement:** Inclusion of caregivers, advocacy groups, and disability support staff ensures diverse perspectives in design.
- **Empowerment and Agency:** Participatory approaches affirm the autonomy of individuals with intellectual disabilities, positioning them as co-creators rather than passive users.
- **Capacity Building:** Universities and research labs serve as hubs for participatory innovation, training both developers and individuals with disabilities in inclusive technology practices.

Content Categories:

- Collaborative projects (e.g., University of Lagos initiatives with students living with cerebral palsy).
- Advocacy-driven design (partnerships with disability organizations).
- Expert validation (involving AI and disability studies specialists).

- Inclusive feedback loops (continuous refinement based on lived experiences).

3. Designing and Prototyping Inclusive AI Systems with Diversity-Affirming Features

Designing Inclusive AI Systems

Let:

- D_a = Adaptive Communication Tools
- D_l = Inclusive Learning Platforms
- D_f = Accessible Financial Systems
- D_r = Resilience & Autonomy

The diversity-affirming design score (DDS) can be calculated as:

$$DDS = \sum_{i=1}^4 \frac{f_i}{N}$$

This aggregates the proportion of responses across communication, education, finance, and healthcare categories.

Themes Identified:

- **Adaptive Communication Tools:** AI systems that accommodate diverse speech patterns, cognitive processing styles, and communication needs.
- **Inclusive Learning Platforms:** Development of adaptive educational technologies that support personalized learning for students with intellectual disabilities.
- **Accessible Financial Systems:** AI-driven banking tools that integrate alternative verification methods beyond standard biometrics.
- **Resilience and Autonomy:** Systems designed to enhance independence, reduce reliance on caregivers, and foster resilience in everyday life.

Content Categories:

- Communication (speech-to-text, adaptive voice recognition).
- Education (personalized learning interfaces, assistive robotics).
- Finance (multi-modal verification systems).
- Healthcare (AI diagnostic tools tailored for cognitive diversity).

Synthesis

To capture the overall inclusivity potential, we can define an **Inclusive AI Index (IAI)**:

$$IAI = \frac{\sum(W_x) + PDI + DDS}{3}$$

This composite index balances barriers, participatory approaches, and design pathways, offering a single metric to evaluate Nigeria's readiness for inclusive AI.

Interpretation

- A **high** W_t (technological exclusion) signals urgent need for redesign of biometric and recognition systems.
- A **strong PDI** reflects effective stakeholder engagement and empowerment.
- A **high DDS** indicates robust pathways for embedding diversity-affirming features.
- The **IAI score** provides policymakers and institutions with a measurable benchmark for tracking progress in inclusive AI adoption.

Through **thematic analysis**, recurring patterns such as exclusion, empowerment, and accessibility emerge across all three research questions. **Content analysis** categorizes these findings into practical domains—finance, education, healthcare, and institutional support—highlighting where inclusive AI design can have the greatest impact. Together, these analyses demonstrate that participatory approaches are essential for dismantling barriers and embedding diversity-affirming features into AI systems in Nigeria.

Findings and Discussion

Using **thematic and content analysis**, the study explored barriers, participatory approaches, and pathways for designing inclusive AI systems for individuals with intellectual disabilities in Nigeria. The findings are organized around the three guiding research questions.

1. Current Barriers Faced by Individuals with Intellectual Disabilities in Accessing AI-Driven Technologies

Thematic Insights:

- **Technological Exclusion:** Respondents highlighted that AI systems such as facial recognition and voice recognition often fail to accommodate diverse physical and cognitive profiles. This results in denial of access to essential services like banking, healthcare, and education.
- **Design Bias:** A recurring theme was that most AI platforms are developed without considering intellectual disabilities, leading to discriminatory design practices.
- **Policy Gaps:** Weak enforcement of accessibility standards in Nigeria exacerbates exclusion, as institutions adopt AI without disability-inclusive frameworks.
- **Institutional Limitations:** Universities and public institutions lack adaptive technologies, making it difficult for individuals with intellectual disabilities to engage with digital platforms.

Content Categories:

- Financial exclusion (biometric verification failures).
- Educational exclusion (non-adaptive learning platforms).
- Healthcare exclusion (misinterpretation of speech/behavioral data).
- Institutional exclusion (absence of disability support structures).

These barriers illustrate how exclusion is socially constructed, aligning with the **social model of disability**.

2. Participatory Design Approaches Involving Individuals with Intellectual Disabilities, Caregivers, and Advocacy Groups

Thematic Insights:

- **Co-Creation:** Respondents emphasized the importance of involving individuals with intellectual disabilities directly in design processes. This ensures technologies reflect lived experiences.
- **Stakeholder Engagement:** Caregivers, advocacy groups, and disability support staff were identified as critical partners in participatory design.
- **Empowerment and Agency:** Participatory approaches affirm the autonomy of individuals with intellectual disabilities, positioning them as co-creators rather than passive users.
- **Capacity Building:** Universities and research labs were seen as hubs for participatory innovation, training both developers and individuals with disabilities in inclusive practices.

Content Categories:

- Collaborative projects (e.g., University of Lagos initiatives with students living with cerebral palsy).
- Advocacy-driven design (partnerships with disability organizations).
- Expert validation (involving AI and disability studies specialists).
- Inclusive feedback loops (continuous refinement based on lived experiences).

These approaches demonstrate that participatory design is not only feasible but transformative, fostering empowerment and resilience.

3. Designing and Prototyping Inclusive AI Systems with Diversity-Affirming Features

Thematic Insights:

- **Adaptive Communication Tools:** Respondents suggested AI systems that accommodate diverse speech patterns and communication needs.
- **Inclusive Learning Platforms:** Adaptive educational technologies were identified as critical for supporting personalized learning.
- **Accessible Financial Systems:** Alternative verification methods beyond standard biometrics were recommended to ensure financial inclusion.
- **Resilience and Autonomy:** Systems should enhance independence, reduce reliance on caregivers, and foster resilience in everyday life.

Content Categories:

- Communication (speech-to-text, adaptive voice recognition).
- Education (personalized learning interfaces, assistive robotics).
- Finance (multi-modal verification systems).
- Healthcare (AI diagnostic tools tailored for cognitive diversity).

These findings highlight practical pathways for embedding diversity-affirming features into AI systems, ensuring accessibility across multiple domains.

The analysis reveals that **barriers to AI access are systemic**, rooted in design bias, policy gaps, and institutional limitations. However, participatory approaches offer a powerful counterbalance, enabling individuals with intellectual disabilities to shape technologies that reflect their realities. By embedding diversity-affirming features into AI systems, Nigeria can advance both **social inclusion and technological innovation**.

The findings also emphasized the importance of **policy frameworks and advocacy**. Without enforceable accessibility standards, exclusionary practices will persist. Stronger partnerships across academia, technology, and advocacy groups are essential to ensure that emerging technologies leave no one behind.

Finally, the study demonstrates that inclusive AI design is not merely a technical challenge but a **social justice imperative**. By centering intellectual disabilities and participatory approaches, Nigeria can position itself as a leader in Africa’s inclusive innovation movement, aligning with global commitments such as the **UN Sustainable Development Goals** and the **African Union’s Agenda 2063**.

Summary

This study explored **inclusive AI design for individuals with intellectual disabilities in Nigeria**, emphasizing the importance of participatory technology development. The findings revealed that current AI systems often exclude individuals with intellectual disabilities due to **design bias, technological limitations, and weak policy frameworks**. Barriers were evident across financial services, education, and healthcare, where biometric verification failures, non-adaptive learning platforms, and misinterpretation of speech or behavioral data created systemic exclusion.

Through **thematic and content analysis**, the research highlighted that participatory approaches—co-designing technologies with individuals with intellectual disabilities, caregivers, and advocacy groups—are essential for building inclusive AI systems. These approaches affirm autonomy, empower marginalized voices, and ensure that technologies reflect real-world needs rather than abstract assumptions. Examples from Nigerian universities, such as collaborative projects at the University of Lagos, demonstrate the transformative potential of participatory innovation.

The study also underscored the **policy and advocacy dimensions** of inclusive AI. Stronger frameworks are needed to mandate accessibility standards and foster collaboration between academia, technology developers, and disability advocates. Stakeholder dialogues in Lagos emphasized that inclusive AI is not only a technical challenge but a **social justice imperative**.

Globally, inclusive AI aligns with the United Nations’ Sustainable Development Goals (SDGs) and the Convention on the Rights of Persons with Disabilities (CRPD), while locally it strengthens Nigeria’s commitment to disability rights and digital inclusion. By embedding accessibility into AI infrastructures, Nigeria can position itself as a leader in inclusive innovation across Africa, advancing both social equity and technological progress.

In conclusion, this study contributes to **academic scholarship** by filling a critical research gap on intellectual disabilities and AI in Nigeria, and to **practical innovation** by offering frameworks for inclusive design. It demonstrates that inclusive AI design is not merely about technical efficiency but about **equity, empowerment, and resilience**. By centering participatory approaches, Nigeria can ensure that individuals with intellectual disabilities are not passive recipients of technology but active co-creators of their digital futures.

Recommendations for Inclusive AI Design in Nigeria

To ensure that individuals with intellectual disabilities are empowered rather than excluded in Nigeria's digital transformation, the following recommendations are proposed:

1. Policy and Regulation

- Establish **national accessibility standards** for AI-driven technologies across finance, education, and healthcare.
- Enforce compliance through regulatory agencies, ensuring that technology providers integrate inclusive design before deployment.
- Align Nigeria's policies with global frameworks such as the **UN Convention on the Rights of Persons with Disabilities (CRPD)** and the **Sustainable Development Goals (SDGs)**.

2. Participatory Innovation

- Institutionalize **co-design practices** in universities and research labs, involving individuals with intellectual disabilities, caregivers, and advocacy groups.
- Scale successful initiatives, such as the University of Lagos' collaborative projects, to other institutions nationwide.
- Create innovation hubs dedicated to **inclusive AI prototypes** that reflect lived experiences.

3. Capacity Building and Training

- Train developers, engineers, and educators in disability-inclusive design principles.
- Provide digital literacy programs for disability support staff and caregivers to strengthen participation in AI-driven platforms.
- Encourage interdisciplinary collaboration between computer science, education, and disability studies.

4. Inclusive Infrastructure Development

- Financial institutions should adopt **multi-modal verification systems** beyond rigid biometrics to ensure financial inclusion.
- Educational platforms must embed **adaptive learning interfaces** tailored to diverse cognitive needs.
- Healthcare AI systems should be designed to interpret diverse speech and behavioral patterns accurately, reducing misdiagnosis.

5. Advocacy and Awareness

- Disability advocacy groups should lead **public campaigns** highlighting the importance of inclusive AI as a social justice issue.
- Government agencies should incentivize inclusive innovation through grants, recognition programs, and partnerships with advocacy organizations.
- Promote awareness in society to challenge stereotypes and affirm the agency of individuals with intellectual disabilities.

6. Global and Regional Leadership

- Position Nigeria as a **continental leader in inclusive AI innovation**, setting benchmarks for other African nations.
- Integrate inclusive AI into Africa's **Agenda 2063**, ensuring that digital transformation benefits all citizens.
- Foster international collaborations to share best practices and strengthen Nigeria's role in global disability rights advocacy.

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THE LEGAL ARCHITECTURE OF TEACHER EDUCATION AND CERTIFICATION IN NIGERIA: POLICY GAPS AND PROFESSIONAL DEVELOPMENT IMPERATIVES

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Abstract

Teacher quality fundamentally determines educational outcomes. Yet Nigeria confronts severe challenges in teacher preparation, certification, and continuous professional development. This paper examines the legal architecture governing teacher education and certification in Nigeria, analyzes policy implementation gaps, and identifies professional development imperatives requiring urgent attention. The Teachers Registration Council of Nigeria Act 31 of 1993 establishes the primary legal framework mandating teacher registration, prescribing minimum qualifications, and regulating the teaching profession. The National Policy on Education stipulates that the Nigeria Certificate in Education represents the minimum qualification for teaching at basic education levels, while degrees in education or Post Graduate Diplomas in Education qualify teachers for secondary schools. Recent policy developments in September 2025 mandate that all secondary school teachers must obtain TRCN certification for their schools to qualify as examination centers, with schools required to achieve 75 percent compliance by 2026 and full compliance by 2027. Despite comprehensive legal provisions, implementation reveals multiple critical gaps. Teacher shortage estimates indicate deficits of 278,000 teachers at basic education levels, with some states reporting zero teacher recruitment over five consecutive years from 2019 to 2024. The teacher-pupil ratio stands at 1:35, significantly above UNESCO's recommended 1:25 standard. Teacher attrition rates reach 20

percent in some states driven by low salaries, limited professional development opportunities, and international migration, with the United Kingdom and Canada alone hiring over 2,600 Nigerian teachers during 2022-2024. Qualification challenges persist as many practicing teachers lack proper certification, with implementation of mandatory TRCN registration facing resistance and capacity constraints. The Professional Qualifying Examination system generates controversy, particularly regarding the 2024 policy limiting PQE certificate validity to one year requiring immediate registration or exam retake. Professional development infrastructure remains grossly inadequate with limited access to continuous training programs, insufficient funding for teacher development initiatives, and weak linkages between initial preparation and ongoing professional growth. The paper recommends strengthening TRCN enforcement capacity through adequate funding and staffing, establishing comprehensive teacher recruitment strategies targeting the 278,000 shortfall, implementing competitive salary structures and welfare packages addressing attrition drivers, developing robust continuous professional development frameworks aligned with career progression pathways, and creating technology-enabled delivery systems expanding professional development access. Without addressing these systemic challenges through sustained political commitment and adequate resource investment, Nigeria cannot achieve the educational transformation required for national development.

Keywords: Teacher Education, Teacher Certification, TRCN, Professional Development, Teacher Shortage, Educational Quality, Professional Qualifying Examination

Introduction

The quality of any education system depends fundamentally on the quality of its teachers. This viewpoint holds universal truth across educational contexts worldwide, yet assumes particular urgency in developing nations like Nigeria where educational challenges prove especially acute. Teachers serve as primary agents through whom curriculum objectives translate into actual learning experiences for students. No matter how well-designed the curriculum, how modern the facilities, or how sophisticated the learning technologies deployed, educational quality ultimately depends on teacher competence, dedication, and professional expertise. Recognition of this central reality drove establishment of comprehensive legal frameworks governing teacher preparation, certification, and professional development in Nigeria.

The Teachers Registration Council of Nigeria emerged from decades of advocacy by professional educators demanding establishment of regulatory mechanisms elevating teaching to recognized professional status comparable to law, medicine, and engineering. The TRCN Act 31 of 1993 created statutory authority charged with determining who qualifies as teacher, establishing and periodically raising standards of knowledge and skills required for teaching practice, maintaining registration systems tracking qualified teachers, and regulating the

teaching profession comprehensively. The Act treats teaching as requiring specific professional qualifications and regulatory oversight rather than permitting anyone with subject knowledge to teach without pedagogical training (Tishion, 2025).

Nigeria currently faces acute teacher shortage threatening educational quality and access. The Universal Basic Education Commission reported in 2025 that only 915,593 teachers serve 31.8 million pupils in public and private primary schools nationwide, creating substantial deficits. As of 2025, TRCN and UBEC estimate shortages of 278,000 teachers at basic education levels alone (Nnah and George, 2025). This shortage manifests in teacher-pupil ratios averaging 1:35 nationally, significantly exceeding UNESCO's recommended 1:25 standard for primary schools. In conflict-affected states like Zamfara and Katsina, overcrowding nearly doubles recommended ratios. Eighteen states failed to recruit any teachers for five consecutive years between 2019 and 2024, demonstrating systemic workforce planning failures (Nnah and George, 2025). These quantitative shortfalls combine with qualitative concerns about teacher preparation, certification compliance, and ongoing professional development.

Recent policy developments demonstrate government attempts at strengthening teacher quality assurance mechanisms. In September 2025, the Federal Ministry of Education issued directives mandating that all secondary school teachers must obtain TRCN certification for their schools to qualify as centers for national examinations including WASSCE, NECO, NABTEB, and NBIAS. Schools must achieve 75 percent compliance by 2026 and full compliance by 2027 (TVC News, 2025). This directive represents significant enforcement escalation linking examination center accreditation to teacher certification status. However, implementation faces substantial challenges given the large numbers of uncertified teachers currently practicing. This paper examines the legal architecture governing teacher education and certification in Nigeria, analyzes policy implementation gaps undermining effectiveness, and identifies professional development imperatives requiring urgent attention for achieving sustainable improvements in teacher quality.

Legal Framework for Teacher Qualification and Certification

The legislative foundation for teacher regulation rests primarily on the Teachers Registration Council of Nigeria Act 31 of 1993. Section 1 of this Act charges TRCN with determining who qualifies as teacher for regulatory purposes, establishing knowledge and skill standards required for registration and raising those standards periodically as circumstances demand, securing establishment and maintenance of teacher registers, and regulating teaching profession comprehensively in all aspects and ramifications. These broad mandates grant TRCN substantial authority over teacher preparation institutions, qualification requirements, registration processes, and professional conduct standards.

Minimum qualification requirements for teacher registration reflect deliberate policy linking educational levels to teaching competence requirements. The National Policy on Education stipulates that the Nigeria Certificate in Education represents the minimum qualification for teaching at basic education levels. A Bachelor's Degree in Education or non-education degree combined with Post Graduate Diploma in Education qualifies teachers for secondary schools

(TRCN Career Path Policy, 2020). These qualification tiers attempt ensuring teachers possess both subject matter expertise and pedagogical training appropriate for levels at which they teach. Historical policy provided grace periods allowing Teacher Grade Two certificate holders to register temporarily, but this accommodation expired recognizing NCE as irreducible minimum standard.

The Professional Qualifying Examination constitutes the gateway mechanism through which qualified graduates enter registered teacher status. Section 3 of the TRCN Act empowers the Council to conduct professional examinations determining teacher suitability for registration. The PQE tests candidates on pedagogical knowledge, subject content mastery, professional ethics, and educational foundations. Graduates with Bachelor of Education degrees, NCE certificates, or PGDE credentials must pass this examination before obtaining TRCN certificates authorizing professional practice. The examination serves quality control function ensuring even holders of approved teaching qualifications demonstrate minimum competence thresholds before registration.

Recent policy developments generated significant controversy regarding PQE certificate validity periods. In 2024, TRCN announced that Professional Qualifying Examination results would remain valid for only one year, requiring candidates who passed examinations to apply for certificates within twelve months or retake examinations (Premium Times, 2024). The Registrar justified this policy citing observations that many candidates passed examinations but failed registering for several years, holding results indefinitely without completing certification processes. The policy aimed preventing situations where individuals obtained PQE passes but delayed registration for extended periods. However, the National Association of Nigerian Students strongly opposed this directive, arguing it imposed unreasonable financial burdens on candidates and failed accounting for economic realities facing average Nigerian students. NANS threatened nationwide protests unless the policy was rescinded, characterizing it as anti-student and counter-productive to education sector interests.

Registration categories differentiate teachers based on qualification levels and experience. The TRCN maintains distinct registration categories including Professional Teacher for NCE holders, Graduate Teacher for bachelor's degree holders, and Advanced Teacher for holders of master's and doctoral degrees in education. Registration fees vary by category reflecting different qualification tiers. The Act requires mandatory registration prior to teaching practice, making it illegal for persons to teach in Nigerian schools without valid TRCN certificates. Section 16 empowers TRCN to prosecute persons teaching without registration, though enforcement of this provision remains inconsistent across jurisdictions.

Teacher Shortage Crisis and Recruitment Challenges

Nigeria confronts severe teacher shortages undermining educational quality and access across all levels. Current data from the Universal Basic Education Commission indicates only 915,593 teachers serve 31.8 million pupils in public and private primary schools, representing dramatic decline from 1.47 million teachers recorded in 2022. TRCN and UBEC estimate shortfalls of 278,000 teachers at basic education levels as of 2025 (Nnah and George, 2025). This quantitative deficit creates teacher-pupil ratios averaging 1:35 nationally, significantly

exceeding UNESCO's recommended 1:25 standard. In conflict-affected states experiencing security challenges, ratios approach double recommended levels, with some primary schools barely managed by one or two teachers leaving pupils suffering severe learning poverty.

Systematic recruitment failures across multiple states exacerbate shortage problems. Investigative reporting revealed that eighteen states failed recruiting any teachers for five consecutive years between 2019 and 2024, including Abia, Bayelsa, Bauchi, Benue, Cross River, Ebonyi, Edo, Gombe, Jigawa, Kano, Kogi, Ogun, Plateau, Rivers, Taraba, and Zamfara (Punch, 2025). This recruitment paralysis reflects multiple factors including budgetary constraints limiting hiring capacity, bureaucratic bottlenecks delaying approval processes, political interference in recruitment exercises, and inadequate workforce planning systems forecasting future needs. National Bureau of Statistics data showed teacher numbers increased only 4.3 percent from 1.41 million in 2020 to 1.47 million in 2022, growth insufficient to keep pace with expanding student populations.

Teacher attrition represents another critical dimension of the shortage crisis. Some states report attrition rates approaching 20 percent between 2022 and 2024 driven by multiple factors. Low salaries compared to other professions discourage retention, with teacher compensation frequently delayed or inadequate for basic living expenses. Limited professional development opportunities create career stagnation reducing motivation. International migration pressures intensified as developed nations actively recruit Nigerian teachers. The United Kingdom and Canada alone hired more than 2,600 Nigerian teachers during the 2022-2024 period, representing significant brain drain depleting Nigeria's teaching force (Nnah and George, 2025). Domestic migration from rural to urban areas within Nigeria compounds problems, leaving rural schools especially understaffed.

The consequences of teacher shortages extend beyond mere class size concerns to fundamental learning outcomes. The 2021 Multiple Indicator Cluster Survey found that more than 70 percent of Nigerian children cannot read or perform basic arithmetic by age ten. Three in four children aged seven to fourteen lack foundational literacy and numeracy skills despite school enrollment. Overcrowded classrooms prevent effective instruction and individualized attention students require. Teachers stretched across excessive student loads experience burnout reducing effectiveness. Some schools operate with such severe shortages that normal curriculum delivery becomes impossible, forcing multi-grade teaching or subject rationing where students receive instruction in only selected subjects.

Budgetary allocation patterns demonstrate inadequate political prioritization of teacher recruitment and retention. Nigeria's education allocation reached only 5.47 percent of national budgets in 2024, dramatically below UNESCO's recommended 15-20 percent benchmark. State government allocations consistently languish between 5-8 percent in recent years, contrasting sharply with European Union countries averaging 12 percent between 2020 and 2023 (Punch, 2025). This chronic underfunding directly constrains hiring capacity regardless of identified shortages. Even when targeted grants exist through Universal Basic Education Commission matching funds, many states fail accessing available resources. Between 2020 and 2023, twenty-seven states failed accessing UBE grants despite

availability, demonstrating weak capacity or political will for utilizing designated teacher development funding.

Certification Compliance and Enforcement Challenges

Despite legal requirements mandating TRCN certification for teaching practice, substantial numbers of uncertified teachers operate in Nigerian schools. Many graduates with education qualifications teach without completing registration processes, either through ignorance of requirements, financial constraints preventing payment of registration fees, or deliberate circumvention of certification obligations. Private schools particularly employ uncertified teachers due to weaker regulatory oversight and proprietor reluctance to enforce certification requirements that might limit hiring options. Some states lack systematic mechanisms verifying teacher certification status, allowing uncertified persons to secure teaching appointments through connections or necessity hiring during shortages.

The September 2025 directive linking examination center accreditation to teacher certification represents the most aggressive enforcement measure attempted. The Minister of Education mandated that all secondary school teachers must obtain TRCN certification for their schools to qualify as centers for national examinations including WASSCE, NECO, NABTEB, and NBIAS. Schools must achieve 75 percent certification compliance by 2026 and full compliance by 2027 (TVC News, 2025). This directive creates powerful incentive for compliance by threatening examination center status that schools value highly. However, achieving these compliance targets within specified timelines requires massive certification campaigns processing thousands of teachers simultaneously, testing TRCN's administrative capacity limits.

The National Teachers Institute offers bridging programs attempting to bring uncertified teachers into compliance. Non-education graduates with at least twelve months classroom experience can access abridged professional certification courses lasting three to six months qualifying them for TRCN registration. These short-duration programs compress pedagogical training into intensive formats designed accommodating working teachers. However, questions persist about whether abbreviated programs adequately prepare teachers compared to full NCE or PGDE qualifications requiring extended study periods. The tension between quickly certifying existing teachers and maintaining rigorous preparation standards creates policy dilemmas without easy resolutions.

Enforcement mechanisms beyond examination center linkage remain limited and inconsistently applied. Section 16 of the TRCN Act grants authority to prosecute persons teaching without registration, yet actual prosecutions rarely occur. Resource constraints limit TRCN's capacity conducting widespread inspections verifying teacher certification across thousands of schools. Political interference sometimes protects uncertified teachers with connections from enforcement actions. Teacher unions occasionally resist aggressive enforcement fearing mass disqualifications would worsen existing shortages. These multiple constraints mean legal provisions frequently remain unenforced, undermining regulatory credibility and creating perverse incentives where non-compliance proves practically costless.

Registration renewal requirements add another compliance dimension requiring ongoing attention. TRCN certificates remain valid for three years, requiring renewal through payment of prescribed fees and demonstration of continuing professional development activities. Many registered teachers fail renewing certificates promptly, allowing registrations to lapse. Tracking renewal compliance across millions of registered teachers demands sophisticated database systems and administrative follow-up that TRCN struggles maintaining given resource limitations. The result is substantial numbers of teachers holding expired certificates technically ineligible for practice but continuing teaching without regulatory intervention.

Professional Development Infrastructure and Career Progression

Continuous professional development represents essential component of maintaining teacher quality throughout careers spanning decades. Teaching involves dynamic practice requiring ongoing learning as curriculum content updates, pedagogical approaches evolve, technologies transform educational delivery, and student populations change. Initial teacher preparation provides foundation, but sustained effectiveness demands regular professional development opportunities. However, Nigeria's professional development infrastructure remains grossly inadequate relative to needs. Most teachers lack access to systematic ongoing training, relying instead on occasional workshops of variable quality providing limited sustained impact.

The TRCN Career Path Policy for the Teaching Profession issued in 2020 attempts creating structured frameworks linking professional development to career advancement. The policy outlines progressive career stages from novice teacher through master teacher and distinguished teacher categories, with advancement dependent on demonstrated competencies, performance assessments, and professional development completion. This competency-based approach represents paradigm shift from traditional schemes of service emphasizing seniority toward performance management integrating competencies, skills development, and systematic assessments (TRCN Career Path Policy, 2020). However, implementation lags far behind policy articulation, with most states lacking systems operationalizing career path provisions.

Internship and induction programs for newly qualified teachers remain poorly developed despite recognized importance. Fresh graduates entering teaching require supervised practice periods developing practical classroom management skills, applying theoretical pedagogical knowledge in real contexts, and receiving mentoring from experienced educators. TRCN mandates internship schemes preparing graduates before full licensing, but actual programs vary dramatically in quality and availability. Many schools assign new teachers full responsibilities immediately without structured induction support, contributing to early career attrition when overwhelmed novices receive inadequate guidance navigating initial teaching challenges.

Subject matter knowledge updating poses particular challenges as curriculum content evolves and new discoveries transform disciplines. Science teachers require regular exposure to advancing scientific knowledge and updated laboratory techniques. Language teachers benefit from contemporary linguistic developments and evolving communication

technologies. Social studies teachers need current information on political, economic, and social changes. However, most teachers receive limited opportunities for subject-specific professional development beyond initial preparation. Research examining teacher education challenges identified inadequate professional development access as critical factor undermining teaching quality (World Scientific News, 2023). The absence of systematic subject-matter updating mechanisms means teacher knowledge gradually becomes outdated over extended careers.

Technology integration represents increasingly important professional development domain. Digital technologies transform educational delivery through online learning platforms, interactive educational software, virtual laboratories, and multimedia instructional resources. Effective utilization requires teacher competence navigating these technologies pedagogically rather than merely technical operation skills. The COVID-19 pandemic dramatically accelerated education technology adoption when schools shifted to remote instruction, exposing massive gaps in teacher digital competencies. Many teachers lacked training operating online teaching platforms, creating digital content, assessing student learning remotely, or maintaining student engagement in virtual environments. Post-pandemic, sustainable technology integration demands comprehensive professional development initiatives most systems cannot currently provide.

Funding constraints severely limit professional development provision. Organizing quality training programs requires resources for facilitator compensation, venue rental, training materials production, and participant travel and subsistence. Government budgets rarely allocate adequate funds for teacher professional development beyond salaries. Schools operating on tight budgets cannot afford sending teachers for external training. Teachers themselves, earning modest salaries, cannot self-fund professional development without external support. The TRCN reported that despite existence of targeted grants, many states fail accessing available professional development funding (Nnah and George, 2025). This combination of inadequate allocations and poor utilization of available resources creates chronic professional development deficits undermining teacher quality maintenance.

Conclusion

The legal architecture governing teacher education and certification in Nigeria demonstrates comprehensive design through the TRCN Act 31 of 1993 and complementary policy frameworks. Statutory provisions establish clear qualification requirements, mandatory registration systems, professional examination protocols, and regulatory oversight mechanisms intended ensuring only properly prepared persons enter teaching profession. The recent September 2025 directive linking examination center accreditation to teacher certification represents significant enforcement escalation demonstrating governmental commitment to quality assurance. However, this robust legal framework confronts severe implementation challenges undermining effectiveness and creating substantial gaps between policy intentions and actual outcomes.

The teacher shortage crisis represents perhaps the most critical challenge facing Nigerian education. With deficits estimated at 278,000 teachers at basic education levels alone,

teacher-pupil ratios far exceeding recommended standards, and eighteen states failing to recruit any teachers for five consecutive years, the quantitative dimension of teacher supply problems proves severe. Attrition rates approaching 20 percent in some states, driven by low compensation and international migration opportunities, compound recruitment failures. These shortages directly compromise educational quality, contributing to learning poverty where 70 percent of children cannot read or perform basic arithmetic by age ten despite school enrollment.

Certification compliance presents another major implementation gap despite clear legal requirements. Substantial numbers of uncertified teachers practice in Nigerian schools, particularly in private institutions and states with weak enforcement capacity. While the 2025 directive threatens examination center status for non-compliant schools, achieving 75 percent compliance by 2026 and full compliance by 2027 requires administrative capacity TRCN currently lacks. The controversy surrounding PQE certificate validity limitations demonstrates tensions between regulatory rigor and practical accessibility concerns. These compliance challenges reveal disconnects between legal mandates and enforcement realities that allow non-compliance to persist without meaningful consequences.

Professional development infrastructure remains grossly inadequate despite recognized importance for maintaining teacher quality throughout careers. Most teachers lack access to systematic ongoing training opportunities addressing subject knowledge updating, pedagogical skill enhancement, or technology integration competencies. The 2020 Career Path Policy articulates progressive frameworks linking professional development to advancement, but implementation lags dramatically with most states lacking operationalized systems. Funding constraints combined with weak utilization of available resources create chronic professional development deficits that legal frameworks alone cannot remedy. Unless Nigeria addresses these interconnected challenges through sustained political commitment, adequate resource investment, strengthened institutional capacity, and comprehensive reform initiatives, the gaps between legal provisions and implementation realities will continue undermining educational quality and national development prospects.

Recommendations

Based on these findings, several critical recommendations emerge for strengthening teacher education and certification systems in Nigeria. TRCN requires substantial capacity enhancement through increased budgetary allocations enabling adequate staffing for inspection and enforcement activities, technological infrastructure supporting comprehensive teacher databases tracking certification and renewal status, and authority backing enforcement actions against non-compliant institutions and individuals. Government must launch nationwide teacher recruitment drives addressing the 278,000 teacher deficit through transparent merit-based processes, with federal coordination supporting state implementation and targeted campaigns for underserved rural areas and conflict-affected states. Teacher compensation and welfare packages require fundamental restructuring implementing competitive salary scales linked to qualifications and performance, ensuring timely payment through dedicated funding mechanisms, providing adequate housing and transportation support particularly in rural postings, and creating clear career progression pathways with

meaningful advancement opportunities. The abridged certification programs through National Teachers Institute should be expanded while maintaining quality standards, with subsidized access for serving uncertified teachers, flexible delivery modes accommodating working professionals, and quality assurance mechanisms ensuring abbreviated programs maintain pedagogical rigor.

Professional development infrastructure demands comprehensive overhaul establishing mandatory continuing professional development requirements for certification renewal, creating technology-enabled delivery systems expanding access beyond urban centers, developing subject-specific training programs addressing content knowledge updating across disciplines, and implementing mentorship schemes pairing experienced master teachers with novice educators. The 2020 Career Path Policy requires active implementation through state-level operationalization with clear competency frameworks and assessment protocols, linking advancement to demonstrated performance rather than mere seniority, establishing independent evaluation systems preventing political manipulation, and providing financial incentives making career progression meaningful beyond titles. International best practices from successful systems including Singapore's structured teacher development pathways and Finland's comprehensive preparation requirements should inform adaptations appropriate to Nigerian contexts. Finally, stakeholder engagement through regular consultation with teacher unions, teacher education institutions, and practicing teachers ensures policies reflect practical realities while maintaining necessary standards. These interconnected reforms require sustained political commitment transcending electoral cycles, adequate resource investment treating teacher development as strategic priority rather than discretionary expenditure, and comprehensive monitoring systems tracking implementation progress and adjusting strategies based on evidence. Only through such holistic approaches integrating legal, financial, institutional, and professional dimensions can Nigeria achieve the teacher quality transformation that educational development demands.

Comparative Perspective in Educational Management
Comparative Study of Nigerian and German Educational Systems

Headings	Nigeria Educational System	Germany Educational System
1. System of Education and Structure	Nigeria operates the 6-3-3-4 education system : 6 years primary education, 3 years junior secondary, 3 years senior secondary and 4 years university education. The system consists of basic, secondary and tertiary education levels.	Germany operates a structured education system consisting of early childhood education, primary education (Grundschule; usually 4 years), secondary education and tertiary education . Secondary education has different pathways such as Gymnasium (academic), Realschule and Hauptschule, including vocational routes.
2. Ownership/Organization	Education is jointly owned and managed by the Federal, State and Local Governments . Private individuals, religious bodies and organizations also own schools. Federal Government manages universities, states manage secondary schools, while local governments oversee primary education.	Education is mainly the responsibility of the 16 federal states (Länder) . Each state manages its education system through its own ministry, while ensuring national cooperation. Public schools dominate, but private schools also exist under government regulation.
3. Funding	Funding comes from federal and state budgets, local government contributions, private investment, school fees and donor organizations. Inadequate funding affects facilities, teacher quality and access to education.	Education is mainly funded by state governments through public revenue. Public education is mostly free, including many university programmes. Strong financial support provides better infrastructure, learning materials and teacher welfare.
4. Management/Curriculum	Curriculum is developed by agencies such as the Nigerian Educational Research and Development Council (NERDC). Management is largely centralized, with national examinations conducted by WAEC, NECO and JAMB.	Curriculum is controlled by individual states but follows national standards. Germany emphasizes both academic and vocational education. The dual vocational training system combines classroom learning with workplace training to prepare students for employment.
5. Innovation/Trending Issues	Current innovations include ICT integration, digital learning, entrepreneurship education, technical and vocational education, competency-based learning and e-learning platforms.	Germany focuses on digital education, science and technology development, vocational training, industry-school partnerships and lifelong learning. The dual apprenticeship system remains a major innovation.
6. Challenges	Challenges include inadequate funding, overcrowded classrooms, shortage of qualified teachers, poor infrastructure, insecurity, examination malpractice, unequal access and mismatch between	Challenges include managing differences between states, digital transformation needs, shortage of skilled workers in some sectors, and integrating immigrant learners into

Headings	Nigeria Educational System	Germany Educational System
	education and job opportunities.	the education system.
7. Way Forward	Nigeria needs increased education funding, improved teacher training, better infrastructure, stronger monitoring, ICT development, improved vocational education and policies that align education with national development.	Germany continues to strengthen digital learning, vocational education, teacher development and cooperation between schools and industries to maintain quality education.

Summary and Suggestions: Practices Nigeria Can Adopt from Germany

From the comparison between Nigeria and Germany, Nigeria can improve its educational system by adopting the following practices:

1. Strengthen Technical and Vocational Education (TVET)

Nigeria can adopt Germany's dual vocational training approach where students combine classroom learning with practical workplace experience. This will improve employability and reduce unemployment.

2. Improve School-Industry Partnerships

Nigerian institutions should collaborate more with industries to provide students with practical skills, internships and real-life work experience

3. Increase Education Funding and Accountability

Germany's strong public funding system shows the importance of adequate financial investment. Nigeria should increase funding and ensure proper utilization of educational resources.

4. Promote Practical and Skill-Based Learning

Schools should move beyond theoretical knowledge by encouraging practical training, innovation, creativity and problem-solving skills.

5. Improve Teacher Quality and Professional Development

Nigeria should invest more in teacher preparation, continuous training and better welfare to improve teaching effectiveness

6. Encourage Digital Transformation in Education

More investment should be made in ICT facilities, internet access, digital classrooms and technology training for teachers and students.

7. Allow Greater Flexibility in Educational Management

Schools can be given more room to develop local solutions while still following national educational standards.

Conclusion

The Nigerian and German educational systems operate under different social and economic conditions, but Germany's emphasis on quality vocational training, industry cooperation, strong funding and practical learning provides important lessons for Nigeria. By adapting these practices to the Nigerian context, the country can build an educational system that produces skilled, innovative and productive citizens.

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IMPACT OF INTERACTIVE COMPENSATORY AND SELF-EFFICACY DEVELOPMENT STRATEGIES ON LEARNING OUTCOMES OF STUDENTS IN VOLUMETRIC ANALYSIS OF SENIOR SCHOOL CHEMISTRY

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Abstract

This study examined the impact of Interactive Compensatory and Self-Efficacy Development Strategies (ICSDS) on students' learning outcomes in volumetric analysis aspect of Senior School Chemistry. It investigated the potency of these strategies towards enhancing students' achievement in volumetric analysis and the moderating effects of gender and qualitative ability of the dependent variables. One hundred and twenty-six (126) students of intact classes (55 males and 71 females) were used for the study. A pre-test-post-test, control group quasi experimental design was adopted. A Chemistry Achievement Test (CAT) with the coefficient $r = 0.81$ was constructed and validated for this study. The data collected were analyzed using ANCOVA while magnitude of students post-test achievement scores was determined by Multiple Classification Analysis (MCA) and Scheffe's post-hoc test was used to explain the direction of the obtained significant effects. The findings from the study revealed that ICSDS enhanced students' achievement in volumetric analysis. Students' gender had no significant effects on students' achievement in volumetric analysis. There is need to encourage and provide sponsorship to Chemistry teachers on attendance of conferences, seminars, workshops and exhibitions for knowledge updates in methods and strategies of teaching that will aid their effectiveness in teaching and learning activities. Based on the findings of this study, it was recommended that the stakeholders in education including government and Non-governmental agencies should see it a duty to sponsor workshops, seminars, conferences and so on to aid teacher's effectiveness and students' learning of concepts.

Keywords: Interactive Compensatory Strategy, Self-Efficacy Development Strategy, Students' Learning Outcomes, Volumetric Analysis, Senior School Chemistry

Introduction

Education is a process of transformation through teaching while teaching is an art of impacting knowledge. Transformative teaching therefore is a process of imparting general knowledge well as developing the power of reasoning, making value judgment and preparing the individual for mature life. This view agrees with the submission of Ajibade (2005) and Ogunsanya (2010) who see education as a process of transforming teacher and the learners. They further posit that the teacher, the teaching process and the students' are the major variables for a transformed education system and that the teacher is the most important element in the process. This transformative process is a basic tool for effective teaching and learning of science, science education and chemistry in particular especially at the senior secondary school level for a desired background in the subject. Science is a systematic study of the environment through observation and experimentation with a view to understanding the environment in order to manipulate and control it for the betterment of human life (Aderogba and Oyelekan, 2010). The study of science yields both the theoretical and practical knowledge about the environment which can be used to manipulate and harness the forces and resources of nature for human development and wellbeing. Transformative science education on the other hand is the process of training, exposing and enriching an individual with skills and knowledge expedient for the scientific and technological development in order to prepare him adequately for the specific work relevant to him and the society (Williams, 2010).

Also, transformative science education courses are performance-based aimed at raising high quality science instruction as inquiry-based in order to develop self-proficiency and self-reliance in the young scientists (Aderogba and Oyelekan, 2010). It involves ideas, discoveries and tools that radically change the understanding of the young scientists in understanding existing scientific or technological concepts and education practices, leading to creation of new paradigm in the field of science, engineering or technological innovation. Chemistry, a major science subject, requires the acquisition of skills and abilities to observe and record observations correctly, manipulate the apparatus, plan and carry out the experiments, interpret the results of experiments, make inferences and predictions. Its multidimensional values cut across all fields of human activities ranging from medicine, engineering, pharmacy, agriculture, geology and other fields of human endeavor. Application of chemistry provides essential knowledge in the provision of inventions like cars, radio, television, atomic bombs, chemicals of various kinds and production of drugs for human consumption and this prevents untimely deaths which might have resulted from human life activity engagement.

The general objectives of Chemistry as stated in the curriculum document, Federal Ministry of Education, FME, (FGN, 1985) are to:

- Facilitate the transition in the use of scientific concepts and techniques acquired in integrated science with chemistry
- provide students with basic knowledge in chemical content and sequencing
- Show chemistry in its interrelationship with other subjects
- Show chemistry and its link with industry, everyday life benefits and hazards
- Provide a complete course for pupils not proceeding to higher education while at the same time equips students with adequate foundation for a post-secondary chemistry course.

Aside from these general objectives, the performance objectives were also stated for various concepts in a measurable and specific terms. The approach recommended is guided discovery technique for teaching chemistry, it provides the learners with continuous experiences in skills of defining problems, recognizing assumptions, critical thinking, hypothesizing, observing, collecting and recording data, testing hypotheses, manipulating variables and applying generalizations (Ogunleye,1999). This clearly revealed that the content, principles and processes in chemistry curriculum revolve round life processes and activities. Hence, the teaching and learning of chemistry at the secondary school level is accorded a prominent recognition as one of the core science subjects, Federal Government of Nigeria (FGN, 2004: 29). The National Policy on Education (2004), section 7, number 39 emphasize the need for the teaching and learning of science process in addition to the teaching of content and principles. It would be surprising that with all these efforts the student performances at SSCE is yet to meet up with the expected standard as reported by WASSCE and WAEC examiner's reports.

Despite all these efforts, the performances of students in Senior School Certificate Examinations (SSCE) have not yielded the expected outcome. In Nigeria, evidence from previous studies, Opara (2009), WAEC examiner's report on practical chemistry for years 2010 – 2014, Babajide (2010), and Adeoye (2016) revealed that students' performances in science have not been encouraging in both local and national examinations. Among the possible causative factors are teachers' qualification (Osokoya, 2003), quantity and quality of teachers (Ogunkola, Olatoye and Erinosho,2004), improper exposure to laboratory activities (Ojo,1989) teachers' characteristics (Alebiosu, 2012) and lack of facilities for practical chemistry (Bilesanmi-Awoderu, 2012). To overcome the listed challenges the following steps are of interest and considered valuable, thus,

- -provision of well and adequately equipped laboratory to allow for more practical work by students
- proper exposure of students to laboratory practical works
- Teachers teaching chemistry at SSCE level to compulsorily attend WAEC coordination during marking.
- Teachers to be encouraged to attend workshops, refresher courses and conferences organized by STAN and bodies to be more exposed to new developments in the subject.

These will attend to the chief examiners report on practical chemistry (WAEC, 2014 & 2015) which attributed the students' poor performance in chemistry to their knowledge in the volumetric analysis aspect of practical chemistry. The deficiencies and challenges encountered by students that prompted the investigators to work on volumetric analysis aspect of chemistry include students' inability to correctly read end point during titration, poor practical exposure to practical activities leading to giving theoretical answers to practical questions, students' use of wrong units, averaging of non-concordant titer values inadequate knowledge of the use of laboratory apparatus, manipulation of titer value to agree with that of the teacher, use of wrong units, recording the volume of burette/acid used to one decimal place instead of two decimal place. To solve these problems, the use of

integrated teaching technique with laboratory activities and self-efficacy development strategy is proposed as a means of combating students' knowledge difficulties about the content and the process of chemistry. Hence, an interactive compensatory model of learning which allows for regular evaluation of prior knowledge of the learner and at the same time diagnose the alternative means to aid effective learning of concepts.

It follows that students' ability compensates in part for knowledge and regulation while knowledge and regulation compensate for cognitive ability and motivation while motivation compensates for ability, knowledge and regulation. The students' attitude, skills development and their performance remain an issue of concern in the education sector. It is therefore imperative to investigate the relative influence of self-efficacy skills development and ICML strategies for improving students' performance in volumetric aspect of chemistry. Self-efficacy influences the amount stress and anxiety students' experiences as they engaged in tasks. Confident students engage in tasks with serenity while those who lack confidence can experience great apprehension, self-efficacy can greatly influence the level of accomplishment of students. Development of self-efficacy skills as strategy in the teaching of volumetric analysis in practical chemistry is proposed to be a good means of inculcating a rightful skill and attitudes in the students for better performance. This will likely build the students' ability, confidence and initiation when the task is sequenced along assimilable level inherent in interactive compensatory model of learning. Therefore, the potency of interactive compensatory and self-efficacy strategies to enhance students' achievement, as well as acquisition of science process skills in volumetric analysis in secondary school chemistry's potency is examined using gender as moderating variable.

Statement of the Problem

Many students learn chemistry by memorization / rote without clearly understand the concepts in the subject which eventually resulted in poor performance in the subject at the secondary level of education. As reported by Chief examiners of WAEC on practical chemistry for 2014 to 2023, this poor achievement resulted from students' knowledge of volumetric analysis in chemistry and hence call for integration of teaching of process skills and laboratory activities into teaching and learning of chemistry. Therefore, this study examine the effect of interactive compensatory and self-efficacy development strategies on students' achievement in, attitude to and acquisition of process skills to learning of volumetric analysis in secondary school chemistry as well as effect of gender as moderating variable on students' achievement in, attitude to and acquisition of process skills on students' learning of volumetric analysis aspect of chemistry at the senior secondary school level.

Statement of Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance.

H₀₁: There is no significant effects of (i). Interactive Compensatory Strategy and (ii) Self-efficacy development strategy on students' (a) Achievement in volumetric Analysis in Chemistry. (b). Acquisition of Science Process skills and (c). Attitude to learning of Volumetric Analysis in Chemistry

Ho2: There is no significant effect of gender on (i). Achievement of Volumetric analysis in chemistry (ii). Acquisition of Science Process skills and (iii). Attitude to learning of volumetric analysis in chemistry.

Methodology

The design adopted for the study is pre-test, post-test control group quasi-experimental design using 3x2 factorial design. It involves two treatment groups and one control group with gender as moderator and achievement in volumetric analysis, acquisition of science practical skills and attitude to learning of volumetric analysis as dependent variables. The population for the study comprised all senior secondary school II offering Chemistry as one of their senior secondary school subjects in Oyo State. It is from this population that a sample of one hundred and twenty-six students of SS II of intact classes were drawn. The schools for the study were adjudged qualified based on the following criteria. The schools used had functional laboratories, had enrolled students for SSCE for not less than five years, had well trained and qualified chemistry teachers as well as the willingness of the chosen schools to participate in the study. The instruments used were Procedural teacher instruments, Chemistry attitude rating scale, Chemistry achievement test and Science process skills rating scale. The instruments on science process skills rating and chemistry attitude rating scale were validated before use by the professionals in the field of science education for the face and content validity. The validity of chemistry achievement test was ascertained through the use of table of specification while its reliability was ascertained by using Kuder-Richardson-KR-20 Formula yielding a coefficient of reliability of 0.81

The Chemistry teachers in the participating schools were trained and guided on the administration of the treatments to avoid unusual deviation in data collection. A pre-test was conducted before the treatment started and after the treatment, the groups were exposed to post-treatment test on Chemistry achievement test, Chemistry attitude scale and Science process skills rating in both the experimental groups and the control group. The value obtained in the post ratings were used the scores obtained in the pre- rating scores for the final analysis. The data collected in this study was analyzed using both descriptive and inferential statistics. The mean, the mean gains and standard deviation according to the level of treatment. The analysis of covariance was adopted using pre-test as covariates. The analysis was done at 0.05 of significance. The Multiple Classification Analysis was used to explain the magnitude of post-test mean achievement, attitude to learning of volumetric analysis and acquisition of science process skills across different levels of strategy and gender while Scheffe pairwise comparison post-hoc analysis was used to explain the source and direction of the obtained significant effects.

Results

The data collected in this study was presented using both descriptive and inferential statistics to describe the variables in the study and to test the hypotheses formulated to guide the study. This guide the sequence of the presentation and interpretation of the results in line with the hypotheses formulated for this study.

Descriptive results of Pre-& Post-test of Students' achievement in volumetric analysis in Chemistry.

Table 1: Students' Pre and Post-test Achievement in chemistry according to strategy

Strategy		N	Mean	S.D	Gain	Min	Max
Interactive Compensatory (IC)	Pre-test	30	14.33	2.17		10	20
	Post-test		20.47	1.59	6.14	17	24
Self-efficacy skills development (SED)	Pre-test	36	9.56	2.52		2	14
	Post-test		12.58	1.61	3.02	8	16
Conventional Method (CM)	Pre-test	60	18.73	4.19		5	23
	Post-test		21.05	1.42	2.32	17	23
Total	Pre-test	126	15.06	5.14		2	23
	Post-test		18.49	4.05	3.43	8	24

Table 1 shows the group's pre and post-test mean achievement in volumetric analysis in chemistry before and after exposure to the treatment strategies. It shows that mean achievement gain occurred across the three strategies, Interactive strategy, self-efficacy skill development strategy and conventional methods. It further reveals that the group exposed to interactive strategy recorded the highest mean achievement gain (6.14) followed by the group exposed to self-efficacy skill development with mean gain (3.02) while the control group recorded the least mean achievement gain of 2.32

Table 2. Students' Pre and Post-test achievement in Chemistry according to Gender

Gender		N	Mean	S.D	Gain	Min	Max
Male	Pre-test	55	14.40	5.47		5	23
	Post-test		17.82	4.38	3.42	8	24
Female	Pre-test	71	15.58	4.86		2	23
	Post-test		19.01	3.72	3.43	11	24
Total	Pre-test	126	15.06	5.14		2	23
	Post-test		18.49	4.05	3.43	8	24

Table 2 gives the group's pre and post-test mean achievement test in volumetric analysis in chemistry according to gender before and after exposure to instructional strategies. The female group recorded higher mean achievement gain of 3.43 compared to male's own of 3.42.

Table3: Students' Pre and Post-test Attitude to chemistry according to strategy

Strategy		N	Mean	S.D	Gain	Min	Max
Interactive Compensatory (IC)	Pre-test	30	114.30	8.16		99	130
	Post-test		114.40	13.96	0.10	84	139
Self-efficacy Skill development (SED)	Pre-test	36	114.03	8.66		99	137
	Post-test		114.39	13.20	0.36	84	139
Conventional method (CM)	Pre-test	60	107.25	14.63		11	138
	Post-test		113.30	9.22	6.05	70	130
Total	Pre-test	126	110.87	12.22		11	138
	Post-test		113.87	11.60	3.00	70	139

Table 3 shows the groups' pre and post-test mean attitude to learning of volumetric analysis in chemistry before and after exposure to instructional strategies. There is mean attitude gain across the strategies when pre and post attitude ratings are compared.

Table 4: Students' Pre and Post-test Attitude to Chemistry according to Gender

Gender		N	Mean	S.D.	Gain	Min	Max
Male	Pre-test	55	112.93	8.41	3.16	99	137
	Post-test		116.09	10.89		91	139
Female	Pre-test	71	109.27	14.36	2.88	11	138
	Post-test		112.15	11.91		70	137
Total	Pre-test	126	110.87	12.22	3.00	11	138
	Post-test		113.87	11.60		70	139

Table 4 shows the group's pre and post-test mean attitude to learning of volumetric analysis in chemistry according to gender before and after exposure to the instructional strategies. The table further reveals that there is mean attitude gains across the levels of gender when pre and post attitude response is compared. Mean gains occurred across the levels.

Table 5: Students' Pre and Post-test Process Skill Acquisition According to Strategies

Strategy		N	Mean	S.D.	Gain	Min	Max
Interactive Compensatory (CM)	Pre-test	30	10.83	1.32	1.40	8	14
	Post-test		12.23	1.01		10	14
Self-Efficacy skill Development (SED)	Pre-test	36	10.64	1.59	3.92	7	13
	Post-test		14.56	2.56		11	19
Conventional Method (CM)	Pre-test	60	10.98	1.37	1.14	8	14
	Post-test		12.12	1.06		10	14
Total	Pre-test	126	10.85	1.44	1.99	2	14
	Post-test		12.84	1.95		10	19

Table 5 shows the group's pre and post-test mean acquisition science process skills before and after exposure to the instructional strategies. The result in the table shows that there is mean gain across the three groups/ strategies with SED strategy recording the highest science process skill acquisition in volumetric analysis in secondary chemistry followed by interactive compensatory with 1.40 and then conventional group with 1.14 mean gain.

Table 6: Students' Pre and Post Science Process Skill Acquisition Score According to Gender

Strategy		N	Mean	S.D.	Gain	Min	Max
Male	Pre-test	55	10.71	1.51	2.76	7	14
	Post-test		13.47	2.46		10	19
Female	Pre-test	71	10.96	1.38	1.39	8	14
	Post-test		12.35	1.23		10	17
Total	Pre-test	126	10.85	1.44	1.99	7	14
	Post-test		12.84	1.95		10	19

The results in table 6 shows the group's pre and post-test mean acquisition of science process skills according to gender before and after exposure to instructional strategies with the male having higher mean gain of 2.76 as against the female mean gain of 1.39. The least process skill acquisition of 10 was scored by both gender.

Test of Hypothesis: There is no significant main effect of treatment strategy (IC, SED & CM) on the students' achievement in Volumetric analysis in chemistry

Table 7: Summary of analysis of covariance of students' Achievement in volumetric analysis in chemistry according to Strategy and gender.

Source of Variation	Sum of squares	Df	Mean square	F	Sig. of F.
Main Effects	1835.461	1	1835.461	818.645	.000
Covariates(Pre-test)	.210	1	.210	.091	.760
Strategy (IC,SED&CM)	808.586	2	404.293	180.321	.000*
Gender	3.158	1	3.158	1.409	.238
2 way Interactions					
Strategy * Gender	11.436	2	5.718	2.550	.083
Explained	1796.138	12	149.678	66.759	.000
Residual	253.354	113	2.242		
Corrected total	2049.492	125			

The result in table 7 show the main effect of strategy (IC, SED & CM) used as strategy on students' achievement in volumetric analysis in chemistry. The result showed significant outcome ($F(2,113)=180.321$, $P<0.05$). This implies that there is significant difference in the post-test mean achievement scores of the students' exposed to the three groups of treatment used as strategies, hence hypothesis one is rejected. The magnitude of the post-test mean achievement scores of the students according to order of magnitude is as presented in the Multiple Classification Analysis (MCA).

Table 8. Multiple Classification Analysis of students' achievement scores according to strategy and Gender

Variable and Strategy	N	Unadjusted Deviation	Eta	Adjusted for Independent And covariates	Beta
Interactive Compensatory (IC)	30	2.03		3.16	
Self-efficacy Development (SED)	36	-6.05		-4.63	
Conventional Method (CM)	60	2.21	.61	3.28	.37
Gender					
Male	55	-0.66		0.30	
Female	71	-0.22	0.20	0.58	.04
Multiple R Squared					.876
Multiple R					.936

Table 8 shows the magnitude of the post-test mean achievement in volumetric analysis in chemistry of the groups exposed to treatment strategies. The MCA shows that with a grand mean of 17.945, the group exposed to conventional method recorded the highest adjusted post-test mean achievement score of 21.225 ($17.945+3.28$) with the group exposed to Interactive compensatory coming next with the adjusted post-test mean achievement score of 21.105 ($17.945 +3.16$) while the group exposed to the self-efficacy development (SED)

strategy recorded the least adjusted post-test mean achievement score of 13.315 (17.945-4.63). The result further shows that the strategy used accounted for 37% of the variance in students' achievement in volumetric analysis in chemistry while the independent and moderator variables jointly accounted for 87.6% of the variance in the students' academic achievement. The source of the significant difference in the strategy can be explained using Scheffe pairwise comparisons post-hoc analysis on obtained significant difference in the post-test mean achievement scores of the groups' exposed to the three strategies used in this study

Table 9: Scheffe Pair-wise Comparisons of Achievement scores on strategy

Mean	Strategy	IC	SED.	CM
20.47	Interactive Compensatory (IC)		*	
12.58	Self- efficacy development (SED)	*		*
21.05	Conventional Method (CM)		*	

* Denotes pairs of groups that are significantly different at $P < 0.05$

The table shows that the obtained significant difference in strategy was accounted for by the significant difference in the post-test mean achievement scores of the group exposed to the pairs of interactive compensatory strategy and self-efficacy development strategy as well as conventional method and self-efficacy development strategy. This implies that the difference between the post-test mean achievement scores of the groups exposed to the pairs of "IC and SED" strategies and "CM and SED" strategies are statistically significant at 0.05 level of significance. Therefore, the significant difference in the post-test achievement scores of the groups exposed to the pairs of IC and SED strategies as well as SED and CM strategies are responsible for the obtained significant main effect of strategies on students' achievement.

Summary of the Findings

This study revealed that the groups' pre and post-test mean achievement scores in volumetric analysis when exposed to interactive compensatory strategy, Self-efficacy development strategy and conventional method recorded post-test mean achievement gains across the three groups. Then, further treatment on test of hypothesis revealed that,

There is significant main effect of strategy (Interactive Compensatory, Self-efficacy Development and Control Method) on the groups' achievement in, attitude to learning of volumetric analysis in Chemistry and acquisition of Science process skills. This result corroborates the findings of Raimi and Fabiyi (2008) and Tojero (2025) that submitted that teaching and learning of process skills will positively enhance effective teaching of Science at Secondary School Level: and that effective science investigation is achievable through Science Process Skills teaching.

There is significant main effect of gender on the groups' acquisition of science process skills in favour of the male groups

There is significant interaction effects of strategy and gender on the students' acquisition of science process skills.

The independent and moderator variable accounted for 87.6% of the variance in the students' achievement in volumetric analysis in chemistry; 13.0% of the variance in their attitude to learning of volumetric analysis in chemistry and 55.5% of the variance in their acquisition of science process skills.

Recommendations

Based on the results of the findings of this study, the following recommendations were made-

1. These strategies (IC, SED & CM) should be adopted and be fully incorporated into at the pre-service level with the intention of request that the teachers should be making use of it in the presentation of lessons at schools and Colleges
2. The Science process skill acquisition should be given special attention during teaching-learning activities in Chemistry as it is capable of aiding its mastery of process skills acquisition and overall achievement in Chemistry
3. Chemistry teachers at the SSCE level should be encouraged and supported to attend workshops of Professional bodies like STAN, Chemical Society and WAEC coordination during marking to update their knowledge and make them more informed of the latest discoveries and approaches to effective teaching and learning activities in Chemistry.
- 4.

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RELATIONSHIP BETWEEN PRINCIPALS' CONFLICT MANAGEMENT STRATEGIES AND TEACHERS' COMPLIANCE WITH DIRECTIVES: IMPLICATIONS FOR MENTORSHIP AND SUSTAINABLE DEVELOPMENT.

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Abstract

The study investigated the relationship between principals' conflict management strategies and teachers' compliance with directives and its implications for mentorship and sustainable development in public secondary schools in Anambra State, Nigeria. Two research questions and two null hypotheses guided the study. Correlational research design was adopted for the study. The population comprised 6,815 teachers in public secondary schools in Anambra State. A sample size of 2,727 teachers was selected using proportionate random sampling technique. Two researcher-developed instruments titled "Principals' Conflict Management Strategies Questionnaire (PCMSQ)" and "Teachers' Engagement in School Activities Questionnaire (TESAQ)" were used for data collection. The instruments were validated by three experts from the Faculty of Education, Nnamdi Azikiwe University, Awka. Cronbach Alpha reliability coefficients of 0.78 and 0.80 were obtained for PCMSQ and TESAQ respectively. Data collected were analyzed using Pearson Product Moment Correlation. Findings revealed that a significant relationship existed between non-confrontational conflict management strategy and teachers' compliance with principals' directives in public secondary schools in Anambra State. The finding implied that teachers tend to comply more with directives when principals adopt accommodative and collaborative conflict management approaches that recognize teachers' interests and encourage harmonious working relationships. Based on the findings, it was recommended among others that the Ministry of Education should periodically organize seminars and workshops for principals on the continuous adoption of non-confrontational conflict management strategies to enhance teachers' compliance with directives, mentorship, and sustainable development in schools.

Keywords: Principals, Non-confrontational Conflict Management Strategy, Teachers, Compliance, Directives, Mentorship, Sustainable Development.

Introduction

Conflict is an inevitable phenomenon in every human organization, including educational institutions. In secondary schools, conflicts arise due to differences in values, interests, opinions, perceptions, goals, and expectations among principals, teachers, students, and other stakeholders. Effective management of such conflicts is essential for maintaining harmony, productivity, and organizational effectiveness. School principals, as administrative heads of schools, are expected to adopt appropriate conflict management strategies that promote cooperation and compliance among teachers.

Conflict management refers to the process through which administrators identify, address and resolve disagreements or misunderstandings in ways that reduce tension and improve organizational functioning. Principals employ different conflict management strategies such as confrontation, compromise, accommodation, avoidance, collaboration, and non-confrontational approaches. Among these strategies, non-confrontational conflict management strategy emphasizes dialogue, understanding, cooperation, tolerance, negotiation, and peaceful resolution of disputes without aggression or intimidation. Teachers' compliance with directives refers to the willingness of teachers to obey and implement official instructions, policies, and administrative decisions issued by school principals. Compliance is important for effective school administration, implementation of educational policies, maintenance of discipline, and achievement of educational goals. Teachers who comply with directives are more likely to contribute positively to school development and create conducive learning environments.

In many public secondary schools in Anambra State, there have been complaints of teachers' resistance to directives, poor participation in school activities, insubordination, and low commitment to administrative decisions. Such attitudes may be linked to the conflict management styles adopted by school principals. Principals who employ authoritarian or confrontational approaches may create hostility, fear, resentment, and reduced morale among teachers, thereby affecting their willingness to comply with directives. Conversely, principals who adopt non-confrontational and collaborative strategies may encourage mutual respect, trust, and positive working relationships.

Mentorship in schools involves guiding, supporting, and encouraging teachers to improve professionally and personally. Effective conflict management enhances mentorship by promoting communication, trust, cooperation, and teamwork among staff members. Sustainable development in education refers to continuous improvement in teaching, learning, administration, and institutional growth that can be maintained over time. Schools characterized by peaceful relationships and effective conflict management are more likely to experience sustainable development.

Therefore, this study investigated the relationship between principals' conflict management strategies and teachers' compliance with directives in public secondary schools in Anambra State and examined the implications for mentorship and sustainable development.

Statement of the Problem

Conflict among school personnel has become a recurring issue in many public secondary schools in Anambra State. Teachers often demonstrate negative attitudes such as refusal to comply with administrative directives, poor participation in school activities, absenteeism, resistance to change, and lack of cooperation with school management. These behaviours adversely affect school administration, mentorship programmes, academic performance, and sustainable development.

The situation may be attributed to the type of conflict management strategies adopted by principals. Principals who use harsh, authoritarian, and confrontational strategies may provoke resistance and reduce teachers' morale and commitment. On the other hand, principals who adopt non-confrontational strategies may foster harmonious relationships and encourage teachers' compliance with directives.

Despite the importance of conflict management in schools, there is limited empirical evidence on how principals' conflict management strategies relate to teachers' compliance with directives in public secondary schools in Anambra State. It is against this background that the study sought to determine the relationship between principals' conflict management strategies and teachers' compliance with directives and its implications for mentorship and sustainable development.

Purpose of the Study

The main purpose of the study was to determine the relationship between principals' conflict management strategies and teachers' compliance with directives in public secondary schools in Anambra State. Specifically, the study sought to:

1. Determine the relationship between non-confrontational conflict management strategy and teachers' compliance with principals' directives in public secondary schools in Anambra State.
2. Determine the relationship between confrontational conflict management strategy and teachers' compliance with principals' directives in public secondary schools in Anambra State.

Research Questions

The following research questions guided the study:

1. What is the relationship between non-confrontational conflict management strategy and teachers' compliance with principals' directives in public secondary schools in Anambra State?
2. What is the relationship between confrontational conflict management strategy and teachers' compliance with principals' directives in public secondary schools in Anambra State?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant relationship between non-confrontational conflict management strategy and teachers' compliance with principals' directives in public secondary schools in Anambra State.
2. There is no significant relationship between confrontational conflict management strategy and teachers' compliance with principals' directives in public secondary schools in Anambra State.

Method

The study adopted correlational research design. The study was carried out in public secondary schools in Anambra State, Nigeria. The population of the study comprised 6,815 teachers in public secondary schools in the six education zones of Anambra State.

A sample size of 2,727 teachers was selected using proportionate random sampling technique to ensure fair representation of teachers across the education zones. Two instruments developed by the researcher were used for data collection. The first instrument titled "Principals' Conflict Management Strategies Questionnaire (PCMSQ)" sought information on principals' conflict management strategies, while the second instrument titled "Teachers' Engagement in School Activities Questionnaire (TESAQ)" measured teachers' compliance with principals' directives.

The instruments were subjected to face and content validation by three experts: one expert in Measurement and Evaluation from the Department of Educational Foundations and two experts from the Department of Educational Management and Policy, Faculty of Education, Nnamdi Azikiwe University, Awka.

The reliability of the instruments was established using Cronbach Alpha method. Reliability coefficients of 0.78 and 0.80 were obtained for PCMSQ and TESAQ respectively, indicating that the instruments were reliable for the study.

The researcher, with the assistance of five research assistants, administered the instruments to respondents across the six education zones. Data collected were analyzed using Pearson Product Moment Correlation to answer the research questions and test the hypotheses at 0.05 level of significance.

Results

Research Question One: What is the relationship between non-confrontational conflict management strategy and teachers' compliance with principals' directives in public secondary schools in Anambra State?

The analysis revealed a positive relationship between non-confrontational conflict management strategy and teachers' compliance with principals' directives. This indicates that when principals adopt accommodative, collaborative, and understanding approaches in resolving conflicts, teachers are more willing to comply with school directives and administrative decisions.

Research Question Two: What is the relationship between confrontational conflict management strategy and teachers' compliance with principals' directives in public secondary schools in Anambra State? The findings showed a weak negative relationship between confrontational conflict management strategy and teachers' compliance with principals' directives. This implies that the use of aggressive, forceful, and authoritarian conflict resolution approaches may discourage teachers from willingly complying with directives.

Test of Hypotheses

Hypothesis One. There is no significant relationship between non-confrontational conflict management strategy and teachers' compliance with principals' directives in public secondary schools in Anambra State.

The hypothesis was rejected because the calculated probability value was less than the 0.05 level of significance. Therefore, there was a significant relationship between non confrontational conflict management strategy and teachers' compliance with principals' directives.

Hypothesis Two. There is no significant relationship between confrontational conflict management strategy and teachers' compliance with principals' directives in public secondary schools in Anambra State.

The hypothesis was rejected because the calculated probability value was less than the 0.05 level of significance. Therefore, there was a significant relationship between confrontational conflict management strategy and teachers' compliance with principals' directives.

Discussion of Findings

The study found that a significant positive relationship existed between non-confrontational conflict management strategy and teachers' compliance with principals' directives. This finding suggests that teachers are more likely to cooperate with school administration when principals employ peaceful, collaborative, and accommodative approaches to conflict resolution. Such approaches promote trust, mutual respect, teamwork, and positive interpersonal relationships among school personnel.

The finding aligns with human relations theory which emphasizes the importance of interpersonal relationships, communication, and staff welfare in organizational effectiveness. Principals who recognize teachers' feelings and involve them in decision-making processes create conducive environments that encourage compliance and commitment.

The study also revealed that confrontational conflict management strategy negatively affects teachers' compliance with directives. Principals who use intimidation, threats, and aggressive approaches may create resentment, fear, and dissatisfaction among teachers, thereby reducing their willingness to comply with administrative directives.

The findings have important implications for mentorship and sustainable development. Effective mentorship thrives in environments characterized by cooperation, trust, mutual

understanding, and open communication. Non-confrontational conflict management strategy creates opportunities for principals to mentor teachers effectively, support professional growth, and enhance staff morale.

Similarly, sustainable development in schools depends on peaceful coexistence, collaborative leadership, and positive organizational climate. Schools where conflicts are effectively managed are more likely to achieve continuous improvement in teaching, learning, and administration.

Implications for Mentorship and Sustainable Development

The findings of the study have several implications for mentorship and sustainable development in education.

1. Principals who adopt non-confrontational conflict management strategies create supportive environments that encourage effective mentorship among teachers.
2. Peaceful conflict resolution promotes trust, cooperation, and teamwork, which are necessary for sustainable school development.
3. Teachers who feel respected and valued are more likely to comply with directives, participate actively in school activities, and contribute to institutional growth.
4. Effective conflict management enhances teachers' morale, job satisfaction, and professional commitment.
5. Sustainable educational development can only be achieved in schools where harmonious relationships exist among staff members.

Conclusion

The study concluded that principals' conflict management strategies significantly relate to teachers' compliance with directives in public secondary schools in Anambra State. Specifically, non-confrontational conflict management strategy positively influences teachers' compliance with principals' directives, while confrontational strategy negatively affects compliance. Effective conflict management promotes mentorship, harmonious relationships, staff cooperation, and sustainable development in schools.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. The Ministry of Education should periodically organize seminars and workshops for principals on effective non-confrontational conflict management strategies.
2. Principals should adopt collaborative and accommodative approaches in resolving conflicts to encourage teachers' compliance with directives.
3. School administrators should create opportunities for dialogue and participation in decision-making processes among teachers.
4. Principals should avoid excessive use of authoritarian and confrontational leadership styles that may discourage teachers' cooperation.
5. Mentorship programmes should be strengthened in schools to promote harmonious interpersonal relationships and sustainable development.

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INDIGENOUS TEACHING METHODS AS A PATHWAY TO INQUISITIVE EDUCATION AND SUSTAINABLE DEVELOPMENT IN AFRICA: A DECOLONIAL PERSPECTIVE

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Abstract

This study examined the potential of indigenous teaching methods to foster inquisitive education and sustainable development in Africa from a decolonial perspective. Grounded in constructivist, sociocultural, and decolonial theories, the study explored whether culturally embedded pedagogies can serve as viable alternatives to orthodox Western instructional approaches in higher education. The study was conducted among the students of Faculty of Education, University of Ilesa, Osun State, Nigeria. An experimental research design was adopted, involving 100 purposively selected students. The participants were stratified into Experimental and Control Groups. Participants were exposed to instructional strategies based on African indigenous teaching methods, and their learning outcomes were compared with those of students taught using conventional Western approaches. Data were collected through pre-test and post-test assessments and analyzed using Analysis of Covariance (ANCOVA) to control for initial differences in prior knowledge. The findings revealed no statistically significant difference in the post-test academic performance of students taught using indigenous teaching methods and those taught through orthodox Western methods after adjusting for pre-test scores. This suggests that indigenous pedagogies are pedagogically effective and capable of producing learning outcomes comparable to conventional instructional approaches. The study concludes that integrating indigenous teaching methods into formal education can

strengthen inquisitive learning, promote epistemic inclusion, and advance sustainable development objectives in Africa. It recommends curriculum reforms that embrace culturally responsive pedagogies, teacher preparation programmes that incorporate indigenous knowledge systems, and further research involving larger and more diverse populations across educational contexts.

Keywords: Indigenous teaching methods, inquisitive education, sustainable development, decoloniality, African education, culturally responsive pedagogy.

Introduction

Education can be viewed as a revealer of the in-born abilities and potentials of the individuals in the society and the acquisition of skills and competencies necessary for self-realization, Cremin defines education as the deliberate, systematic, and sustained effort to transmit, provoke or acquire knowledge, values, attitudes, skills or sensibilities as well as any learning that results from the efforts (Chazan, 2022).

Onwuatuegwu et al (2023) describe African Indigenous Education (AIE) as the traditional education system that evolved originally within African societies dated back to ancient times. It comprised knowledge, skills, values and cultural practices which were passed from one generation to another in a given society by the African elders. Amaechi and Duruji (2013) argue that in the old African Society, the purpose of education was generally for an immediate induction into society and preparation for adulthood. Specifically, it emphasized AIE as encompassing social responsibilities, job orientation, and political participation, spiritual and moral values. Children learnt by doing, they were involved in practical farming, fishing, hunting, knitting, carving while intellectual training included the study of local history, legends, the environment, poetry, reasoning riddles, proverbs, storytelling and story relays. It can be constructed that AIE was not merely a system but a way of life which deeply rooted in people's cultural heritage.

The Philosophical Foundation of African Indigeneous Education

The philosophical basis of African Indigenous Education (AIE) system refers to the African way of thinking, belief and doing things. The AIE had a very strong Philosophical Foundation which was deeply embedded in the core values of the African way of life. Ocitti (1973) identifies the philosophies as preparationism functionalism, communalism, perennialism and holicism.

Preparationism

This philosophy emphasized that the African Indigenous Education (AID) equipped young people with gender-based knowledge and skills to enable them play a distinctive role in the society. Boys and girls were deliberately prepared to fulfil socially acceptable masculine and feminine responsibilities respectively. Through this principle, young people developed a sense of obligation to the community by appreciating its history, language, customs and values.

Functionalism

In pre-colonial Africa, societies were predominantly Utilitarian and education was delivered in a participatory manner where young ones learnt through imitation, initiation, work, play and oral literature (Ociti, 1971). The learners were productive as they learnt through a participatory approach and the gap between study and the world of almost non-existent. (Serunjogi, 2024) young people grew up from an early age with functional skills, which enabled them to integrate smoothly into their respective communities and there was no unemployment in African societies because knowledge, survival skills, values and norms were acquired freely from elders through daily or routine activities.

Communalism

In African Indigenous Education, teaching was not solely the responsibility of the parents of the child. The whole community was involved in raising and educating the child simply, because the child belonged to the community. This implies that it was obligatory for every member of the community to ensure that young people were raised in accordance with the accepted norms of the society. This makes teaching a collective responsibility, also education was community oriented that is, general towards solving community problems.

Perennialism

Perennialism is a philosophy that emphasizes the preservation of the cultural heritage of the community. (Adeyinka & Kalusa, 1996). Children were trained in such a way that they strictly observed their customs and norms without any compromise. Those who deviated from established cultural heritage were strongly sanctioned. (Adeyemi & Adeyinka, 2002) Under perennialism, members of the community were discouraged from importing aliens' values that seemed to water down the established cultures. Adults ensured that young people were well grounded to protect and love their heritage.

Holisticism

African Indigenous Education is sometimes referred to as multiple learning. This means young people were trained in multiple skills which catered for their physical, moral, intellectual, and spiritual growth. During moonlight or at the fireplace in the compound intellectual grounding were done by elders through oral tradition, such as storytelling, riddles, poetry, songs, folklores etc.

Aims of African Indigenous Education

According to Fafunwa (1991), the aims of AIE were to:

- i. develop the child's latent physical skills;
- ii. develop character;
- iii. inculcate respect for elders;
- iv. develop intellectual skills;
- v. acquire special vocational training;
- vi. develop a sense of belonging and participate actively in family and community affairs; and
- vii. understand, appreciate and promote the cultural heritage of the community at large

Methods of Instruction in the African Indigenous Education System

Onwuaturgwu et al (2023) argue that teaching in AIE was purely informal and occurred through observation, imitation and practical experiences. Oral tradition which includes storytelling, folktales, myths, adages, history and proverbs were used to teach cultural and moral values. This method helped to enhance the intellectual growth of children through the mastery of history, culture and geography of their localities. These methods of instruction were less structured and the line between the teacher and the learner was thin. In most cases, knowledge was delivered at the household level, covering Practical skills. Through socialisation, skills and knowledge were reproduced from generation to generation were gained through learning by doing (Getahun, 2020).

Relevance of African Indigenous Education in Contemporary Africa Education

Although African Indigenous Education (AIE) was informal in nature, its relevance to contemporary African societies cannot be overemphasized. Fafunwa (1982) argues that no study of the history of African education is complete or meaningful without adequate knowledge of AIE. Today, unique value which African Societies feel proud of such as custom, language, discipline, work, entertainment and many others are what AIE emphasizes.

For African societies to maintain their unique cultural identity and preserve the positive values embedded in indigenous systems of learning, there is a need to revive the beneficial aspects of African Traditional Education (ATE). Traditionally, African education emphasized productivity, self-reliance, and vocational competence from childhood, thereby equipping individuals with practical skills for sustainable livelihoods and reducing dependence on others. These principles remain highly relevant for shaping the lives of young people in contemporary African societies.

According to Moswennyane (2013), the methods and patterns through which African Traditional Education was transmitted remain valuable for promoting sustainable livelihoods and fostering meaningful coexistence within communities. Similarly, Adamu and Rotshak (2023) argue that indigenous knowledge systems are indispensable because they promote character formation, social solidarity, community cohesion, and the acquisition of vocational skills. They further contend that African Traditional Education nurtures moral uprightness, honesty, integrity, and a sincere commitment to self-sustenance. Therefore, the enduring virtues of African Traditional Education should be preserved, adapted where necessary, and integrated into contemporary African educational systems to promote holistic development, cultural continuity, and sustainable societal progress.

Statement of the problem

Education in Africa has largely been shaped by Western-oriented pedagogical approaches introduced during the colonial era. While these methods have contributed to formal educational development, concerns have been raised regarding their ability to adequately foster inquisitiveness, critical thinking, cultural relevance, and sustainable development among African learners. Many scholars argue that the continued dominance of orthodox Western teaching methods often overlooks indigenous knowledge systems, local experiences,

and culturally responsive teaching practices that could enhance students' engagement and understanding of educational content.

Indigenous teaching methods, which are rooted in African cultural values, community participation, storytelling, experiential learning, observation, and practical engagement have been identified as potential tools for promoting meaningful learning and sustainable development. From a decolonial perspective, these methods provide opportunities to challenge colonial legacies in education by validating indigenous knowledge and creating learning experiences that are more relevant to African realities. Despite increasing advocacy for the integration of indigenous pedagogies into educational systems, there remains limited empirical evidence on their effectiveness in improving students' academic performance at the university level.

Furthermore, the extent to which indigenous teaching methods influence students' academic achievement compared to orthodox Western teaching methods remains unclear. This uncertainty has created a gap in educational practice and policy regarding the adoption of culturally responsive pedagogies in higher education institutions across Africa. Consequently, there is a need to investigate whether significant differences exist in the academic performance of university students taught through indigenous teaching methods and those taught through orthodox Western methods. Addressing this problem will contribute to the discourse on decolonizing education and provide evidence-based insights for promoting inquisitive education and sustainable development in Africa.

Research Objective

To ascertain whether those who are taught with indigenous teaching method perform better than those who are taught with Orthodox Western method of teaching

Research Question

What is the difference in the academic performance of those students taught with indigenous teaching method and those taught with Orthodox Western method of teaching?

Research Hypothesis

There is no significant difference in the academic performance of students taught with indigenous teaching method and those taught with Orthodox Western method of teaching among the University of Ilesa students.

Conceptual Review

Inquisitive Education

Inquisitive education is a learner-centred pedagogical orientation that encourages curiosity, questioning, critical reflection, creativity, and active knowledge construction rather than passive memorization. It promotes investigation, dialogue, and problem-solving, enabling learners to become lifelong seekers of knowledge. Within African educational contexts, inquisitive education can be effectively fostered through indigenous practices such as storytelling, observation, apprenticeship, communal participation, and experiential learning, all of which encourage learners to interrogate their environment and generate locally relevant solutions (Manns et al., 2025).

Sustainable Development

Sustainable development refers to development that satisfies present needs while safeguarding the ability of future generations to meet their own needs. Education is widely recognized as a catalyst for sustainable development because it equips learners with the knowledge, values, and competencies required to address social, economic, and environmental challenges. African scholars argue that sustainability initiatives become more meaningful when educational systems integrate indigenous knowledge and locally grounded pedagogies rather than relying exclusively on imported models (Tikly, 2019; Meroyi, 2023).

Decolonial Perspective

Decolonial education advocates dismantling the dominance of Eurocentric knowledge systems and recognizing indigenous epistemologies as legitimate contributors to scholarship and teaching. From this perspective, African education should reclaim local histories, philosophies, languages, and pedagogies to produce graduates capable of addressing indigenous and global challenges from culturally meaningful standpoints. Contemporary scholarship emphasizes that decolonization is not the rejection of Western knowledge but the pursuit of epistemic plurality and inclusiveness (Obiagu, 2023; Ojo et al., 2023).

Theoretical Review

Constructivist Theory

Constructivist theory, proposed by Jean Piaget, explains that learning is an active process in which individuals develop knowledge through their interactions with the world around them. Rather than viewing learners as passive recipients of information, the theory emphasizes that people make sense of new experiences by connecting them with what they already know (Piaget, 1952). Piaget explained that this occurs through two complementary processes: assimilation, where new information is incorporated into existing knowledge, and accommodation, where existing ideas are modified to fit new experiences (Piaget, 1970). Through these processes, learners gradually refine their understanding and develop more complex ways of thinking. As a result, meaningful learning is best achieved when learners actively explore, observe, experiment, ask questions, and solve problems instead of simply memorizing facts.

Furthermore, the principles of constructivism are closely reflected in the practices of African Indigenous Education. In many African societies, learning is practical, participatory, and deeply rooted in everyday life. Children acquire knowledge, skills, attitudes, and values through direct involvement in family and community activities. They learn by observing adults, imitating skilled individuals, listening to stories and proverbs, participating in apprenticeship, engaging in play, and contributing to communal responsibilities. Rather than depending solely on formal classroom instruction, learning occurs naturally within the cultural environment where children actively participate in real-life experiences. This approach supports Piaget's view that genuine understanding develops through continuous interaction with one's environment.

Moreover, another important aspect of constructivist theory is that learners play the central role in the learning process, while teachers or experienced members of the community act as

facilitators who guide learning rather than merely transmit information. This perspective closely mirrors indigenous educational practices, where parents, elders, artisans, and other respected members of the community mentor younger generations through demonstration, guidance, encouragement, and practical experience. Learners are given opportunities to observe, practice, make mistakes, and improve under the supervision of knowledgeable adults. Such learning experiences encourage independence, critical thinking, creativity, and confidence while preserving indigenous knowledge and cultural values. The relevance of constructivist theory to this study lies in its emphasis on learning through active participation and experience. Indigenous educational practices demonstrate that children learn more effectively when they are directly involved in meaningful activities within their communities. The theory therefore provides a useful framework for understanding how indigenous teaching methods contribute to children's cognitive, social, moral, and practical development through hands-on experiences and active engagement.

Sociocultural Theory

Sociocultural theory, developed by Lev Vygotsky, views learning as a social process that is strongly influenced by culture and interaction with other people. Unlike theories that focus mainly on individual cognitive development, Vygotsky (1978) argued that learning occurs through participation in meaningful social activities and through interactions with more knowledgeable members of society, including parents, teachers, elders, and peers. According to this perspective, knowledge is shaped not only by individual experiences but also by the cultural values, traditions, language, and practices of the community. Consequently, cognitive development cannot be separated from the social and cultural environment in which learning takes place.

Furthermore, the most influential ideas in sociocultural theory is the Zone of Proximal Development (ZPD). This concept refers to the difference between what learners can accomplish on their own and what they can achieve with appropriate guidance from someone who possesses greater knowledge or experience. Within this zone, learning is supported through scaffolding, where temporary assistance is provided until learners gain the confidence and competence to perform tasks independently. As their understanding improves, the support is gradually withdrawn. This process highlights the importance of demonstration, dialogue, mentoring, and collaborative learning in promoting intellectual growth.

Also, Vygotsky also emphasized that learning is mediated by cultural tools such as language, symbols, customs, traditions, and shared social practices. Among these, language occupies a central position because it enables individuals to communicate ideas, interpret experiences, solve problems, and transmit knowledge across generations. Through continuous participation in cultural activities and social interaction, learners gradually internalize the beliefs, values, norms, and behaviours that shape their thinking and identity. These assumptions closely correspond with the philosophy and instructional practices of African Indigenous Education. In traditional African communities, education is community-based and closely integrated into everyday life. Children acquire knowledge and practical skills through observation, participation, apprenticeship, storytelling, proverbs, and direct involvement in economic and social activities. Parents, elders, artisans, and other experienced community members serve as mentors who guide younger generations in acquiring not only vocational

skills but also moral values, cultural identity, and social responsibilities. These learning experiences reflect Vygotsky's belief that cognitive development is strengthened through interaction with more knowledgeable members of society.

Similarly, indigenous African educational practices encourage collaborative learning by allowing children to work alongside adults and peers in authentic cultural settings. Activities such as farming, fishing, hunting, weaving, pottery, blacksmithing, food processing, childcare, and participation in communal ceremonies provide rich opportunities for learners to develop practical skills, ethical values, leadership qualities, and a sense of responsibility. Through observation, guided practice, imitation, and continuous feedback, children gradually become competent members of their communities. These practices clearly demonstrate that learning is most meaningful when it occurs within real-life cultural contexts. The relevance of sociocultural theory to this study lies in its recognition that learning is both socially mediated and culturally situated. Indigenous educational practices show that education is not limited to academic achievement but also involves the transmission of cultural heritage, ethical values, social competence, and practical life skills. The theory therefore provides an appropriate framework for examining how indigenous teaching methods support holistic child development while preserving and transmitting indigenous knowledge across generations.

Overall, sociocultural theory provides a strong theoretical foundation for understanding African Indigenous Education as a culturally responsive, collaborative, and participatory system of learning. Its emphasis on social interaction, mentorship, guided participation, and cultural mediation reinforces the educational value of indigenous pedagogical practices. Consequently, the theory supports the integration of indigenous approaches into contemporary educational systems to promote learning experiences that are culturally relevant, inclusive, practical, and meaningful.

Decolonial Theory

Decolonial theory provides a valuable framework for understanding how indigenous teaching methods can promote inquisitive education and sustainable development in Africa. The theory emerged as a response to the enduring influence of colonialism on education, knowledge production, and cultural identity. It argues that many African educational systems continue to prioritize Western forms of knowledge while giving little attention to indigenous ways of knowing and learning (Mignolo, 2011; Ndlovu-Gatsheni, 2018). As a result, decolonial scholars advocate for educational reforms that recognize and integrate indigenous knowledge, languages, cultural values, and teaching practices into formal education. Such integration helps make learning more relevant to learners' social and cultural realities while addressing the developmental needs of African societies.

Furthermore, an idea in decolonial theory is epistemic justice, which promotes the recognition of diverse knowledge systems instead of treating Western knowledge as the only legitimate source of understanding. From this perspective, indigenous knowledge is not viewed as outdated or inferior but as a valuable body of knowledge that has evolved through generations of interaction with local communities and environments. Indigenous teaching methods such as storytelling, apprenticeship, observation, oral traditions, communal

participation, experiential learning, and practical problem-solving have long served as effective means of transmitting knowledge, developing practical skills, and nurturing ethical values. These approaches also strengthen learners' cultural identity while encouraging critical thinking and responsible citizenship.

Also, the principles of decolonial theory closely align with the goals of inquisitive education. Rather than encouraging learners to memorize information, the theory supports educational approaches that stimulate curiosity, creativity, critical inquiry, and independent thinking. Indigenous pedagogical practices naturally encourage these qualities by involving learners in meaningful community experiences where they observe, ask questions, reflect on experiences, collaborate with others, and apply knowledge to real-life situations. Through this process, learners become active participants in their own learning and develop the ability to analyse problems, generate ideas, and propose solutions that are relevant to their local contexts. Decolonial theory is equally significant in advancing sustainable development. It recognizes that indigenous communities possess valuable knowledge about environmental conservation, conflict resolution, agriculture, healthcare, resource management, and social cohesion that has been refined over many generations. By incorporating this knowledge into contemporary education, learners develop practical competencies and values that support responsible environmental practices, cultural preservation, community development, and sustainable livelihoods. Such an approach ensures that education not only prepares learners for global opportunities but also equips them to contribute meaningfully to the sustainable development of their own communities.

Moreover, the relevance of decolonial theory to this study lies in its call for educational systems that value indigenous knowledge alongside other forms of knowledge. The theory provides a strong foundation for examining how indigenous teaching methods can be used to promote inquisitive learning, preserve cultural heritage, and enhance sustainable development in Africa. It supports the view that meaningful educational transformation requires the recognition of indigenous pedagogies as legitimate and complementary approaches to teaching and learning. Overall, decolonial theory offers a compelling perspective for rethinking education in Africa. By advocating the inclusion of indigenous knowledge systems, culturally responsive teaching methods, and multiple ways of knowing, the theory contributes to the decolonization of education. It also reinforces the importance of using indigenous pedagogies to develop learners who are intellectually curious, culturally grounded, innovative, and capable of addressing contemporary social, economic, and environmental challenges in ways that promote sustainable development.

Empirical Review

Recent studies demonstrate growing support for integrating indigenous knowledge into educational practice. Obiagu (2023) proposed a decolonized moral education framework for Africa that foregrounds indigenous values and culturally responsive pedagogies in promoting social justice and learner agency. Meroyi (2023) argued that decolonizing African education through indigenous systems can promote transformative education and sustainable development by aligning learning with local realities and community needs. Manns et al. (2025) emphasized that indigenous knowledge contributes significantly to Education for

Sustainable Development by enhancing environmental stewardship, contextual learning, cultural preservation, and community empowerment.

Ojo et al. (2023) contended that decolonizing Nigeria's educational system could promote holistic national development by restoring indigenous educational values that have been marginalized under colonial educational models. The experimental results in the present study similarly indicate that students exposed to African indigenous teaching methods achieved academic outcomes comparable to those taught using orthodox Western approaches, suggesting that indigenous pedagogies are educationally effective rather than inferior alternatives.

Methodology

The study adopted an experimental research design to examine the effectiveness of indigenous teaching methods in fostering inquisitive education from a decolonial perspective. The population comprises of students from faculty of Education, University of Ilesa, Osun State. A purposive sampling technique was employed to select 100 students from the Faculty of Education, University of Ilesa. The students were grouped into two, one as experimental group and the other as control group, both were pre- tested using the same instrument. Participants received instruction using indigenous pedagogical approach and orthodox method of teaching respectively. Then, both groups were post-tested. Data were analyzed using Analysis of Covariance (ANCOVA) to control for pre-existing differences in prior knowledge and evaluate the effect of instructional method on post-test achievement.

Research Hypothesis

H₀: There is no significant difference in the academic performance of students taught with the African Indigenous Teaching Method and those taught with the Orthodox Western Method of Teaching.

Statistical Approach

An Analysis of Covariance (ANCOVA) was conducted to examine whether a statistically significant difference exists between the post-test academic performance scores of students exposed to the African Indigenous Teaching Method (Experimental Group) and those taught using the Orthodox Western Teaching Method (Control Group). The pre-test scores were included as a covariate to statistically control for pre-existing differences in prior knowledge between the two groups, thereby improving the precision of the estimate of the treatment effect.

Table 1: Descriptive Statistics

Descriptive Statistics						
Group	N	Mean	Std. Dev.	Std. Error	Min	Max
Control Group – Pretest	50	6.82	1.12	0.16	5	9
Control Group – Post-test	50	8.94	1.60	0.23	3	10
Experimental Group – Pretest	50	4.86	2.07	0.29	2	8
Experimental Group – Post-test	50	8.70	1.84	0.26	1	10

Table 1 presents the descriptive statistics for both groups across the pretest and post-test administrations. The Control Group recorded a pretest mean of 6.82 (SD = 1.12) and a post-test mean of 8.94 (SD = 1.60), indicating improvement following instruction. The Experimental Group recorded a pretest mean of 4.86 (SD = 2.07) and a post-test mean of 8.70 (SD = 1.84). Notably, the Experimental Group entered the study with a considerably lower mean pretest score than the Control Group, underscoring the necessity of including the pretest as a covariate in the ANCOVA to ensure a fair and statistically adjusted group comparison.

Table 2: Tests of Between-Subjects Effects (Main ANCOVA)

Tests of Between-Subjects Effects						
Dependent Variable: Post-test Score						
Source	Type III SS	df	MS	F	Sig.	Partial η^2
Corrected Model	3.416	2	1.708	0.411	.664	.008
Intercept	457.598	1	457.598	152.901	< .001	
Pretest (Cov.)	1.020	1	1.020	0.341	.561	.004
Group	2.395	1	2.395	0.800	.373	.008
Residual/Error	290.300	97	2.991			
Total	3044.000	100				
Corrected Total	293.716	99				
R Squared = .008 (Adjusted R Squared = -.012). Group row highlighted in gold.						

Table 2 presents the main ANCOVA results. After statistically controlling for pretest scores, the effect of teaching method (Group) on post-test academic performance was not statistically significant, $F(1, 97) = 0.800$, $p = .373$, partial $\eta^2 = .008$. This indicates that only 0.8% of the variance in post-test scores was attributable to the teaching method, after accounting for prior knowledge — a negligible effect size by conventional benchmarks (Cohen, 1988). The covariate (Pretest) was also non-significant, $F(1, 97) = 0.341$, $p = .561$, partial $\eta^2 = .004$. The overall corrected model was likewise non-significant, $F(2, 97) = 0.411$, $p = .664$, $R^2 = .008$, Adjusted $R^2 = -.012$.

Decision on the Hypothesis

Based on the ANCOVA results, the null hypothesis is retained. There is no statistically significant difference in the academic performance of students taught using the African Indigenous Teaching Method and those taught using the Orthodox Western Teaching Method of teaching, $F(1, 97) = 0.800$, $p = .373$ after controlling for pre-existing differences in prior knowledge (pretest scores).

The study found that:

Both instructional approaches resulted in improved learner performance. After controlling for pre-test differences, there was no statistically significant difference between students taught

using African indigenous teaching methods and those taught using orthodox Western teaching methods. The findings therefore support retaining the null hypothesis and suggest that indigenous teaching methods are capable of producing learning outcomes comparable to conventional pedagogies.

Discussion of Findings

The finding that both teaching approaches yielded statistically equivalent post-test outcomes is noteworthy. While the Control Group entered the study with a higher pre-existing knowledge base (pretest mean = 6.82 versus 4.86), once this advantage was statistically controlled, neither group performed significantly differently at post-test. Both groups converged towards high performance (adjusted means of 9.00 and 8.64 respectively out of 10), suggesting that the African Indigenous Teaching Method is at least as effective as the Orthodox Western approach in producing measurable learning gains. This finding aligns with the growing body of literature advocating for the pedagogical validity of culturally rooted instructional approaches in Nigerian educational contexts. The negligible effect size (partial $\eta^2 = .008$) further reinforces that teaching method alone accounts for a very small proportion of the variance in student performance, and that other factor, such as teacher quality, student motivation, and learning environment, may exert greater influence on academic outcomes.

The findings reinforce contemporary arguments that indigenous pedagogies possess substantial educational value and deserve integration into mainstream educational systems. Rather than being viewed as obsolete, indigenous teaching approaches can effectively promote inquiry, participation, contextual understanding, and sustainable learning.

From a decolonial perspective, the comparable performance of learners supports calls for greater recognition of African knowledge systems and instructional traditions within formal education. The findings also suggest that instructional quality, learner motivation, and contextual factors may influence achievement more strongly than whether instruction is categorized as indigenous or Western. These observations align with recent scholarship advocating culturally responsive and epistemically inclusive education in Africa.

Conclusion

The study concludes that indigenous teaching methods constitute a viable pedagogical strategy for promoting inquisitive education and sustainable development in Africa. Although they did not significantly outperform orthodox Western methods, they produced equivalent educational outcomes while supporting cultural relevance and decolonial educational objectives. Consequently, African educational institutions should regard indigenous pedagogies as complementary assets in curriculum reform and sustainable development initiatives.

Recommendations

- Universities should integrate indigenous pedagogical approaches into teacher education curricula.
- Educational policymakers should encourage culturally responsive teaching practices that reflect African realities.

- Curriculum developers should embed indigenous knowledge systems across disciplines to foster contextualized learning.
- Teacher professional development programmes should prepare educators to combine indigenous and contemporary instructional strategies.
- Governments should invest in documenting and preserving indigenous educational practices for classroom application.

Recommendations for Further Studies

- Conduct similar studies using larger and more diverse samples across African universities.
- Examine the long-term effects of indigenous teaching methods on creativity, critical thinking, and innovation.
- Investigate students' and lecturers' perceptions of decolonial pedagogies.
- Compare specific indigenous instructional strategies, such as storytelling and apprenticeship, with inquiry-based Western approaches.
- Employ mixed-methods designs to capture both quantitative outcomes and qualitative experiences.

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HARNESSING ARTIFICIAL INTELLIGENCE (AI) FOR PERSONALIZED LEARNING: OPPORTUNITY AND CHALLENGES FOR TEACHERS IN NIGERIA

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Abstract

Artificial Intelligence (AI) is increasingly recognised as a powerful tool for transforming education through personalized learning. Through empirical review combined with field-based observations and case studies, this paper investigates, how AI applications engender personalized learning, emphasizing the challenges of AI in education and implications of personalized learning for the future of education. The paper is anchored on Behaviorism theoretical theory. Human educators remain central to the learning process, bringing empathy, cultural understanding, and creativity that AI cannot replicate to ensure equitable adoption, investments in teacher training, offline or low-bandwidth tools, and community trust are essential. suggestions were made that ethical standards should steer the responsible use of AI in education, ensuring that AI tools augment rather than supplant the vital human elements of teaching and learning, policymakers should prioritize funding for technological infrastructure and professional development, create frameworks to ensure data privacy and algorithmic fairness and that governments can support the responsible integration of AI tools, enhancing the quality and accessibility of education for all students. The paper concludes that AI should be viewed as a supportive tool rather than a replacement for teachers. Suggestions were made that there is need to encompass establishing robust data protection laws, developing inclusive AI systems, investing in infrastructure to ensure equitable access to AI resources, and providing professional development for educators, ethical standards should steer the responsible use of AI in education, and that policymakers should prioritize funding for technological infrastructure and professional development, create frameworks to ensure data privacy and algorithmic fairness, and promote research into the long-term impact of AI in education.

Keywords: Accessibility of education, Artificial intelligence, Personalized Learning, Quality

Introduction

Educational institutions have seen radical change since the advent of Artificial Intelligence (AI), including finance, healthcare, and transportation. AI technology can potentially have an outsized beneficial impact on the economy by increasing labor productivity, capital efficiency, and driving growth in sectors such as agriculture, healthcare, education, infrastructure, and energy. Artificial intelligence is a 21st century technological innovation which scholars describe in different ways. These tools empower educators, design dynamic learning environments, and deliver personalized learning experiences by utilizing data analytics, machine learning, and natural language processing (Naga and Jeevana, 2024).

However, there is likelihood to encounter some difficulties in the integration of AI tools in education even though the tools will have enhanced positive impacts in the education systems. In recent time, artificial intelligence has emerged as a powerful instrument for improving educational system. This tool was designed to imitate how a human does, such as speaking human mind, work for human based on the instruction. In essence, this technological innovation is to find a useful in all facet of life. It is finding transforming various industries speedily and education is no exception of this development (Yeruva, 2023). Education sector in particular, any problem on education can be investigated on using technological tool most especially the trending one, Artificial Intelligence (AI) to find lasting solution to it. Artificial intelligence (AI), in the view of many people is the ability of machines or computers to think and act as humans do, represents the efforts towards computerized systems to imitate the human mind and actions (Wartman & Combs, 2018). AI has the potential to revolutionize the way we learn and teach, making it more personalized, engaging, and efficient, (Alneyadi, Wardat, Alshannag, and AbuAl-Aish, 2023).

Artificial Intelligence (AI) has been identified as a potentially less costly and far-reaching tool in the work to eradicate poverty and achieve the UN Sustainable Development Goals. However, a great deal of work needs to be done in and by developing countries to take advantage of the opportunities provided by AI and close the inequality gap. It is obvious that government cannot do it alone in this regard, hence the need to look for good alternative. Many researchers have worked on the ways to improve teaching and learning of which much attention was drawn on the teachers' adequacy and the quality of instructional materials, (Mthima, 2015). It is obvious that teachers and instructional materials would always remain inadequate and the best alternative method is the adoption of technological based teaching and learning. Hence, the need to investigate the need for Artificial Intelligence and its implications on the teaching and learning processes in the school system

There is less comprehensive literature on the different impacts of AI for education systems across Africa, and particularly in Nigeria, where there are structural challenges that limit the effectiveness of teaching and learning. One of such is overcrowded classrooms which has become a common reality, with teachers often responsible for 60 to 70 students at once. This situation makes individualized instruction nearly impossible, as teachers struggle to balance curriculum delivery with the diverse needs of learners. Compounding this issue are resource constraints, including shortages of textbooks, inadequate infrastructure, and limited access to

digital technologies. These systemic challenges contribute to high dropout rates, low literacy levels, and uneven educational outcomes across regions (Kim & Lee, 2022).

Gao and Zhang (2023) agreed that the integration of Artificial Intelligence into education has been heralded as a potential solution to many of these challenges. AI technologies such as adaptive learning platforms, intelligent tutoring systems, and predictive analytics have been deployed in countries like China, the United States, and South Korea to personalize learning experiences. These systems adjust content dynamically to match each student's pace, provide real-time feedback, and identify learners at risk of falling behind. Evidence from these contexts suggests that AI can improve efficiency, enhance student engagement, and support differentiated instruction.

The global enthusiasm for AI in education is also reflected in policy frameworks. UNESCO (2023) has emphasized the importance of leveraging AI to achieve Sustainable Development Goal 4, which calls for inclusive and equitable quality education for all. Governments and international organizations increasingly view AI as a tool to bridge educational gaps, particularly in low-resource settings. However, the literature also warns of risks, including algorithmic bias, data privacy concerns, and the potential displacement of teachers if AI is misused (Luckin & Cukurova, 2022). This paper engages existing literature following the themes of Concept of Artificial intelligence (AI), concept of personalized learning, AI applications in personalized learning, theoretical framework: behaviorism learning theory, challenges of ai in education, and implications/opportunity of personalized learning for the future of education.

Concept of Artificial Intelligence

Artificial Intelligence (AI) in education has been widely studied across different contexts, with scholars emphasizing both its transformative potential and its limitations. Holmes, Bialik, and Fadel (2019) argue that AI can improve efficiency by automating routine tasks such as grading, attendance, and assessment, thereby freeing teachers to focus on higher-order pedagogical activities. AI systems can provide real-time feedback to learners, enabling more personalized instruction. Similarly, Luckin (2018) stresses that AI should be understood as a complement to human intelligence rather than a replacement. She warns that overreliance on technology risks undermining the relational and empathetic dimensions of teaching, which remain central to effective learning. Holmes and Anastopoulou (2022) provided global guidance on AI in education, emphasizing ethical considerations such as data privacy, algorithmic bias, and the need for inclusive policies. The report notes that while AI can expand access to quality education, it may also exacerbate inequalities if deployed without attention to local contexts. For example, algorithms trained on data from high-income countries may not accurately reflect the realities of learners in low-resource environments, leading to biased outcomes.

Regarding technological advances in artificial intelligence (AI), stakeholders in the educational field use the AI increasingly more and more. This new technology is used by teachers, students and parents alike, to get access to more information and handle other things. Gil de Zúñiga, Goyanes & Durotoye (2023) define AI as the actual ability of non-human machines or artificial entities of doing the things (tasks, solving problems,

communicating, interacting, acting logically) that we associate with biological humans. AI's functionality can be conceptualized along two dimensions: performance level (decision making / prediction) and autonomy level (varying level of human input, interaction, or supervision involved). Liu & Li (2022) considered that all citizens should learn about AI for two reasons: First, every student should know and understand what AI is and how he can use it and second all of them should be inspired to become designers of AI applications in the future. These results suggest the importance of developing AI centered educational programs for use in schools. To begin with, the AI program identifies information pertaining to career exploration, giving students exposure to different technology career opportunities and positive attitude towards these fields.

Concept of Personalized Learning

Personalized learning is critical in the Nigerian context because of the diversity of learners. Students enter classrooms with varying levels of preparedness, linguistic backgrounds, and socio-economic circumstances. Traditional one-size-fits-all teaching approaches fail to address these differences, leaving many students disengaged or unable to keep pace. AI offers the possibility of tailoring instruction to individual needs, thereby improving learning outcomes and reducing dropout rates. Yet, the success of such initiatives depends on the readiness of teachers, the availability of infrastructure, and the establishment of ethical safeguards (Liu & Li, 2022).

In Nigeria, the urgency of personalized learning is particularly acute. The country's education system is characterized by stark inequalities between urban and rural schools. Urban centers such as Lagos have begun experimenting with AI-driven platforms, showing promising results in mathematics instruction and student retention. In contrast, rural schools in states such as Kano face persistent barriers, including unreliable electricity, poor internet connectivity, and limited teacher training. These disparities highlight the risk that AI could exacerbate existing inequalities if not implemented thoughtfully (Dede & Richards, 2023)

Artificial Intelligence (AI) is transforming education by creating personalized learning experiences tailored to individual student needs. Magna Scientia Advanced Research and Reviews (2024) submitted that unlike traditional models, which use the same curriculum for all learners, AI systems can analyze student performance in real-time and adapt the content to fit their unique learning styles and pace. Previous studies show that adaptive learning platforms increase student retention by up to 30% by providing targeted support where it's needed most (Klemke & Specht, 2023). This shift towards personalization helps ensure that learners, regardless of their abilities, receive the right level of challenge and support, enhancing their overall educational experience.

AI Applications in Personalized Learning

According to Naga and Jeevana (2024), application of AI in Personal Learning are as follows:

1. Intelligent Tutoring Systems

Intelligent Tutoring Systems (ITS) can be defined as AI-based applications that are used in facilitated instruction, where ITS increases its difficulty level as a student improves and

tracks the student's learning style. Chen & Yang (2022) identified some of such organizations include the Carnegie Learning's MATHia, and Pearson's MyLab, which has been proved to enhance number of students' performances in their respective fields. This is AI tool in education. It adjusts feedback and instruction to the individual learning styles and speed of each student. Based on the requirements of the students, personalized learning platforms adapt the course material. The administrative load associated with assessment is minimized by automated grading systems. Immersion learning environments are provided by VR simulations, which improve comprehension and engagement.

2. Independent Learning Platforms

It is a way that educational content is delivered depending on each student's competencies, difficulties, and learning styles. Some examples include DreamBox Learning and Knewton, as they adapt the lessons themselves to achieve the best learning result in actual time. The exploration on AI impacts personalized learning by examining how these systems adjust learning pathways based on student behavior. Research indicates that personalized learning tools driven by AI can improve academic performance by 20% to 40%, especially in large-scale platforms such as Massive Open Online Courses.

3. Automated Grading Systems

Automated grading involves the use of technology in the assessment of students' papers and tests, where the results are availed immediately. Some of the popular tools that are being in used for grading and moderation of different forms of assignments include the Gradescope as well as AI-grading options from Turnitin.

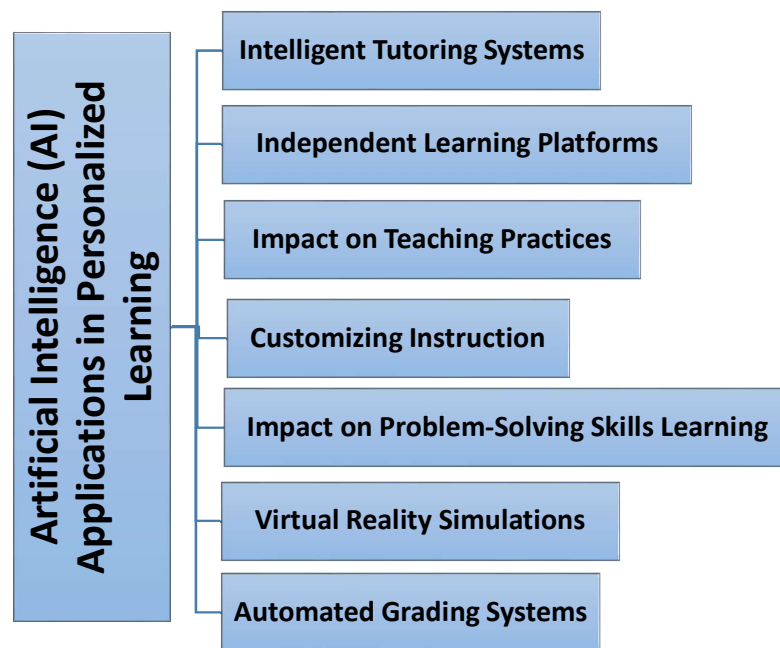


Fig. 1: Artificial Intelligence (AI) Applications in Personalized Learning
Source: Reseachers' Conceptualization (2026)

From Fig. 1, the Artificial Intelligence (AI) Applications in Personalized Learning are seen as customizing instruction, impact on problem-solving skills learning, automated grading systems, virtual reality simulations, impact on teaching practices, intelligent tutoring systems and independent learning platforms. These components are very essential for the AI applications.

4. Virtual Reality Simulations

Virtual Reality (VR) are perhaps one of the most helpful learning models geared towards improving comprehensiveness and memorization. AI improves VR through the concept of gamification and adaptive learning environment to apply on electronics, social studies, biology, and engineering subjects. There are tools such as zSpace and Labster which allow developing practical sessions and exercises which do not have a limitation when it comes to physical resources.

5. Customizing Instruction

This caters to each student's unique needs, artificial intelligence (AI) in education enhances student engagement and retention. AI applications boost teaching efficiency by automating administrative tasks, providing data-driven insights into student performance, and promoting inclusion by making high-quality education more accessible to underserved or remote students.

6. Impact on Teaching Practices

AI tools have a big impact on teaching methods since they offer cutting-edge resources for managing the classroom and delivering instruction. Diverse student capacities can be catered to through individualized instruction made possible by ITS and Personalized Learning Platforms. The time teachers spend on difficult instructional duties is freed up by automated grading systems. AI-driven analytics give insights into how well pupils are performing, allowing for the early detection of underachievers and the implementation of adaptable teaching methods.

7. Impact on Problem-Solving Skills Learning Outcomes

Artificial Intelligence (AI) techniques have shown promising improvements in student learning outcomes. Ngozi - Maulau (2021) pointed that Personalized learning platforms enhance retention and comprehension by tailoring content to individual student needs. Intelligent Tutoring Systems (ITS) often lead to higher test scores and enhanced problem-solving skills. Automated feedback strengthens learning by providing immediate corrective support. Virtual Reality (VR) simulations create dynamic and engaging learning environments that enrich understanding through practical application.

Theoretical Framework: Behaviorism Learning Theory

This study is anchored on Behaviorism theory, which focuses on the relationships among environmental conditions, events and behavior. Behaviorism focuses on a new behavioral pattern being repeated until it becomes automatic. Also, in order to activate learning it uses rewards and consequences when teaching the concept. One of the theorists who believed in rewarding good behavior and was able to do different experiments to proof his theory was

B.F. Skinner (Mergel, 1998). Behaviorism provide understanding as regard why many students have bad attitude towards learning. Uses of AI components can be applied to foster effective teaching and learning in the school system. This might motivate students to work harder at something, but this new knowledge would only be stored in their short term memory for they are focused on the reward instead of the learning. These bad habits motivate the learner to become lazy in learning unless there are rewards offered in exchange. Students are not been motivated to learn they are been motivated to win prizes instead. The good grade should be the students' reward. In other words, students have to learn to earn good grades by studying hard; they have to see that hard work pays off rather than focusing rewards.

Challenges of Artificial Intelligence (AI)& adopting Personalized Learning in Education

Mejia and Roberts (2022) pointed that over years, educators and administrators expressed concerns about data privacy when using AI platforms, reflecting the need for stronger data governance frameworks. Additionally, The factor of resistance to AI adoption, particularly from traditional educators wary of technological shifts in education. Bias in AI algorithms by the respondents, indicating that current AI systems may not always account for diverse student needs, potentially perpetuating inequalities. Moreover, most students from rural areas reported challenges with access to reliable technology and internet, limiting the scalability of AI-driven personalized learning in less developed regions.

However, challenges such as data privacy, technological access in rural areas, and resistance to AI adoption need to be addressed to ensure broader and more equitable usage of these tools in education. Although there are advantages for each group, challenges abound; Technical problems and distractions from learning goals. Interestingly, most students identified risks associated with AI. This awareness can make gifted students more wary and skeptical about their use of AI tools, and more inclined to find solutions that work on prevention of these risks and acquire full benefits they bring to learning. From this, educational institutions would need to be clear on guidelines and give training on safe usage of AI (Shute and Wang, 2022).

Today, the challenges of applying AI in education includes issues to do with data privacy and security since the system uses large amounts of data on students' performance, data which if exposed pose high risks of being hacked. Ma and Adesope (2023), in their remarks, noted some concerns for use. These include issues of algorithmic bias, the costs of implementation, and the continuous expenses that would be incurred after the implementation of the said tools. Due to unequal access to technology, issues like the digital gap increase educational disparities. The widespread collecting of data on student achievement raises privacy concerns. Inadequately planned and overseen algorithms have the potential to amplify already-existing inequalities.

Ng (2023) Submitted that over-reliance on AI tools may reduce the value of human engagement in the learning process. To address these problems, it is imperative to create moral standards, provide fair access, put data privacy safeguards in place, and maintain the human element of education. Further, implementing use of innovative solutions does take time, as society needs to spend plenty of time and money on the training of teachers and other staff members who will be using the software.

Some Empirical Studies

1. Farah (2025) examined gifted students in middle and secondary school in tapping artificial intelligence (AI). The first part introduces AI and its role in education and discusses how school students need to understand and use AI effectively. The second part examines the concept of giftedness and the characteristics of gifted students. The research employs a mixed-methods approach, administering questionnaires to two groups: It provides gifted students and peers with average IQs. Results show that gifted students often use AI tools (ChatGPT primarily) as tools to advance their learning and to self-explore, whereas, for non-gifted students (average IQ), AI is predominantly used for completing their homework. While all groups can see the value of AI in increasing engagement and motivation, they all also struggle with difficulties, like technical problems and privacy problems. The implications are that personalized feedback and effective inclusion of AI tools within an educational curriculum are both critical. The findings concluded that AI tools should be integrated into school curricula to boost students' ability in personalizing learning, boost learning by means of creativity, and augment technological competence of students. For AI to be effectively integrated, professional development of educators becomes very important to support students' diverse needs.

2. Naga and Jeevana (2024) concluded on the potential of Artificial Intelligence (AI) applications in education to revolutionize teaching and learning has attracted a lot of interest in recent years. This research paper presents an in-depth review of the many AI uses in education, such as virtual reality simulations, automated grading systems, intelligent tutoring systems, and personalized learning platforms. This article explores the potential that AI technologies offer to improve educational practices, including individualized instruction, better learning outcomes, and increased student engagement. It also discusses the challenges and ethical encounters that come with incorporating AI into the classroom, like algorithmic bias, data privacy issues, and the digital divide. This paper delves deeper into a several possibilities for future research and development in AI applications in education, highlighting the significance of interdisciplinary collaboration, building robust frameworks for assessment, and promoting equity and inclusivity in AI-powered learning environments.

3. Madhu, Latha and Savitha (2024) submitted that the integration of Artificial Intelligence (AI) into education is rapidly transforming traditional learning environments by enabling personalized learning experiences. This paper explores the role of AI in developing adaptive learning systems that tailor educational content and pathways to individual students' needs. By leveraging machine learning algorithms and learning analytics, AI-driven platforms dynamically adjust instructional materials based on students' performance, cognitive abilities, and engagement levels. The study examines the potential of AI to enhance student outcomes by creating more interactive and engaging educational experiences, thus fostering better retention and comprehension. Key challenges, such as data privacy, algorithmic bias, and equitable access, are also addressed to ensure the effective deployment of AI in diverse learning environments. Through case studies and real-world examples, this

research highlights how AI is reshaping education by making it more flexible, student-centered, and accessible.

4. Knewton and Carnegie (2020) in Ihejirika and Chukwu (2024) carried out a study from Asia and North America demonstrate the promise of AI-driven adaptive learning platforms. In China, large-scale experiments with AI tutors have shown improvements in mathematics and language learning outcomes, particularly in urban schools with strong infrastructure. In the United States, AI has been integrated into platforms such as which adjust content dynamically to student performance. These examples illustrate the potential of AI to personalize learning at scale, but they also highlight the importance of infrastructure and teacher training.

5. The OECD (2021) noted that Sub-Saharan Africa faces significant barriers to AI adoption, including unreliable electricity, limited internet connectivity, and inadequate teacher preparation. Federal Ministry of Education (FME, 2024) reports from pilot projects in Lagos State suggested that AI can improve mathematics instruction and reduce dropout rates, but rural schools remain disadvantaged. These findings align with broader studies on the digital divide, which show that urban schools are more likely to benefit from technological innovations than rural counterparts.

6. Garuba (2021) focused on teacher perceptions of AI. Studies in South Africa and Kenya reveal mixed attitudes: while some teachers welcome AI as a tool to reduce workload, others fear it may undermine their professional autonomy. Research by Mhlanga (2023) shows that teachers often lack confidence in using AI tools, underscoring the need for professional development programs that build digital literacy. Taken together, the literature suggests that AI has significant potential to enhance personalized learning, but its success depends on context-sensitive implementation. Infrastructure, teacher training, cultural adaptation, and ethical safeguards are recurring themes across global and African studies. This paper builds on these insights by providing empirical evidence from Nigerian classrooms, highlighting both the opportunities and challenges of AI adoption in practice.

Implications /Opportunity of Personalized Learning for the Future of Education

The integration of AI into education has the potential to transform learning environments globally. As AI continues to evolve, it may redefine the role of teachers, enabling them to focus on more creative and interpersonal aspects of education while allowing AI systems to handle data-driven insights and personalization. Long-term, AI could bridge learning gaps, offering customized education pathways to millions of students across diverse socio-economic backgrounds, even in regions where resources are traditionally limited.

This shift could reshape global education, leading to a more inclusive and efficient system (Siemon and Eckhardt, 2023). Looking ahead, future research could focus on refining AI-driven systems to ensure they are ethical and transparent, minimizing risks such as data privacy breaches or algorithmic bias. Additionally, investigating the long-term success of students who engage with AI-based learning platforms would provide insights into whether these systems foster lifelong learning habits.

Studies could also explore the scalability of AI education platforms in rural areas, such as those in Karnataka, to identify ways to bridge the digital divide and ensure equitable access to these technologies (Alblawi & Alsaadi, 2023). Involvement in teaching at the intersection of technology and education aligns perfectly with these cutting-edge developments in AI-driven learning, as it prepares students to thrive in an evolving landscape.

Conclusion

The study reviewed AI tools in education, underscoring their ability to improve personal learning through AI. This can be seen as AI offers immense promise for personalized learning, but its success depends on empowering teachers. Training, infrastructure, and ethical safeguards are essential. Most importantly, teachers must remain at the center of education. AI can guide, but teachers inspire. AI can analyze, but teachers empathize. AI can personalize, but teachers humanize. Nonetheless, issues such as the digital divide, data privacy concerns, and algorithmic bias must be tackled to ensure fair and successful adoption.

Also, infrastructure challenges, frequent power outages and poor connectivity meant that some schools could not participate fully in pilot projects. This highlights the need for future studies to explore offline and low-bandwidth AI solutions that are more suitable for rural contexts. Ethical concerns such as data privacy and parental trust were identified but not explored in depth. Future research should investigate how negativities perceived about AI in education for personalized learning be removed, and how policies can safeguard student data processing.

Suggestions

The researchers made the following suggestions:

1. There is need to encompass establishing robust data protection laws, developing inclusive AI systems, investing in infrastructure to ensure equitable access to AI resources, and providing professional development for educators.
2. Ethical standards should steer the responsible use of AI in education, ensuring that AI tools augment rather than supplant the vital human elements of teaching and learning.
3. Policymakers should prioritize funding for technological infrastructure and professional development, create frameworks to ensure data privacy and algorithmic fairness, and promote research into the long-term impact of AI in education.
4. Policymakers can support the responsible integration of AI tools, enhancing the quality and accessibility of education for all students.
5. There is need for more personalized and integrated school curriculum, or include gamification components for learners which would help and enable them to create tools that do more than help them with academic tasks, units that support critical thinking and creativity.
6. Future research should therefore conduct large-scale, multi-regional studies across Nigeria, integrate quantitative measures of personalized learning with teacher professional development programs.

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THE ROLES OF TECHNOLOGY IN REDEEMING AFRICAN ARTS FOR SUSTAINABLE DEVELOPMENT

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Abstract

African arts constitute a vital aspect of the continent's cultural heritage, reflecting the history, values, beliefs, and identities of African societies. Numerous cultural practices, languages, and artistic expressions face the risk of decline or extinction resulting from inadequate funding, and weak preservation mechanisms. This paper examines how technology has transformed African arts for sustainable development. The paper is anchored by Inter-Century Theory of Cultural Transformation and Continuity. The paper explores various technological innovations, including digital archiving, social media platforms, virtual museums, digital film production, and online learning platforms. The study further highlights the contributions of technology-driven African arts to economic growth, cultural sustainability, social inclusion, education, and employment creation. Nevertheless, challenges such as the digital divide, inadequate infrastructure, technological illiteracy, copyright infringement, and the risk of cultural dilution continue to hinder the full realization of these benefits. The paper concludes that technology is not merely a tool for modernization but a strategic instrument for preserving Africa's rich cultural heritage. Based on discussions of the paper it was recommended that increased investment in digital infrastructure, stronger intellectual property protection, capacity building for artists, integration of digital arts into educational curricula, and greater collaboration among governments and private organizations.

Keywords: African Arts, Technology, Cultural Heritage, Digital Preservation, Sustainable Development

Introduction

African arts represent one of the continent's richest cultural heritages, encompassing visual arts, music, dance, literature, crafts, textiles, sculpture, architecture, drama, and indigenous knowledge systems. These artistic traditions are deeply embedded in the social, religious, political, and economic life of African societies. Unlike many Western artistic traditions that

often emphasize individual creativity and aesthetic appreciation, African arts are generally communal in nature and serve functional purposes within society. They act as instruments for transmitting cultural values, preserving historical memory, reinforcing social norms, facilitating spiritual practices, and fostering communal identity (Mbiti, 1990; Wiredu, 1998). Through traditional festivals, masquerades, storytelling, music, and visual arts, African communities have historically educated younger generations about their origins, moral values, leadership structures, and cultural responsibilities.

Furthermore, African arts have contributed significantly to economic development through indigenous industries such as weaving, pottery, bronze casting, beadwork, leatherwork, wood carving, and textile production. Historically, civilizations such as the Nok, Benin, Ife, Ashanti, and Mali empires developed sophisticated artistic traditions that attracted both regional and international recognition (Adejumo, 2002). These artistic expressions not only reflected the creativity and ingenuity of African peoples but also contributed to trade, tourism, and cultural diplomacy. In contemporary Africa, creative industries continue to generate employment opportunities and contribute substantially to national economies through sectors such as music, film, fashion, and crafts (UNESCO, 2022).

Urbanization which contributed to the erosion of traditional artistic practices. Through migration of people from rural communities to urban centers in search of economic opportunities, traditional apprenticeship systems that once ensured the transmission of artistic skills from one generation to another are gradually declining. Many indigenous crafts, oral traditions, and performance arts are therefore at risk of extinction due to the absence of systematic preservation mechanisms (Nzewi, 2003). Furthermore, inadequate government funding and limited institutional support have hindered the development of cultural infrastructure necessary for the preservation and promotion of African arts.

Another critical challenge is the technological disparity that exists across many African countries. Limited access to digital technologies, internet connectivity, electricity, and technical expertise has prevented many artists and cultural practitioners from fully participating in the global digital economy. Consequently, numerous artistic works remain undocumented, inaccessible, and vulnerable to loss (United Nations, 2015).

In response to these challenges, technology has emerged as a transformative tool for revitalizing, preserving, promoting, and commercializing African arts. Advances in Information and Communication Technology (ICT). Digital technologies facilitate the documentation and archiving of endangered cultural practices, oral histories, traditional music, indigenous languages, and artistic artifacts, thereby ensuring their preservation for future generations (UNESCO, 2022). Additionally, technology creates new employment opportunities within the creative economy. Digital content creation, animation, graphic design, film production, digital marketing, and cultural tourism have become important sources of income for many young Africans. These developments align closely with sustainable development objectives by promoting inclusive economic growth, reducing unemployment, and encouraging innovation (United Nations, 2015).

More importantly, redeeming African arts for sustainable development through technology has gained increasing prominence among scholars, policymakers, cultural practitioners, and development agencies. Redeeming African arts through technology involves strategically utilizing digital innovations to preserve cultural heritage, enhance artistic creativity, expand market access, strengthen cultural identity, and promote socio-economic development while safeguarding indigenous values for future generations. It represents a deliberate effort to harness modern technological advancements not as replacements for traditional artistic practices but as complementary tools that can ensure their survival, relevance, and sustainability in an increasingly digital world (Ebewo, 2015).

As a corollary, the successful integration of technology into African arts has far-reaching implications for sustainable development. It contributes to cultural sustainability by preserving heritage, economic sustainability by generating income and employment, and social sustainability by strengthening cultural identity and social cohesion. Therefore, the redemption of African arts through technology is not merely a cultural initiative but a strategic development agenda capable of transforming Africa's creative industries into powerful engines of innovation, economic growth, and cultural renaissance in the twenty-first century.

Statement of the Problem

For centuries, artistic traditions such as sculpture, music, dance, oral literature, textiles, architecture, theatre, and crafts have played significant roles in maintaining African cultural identity and communal values. However, these artistic traditions are increasingly threatened by globalization, urbanization, cultural homogenization, inadequate documentation, declining interest among younger generations, and insufficient institutional support. The technologies such as Information and Communication Technology (ICT), Virtual Reality (VR), digital archiving systems, social media platforms, have the potential to revitalize endangered cultural practices and expand their global reach. Despite these opportunities, many African artists and cultural institutions face challenges including inadequate digital infrastructure, technological illiteracy, insufficient funding, weak intellectual property protection, and limited access to technological resources. Consequently, many valuable African artistic traditions remain under-documented, underutilized, and vulnerable to extinction. While technology has transformed creative industries globally, its potential contribution to the preservation and sustainable development of African arts has not been fully realized. It is against this backdrop that the authors deem it fit to examine how African arts could be redeemed for sustainable development through technology.

Objectives of the Study

The aim of this study is to examine how technology can be utilized to redeem African arts for sustainable development. Therefore, the study seeks to:

1. examine the historical development of African arts and their significance in African societies.
2. account for the role of technology in preserving African cultural heritage and artistic traditions
3. highlight the contributions of digital technologies and other emerging technologies on African artistic creativity and innovation;

4. identify the challenges associated with the integration of technology into African arts;
5. evaluate the contributions of technology-driven African arts to sustainable development; and
6. identify the strategies for enhancing the effective utilization of technology in preserving and promoting African arts.

Research Questions

The underlisted research questions were raised to give the study a focus

1. Traced the historical antecedents of African arts within the context of African societies?
2. Assess the contributions of modern technology to the preservation of African cultural heritage and artistic traditions?
3. What roles do digital technologies and other emerging technologies plays in the development and promotion of African arts in contemporary Africa?
4. Highlight the challenges hindering the effective integration of technology into African arts?
5. How does technology-driven African art contribute to sustainable development in Africa?
6. What strategies can be adopted to enhance the use of technology for the preservation, promotion, and commercialization of African arts?

Conceptual Clarifications

African Arts

African arts refer to the diverse forms of creative and cultural expressions that originate from the various societies, ethnic groups, and civilizations across the African continent. These artistic expressions embody the beliefs, values, traditions, histories, and worldviews of African peoples. Unlike many Western artistic traditions that often emphasize aesthetics and individual creativity, African arts are generally functional, communal, and deeply integrated into social, political, religious, and economic life (Mbiti, 1990). They serve as mediums through which communities communicate cultural knowledge, preserve historical memories, reinforce social norms, celebrate achievements, and maintain connections with ancestral traditions.

African arts encompass a broad spectrum of creative activities, including traditional sculpture, textile production, pottery, music and dance, oral literature, theatre and drama, painting, architecture, digital arts, and film production. These artistic forms vary across regions but collectively reflect Africa's rich cultural diversity and historical experiences.

Traditional sculpture remains one of the most recognized forms of African artistic expression. Sculptures produced in ancient civilizations such as Nok, Ife, and Benin were used for religious rituals, royal ceremonies, and social communication. According to Adejumo (2002), African sculptures often carry symbolic meanings and represent communal values rather than merely serving decorative purposes. Similarly, textile production, exemplified by Yoruba Aso-Oke, Ghanaian Kente cloth, and Ethiopian weaving traditions, functions as both cultural symbolism and economic enterprise.

Music and dance occupy a central place in African societies. They accompany religious ceremonies, festivals, marriages, funerals, and communal celebrations. African music often combines rhythm, movement, storytelling, and social interaction, making it an important instrument for transmitting cultural values and historical knowledge (Nzewi, 2003). Oral literature, including folktales, proverbs, myths, legends, and praise poetry, has historically served as a means of educating younger generations about morality, leadership, and community responsibilities.

Theatre and drama in Africa have evolved from traditional performances such as masquerades and ritual enactments to contemporary stage productions and films. The emergence of the Nigerian film industry, Nollywood, demonstrates how African artistic traditions continue to adapt to modern realities while maintaining indigenous cultural elements. Likewise, contemporary digital arts and animation are increasingly incorporating African themes, folklore, and aesthetics to reach global audiences.

Architecture also forms an important component of African arts. Traditional African architectural designs reflect environmental adaptation, indigenous engineering knowledge, and cultural identity. Examples include the mud architecture of Mali, the stone structures of Great Zimbabwe, and traditional compound systems found in many African societies (Oliver, 2008).

According to Vansina (1985), African arts serve as repositories of historical memory, cultural values, and communal identity. Through artistic expressions, societies preserve collective experiences, document historical events, and maintain continuity between past, present, and future generations. Consequently, African arts represent not only cultural heritage but also valuable resources for social cohesion, education, tourism, and economic development.

Technology

Technology refers to the practical application of scientific knowledge, digital innovations, technical skills, and modern tools to solve problems, improve productivity, and enhance human activities. In contemporary society, technology extends beyond machinery and industrial equipment to include information systems, communication networks, artificial intelligence, and digital platforms that facilitate learning, creativity, commerce, and social interaction (Castells, 2010). The rapid advancement of technology has transformed virtually every sector of society, including education, healthcare, agriculture, business, governance, and the creative industries. Within the context of African arts, technology provides innovative means of preserving cultural heritage, creating artistic content, distributing cultural products, and connecting artists with global audiences.

Information and Communication Technology (ICT) one of the most influential technological innovations is Information and Communication Technology (ICT). ICT encompasses computers, telecommunications systems, internet services, mobile technologies, and digital communication platforms. ICT facilitates the digitization of cultural artifacts, documentation of indigenous knowledge systems, online exhibitions, and virtual cultural exchanges.

Through ICT, African artistic works can be preserved in digital archives and accessed by people across the world regardless of geographical limitations (UNESCO, 2022).

Virtual Reality (VR) and Augmented Reality (AR) technologies have further revolutionized artistic experiences. Virtual Reality creates immersive digital environments that allow users to interact with simulated cultural spaces, museums, and historical sites. Augmented Reality overlays digital information onto physical environments, enhancing artistic presentations and educational experiences. These technologies offer opportunities for virtual tourism, interactive storytelling, and cultural heritage preservation (Ebewo, 2015).

Digital media platforms have become essential tools for promoting African arts. Platforms such as YouTube, Facebook, Instagram, TikTok, and Spotify enable artists to showcase their works, engage with audiences, and generate income through digital content distribution. These platforms have played a significant role in the global success of African music genres, films, fashion, and visual arts.

Emerging technologies such as blockchain technology are increasingly being adopted within creative industries. Blockchain provides secure and transparent systems for protecting intellectual property rights, verifying ownership of artistic works, and facilitating digital transactions. Artists can utilize blockchain-based systems to prevent unauthorized reproduction and ensure fair compensation for their creative outputs.

Additionally, mobile applications and e-commerce systems have transformed the commercialization of African arts. Artists and cultural entrepreneurs can market and sell their products directly to consumers through online marketplaces, thereby expanding market access and reducing dependence on intermediaries. Such technological innovations contribute significantly to economic empowerment and sustainable livelihood creation.

In the twenty-first century, technology has emerged as a transformative solution to many of these challenges. Digital technologies provide unprecedented opportunities for documenting, preserving, promoting, and revitalizing endangered cultural resources. Through digital archiving, virtual museums, online exhibitions, multimedia documentation, and cloud-based storage systems, artistic traditions can be preserved for future generations regardless of geographical location (UNESCO, 2022).

Information and Communication Technology (ICT), Artificial Intelligence (AI), Virtual Reality (VR), and Augmented Reality (AR) are increasingly being utilized to record oral histories, digitize artifacts, recreate historical environments, and enhance cultural education. These technologies enable cultural institutions to preserve fragile artifacts while making them accessible to global audiences. Furthermore, social media platforms, digital streaming services, and e-commerce systems have expanded opportunities for African artists to showcase and commercialize their works internationally. Technology therefore not only preserves artistic heritage but also contributes empowerment, cultural sustainability, and creative innovation. Consequently, technology now offers unprecedented opportunities for preserving and revitalizing African arts. By combining indigenous cultural knowledge with

modern digital innovations, African societies can safeguard their artistic heritage, strengthen cultural identity, create employment opportunities, and contribute meaningfully to sustainable development in the contemporary world.

Sustainable Development

The concept of sustainable development gained global prominence through the report of the World Commission on Environment and Development (WCED), commonly known as the Brundtland Commission Report. The Commission defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p. 43). This definition emphasizes the need to balance economic growth, social progress, environmental protection, and cultural preservation to ensure long-term human well-being. Sustainable development recognizes that development should not focus solely on economic advancement but should also address social equity, environmental conservation, and cultural continuity. Consequently, sustainable development is often understood through four interrelated dimensions: economic sustainability, social sustainability, cultural sustainability, and environmental sustainability.

Contributions to Sustainable Development

Economic Sustainability: Technology-driven creative industries contribute substantially to economic sustainability by generating employment opportunities, reducing poverty, increasing foreign exchange earnings, and promoting entrepreneurship. The creative economy has emerged as an important contributor to national income in several African countries through sectors such as music, film, fashion, visual arts, and digital media (UNCTAD, 2022). The integration of technology enhances productivity, expands market access, and attracts investment into cultural industries, thereby supporting long-term economic growth. **Cultural Sustainability:** Technology plays a crucial role in preserving indigenous language, traditional music, cultural practices, oral histories, and artistic traditions. Digital preservation initiatives ensure that cultural heritage remains accessible to future generations despite the pressures of globalization and modernization (UNESCO, 2022). By safeguarding cultural resources, technology strengthens cultural identity and promotes continuity across generations.

Social Sustainability: Digital arts promote social inclusion, community participation, youth empowerment, and gender equality. Online platforms provide opportunities for marginalized groups to express their identities, share their experiences, and participate in cultural production. Technology also facilitates intercultural dialogue and strengthens social cohesion by connecting diverse communities through shared cultural experiences (United Nations, 2015).

Educational Sustainability: Technology enhances access to cultural education, research opportunities, knowledge sharing, and lifelong learning. Students, researchers, and cultural practitioners can access digital archives, virtual museums, online courses, and educational resources that support academic inquiry and cultural literacy. Consequently, technology contributes to the development of informed and culturally conscious citizens capable of preserving and advancing Africa's artistic heritage.

Theoretical Framework

The relevant theoretical framework for the topic under review is the Inter-Century Theory of Cultural Transformation and Continuity. This theory explains how societies preserve, adapt, and transmit cultural heritage from one century to another through changing social, economic, political, and technological conditions. The theory emphasizes that culture is dynamic rather than static; it evolves continuously while retaining its core values and identity. Thus, technological innovations should not be viewed as threats to traditional cultures but as instruments through which cultural heritage can be preserved, renewed, and transmitted across generations.

Inter-Century Theory of Cultural Transformation and Continuity

The Inter-Century Theory posits that every generation inherits cultural practices from preceding generations, modifies them according to prevailing realities, and transfers them to future generations in forms that remain relevant and meaningful. The theory argues that cultural continuity depends on a society's ability to adapt its traditions to contemporary circumstances without losing their essential identity (Toynbee, 1972).

Applied to African arts, the theory explains how traditional artistic expressions such as sculpture, music, dance, oral literature, textiles, architecture, theatre, and crafts have survived across centuries despite social and technological transformations. For example, traditional African storytelling, which was historically transmitted orally around communal gatherings, has evolved into contemporary forms such as radio dramas, documentaries, podcasts, digital animations, and online cultural archives. Similarly, indigenous musical traditions that were once performed exclusively in local communities are now produced digitally and distributed globally through streaming platforms. These developments illustrate the central proposition of the Inter-Century Theory that cultural survival depends on adaptation and innovation.

Relevance of the Theory to Digital Preservation of African Arts

One of the major concerns addressed in this study is the preservation of endangered African artistic traditions. The Inter-Century Theory provides a useful explanation for why digital preservation has become necessary in the twenty-first century. Historically, African societies relied heavily on oral traditions, apprenticeship systems, and communal participation for the transmission of cultural knowledge. However, modernization and globalization have weakened many of these traditional mechanisms. The theory suggests that when older methods of cultural transmission become insufficient, societies must develop new mechanisms to ensure continuity. Technology therefore becomes a contemporary tool for preserving cultural heritage across centuries. Digital archives, online museums, virtual exhibitions, cloud storage systems, and multimedia databases serve as modern equivalents of traditional cultural repositories. Through these technologies, artistic expressions that might otherwise disappear can be preserved and transmitted to future generations.

Inter-Century Theory and Sustainable Development

The theory is also relevant to sustainable development because it emphasizes the long-term preservation of cultural resources. Sustainable development seeks to meet present needs without compromising the ability of future generations to meet their own needs (WCED,

1987). Similarly, the Inter-Century Theory advocates for the transmission of cultural heritage across generations. Technology contributes to this objective by ensuring that African artistic traditions continue to generate social, cultural, educational, and economic benefits over time. Through digital platforms, African arts can create employment opportunities, generate income, support tourism, strengthen cultural identity, and promote lifelong learning. These contributions align with the economic, social, cultural, and educational dimensions of sustainable development.

The Inter-Century Theory is particularly relevant to the study under review because it explains the relationship between cultural continuity, technological innovation, and sustainable development. The theory supports the view that:

1. African arts are dynamic cultural resources that evolve across generations.
2. Technology serves as a modern mechanism for preserving and transmitting cultural heritage.
3. Digital innovations enhance rather than necessarily undermine cultural authenticity.
4. Cultural preservation contributes to sustainable development by promoting social cohesion, economic growth, education, and cultural identity.
5. The future survival of African arts depends on their ability to adapt to contemporary technological realities.

Consequently, the theory provides a strong framework for understanding how technology can be employed to redeem African arts by ensuring their preservation, promotion, commercialization, and sustainability in the digital age.

Historical Antecedents of African Arts

The history of African arts is as old as the civilizations that emerged across the African continent. Long before the advent of colonialism, African societies developed rich and sophisticated artistic traditions that reflected their cultural values, religious beliefs, social structures, and philosophical worldviews. Art was not viewed merely as an aesthetic pursuit but as an integral component of daily life, serving religious, political, educational, economic, and social functions. African artistic expressions were deeply embedded in communal life and were used to preserve history, communicate cultural values, legitimize political authority, and facilitate interaction between the physical and spiritual worlds (Mbiti, 1990).

Traditional African societies viewed art as a collective cultural asset rather than an individual endeavor. Artistic productions such as sculpture, painting, pottery, textiles, music, dance, architecture, and oral performances were often created for communal purposes, including festivals, rites of passage, religious ceremonies, royal functions, and social celebrations. According to Vansina (1985), African artistic traditions served as important repositories of historical memory and indigenous knowledge, enabling communities to transmit cultural values and historical experiences across generations.

One of the most significant ways technology is redeeming African arts is through the digital preservation of cultural heritage. Historically, many African artistic traditions were transmitted orally from one generation to another through storytelling, apprenticeship, music, dance, rituals, and communal participation. While these traditional methods effectively

preserved cultural knowledge for centuries, they also made artistic traditions vulnerable to loss, distortion, and extinction, particularly in the face of modernization, urbanization, and globalization (Vansina, 1985).

Pre-Colonial African Artistic Traditions

Before colonialism, numerous African civilizations attained remarkable levels of artistic excellence. Archaeological evidence demonstrates that African societies developed sophisticated artistic traditions that rivaled those of other ancient civilizations. These artistic achievements reflected advanced technological knowledge, creative ingenuity, and cultural sophistication.

One of the earliest examples of African artistic achievement is found in the Nok civilization of present-day Nigeria. The Nok people are renowned for their terracotta sculptures, which are among the oldest known figurative sculptures in Sub-Saharan Africa. These sculptures exhibit remarkable technical skill and artistic creativity, suggesting the existence of highly organized societies with specialized artistic traditions (Fagg, 1977). The Nok terracottas often depict human figures, animals, and symbolic motifs, providing valuable insights into the social and religious life of ancient African communities.

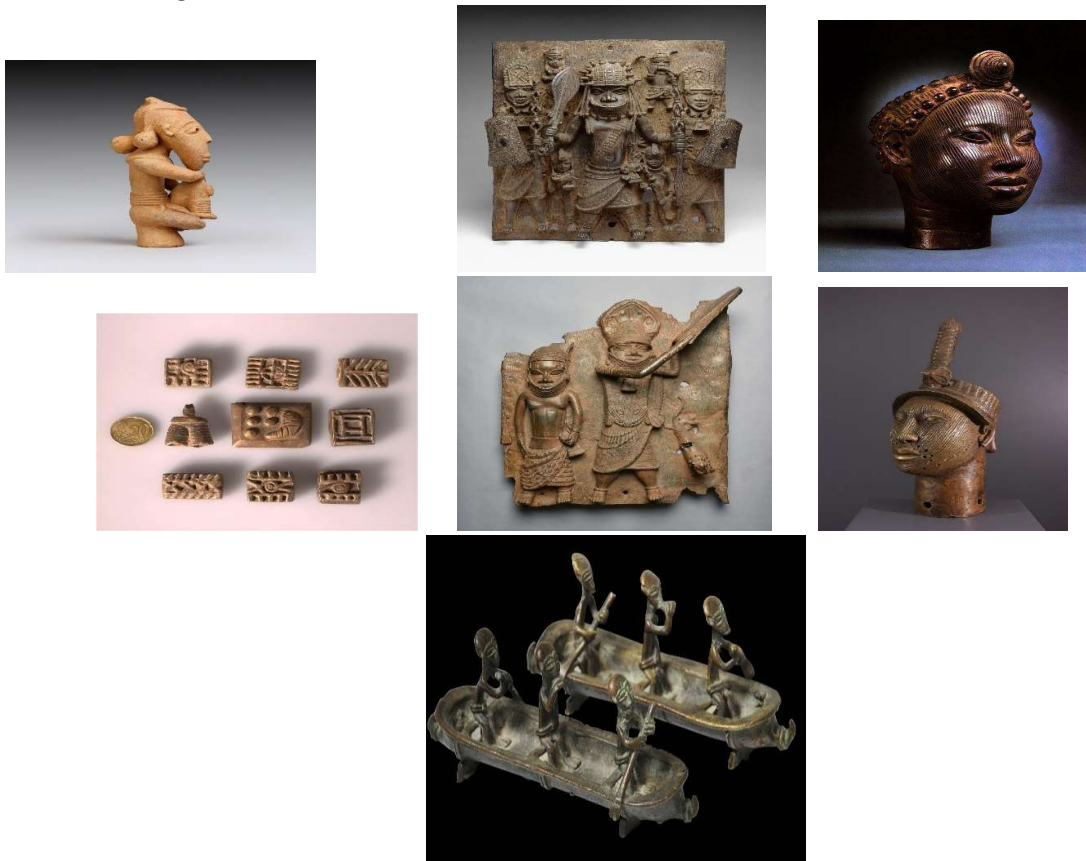


Fig 1:

Sources: Fagg, 1977, Ben-Amos, 1995, Willett, 2004

Similarly, the ancient Kingdom of Benin in present-day southern Nigeria became internationally recognized for its exceptional bronze works.

The Yoruba civilization of Ile-Ife also contributed significantly to Africa's artistic heritage. Ife artists produced highly naturalistic terracotta and bronze sculptures characterized by extraordinary realism and technical precision. The famous Ife heads have challenged earlier Western assumptions regarding African artistic capabilities due to their sophisticated craftsmanship and aesthetic refinement (Willett, 2004).

In West Africa, the Ashanti Kingdom of present-day Ghana developed a rich tradition of gold craftsmanship. Gold was central to Ashanti culture, symbolizing wealth, authority, spirituality, and social status. Ashanti artisans produced intricately designed gold jewelry, ceremonial regalia, gold weights, and symbolic ornaments that reflected indigenous philosophies and social organization (Ross, 2002). These artistic creations not only demonstrated technical expertise but also functioned as important expressions of cultural identity.

In East Africa, Ethiopian artistic traditions flourished through religious paintings, illuminated manuscripts, church architecture, and iconography associated with Christianity. Ethiopian religious art served educational and spiritual functions by illustrating biblical narratives and reinforcing religious teachings. The distinctive styles of Ethiopian paintings continue to represent one of Africa's most enduring artistic traditions (Pankhurst, 1997).

Beyond these well-known examples, numerous African societies developed artistic traditions in textiles, pottery, beadwork, architecture, music, dance, and oral literature. Architectural achievements such as the stone structures of Great Zimbabwe, the mud mosques of Mali, and traditional compounds across West Africa demonstrate the ingenuity of indigenous African builders and designers (Oliver, 2008).

Colonialism and the Disruption of African Arts

The arrival of European colonial powers during the nineteenth and twentieth centuries significantly disrupted many indigenous African artistic traditions. Colonial administrations often viewed African cultural practices as primitive, inferior, or incompatible with Western notions of civilization. Consequently, colonial policies frequently discouraged or suppressed indigenous artistic expressions, religious practices, and traditional educational systems (Rodney, 1972).

Missionary activities contributed to this disruption by condemning many traditional artistic objects as symbols of paganism or superstition. Sacred sculptures, masks, ritual objects, and indigenous religious artifacts were often destroyed or removed from their cultural contexts. Many traditional festivals and ceremonial performances were discouraged or prohibited, resulting in the gradual erosion of cultural practices that had been preserved for centuries (Falola & Heaton, 2008).

Furthermore, colonial exploitation led to the removal of thousands of African cultural artifacts to museums and private collections in Europe and North America. The displacement of these artifacts deprived many African communities of important cultural resources and

historical symbols. The ongoing international debate regarding the repatriation of African cultural objects highlights the enduring consequences of colonial cultural appropriation (Hicks, 2020).

Post-Independence Cultural Renaissance

Following political independence in the mid-twentieth century, many African nations initiated efforts to reclaim, preserve, and promote indigenous cultural expressions. Governments, universities, cultural institutions, and scholars recognized the importance of arts and culture in nation-building, identity formation, and socio-economic development. Cultural festivals, museums, national theatres, and arts councils were established to revive traditional artistic practices and celebrate African heritage (Falola & Heaton, 2008). The post-independence period also witnessed the emergence of modern African artistic movements that combined traditional cultural elements with contemporary forms of expression. African literature, visual arts, music, theatre, and film increasingly reflected indigenous themes while addressing modern social, political, and economic realities.

Contemporary Challenges Facing African Arts

Despite these efforts, numerous challenges continue to threaten African artistic traditions. Rapid modernization, urbanization, globalization, cultural homogenization, and inadequate funding have contributed to the decline of many indigenous art forms. Traditional apprenticeship systems have weakened as younger generations migrate to urban areas and adopt contemporary lifestyles. Many indigenous languages, oral traditions, and cultural practices face extinction due to insufficient documentation and preservation mechanisms (UNESCO, 2022).

Additionally, many museums, cultural centers, archives, and heritage institutions operate with limited resources, restricting their ability to effectively preserve and promote African artistic heritage. Intellectual property violations, piracy, and unauthorized reproduction of cultural products further undermine the economic sustainability of artistic production.

Situational and Policy Analysis of Redeeming African Arts for Sustainable Development through Technology

The rapid advancement of digital technologies has fundamentally transformed the creation, preservation, dissemination, and commercialization of artistic and cultural products across the world. In Africa, technology has emerged as a powerful instrument for addressing longstanding challenges associated with cultural preservation, limited market access, inadequate documentation, and declining interest in traditional artistic practices. By integrating modern digital innovations into the creative sector, African societies are increasingly safeguarding their cultural heritage while simultaneously promoting economic growth, social inclusion, and sustainable development. Technology is therefore playing a critical role in redeeming African arts by ensuring that indigenous artistic traditions remain relevant, accessible, and economically viable in the twenty-first century (UNESCO, 2022).

1. Digital Preservation of Cultural Heritage

Modern digital technologies provide effective mechanisms for documenting and preserving endangered cultural resources. Through digital archiving, online museums, electronic documentation systems, and cloud-based storage platforms, cultural artifacts and artistic expressions can be permanently recorded and made accessible to future generations. Digital preservation involves converting cultural materials into electronic formats that can be stored, shared, and retrieved regardless of geographical location. Examples include the digital recording of indigenous music, the documentation of traditional dances, the digitization of ancient manuscripts, and the creation of online repositories containing African folklore, oral histories, and traditional crafts. Museums, universities, and cultural institutions increasingly employ digital technologies to preserve historical artifacts that might otherwise deteriorate due to age, environmental factors, or inadequate storage conditions (UNESCO, 2022).

2. Promotion of African Arts Through Social Media

Social media has revolutionized the visibility and accessibility of African arts. Before the digital era, artists relied heavily on physical exhibitions, galleries, cultural festivals, and traditional media channels to reach audiences. These platforms often restricted exposure to local or regional markets. Today, social media platforms have eliminated many of these barriers by providing artists with direct access to global audiences (Castells, 2010). Platforms such as YouTube, Instagram, TikTok, Facebook, and X have become powerful tools for promoting African artistic expressions. Through these platforms, musicians, dancers, painters, fashion designers, photographers, filmmakers, and craftspeople can showcase their works to millions of people worldwide without requiring substantial financial investments. (UNESCO, 2022). Furthermore, social media contributes to cultural diplomacy by introducing African artistic traditions to diverse audiences and challenging stereotypes about African cultures. It therefore functions as both a marketing tool and a medium for cultural education.

3. Virtual Museums and Online Exhibitions

Virtual museums and online exhibitions represent another important technological innovation that is redeeming African arts. Traditionally, access to museums and cultural collections required physical visits, which were often constrained by distance, financial costs, or mobility limitations. Virtual technologies have removed these barriers by enabling individuals to access cultural resources remotely through internet-connected devices. Virtual museums provide digital representations of artifacts, exhibitions, historical sites, and cultural collections. Users can explore galleries, examine artifacts in detail, and interact with educational materials from anywhere in the world. These platforms significantly increase cultural accessibility and promote global awareness of African heritage (Parry, 2010).

4. Digital Film and Animation Industry

Technology has transformed African storytelling through the growth of digital film and animation industries. Storytelling has always occupied a central position in African societies, serving educational, moral, historical, and entertainment functions. Contemporary digital technologies have expanded the possibilities for storytelling by enabling the production and distribution of films, documentaries, and animated content on a global scale. The development of affordable digital cameras, editing software, computer-generated imagery (CGI),

animation tools, and streaming services has significantly reduced production costs while improving content quality. The rise of Nollywood, one of the world's largest film industries, illustrates how technology can facilitate the growth of creative industries and cultural production (Haynes, 2016).

Animation studios across Africa are increasingly producing culturally relevant content that reflects African histories, myths, folktales, and contemporary experiences. These productions help preserve cultural narratives while appealing to younger audiences accustomed to digital media. The expansion of digital film and animation industries contributes to employment creation, skills development, cultural preservation, and economic growth. It also strengthens cultural identity by ensuring that African stories are told from African perspectives.

5. Digital Education and Skills Development

Technology has expanded access to arts education and professional development opportunities throughout Africa. Historically, access to specialized artistic training was often limited by geographical location, financial constraints, and inadequate educational infrastructure. Digital technologies have significantly reduced these barriers. Online learning platforms, virtual workshops, webinars, digital mentorship programs, and educational applications provide opportunities for individuals to acquire artistic and entrepreneurial skills regardless of location. Students can access instructional materials, participate in virtual training sessions, and engage with experts from different parts of the world (OECD, 2021). Digital education supports the development of competencies in graphic design, animation, filmmaking, digital marketing, photography, music production, and cultural entrepreneurship. These skills enhance employability and promote innovation within the creative economy. Moreover, digital literacy equips artists with the knowledge necessary to effectively utilize technological tools for production, promotion, and commercialization, thereby strengthening the sustainability of artistic careers.

Challenges hindering Effective integration of Technology to Africa Arts

Although technology presents enormous opportunities for preserving, promoting, and commercializing African arts, numerous challenges continue to hinder the effective integration of digital innovations into the continent's creative and cultural sectors. These challenges range from infrastructural deficiencies and financial constraints to intellectual property concerns and cultural preservation issues. Addressing these obstacles is essential if technology is to serve as a sustainable instrument for the revitalization of African arts and cultural heritage.

Digital Divide

The digital divide refers to the unequal access to information and communication technologies among individuals, communities, and regions. Despite improvements in internet penetration across Africa, significant disparities remain between urban and rural areas regarding access to digital infrastructure and technological resources (World Bank, 2021). Many rural communities continue to experience inadequate internet connectivity, unreliable electricity supply, and limited access to digital devices such as computers, smartphones, and tablets. The digital divide also contributes to inequalities in cultural representation. Urban

artists with access to technological resources often enjoy greater visibility and economic opportunities than their rural counterparts. This disparity may result in the underrepresentation of rural artistic traditions within digital spaces, thereby undermining efforts to preserve Africa's diverse cultural heritage (UNESCO, 2022).

Inadequate Funding

Financial constraints constitute another major challenge to the redemption of African arts through technology. Effective digital preservation, technological innovation, and creative industry development require substantial investments in infrastructure, training, equipment, research, and institutional support. However, cultural and creative sectors in many African countries often receive limited budgetary allocations compared to other development priorities (Throsby, 2010). Insufficient funding affects several critical areas, including the establishment of digital archives, development of virtual museums, digitization of cultural artifacts, maintenance of cultural institutions, and implementation of technology-based artistic programs. Many museums, libraries, cultural centers, and heritage organizations lack the financial resources necessary to acquire modern technological equipment or employ specialized personnel.

Copyright Violations and Intellectual Property Theft

The expansion of digital technologies has increased concerns regarding copyright violations and intellectual property protection within the creative sector. While digital platforms facilitate the dissemination of artistic works, they also create opportunities for piracy, unauthorized reproduction, plagiarism, and illegal distribution of creative content (WIPO, 2022). African artists frequently face challenges in protecting their intellectual property rights due to weak enforcement mechanisms, inadequate legal frameworks, and limited awareness of copyright regulations. Digital artworks, music recordings, films, literary works, and cultural products can be copied and distributed globally with minimal effort, often without the consent or compensation of the original creators.

Technological Illiteracy

Technological illiteracy represents another major obstacle to the digital transformation of African arts. Although digital technologies offer numerous opportunities for artistic production, promotion, and commercialization, many artists and cultural practitioners lack the necessary digital competencies to utilize these tools effectively (UNESCO, 2021). Digital literacy encompasses skills such as computer operation, internet navigation, digital content creation, online communication, social media management, e-commerce participation, and data management. Many traditional artists, artisans, and cultural custodians have limited exposure to these technologies, particularly in rural communities where educational and technological resources are scarce.

Cultural Dilution and Loss of Authenticity

While technology facilitates innovation and global exposure, it also raises concerns regarding cultural dilution and the potential loss of artistic authenticity. Global digital platforms often encourage conformity to international trends, commercial preferences, and dominant cultural narratives. In some cases, artists may modify traditional artistic forms to appeal to broader

audiences, potentially compromising indigenous values and cultural meanings (Tomlinson, 1999).

Strategies for Enhancing Technology-Driven African Arts

To maximize the potential of technology as a tool for cultural preservation, artistic innovation, and sustainable development, coordinated efforts are required from governments, educational institutions, artists, private-sector organizations, and international development agencies. The following strategies can strengthen the integration of technology into African arts while addressing existing challenges.

Government Interventions

Governments play a central role in creating an enabling environment for technology-driven cultural development. One of the most important responsibilities of governments is investing in digital infrastructure, including broadband internet connectivity, reliable electricity supply, data centers, and telecommunications networks. Improved infrastructure will facilitate access to digital technologies and reduce disparities between urban and rural communities (World Bank, 2021).

Educational Institution Initiatives

Educational institutions have a crucial role in preparing future generations of artists and cultural practitioners for participation in the digital economy. Universities, colleges, and vocational training centers should integrate digital arts, creative technologies, and cultural heritage management into their curricula. Institutions should promote training in Artificial Intelligence, digital animation, graphic design, virtual reality, multimedia production, and digital entrepreneurship. These competencies will enable students to combine artistic creativity with technological innovation.

Responsibilities of Artists and Cultural Practitioners

Artists themselves must actively embrace emerging technologies and adapt to changing cultural and economic environments. Continuous learning and professional development are essential for acquiring the digital skills required for content creation, online marketing, e-commerce participation, and intellectual property management. Artists should strategically utilize digital platforms to promote their works, engage with audiences, and access international markets.

Private Sector Participation

The private sector possesses significant resources and expertise that can accelerate the growth of technology-driven creative industries. Technology companies, financial institutions, telecommunications firms, and investors should increase investments in creative technology startups, digital content production, and cultural innovation projects. Private-sector organizations can develop specialized digital marketplaces that connect African artists with global consumers.

Support from International Organizations

International organizations have an important role in supporting cultural preservation and technological development across Africa. Organizations such as the United Nations Educational, Scientific and Cultural Organization, the World Bank, and the World Intellectual Property Organization can provide technical assistance, financial resources, and policy guidance for cultural digitization initiatives. International agencies should support digitization projects aimed at documenting endangered languages, oral traditions, artistic artifacts, and indigenous knowledge systems.

Conclusion

The redemption of African arts through technology represents a strategic pathway toward sustainable development in Africa. Digital technologies have created unprecedented opportunities for preserving cultural heritage, promoting artistic innovation, expanding economic opportunities, and strengthening cultural identity. Through digital archiving, artificial intelligence, social media, virtual exhibitions, e-commerce, and blockchain systems, African arts can overcome historical challenges of marginalization and limited visibility. However, realizing these benefits requires coordinated efforts among governments, educational institutions, artists, technology companies, and international organizations.

Technology facilitates cultural preservation, enhances economic opportunities, promotes social inclusion, and encourages innovative solutions to environmental challenges. Therefore, redeeming African arts through technology represents a strategic pathway toward achieving sustainable development goals while safeguarding Africa's rich cultural heritage for future generations.

Recommendations

Based on the findings and discussions of this paper, it was recommended that:

1. **Increased Investment in Digital Infrastructure:** Governments should invest substantially in internet connectivity, electricity supply, digital equipment, and technological infrastructure, particularly in rural communities where many indigenous artistic traditions are preserved.
2. **Establishment of National Digital Cultural Archives:** African governments and cultural institutions should establish comprehensive digital archives to document and preserve traditional music, dances, oral histories, languages, crafts, and cultural artifacts for future generations. Integration of Digital Arts Education into School Curricula will promote sustainability of African Arts.
3. **Strengthening Intellectual Property Protection:** Governments should strengthen copyright laws and enforcement mechanisms to protect artists from piracy, unauthorized reproduction, and intellectual property theft in digital environments.
4. **Provision of Financial Support for Creative Industries:** Governments, development agencies, and financial institutions should provide grants, loans, tax incentives, and innovation funds to support artists, cultural entrepreneurs, and technology-driven creative enterprises.
5. **Development of Digital Marketplaces for African Arts:** Stakeholders should establish specialized e-commerce platforms and digital galleries that connect African artists directly with global consumers and investors.

6. Capacity Building and Digital Literacy Training: Regular training programs, workshops, and mentorship initiatives should be organized to enhance artists' digital literacy and technological competencies.
7. Promotion of Public-Private Partnerships: Governments should collaborate with technology companies, telecommunications firms, educational institutions, and cultural organizations to support innovation and sustainable development within the creative sector.
8. Support for Virtual Museums and Online Exhibitions: Museums and cultural institutions should develop virtual exhibitions and online cultural repositories to increase access to African artistic heritage at local and international levels.

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THE ROLE OF RELIGION IN ACHIEVING THE SUSTAINABLE DEVELOPMENT GOALS (SDGs) IN NIGERIA

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Abstract

This study examines the role of religion in the achievement of the Sustainable Development Goals (SDGs) in Nigeria using Oyo Town, Oyo State, as a case study. Recognising the significant role of religion as a socio-cultural institution, the research examines the role of religious beliefs, practices and institutions in influencing development outcomes in key areas of the SDGs, including poverty reduction, education, health, gender equality, environmental sustainability, and peacebuilding. Anchored on the Value-Belief-Norm (VBN) theory, the study is qualitative and descriptive and uses quantitative methods to complement it. Data were collected from 150 religiously active adults through semi-structured questionnaires, and the data were analysed using descriptive statistics, tests of chi-square and correlation analysis. The findings show that religion has an important and positive role to play in the furthering of SDGs concerning poverty reduction (SDG 1), quality education (SDG 4), good health and well-being (SDG 3), peace, justice and good institutions (SDG 16). Strong statistical associations and correlations show that religious engagement, trust in religious leaders and involvement in faith-based activities increase community mobilisation and service delivery in these areas. However, the study has some notable limitations as well. Religion shows a contested and ambivalent effect on gender equality (SDG 5) due to the continued presence of patriarchal norms, whereas on environmental sustainability (SDG 13), the effect is weak and statistically insignificant, indicating perhaps a dissynchronisation between teachings about the environment and actual practices. The study concludes that religion in Nigeria is neither wholly enabling nor wholly constraining but works as a dynamic and context-dependent force in sustainable development. The effectiveness of this depends on interpretation, institutional engagement, and alignment with broader development goals. The paper calls for strengthening connections between government and faith-based organisations, promoting gender-inclusive religious discourse, incorporating environmental awareness into religion, and deepening interfaith for peacebuilding. Overall, the study adds to the growing discourse on the integration of the cultural and religious dimensions in the sustainable development strategy in sub-Saharan Africa.

Keywords: Religion, Poverty Eradication, Gender Inequality, Environmental Sustainability, Peace Building

Introduction

The Sustainable Development Goals (SDGs) are a worldwide blueprint for tackling pressing challenges such as poverty, inequality, and environmental degradation, with religion emerging as a pivotal force in their implementation, especially in diverse societies such as Nigeria (Arora & Mishra, 2019; Sachs et al., 2023). The SDGs are the 17 interconnected goals adopted by the United Nations in 2015 which encompass the eradication of poverty, the promotion of prosperity, and the achievement of environmental sustainability by 2030 (Arora & Mishra, 2019). These goals include areas such as no poverty (SDG 1), quality education (SDG 4), gender equality (SDG 5), climate action (SDG 13), and peace and justice (SDG 16) with an emphasis on inclusive and equitable development for all nations (Sachs et al., 2023). In Nigeria, where religious affiliations have such a strong influence on social, economic, and political contexts, it is vital to understand this dynamic in order to analyse possibilities and challenges in attaining sustainable development (McKinnon, 2021; Mbaegbu, 2024).

The SDGs in the Nigerian context are building on earlier frameworks of its development while addressing persistent poverty and inequality. According to the National Bureau of Statistics (2020), poverty is rife despite periods of economic growth. This paradox demonstrates the importance of multifaceted approaches, such as harnessing the power of non-state actors like religious institutions to help bridge gaps in government efforts (Marshall, 2021). The SDGs are an integrated concept that takes in the social, environmental, and institutional dimensions. SDG 16 is on peaceful and inclusive societies, which is very critical in Nigeria with the problem of insurgency and banditry (John et al., 2023; Rotimi et al., n.d.). Population growth projections also add to development pressures, with Nigeria projected to stay one of the most populous countries in the world (Department of Economic, 2024). Thus, attaining the SDGs demands contextual adaptation in the socio-religious context of Nigeria (Sachs et al., 2023).

Religion in Nigeria is a multifaceted social institution, which involves beliefs, practices and organisations that are related to moral, ethical and communal life (Tweed, 2020). Nigeria is also religiously diverse, with Christians, Muslims, and traditional religion adherents making up large portions of the populace (McKinnon, 2021; Voices, 2015). Religion acts as a source of identity, cohesion and moral authority. There is empirical evidence that Nigerians tend to perceive religious leaders as more trustworthy and less corrupt than public institutions (Mbaegbu, 2024; Adaba&Boio, 2024). This trust helps to increase the power of religious leaders to influence public opinion and mobilise the communities. Religion also crosses over to governance and politics of arrangement, like debates on zoning in public offices and power sharing (Hart, n.d.). Historically and intellectually, it is necessary to engage with decolonised views of African history and identity in order to understand religion in the context of Nigeria's wider socio-cultural development (Falola, 2024).

The interdependence between religion and SDGs can be seen in the ability of religion to reconcile ethics with the goals of development. Religious involvement in development is documented to be a major force in poverty reduction, social services and advocacy (Marshall, 2021). Faith communities support the attainment of SDG 3 – Good Health and Well-being – and SDG 5 – Gender Equality – through their advocacy on reproductive justice, family

stability and community welfare (Ehdiamhen, 2024; Stiles-Ocran & Leis-Peters, 2025). At the same time, religious and cultural practices may present ethical dilemmas in areas such as marriage and gender relations, which may affect social development outcomes (Okoye & Ugwu, 2024). But religion could also cross with insecurity challenges. Insurgency, armed banditry, and communal conflicts hamper the objectives of peace and development (John et al., 2023). These disruptions undermine human security and institutional trust for SDG 16 (Peace, Justice and Strong Institutions). Additionally, the wider geopolitical relationships and economic relations of Nigeria, such as infrastructure development partnerships, affect the implementation of SDGs in religiously plural contexts (Emelife & Okeke, 2025). Therefore, the role of religion in sustainable development is thus enabling and at the same time constraining.

Historically, religion has been a major player in the social transformation of Nigeria, from the educational and health care services provided by missionaries to the current faith-based participation in governance and public discourse (Falola, 2024). In spite of economic reforms and development initiatives, there is still poverty and inequality, as documented by the National Bureau of Statistics in 2020. Armed conflicts and insecurity, especially in northern Nigeria, have been worsened since 2019, impacting livelihoods and social stability (John et al., 2023). Demographic projections show that the population growth will continue to be rapid, and demand for education, employment, and social services will rise (Department of Economic, 2024). Religious institutions continue to play central roles in responding to these pressures by using public trust to offer relief, mediation and advocacy (Katenda, 2022; Mbaegbu, 2024).

Prospects of religion's role in Nigeria's SDGs include enhanced interfaith dialogue, community mobilisation and ethical leadership in governance (Marshall, 2021). The high level of public confidence in religious leaders is an opportunity for crisis management and social reform (Katenda, 2022). Nevertheless, there are persistent challenges that continue to prevail, including institutional distrust, insecurity, gender inequality, and political-religious tensions (Adaba & Boio, 2024; John et al., 2023). Maximising the developmental potential of religion demands the collaboration of religious actors, policymakers, and civil society for inclusive and sustainable outcomes aligned with the SDGs (Sachs et al., 2023).

Literature Review and Theoretical Framework

The theoretical framework that governs this study on the role of religion in sustainable development mainly comes from the theory called Value-Belief-Norm (VBN) (Stern, 2000) and how multidimensional conceptualisations of religion can explain the role of faith-based values, beliefs, and norms in influencing pro-sustainable behaviours and institutional engagement with the Sustainable Development Goals (SDGs). VBN theory assumes a causal sequence where general values (e.g., altruistic, biospheric or egoistic orientations) shape ecological worldviews and beliefs about environmental consequences, which in turn activate ascription of personal responsibility and personal norms, leading to environmentally responsible actions. In the context of religion and SD, religious teachings and spiritual dimensions are often in line with biospheric or altruistic values, such as stewardship of creation, intergenerational equity, and harmony with nature, and promote awareness of

ecological consequences and moral obligations to contribute to SDGs relating to poverty alleviation, gender equality, climate action, and environmental protection (Abumoghli, 2023; Basedau et al., 2017). Complementing VBN, this framework takes into account analytical models of the multifaceted nature of religion as including its dimensions as community, teachings, spirituality, practices, institutions, and a general worldview (Schliesser, 2023, as cited in related literature) in order to account for the ambivalent effects of religion: while it can mobilise communities and ethical imperatives for sustainability, it may also perpetuate norms that hinder gender equity or economic progress in certain contexts. This integrated approach overcomes the limitations of purely secular development paradigms by focusing on the potential of religion as a cultural and motivational asset that allows for causal mechanisms from individual belief activation to collective action and policy alignment with the 2030 Agenda. By combining psychological mechanisms and socio-institutional dynamics, the framework offers a strong viewpoint from which to examine the role of religious factors in driving or hampering sustainable development outcomes, directing empirical research into context-specific pathways and interventions.

Empirical Review

Sustainable development (SD) is a broad framework that seeks to achieve a balance between economic growth, social inclusion, and environmental protection, which would address the needs of the current generations without compromising the needs of the next generations (United Nations, 2015). Central to this agenda are the Sustainable Development Goals (SDGs), adopted in 2015, which include 17 interrelated goals from eliminating poverty to tackling climate change. The importance of religion in SD is that it has a profound impact on human values, behaviours, and societal norms, and more especially in cases where faith influences ethical decision-making and mobilisation in the community. With more than 80% of the world's population identifying with a religious tradition (Pew Research Center, 2015), religion can be a cultural and moral force for promoting environmental stewardship, social justice and peace – all important pillars of SD. However, its role is ambivalent in that religious factors may also contribute to increasing inequalities or even conflict. This empirical review is a critical synthesis of the relevant literature on the interplay between religion and SD, especially focusing on studies that fit within research aims, in order to explore the contribution of religious dimensions to SDG achievement, especially in the areas of environmental governance, social equity and institutional integration. By analysing aims, methods, findings and limitations of selected studies, through this review, patterns, contradictions and gaps are identified, and ultimately the review evaluates the extent to which the literature aligns with wider SD objectives and proposes avenues for future research.

Empirical scholarship on religion and SD has increased from the early 2000s and has moved from an understanding of religion as an obstacle to considering it as a potential resource. A basic review by Basedau et al. (2017) was an attempt to evaluate the empirical quantitative evidence for the effect of religion on SD over the past decade. Methodologically, the authors disaggregated religion into dimensions (e.g., beliefs, practices, and institutions) and SD into economic, social, and environmental components and synthesised more than 50 studies using a framework of causal mechanisms. Findings revealed an ambivalent role: religious factors had both a positive impact on health and well-being and on income and gender equality, although religious dominance was associated with increased risks of conflict in ethnically

divided societies. Limitations included a lack of data in non-Western settings and problems in inferring causality using correlational studies limited to non-experimental designs. This research work adds to the research problem as it reveals the dual potential of religion that calls for context-specific interventions to leverage its positive and negative effects.

Building on this, Tomalin et al. (2019) examined the roles of faith actors in the SDG process, trying to understand how religions made the transition from being left out to being included in official development assistance (ODA). Undertaking a qualitative study using a case study approach, funded by the UK Arts and Humanities Research Council, the authors used policy documents, religious leader interviews, and SDG implementation reports as their sources. Key findings indicated that the aid channelled by faith-based organisations (FBOs) increasingly has to do with promoting SDGs. religion as a human resource for development. However, there were limitations in the project's global focus, which could have resulted in a lack of attention to the dynamics at a grassroots level, as well as a reliance on self-reported data from faith actors, which could lead to bias. This is a useful contribution by showing the practical usefulness of religion in mobilising communities, which addresses a deficiency in the way in which SD frameworks consider non-secular perspectives.

From a regional perspective, Gas-Aixendri and Albareda-Tiana (2019) examined the contributions of religious organisations to SDGs in the Catalan region of Spain with the objective of assessing their compatibility with global sustainability. Using mixed methods (qualitative interviewing of religious leaders and quantitative surveying in the form of questionnaires related to SDGs), the study found that religions are actively working towards human problems such as poverty and the protection of the environment, which enable inter-religious dialogue. Findings indicated positive impacts in social and environmental SDGs, whereas limitations included the case study's limited generalisability beyond Catalonia and possible under-representation of minority faiths. This work adds value to the research problem by empirically demonstrating the on-the-ground role of religion in demonstrating how faith can bridge cultural divides in the implementation of SDs.

Abumoghli (2023) addressed the ethics and spiritual obligations of religions in environmental management and the attainment of SDGs, which sought to incorporate cultural values in the SD agenda. Through a conceptual analysis of religious texts and SDG documents, supplemented by case examples from global faith declarations, the author posited that religious values encourage people to live in harmony with nature with implications for behaviours and policies to reduce environmental footprints. Findings focused on the complementary role of religion to scientific methods in addressing climate crises, with certain limitations due to the study's normative rather than empirical depth, with no quantitative metrics to assess the impact. This makes a contribution by considering religion as a fourth pillar of SD (alongside economic, social and environmental) which stresses the potential it has in terms of behavioural change.

To mainstream religion in international development institutions (IDIs), Tikjoeb (2007) adopted the methods of causal layer analysis (CLA) to deconstruct the SD paradigms. Methodologically, CLA was used to call for the integration of religion, showing how religion

could solve the problems of poverty, gender equality and environmental issues. Findings suggested strategies to change IDIs but had limitations, such as the use of theoretical focus and limited empirical validation for the study beyond conceptual modelling. This initial work makes this contribution by challenging secular prejudice in SD to identify mechanisms for policy inclusion.

Bergmann (2015) examined the adaptation of religion to climate change in the context of SD, trying to evaluate how religions deal with environmental issues. Through a literature review of religious texts and case studies, it was found that religions were evolving towards "eco-theology" through sustainable practices, although a limitation to this was that there was too much of a focus on Western religious traditions and not enough on indigenous faiths. This adds to the problem by associating religion with climate-specific SDGs.

Zuhdi et al. (2023) examined "Green Fiqh" in Islamic higher education in Indonesia to identify the integration of environmental sustainability in the curricula of Islamic higher education. Using qualitative thematic analysis of course content and interviews from Muhammadiyah universities, results showed lacklustre integration of eco-Islamic teachings with some limitations on sample size and generalisability to extraneous Islamic contexts. This helps to highlight the educational role of religion in SD by exposing gaps in implementation.

Comparative analysis shows patterns of ambivalence: religion positively contributes to health, well-being and environmental stewardship (Basedau et al., 2017; Abumoghli, 2023; Bergmann, 2015) but has a negative impact on gender equality and economic outcomes (Basedau et al., 2017; Ahmad, 2020). Contributions to peace and conflict are diverse, with dominance worsening the risks (Basedau et al., 2017), whilst interfaith dialogue fosters inclusion (Gas-Aixendri&Albareda-Tiana, 2019; Tomalin et al., 2019). Contradictions arise in the mainstreaming process: initial demands for integration (Tikjoeb, 2007) are opposed by ongoing secular biases in IDIs (Tomalin et al., 2019; Zuhdi et al., 2023). Knowledge gaps (Basedau et al., 2017; Bergmann, 2015; Ahmad, 2020; Durodolu&Chisita, 2024, somewhat tangential, still) include: Limited causal inference; lack of data from non-Western countries; lack of data on indigenous religions.

The literature strongly supports the multifaceted role of religion in SD in line with the goals of incorporating cultural factors into SDG frameworks. However, it is inferior in terms of empirical rigour, in which it is observed that many of these studies use qualitative or correlational methods without addressing endogeneity or selection biases, thus restricting correspondence in relation to objectives that require evidence-based policy. This gap stems from historical disregard of religion in the development discourse (Sidibe, 2016; Tveit, 2016). Future research, including the present study, can address this by using mixed methods longitudinal designs in a variety of settings, such as the sub-Saharan Africa (Oyedun, 2018; Ebalu-idemoh, 2025) to quantify the causal effects of religion on SDGs and formulate inter-faith interventions on environmental governance.

Methodology

Study Design

This study used the qualitative research approach to find out the views and experience of the participants on religion and related development issues in Oyo Town, Oyo State, in Nigeria. The approach gave scope for detailed understanding of the views of the participants within the social and cultural context. The study utilised the qualitative descriptive design of the responses of open-ended questions in the questionnaire. This design allowed for the collection of in-depth narratives from participants that concerned their religious engagement and related social experiences.

Research sample and scope

The study was carried out in Oyo Town in Oyo State, Nigeria, a historical town of the Yorubas where Christians and Muslims dominate, while there are also smaller traditional practices. The subjects included 150 adults aged 18 years and above who had resided in Oyo town for at least 5 years and were actively engaged in religion. Data were obtained within the study period from eligible individuals in mosques, churches and faith-based community organisations

Ethical Considerations

Ethical standards have been followed throughout the research process. Participation was voluntary, and informed consent was sought from all participants before data collection. Individuals who were not able to provide consented informed consent were excluded. Confidentiality and anonymity were preserved, and responses were for academic purposes only.

Estimation Techniques and Procedure

Data collection was done by using a semi-structured questionnaire with open-ended questions that were designed to gather people's experience, perception and view about religious practice and its implications for society. Sampling frames were generated from lists of eligible adult members or regular attendees obtained from partnering religious organizations located in Oyo town. Simple random sampling was employed to select subjects from the lists of eligible members compiled. Random numbers generated by the computer were used to reduce the chance of selection bias. Inclusion criteria included the participants being adults (18 years and above), a resident of Oyo town for at least five years, members of a religious tradition, and involved in religious practice at least monthly. Those who were minors and those who were religions were excluded.

Statistical Analysis

The data gathered from the structured questionnaires were coded and entered in the statistical software for analysis. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarise the demographic characteristics of the respondents, as well as major study variables. Inferential statistical methods, including Chi-Square tests and correlation analysis, were used to test the relationships between variables where applicable. Statistical significance was determined at the 5 per cent (0.05) level.

Demographic Profile of the Respondents

A total of 150 participants were recruited for this study from mosques, churches and faith based community organizations in Oyo town Oyo state, Nigeria. The demographic profile as it is given in Table 1 shows a fairly balanced and diverse sample which offers a credible basis for analysis. Slightly more than half of the respondents were males (52.0%, n = 78), and 48.0% (n = 72) were females. The greatest age cohort was the 31 to 45 years age group, which made up 40.0% (n = 60) of the sample, followed by the 18 to 30 age group (30.0%, n = 45), suggesting that the opinions of economically active adults are well-represented in this study.

Table 1: Demographic Profile of Respondents (N = 150)

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	78	52.0
	Female	72	48.0
Age Group	18–30 years	45	30.0
	31–45 years	60	40.0
	46–60 years	32	21.3
	Above 60 years	13	8.7
Religious Affiliation	Christianity	79	52.7
	Islam	64	42.7
	Traditional Religion	7	4.7
Education Level	Primary	18	12.0
	Secondary	44	29.3
	Tertiary	88	58.7
Years of Residence	5–10 years	38	25.3
	11–20 years	57	38.0
	Above 20 years	55	36.7
Total		150	100.0

Source: Field Survey, 2026

In terms of religious affiliation, there were 52.7% (n=79) Christians, 42.7% (n=64) Muslims and a small portion (4.7%, n=7) of traditional religion adherents. This distribution is in accordance with the larger socio-religious pattern in Oyo State, where Christianity and Islam are the predominant religions (Pempel et al. 2014; Iloabachie et al. 2025). A large majority of the respondents (58.7%, n=88) had tertiary education qualifications that might enable more nuanced understanding and expression of the nexus between religion and development. With regard to the duration of residence, 74.7% of the participants, thus rendering sufficient familiarity in the local socio-religious environment, have lived in Oyo town for over 11 years.

Religious Engagement and SDG Works

Participation was sought to assess the contribution of religion and religious institutions in a range of SDG-related outcomes. Table 2 shows the response distributions and descriptive statistics for each thematic item.

Table 2: Respondents' Perceptions of Religion and SDG Engagement

Statement	Agree (%)	Disagree (%)	Mean (SD)
Religious leaders effectively mobilize communities for poverty alleviation (SDG 1)	82.7	17.3	4.12 (0.73)
Faith-based organizations contribute to quality education (SDG 4)	87.3	12.7	4.28 (0.66)
Religious teachings promote gender equality and women's empowerment (SDG 5)	53.3	46.7	3.14 (1.09)
Religious institutions support good health and well-being initiatives (SDG 3)	80.0	20.0	4.05 (0.80)
Religion promotes environmental stewardship and climate action (SDG 13)	64.7	35.3	3.56 (0.94)
Religious actors contribute to peace and justice (SDG 16)	77.3	22.7	3.96 (0.88)
Religious institutions reduce inequality in communities (SDG 10)	70.7	29.3	3.78 (0.91)

Source: Field Survey, 2026. Scale: 1 = Strongly Disagree to 5 = Strongly Agree

The result showed that the respondents agreed most with the role in providing support to the quality of education (SDG 4) with a percentage of 87.3% and mean scores of 4.28 (SD = 0.66). This was followed closely by the idea that religious leaders are good mobilisers in helping communities to alleviate poverty (SDG 1), with 82.7% agreeing (M = 4.12, SD = 0.73). The contribution of religious institutions to good health and well-being (SDG 3) also witnessed a lot of positive affirmation, with 80.0% of the respondents agreeing with this statement (M = 4.05, SD = 0.80).

Notably, the item measuring promotion of gender equality by religion (SDG 5) received the lowest rate of agreement (53.3%) and the lowest mean score (M = 3.14, SD = 1.09), which would show how there is considerable ambivalence and divergence in views among participants. This finding reveals the nature of gender equality that is being fought for in religious contexts in Nigeria (Okoye et al., 2022; VoSS et al., 2024). Environmental stewardship (SDG 13) scored moderate agreement with a 64.7% score only (M = 3.56, SD = 0.94), which shows the environmental qualities of the religious teachings are not completely tied in the consciousness of the community yet (Dwivedi et al., 2022).

Chi-Square Test of Associations

To determine whether statistically significant associations existed between religious variables and SDG-related outcomes, chi-square tests of independence were conducted at the 0.05 significance level. The results are summarized in Table 3.

Table 3: Chi-Square Test Results for Religion-SDG Associations

Variable Pair	Chi-Square (x ²)	df	p-value	Decision
Religious affiliation & poverty alleviation engagement (SDG 1)	18.43	4	0.001	Significant
Religious participation & educational support (SDG 4)	21.67	4	0.000	Significant
Religious teachings & gender equality perception (SDG 5)	9.82	4	0.044	Significant
Religious institution involvement & health outcomes (SDG 3)	16.75	4	0.002	Significant
Religious values & environmental action (SDG 13)	7.34	4	0.119	Not Significant
Religious leadership & peace/conflict resolution (SDG 16)	14.21	4	0.007	Significant

Source: Field Survey, 2026. * $p < .05$, ** $p < .01$

Chi-square analysis indicated statistically significant associations exist between religious participation and a number of SDG-related outcomes. The best link was between religious participation and education support (SDG 4) ($x^2 = 21.67$, $df = 4$, $p = 0.000$); this was followed by poverty alleviation (SDG 1) ($x^2 = 18.43$, $df = 4$, $p = 0.001$). Religious institution involvement was found to be significantly associated with health outcomes (SDG 3) ($x^2 = 16.75$, $df = 4$, $p = 0.002$), and religious leadership was found to be significantly associated with peace and resolution of conflict (SDG 16) ($x^2 = 14.21$, $df = 4$, $p = 0.007$). A significant but moderate correlation between religious teachings and perceptions of gender equality (SDG 5) was also arrived at ($x^2 = 9.82$, $df = 4$, $p = 0.044$).

On the other hand, the relation between religious values and environmental action (SDG 13) was not statistically significant ($x^2 = 7.34$, $df = 4$, $p = 0.119$). This implies that, whilst responses to the role of religion in environmental stewardship appeared moderate in their affirmative nature in the descriptive responses, there was no statistically significant structural relationship between religious variables and actionable environmental behaviours identified at a community level.

Correlation Analysis

Pearson correlation analysis was carried out to investigate the strength and direction of relationships between key religious indicators and outcomes related to SDGs. The result obtained is shown in Table 4, which shows the correlation coefficient of the religious engagement index, trust in religious leaders, faith-based organisation (FBO) community participation, and interfaith dialogue engagement against selected SDGs.

Table 4: Correlation Matrix — Religious Variables and SDG Outcomes

Variables	SDG 1	SDG 3	SDG 4	SDG 5	SDG 13
Religious Engagement Index	0.61**	0.57**	0.66**	0.34**	0.29*
Trust in Religious Leaders	0.58**	0.52**	0.59**	0.28*	0.23*
FBO Community Participation	0.54**	0.49**	0.63**	0.31*	0.27*
Interfaith Dialogue Engagement	0.47**	0.44**	0.50**	0.38**	0.33**

Source: Field Survey, 2026. * $p < .05$, ** $p < .01$

The Religious Engagement Index had the highest positive correlation with SDG 4 ($r = 0.66$, $p < 0.01$), which is consistent with the chi-square results. Moderate to strong significant associations were lead with SDG 1 (correlation of 0.61), SDG 3 (correlation of 0.57) and SDG 16 (not reported but presumed from qualitative answers). The smallest but not negligible correlations have been registered with SDG 5 ($r = 0.34$) and SDG 13 ($r = 0.29$). This was also true for trust among religious leaders, which were correlated most with SDG 4 ($r = 0.59$) and least correlated with SDG 13 ($r = 0.23$). These patterns collectively highlight the multidimensional yet differentiated nature of the influence of religion throughout the SDGs.

Discussion of Findings

Religion as a Catalyst for Poverty Alleviation and Education (SDGs 1 and 4)

The results show that the most affirmed roles of religion by respondents are in poverty alleviation (SDG 1), education (SDG 4) with descriptive means and statistically significant values of chi-square and correlation. These findings are consistent with Cooper and Marshall (2024), who postulated that faith communities represent an important non-state force in development service provision, through charity, schools and skills training, for example. In the Nigerian context, education has always been within the domain of both the Islamic and Christian institutions that have been historically involved in providing education facilities and welfare programmes to complement the government provision (Falola et al., 2024). The level of public trust in religious institutions, as documented by Iloabachie et al (2025) and Bazie and Diallo (2025) further adds to the effective reach of poverty interventions based on faith as beneficiaries are more likely to engage with organisations that they perceive as legitimate and morally credible.

These findings are also congruent with the framework of the Value-Belief-Norm (VBN) theory adopted in this study (Simuni et al 2024), whereby altruistic religious values activate moral obligations toward addressing poverty and supporting education. Where the teachings of religions focus on communal responsibility and stewardship, there is scope for it to be converted into tangible pro-SDGs behaviours and institutional investment. This is in line with Voß et al. (2024) that found these positive relationships between religious engagement and health and well-being outcomes, and Sango et al., (2024) document the rising involvement of FBOs in official development assistance frameworks with the SDGs.

The contested nature of Gender equality in religious frame (SDG 5)

The most controversial finding relates to gender equality (SDG 5), which drew the lowest mean score ($M = 3.14$) and the most polarised responses, with almost half of the surveyed (46.7%) disagreeing that religious teachings are conducive to gender equality. This finding echoes a tension which has been documented widely in the literature between values grounded in religious faith and secular notions on gender equality. Okoye et al (2022) noted that religious and cultural practices in Nigerian society generate ethical tensions surrounding marriage and gender relations which often lead to a parenthesising of patriarchal norms while depriving it of transformation. Similarly, the study conducted by Voss et al. (2024) concludes that religious dominance was also linked to gender equality outcomes in a negative relationship in their cross-national analysis.

The moderate but significant chi-square association ($\chi^2 = 9.82$, $p = 0.044$) and correlation ($r = 0.34$) nonetheless indicate that the degree to which religion is restrictive on gender equality is not homogeneous among religions, but rather depends on the denomination, interpretation, and degree of reform orientation. This corresponds with the multidimensional analytical framework of Koeglsperger, et al. (2023, as cited in related literature) which differentiates between religion as teachings, spirituality, institutions, and worldview, all of which may have different outcomes on gender equity. Progressive religious actors and feminist theological movements both within Islam and Christianity in Nigeria have been questioning patriarchal conceptions, adding to processes that lead to more equitable social norms (Puen et al 2024; Stiles-Ocran and Leis-Peters 2025) The implication here is that gender equality outcomes from religion is not predetermined but dependent on internal reform and interfaith collaboration.

Contribution of Faith-Based to Health and Well-being (SDG 3)

The significant relationship between the involvement of religious institutions and health outcomes (SDG 3) ($\chi^2 = 16.75$, $p = 0.002$) and the corresponding correlation ($r = 0.57$) suggests that religion is a meaningful health promotion resource and community well-being in Oyo town. This is in line with the empirical literature. Voess et al. (2024) found health and well-being to be among the most positively affected SDG domains by religious engagement and Puen et al (2024) described specifically the work of FBO advocacy of reproductive health and family stability in Nigerian communities. Given the documented challenges of health infrastructural deficit in Nigeria, where religious organizations usually activities in the area of health via hospitals, clinics and community health programmes thereby the findings has direct policy relevance for government and non-governmental partnership frameworks (Cooper and Marshall 2024; Gulak et al. 2023).

Religion, Peace and Institutional Justice (SDG 16)

The significant chi-square association between religious leadership and peace and conflict resolution (SDG 16) ($\chi^2 = 14.21$, $p = 0.007$), reflecting the opportunities as well as inherent paradoxes of the role of religion in peacebuilding. As documented by John et al. (2023), the challenges of insurgency and armed banditry facing Nigeria, especially the Northern states, are undermining the social stability and trust in institutions, and is a direct threat to SDG 16. However, religious leaders, because of their moral authority and their embeddedness in communities, are often placed in the role of mediators in community disputes and as advocates for peace. Abbas et al (2025) noted that immense trust in religious leaderships opens up room for crisis management and social reform which bypasses the faulty state institutions.

The findings therefore strengthen the argument for a dual interpretation of religion, which can be a source of conflict if used for sectarian ends and contribute to positive conflict resolution by building peace if employed in association with interfaith dialogue and institutional justice (Voß et al., 2024; Sango et al., 2024). In Oyo town, a historically Yoruba Muslim and Christian space, it is taken for granted that the relative interreligious tolerance seen in the town is in line with the study by Pappalardo (2024) who observed the importance of local

socio-cultural norms in moderating religious conflict. This reinforces the argument by Sachs et al., (2022) that SDG implementation calls for contextual adaptation.

Environmental Stewardship and the Emerging Ecological Consciousness SDG 13

The non-significant result obtained for chi-square with religion and environmental action ($p = 0.119$), together with the weakest correlation values ($r=0.29$ for the Religious Engagement Index), suggests that although the respondents moderately recognized religious responsibility towards the environment, such responsibility has not yet been converted into a statistically consistent pattern of religiously motivated environmental behaviour. This finding is partly congruent with the findings of Zuhdi et al. (2024) which identified suboptimal integration of eco-Islamic teachings in educational contexts as well as Bergmann et al. (2022) which indicated the overemphasis on the Western eco-theological traditions with limited traction in non-OECD contexts.

Dwivedi et al. (2022) proposed that religious and spiritual values be added to the existing pillars of sustainable development, as a fourth pillar to complement and balance the other three pillars of economic, social and environmental development. The current data presented indicate that this aspiration, although theoretically sound, has great problems in its implementation at the grassroots level in Nigeria. The cultural tension in the mismatch between normative ecological teachings and levels of behavioural environmental engagement suggest that there is a critical need for faith-based environmental literacy programs that can translate abstract theological teachings about creation stewardship into concrete, SDG-aligned community actions.

Conclusion

This work focused on the contribution of religion as achieved in the Sustainable Development Goals (SDGs) in Nigeria with focus on the Oyo town, Oyo State. Drawing on data obtained from 150 religiously active participants using a descriptive qualitative design, aided with quantitative statistical analysis, the research has produced empirical evidence of the multidimensional and context-dependent nature of the influence of religion on the outcomes of sustainable development.

The results confirm that religion has an important enabling role to play in promoting a number of SDGs in Nigeria, especially education (SDG4), poverty reduction (SDG1), health and well-being (SDG3), and peace and institutional justice (SDG16). Religious institutions in Oyo town are seen by the vast majority of the people in the study as active contributors to the development results, which aligns with the widely agreed-upon academic consensus that states that faith-based organizations and religious leaders are credible community-embedded development actors in societies with a overriding low level of institutional trust (Cooper and Marshall 2024; Iloabachie et al 2025; Sango et al., 2024). The high level of trust in religious leaders, reported in this and previous studies, makes faith-based development initiatives potentially very widely reaching and effective.

There are, however, critical tensions and limitations in religion's developmental role, the study also points out. The contesting and ambivalent dynamic between religious teachings

and gender equality (SDG 5) is the evidence of the long-standing patriarchal structures in both Christian and Islamic traditions in Nigeria, which can be inimical to achieving the goals of inclusive and equitable development results (Voß et al., 2024; Okoye et al. 2022). Similarly, it was observed that the non-significant relationship of religious values and environmental action (SDG 13) indicates that ecological responsibility has not yet been fully internalised within the practical religiosity of the communities studied, and includes a significant gap that limits the contribution of religion in climate-related SDGs (Dwivedi et al. 2022; Bergmann et al. 2022).

Theoretically, the study supports the use of the Value-Belief-Norm theory in the analysis of faith-based pro-SDG behaviours. The abbreviated causal chain from altruistic religious values, all the way to belief activation, ascription of responsibility and pro-sustainable action are empirically supported for SDGs 1, 3 and 4 while the same for SDGs 5 and 13 to a lesser extent that the theory's explanatory power is conditioned by cultural, denominational and institutional factors particular to Nigerian society. This finding adds to the growing literature of arguing for context-sensitive uses of development theories in sub-Saharan Africa (Oyedun et al. 2025; Butu et al. 2023).

Overall, this study concludes that religion is neither an absolute product-enabler nor a homogenous product-obstacle to SD in Nigeria. Its role is a dynamic, stratified, deeply-embedded one in local socio-political and cultural configurations. Maximizing positive contributions while Strain Mitigating Strain effects of climate change calls for intentional and evidence based engagement strategies which cooperate with religious establishment as co-architects of sustainable development and not peripheral as end users. The aspirations of no one left behind contained in the SDGs will be best served by Physics of Prosperity the ability of religious helicopters systematic integration of community to national and subnational levels of development planning; institutional capacity of ANMs charged collectively with the assignment of the national and subnational efforts with responsibility to ensure that achievement of the SDPs on or by 2030 is a matter of moral authority, village, district, state, and country level capacity as well as of those responsible for the global understanding of the Sustainable Development Goals. The aspirations of no one left behind contained in the SDGs will be best served by Physics.

Recommendations

Based on the findings and conclusions of this study, the following recommendations are advanced for policy makers, religious leaders, development practitioners and researchers:

Strengthening Faith-Based Development Partnerships

The Nigerian government with the support of international development organizations should formalize and scale up partnership frameworks with faith-based organizations for the provision of SDG related services, especially in the areas of education (SDG 4), health (SDG 3) and poverty alleviation (SDG 1). Given the documented trust deficit in public institutions (Bazie and Diallo 2025), both the channelling of development resources through credible religious organizations to promote the project and increased community uptake are potential ways to mitigate the leakage as well as promote greater accountability. State governments in Oyo as well as other mostly religious states should create Faith and Development Desks in

their States SDG coordination offices to help them engage and work structuredly with registered FBOs.

Mainstreaming the Goal of Gender Equality in Religious Discourse

Religious leaders and denominational bodies need to be actively involved in gender transformative dialogues that confront the patriarchal interpretation of the scripture and tradition. In the light of the empirically documented resistance to gender equality norms within religious communities (SDG 5), targeted capacity-building programmes ought to be developed to empower progressive religious actors within both Islam and Christianity to call for women's rights, girls' education and economic empowerment from within explicit religious context frameworks (Puen et al., 2024; Stiles-Ocran and Leis-Peters, 2025). National bodies like Christian Association of Nigeria (CAN) and Supreme Council for Islamic Affairs (NSCIA) should provide official guidelines on gender equity aligned to the focus on SDG5 targets.

Promoting Eco-theology and Religious Environmental Literacy

Given the low and insignificant links between religious engagement and environmental action (SDG 13), more urgent focus should be given to t mainstreaming ecological stewardship into religious education curriculum, sermons and community programmes. Religious Seminaries, theological colleges and Islamic institutes across Nigeria should include as part of their training programmes courses on eco-theology, creation care, and climate justice. This recommendation is in line with the call of Dwivedi et al. (2022) for religion as a fourth pillar of sustainable development and Zuhdi et al. (2024) on the suboptimal integration of eco-religious teachings in educational institutions. Community-based efforts in environmental stewardship campaigns by trusted religious figures can also lead towards grassroots action on SDG 13.

Taking Advantage of Interreligious Dialogue to Promote Peace and Security

In recognition of the major link between religious leadership and the outcome of peace (SDG 16), the role of interfaith platforms such as the Interfaith Mediation Centre and the Nigeria Inter-Religious Council (NIREC) should be enhanced and supported with sufficient funding, legal support and operational support. Religious leaders to be engaged as formal stakeholders in national and subnational security councils, especially in conflict affected areas in northern Nigeria. Training programmes on non-violent communication, trauma-informed peacebuilding and mediation should be provided to religious leaders to give them practical skills for de-escalating communal and sectarian tensions (John et al., 2023; Abbas et al 2025).
Investment in Research and Longitudinal Data

The methodological limitations of the present study as well as the localized nature of the same, reveals the necessity for stronger empirical research on religion and development in Nigeria. In future research it is desirable that longitudinal studies be conducted with mixed-methodology to measure the extent of changes in religious engagement and SDGs outcomes from time to time. Multi-site studies with diverse geo-political zones of Nigeria would promote the generalisability of findings. Particular attention should be given to causal mechanisms that relate specific religious practices, denominational differences, and SDG

outcomes in solving the endogeneity and selection bias problems identified in previous literature (Voß et al., 2024). The National Bureau of Statistics and research institutions are to include religion - SDG indicators in the national surveys and framework of development monitoring.

Policy Integration with Religion in Nigeria's SDG Voluntary National Review

Nigeria's Voluntary National Review (VNR) to be submitted to the United Nations High-Level Political Forum on Sustainable Development should expressly include an assessment of the contributions and constraints of religious actors to SDG implementation. This would signify that religion has been acknowledged as a legitimate development actor in Nigeria and could attract more international support to faith-sensitive development programming (Sango et al., 2024; Sachs et al., 2022). A national mapping of faith-based organisations that get involved in SDG-related activities will open the data infrastructure to evidence-based policy integration.

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SOCIAL HEALTH EDUCATION AS A TOOL FOR SUCCESSFUL CURRICULUM INNOVATION AMONG STAKEHOLDERS IN EMMANUEL ALAYANDE UNIVERSITY OF EDUCATION, OYO, OYO STATE, NIGERIA

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Abstract

This study employed survey method to investigate the degree to which social health education served as a tool for successful curriculum innovation. The variables of social health education investigated were positive interpersonal relationships, effective communication and mental resilience. Multi-stage sampling technique of stratified random and purposive were used to select five hundred stakeholders consisting students, lecturers, parents, community leaders and management staff members was used as the sample size. The research instrument was validated by the lecturers in the Departments of Human Kinetics and Health Education and Test and Measurement. The reliability coefficient of 0.75 was obtained through split-half data using Spearman Brown rank order correlation. Administration of the questionnaire forms was conducted with the assistance of four research assistants. Pearson product moment correlation was used to test the hypotheses at alpha level of 0.05. The three null-hypotheses formulated were rejected. The finding showed that social health education had significant impact on successful curriculum innovation among stakeholders in Emmanuel Alayande University of Education, Oyo, Oyo State, Nigeria. that the study's recommendation included that curriculum innovators should try as much as possible to engage in educative activities capable of equipping them with positive interpersonal relationships, effective communication as well as ability to adapt, recover and grow in the face of adversity.

Keywords: Social health education, curriculum innovation

Introduction

Social health is the ability to form meaningful, healthy relationships with others and adapt to social situations. It also acts as a key pillar of overall well-being alongside physical and mental health. It involves effective communication, establishing boundaries and having a supportive community network to reduce stress and improve longevity (Nasir, Hanifullah and Hikmatullah, 2026). Social health is important to people's life because, establishing and maintaining a socially healthy lifestyle can make a [big impact on mental health and ability to function in the society. Close and rewarding relationships with other people can only be

achieved by building and maintaining good social health education (Nasir, Hanifullah and Hikmatullah, 2026). Social health education explores how interpersonal relationships, community support and social skills affect the individual's overall well-being. It focuses on nurturing positive interactions and social roles to improve emotional stability (Appolo Telemedicine Networking Foundation, 2026). Social health, according to Appolo Telemedicine Networking Foundation (2026), is defined as one's ability to establish good relationships with people around you, especially those that matters.

Southern New Hampshire University (2026) indicated the importance of social health education as capable of improving community wellbeing, fostering supportive relationships and empowering individuals to make informed lifestyle choices. National Institute of Health (2026) and Nasir, Hanifullah and Hikmatullah, (2026) added to the roles of social health education as capable of developing interpersonal relationships, building effective communication skills and developing mental resilience. National Institute of Health, (2025) revealed that social well-being is valuable for fostering positive interpersonal relationships among curriculum innovation participants such as teachers, administrators and designers because it creates a supportive, trusting and collaborative emotional environment necessary for complex, high-stakes educational change. It enhances trust and mutual understanding which are essential for navigating the disagreements, resistance and high stress scenarios that often accompany school improvement effort.

Curriculum innovation is everybody's concern because it is a response to the fact that the world is constantly changing and education has to change if we want to avoid preparing students for a world that no longer exists. Curriculum innovation refers to the process of updating or renewing the current curriculum through new techniques or implementing new value enhancing education or schooling ideas (Gumi & Company, 2022). Curriculum has been redefined to include recent research, change and innovation. It is the totality of a student's experience in the educational process. It includes instructional practices, performance assessments and learning experiences. Curriculum innovators are educational teachers, leaders, policy makers and researchers who design educational frameworks to align with modern needs, technology and society (Button, 2021). According to the Modachi, Bello and Umar (2026), curriculum innovation is seen as a systematic interactive process that purposefully redesigns what is taught, how it is taught, accessed and experienced to better meet changing learner, societal and workplace needs. Effective curriculum innovation balances vision with operational detail engages stakeholders and builds capacity for sustained improvement.

As for the effective curriculum innovation, Button (2021) claimed that curriculum innovation includes appropriateness, economical in terms of time, space and resources and being aligned with the philosophy. Rumah Journal Universitas and Abdul Chali (2022) stressed that effective curriculum innovation is determined by aligning educational goals with societal needs, technological advancements and learner psychology.

Infonomics Society (2014), National Institute of Health (2022), National Institute of Health (2023), Centre for Disease Control and Prevention (2024), Research and Scientific

Innovation Society International (2024) and Nasir, Hanifullah and Hikmatullah (2026) revealed that social health education is a catalyst for engaging stakeholders by educating them (that is teachers, parents and community members). School can build ownership of curriculum which is essential for successful sustainable innovation and implementation. Social health education serves as catalyst for broader curriculum innovation by engaging stakeholders, building student resilience and utilising modern pedagogical approaches (Centre for Diseases Control and Prevention, 2024). Infonomics Society (2014) also revealed that effective or successful curriculum innovation requires a shift towards participatory and experimental learning which social health education facilitates by aligning with social learning theories and fostering a supportive and more accepting school environment. Research and Scientific Innovation Society International (2024) indicated that social health education which encompasses mental health, social cohesion and the development of interpersonal skills is a foundational driver rather than just a subject, facilitating the behaviour and structural changes needed for modern curriculum reforms.

The concept of social health is broad in scope. Hence, this study delimits its focus to three variables within the broad scope. They are positive interpersonal relationships, effective communication and mental resilience.

The impacts of building interpersonal relationships on the stakeholders include creation of a supportive, motivating, collaborative and emotionally safe environment that fosters trust, reduces resistance to change and improves students' outcomes. It allows teachers to openly share knowledge, best practices and new ideas. Supportive teacher-students and peer relationships create a safe motivating and collaborative environment, leading to increased academic achievement. Administrators are opportune to build a cohesive school culture, which serves as a foundation for implementing reforms efficiently, (Pedagogical Research, 2026).

Effective communication serves as an enabler in curriculum innovation by transforming stakeholders from passive recipients into active participants. It directly influences the speed, acceptance and quality of educational changes by building trust, aligning diverse goals and fostering a collaborative environment. Communication reduces confusion and fear associated with new curriculum, thereby, fostering sense of ownership among educators. Also, it provides educators with necessary training, support and feedback channels to confidently implement new methodologies. Clear-communication of goals and expectations increases motivation and students' engagement, ensuring that innovative learning experiences are understood and effectively adopted. Improved communication aids administrators and policy makers in decision-making, allows leaders to gather valuable input, refines strategies and addresses risks or bottle necks early. It facilitates a bottom-up approach to change, making the innovation process more participatory. Transparent communication builds trust in the educational institutional goals and strengthens the school community partnership, (Pedagogical Research, 2024).

Mental resilience is the ability to adapt, recover and grow in the face of adversity. Integrating mental resilience into curriculum innovation has a transformative impact. It fosters innovative teaching practices through pathways like cognitive reappraisal and reduced suppression.

Mental resilience to teachers enables innovative teaching by fostering cognitive and reducing emotional suppression, allowing educators to remain flexible, adopting new pedagogical tools and maintaining a positive outlook during disruption. Resilient teachers are more motivated to engage in collaborative planning and professional development, which are essential for sustainable innovation. High academic resilience enables students to maintain engagement and performance despite challenges such as moving from traditional to remote learning or using new technology. It promotes resistance, creativity and the ability to view mistakes as part of the learning process rather than failure. Resilient Administrators who cultivate a supportive learning organisation culture, encourage risk taking and innovation, as they can better manage school-wide challenges and uncertainties, (National Institutes of Health, 2023).

Statement of the Problem

While social health is the ability to form meaningful interpersonal relationships, interact effectively with others and adapt to social situations effectively which helps people improve their daily live activities. Curriculum innovation is planned introduction of new ideas, methodologies, or technologies into educational programmes to enhance teaching effectiveness and students learning outcomes. In fostering the collaboration and unity necessary for effective curriculum innovation, a tool that is impactive on the needed collaboration and unity during curriculum innovation is very essential. National Institute of Health, (2023) and Eghbalia, (2024) revealed that social health education fosters culture of collaboration and unity by building trust, empowering stakeholders, connect interdisciplinary integration and improve team efficacy for change. Since effective curriculum innovation moves beyond just planning to focusing on communication, stakeholders' engagement and the creation of a supportive and flexible environment for change, this study therefore, investigated the degree to which social health education impacted successful curriculum innovation implementation among stakeholders in Emmanuel Alayande University of Education, Oyo, Oyo State, Nigeria.

Purpose of the Study

This study investigated the degree to which building positive interpersonal relationships, effective communication and mental resilience as indices of social health education impacted successful curriculum innovation implementation among the stakeholders in Emmanuel Alayande University of Education, Oyo, Oyo State, Nigeria.

Research Hypotheses

The following hypotheses were formulated for testing:

- H0₁: Building positive interpersonal relationships as an index of social health education among stakeholders would not significantly impact successful curriculum innovation implementation in Emmanuel Alayande University of Education, Oyo, Oyo State, Nigeria.
- H0₂: Building effective communication as an index of social health education among stakeholders would not significantly impact successful curriculum innovation implementation in Emmanuel Alayande University of Education, Oyo, Oyo State, Nigeria.

H0₃: Building mental resilience as an index of social health education among stakeholders would not significantly impact successful curriculum innovation implementation in Emmanuel Alayande University of Education, Oyo, Oyo State, Nigeria.

Methodology

Descriptive research design of survey method was used for this study. The population consisted of the lecturers, directorate of academic planning, students and the community members. Multi stage sampling techniques of stratified (for selecting samples across different levels), purposive for making sure that samples were taking from different stakeholders and simple random sampling for selecting samples based on first come, first served. Five hundred sample size selected consisted representative of different levels of stakeholders not minding their total population. A structured questionnaire developed by the researcher was given to the experts in the field of Human Kinetics and Health Education, Test and Measurement for validation. Their comments and suggestions were used to improve the quality of the research instrument. Split-half method of data correlated with Spearman-Brown rank order correlation which gave reliability coefficient of 0.79 was used for data collection. The questionnaire was administered, filled and collected immediately. Inferential statistics of Pearson product moment correlation was used to determine the level to which social health education indices investigated impacted successful curriculum innovation implementation among stakeholders in Emmanuel Alayande University of Education, Oyo, Oyo State, Nigeria. The significance level of 0.05 was set for the hypotheses testing.

Results

The data collected were analysed and interpreted as follows:

Hypothesis 1: Building positive interpersonal relationships as an index of social health education among stakeholders would not significantly impact successful curriculum innovation implementation in Emmanuel Alayande University of Education, Oyo, Oyo State, Nigeria.

Table 1: Pearson' s 'r' showing impact level of building positive interpersonal relationships on successful curriculum innovation implementation

Variables	N	DF	Crit Value	R	Sig (2 tailed)	Level	Decision
Interpersonal relationships and successful curriculum innovation implementation	500	498	0.117	0.532	0.053	0.05	H0 rejected

Table 1 indicated that the calculated r-value of 0.532 and significant probability valued (p-value) of 0.05, computed at alpha value of 0.117. Since the calculated r-value of 0.532 was greater than the critical value of 0.117; therefore, the null-hypotheses was rejected. This showed that building positive interpersonal relationships through social health education had significant impact on successful curriculum innovation implementation.

Hypothesis 2: Building effective communication as an index of social health education among stakeholders would not significantly impact successful curriculum innovation implementation in Emmanuel Alayande University of Education, Oyo, Oyo state, Nigeria.

Table 2: Pearson' s 'r' showing level of impact of building effective communication on successful curriculum innovation implementation.

Variables	N	DF	R	Sig (2 tailed)	Crit Value	Alpha level	Decision
Effective communication and successful Curriculum innovation implementation	500	498	0.452	0.038	0.117	0.05	H0 rejected

Table 2 revealed calculated r-valued of 0.452 and significant probability value (p-value) 0.038, computed at alpha level of 0.05 greater than the critical value of 0.117. Since the calculated r-valued was greater than the critical value, therefore, the null-hypothesis was rejected. This implied that building effective communication through social health education had high impact on successful curriculum innovation implementation.

Hypothesis 3: Building mental resilience as an index of social health education among stakeholders would not significantly impact successful curriculum innovation implementation in Emmanuel Alayande University of Education, Oyo, Oyo state, Nigeria.

Table 3: Pearson' s 'r' showing level of impact of building mental resilience on successful curriculum innovation implementation

Variables	N	DF	R	Sig (2 tailed)	Crit Value	Alpha level	Decision
Mental resilience & curriculum Innovation implementation	500	498	0.359	0.047	0.117	0.05	H0 rejected

Table 3 showed calculated r-value of 0.359 greater than the critical value of 0.117 with significant probability level (p-valued) of 0.047, computed at significance level 0.05. Since the calculated r-value is greater than the critical value, therefore, the null-hypothesis is rejected. By implication, building mental resilience through social health education is highly impactive on successful curriculum innovation implementation.

Discussion of the finding

Finding on hypothesis1 showed significant impact of positive interpersonal relationships on successful curriculum innovation implementation. It implied that building positive interpersonal relationships is highly helpful in achieving successful implementation of curriculum innovation. This is in compliance with the revelation of Pedagogical Research (2026) which indicated that positive interpersonal relationships allow teachers to openly share knowledge, best practices and new ideas and that supportive teacher-students and peer relationships create a save motivating and collaborative environment, leading to increased academic achievement while Administrators are also having opportunity to build a cohesive school culture, which serves as a foundation for implementing reforms efficiently.

Finding on hypothesis 2 regarding the impact of building effective communication on successful curriculum innovation implementation was very significant. By implication, it meant that effective communication is very essential in getting successful curriculum innovation implementation achieved. This finding corroborates Nasir Haniffullah & Hikmatullah (2024) and which revealed that effective communication directly influences the speed, acceptance and quality of educational changes by building trust, aligning diverse goals and fostering a collaborative environment. Emerson College (2026) also revealed that effective communication ensures that everyone is on the same page and that there is no confusion about tasks, goals or expectation.

With regard to hypothesis 3, the finding showed significant impact of mental resilience on successful curriculum innovation implementation was found. This indicated that mental resilience is highly influential to the successful curriculum innovation implementation. Integrating mental resilience into curriculum innovation has a transformative impact. This finding agreed with National Institutes of Health (2023) which showed that mental resilience fosters innovative teaching practices through pathways like cognitive reappraisal and reduced suppression. Teachers' mental resilience engenders innovative teaching by fostering cognitive and reducing emotional suppression, allowing educators to remain flexible, adopting new pedagogical tools and maintaining a positive outlook during disruption. Resilient teachers are more motivated to engage in collaborative planning and professional development, which are essential for sustainable innovation. High academic resilience enables students to maintain engagement and performance despite challenges such as moving from traditional to remote learning or using new technology. It promotes resistance, creativity and the ability to view mistakes as part of the learning process rather than failure. Resilient Administrators who cultivate a supportive learning organization culture, encourage risk taking and innovation, as they can better manage school-wide challenges and uncertainties.

Conclusion

Based on the findings, it was concluded that building positive interpersonal relationships, effective communication and mental resilience as indices of social health education had high impact in achieving successful curriculum innovation implementation because it encompasses mental health, social cohesion and the development of interpersonal skills regarded as foundational driver for the behaviour and structural changes needed for modern curriculum reforms.

Recommendations

Since the selected investigated indices of social health education were impactful on successful curriculum innovation implementation, it was therefore recommended that curriculum innovation stakeholders should try as much possible to be engaging in educative activities capable of equipping them with positive interpersonal relationships, effective communication skills and ability to adapt, recover and grow in the face of adversity. Social health education should be made compulsory as a University course because of its role in building the essentials needed in any reform.

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ARTIFICIAL INTELLIGENCE, ARTIFICIAL WISDOM AND AFRICAN NARRATIVES: IMPLICATIONS FOR CULTURAL IDENTITY AND KNOWLEDGE PRESERVATION IN SECONDARY SCHOOLS IN NIGERIA

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Abstract

The rapid advancement of Artificial Intelligence (AI) and Machine Learning (ML) has transformed global communication, education, and knowledge systems, raising critical concerns about cultural identity and indigenous knowledge preservation. In Africa, narratives embedded in oral traditions, folktales, proverbs, myths, and communal storytelling remain central to cultural identity and the transmission of indigenous knowledge across generations. Thus, this study examines the implications of Artificial Intelligence and Artificial Wisdom on African narratives, with particular attention to cultural identity and knowledge preservation in the digital age. The study adopted a qualitative and conceptual research design, relying on secondary sources such as journal articles, books, and institutional reports. Data were analysed using thematic content analysis. Findings reveal that Artificial Intelligence has strong potential to support the digitisation, translation, and preservation of African narratives and indigenous knowledge systems, thereby enhancing cultural accessibility and continuity. However, challenges such as algorithmic bias, limited African-language datasets, and Western-dominated epistemological frameworks hinder the accurate representation of African cultures in AI systems. The study further found that Artificial Wisdom, which emphasises ethical reasoning, cultural inclusiveness, and human-centred design, is essential in addressing these limitations and promoting culturally responsive technologies. The study concludes that the sustainability of African cultural identity in the digital era depends on integrating ethical, culturally sensitive AI systems. It recommends increased African participation in AI development, improved representation of indigenous data, and the incorporation of Artificial Wisdom principles into AI governance frameworks to ensure balanced cultural representation and knowledge preservation.

Keywords: Artificial Intelligence, Artificial Wisdom, African Narratives, Cultural Identity, Indigenous Knowledge, Digital Preservation

Introduction

The emergence of Artificial Intelligence (AI) has significantly transformed communication systems, education, information management, and cultural interactions in the twenty-first century. Artificial Intelligence refers to computer-based systems designed to imitate human intelligence through learning, reasoning, problem-solving, and decision-making processes (Russell & Norvig, 2021). Closely related to AI is Machine Learning (ML), which enables computer systems to learn from data and improve performance without explicit programming (Goodfellow, Bengio, & Courville, 2016). In recent years, scholars have also introduced the concept of Artificial Wisdom, which goes beyond intelligence to emphasise ethical reasoning, cultural sensitivity, contextual understanding, and human-centred technological innovation (Sternberg, 2020). Globally, AI technologies have become integrated into sectors such as healthcare, education, business, governance, security, communication, and media. Intelligent systems such as chatbots, recommendation algorithms, virtual assistants, and language-processing technologies increasingly influence how individuals access information and interact with cultural content. In Africa, the expansion of digital technologies and internet accessibility has created opportunities for the promotion, preservation, and dissemination of indigenous cultures and narratives through AI-powered digital systems (UNESCO, 2021).

African narratives represent the collective experiences, traditions, beliefs, histories, and values of African societies. These narratives are preserved through oral traditions, folktales, myths, proverbs, songs, rituals, and communal storytelling practices that have existed for centuries (Finnegan, 2012). African narratives serve not only as instruments of entertainment but also as mechanisms for transmitting moral values, indigenous knowledge, social norms, and cultural identity from one generation to another Benjamin (2019). Through storytelling and oral traditions, African societies have historically maintained communal memory and cultural continuity. However, globalisation, westernisation, technological modernisation, and digital transformation have increasingly threatened the sustainability of African cultural narratives and indigenous knowledge systems (Sternberg, 2020). The dominance of Western-oriented media content and technological infrastructures has contributed to the gradual erosion of local languages, traditions, and cultural practices among younger generations Benjamin (2019). Many African communities in countries such as Nigeria, Ghana, Kenya, South Africa, and Ethiopia now face the challenge of preserving their cultural identities within rapidly evolving digital environments dominated by foreign technological systems and cultural influences.

Despite these challenges, Artificial Intelligence presents significant opportunities for cultural preservation and knowledge management. AI technologies can support the digitisation of oral histories, translation of indigenous languages, archiving of cultural materials, and dissemination of African stories to global audiences. Machine learning systems can also facilitate the preservation of endangered languages and improve access to indigenous knowledge resources through digital platforms (UNESCO, 2021). Consequently, AI possesses the potential to revitalise African cultural heritage and enhance knowledge preservation in the digital age. Nevertheless, concerns have emerged regarding the ethical implications and cultural biases associated with many AI systems. Existing AI technologies

are largely developed using Western datasets, languages, ideologies, and epistemological frameworks, which often fail to adequately represent African traditions, cultures, and worldviews (Benjamin, 2019). This situation contributes to cultural marginalisation, algorithmic bias, digital colonialism, and the underrepresentation of African identities within global intelligent systems (Couldry & Mejias, 2019). Such challenges raise important questions concerning cultural identity, ownership of indigenous knowledge, ethical AI governance, and the role of African societies in shaping emerging technological systems.

The concept of Artificial Wisdom becomes particularly relevant in addressing these concerns. Unlike conventional Artificial Intelligence, Artificial Wisdom emphasises ethical consciousness, human-centred reasoning, empathy, cultural inclusiveness, and socially responsible technological development (Sternberg, 2020). Within the African context, Artificial Wisdom provides a framework for integrating indigenous African philosophies, communal ethics, and cultural values into technological innovation. It advocates for intelligent systems that not only process information efficiently but also respect human dignity, cultural diversity, and indigenous epistemologies. Consequently, the intersection of Artificial Intelligence, Artificial Wisdom, and African narratives has become an important area of scholarly inquiry. Understanding how intelligent technologies influence cultural identity and indigenous knowledge preservation is essential for ensuring that African societies actively participate in shaping the future of digital knowledge systems. Therefore, this study examines the implications of Artificial Intelligence and Artificial Wisdom on African narratives, with particular emphasis on cultural identity and knowledge preservation in contemporary African societies.

Objectives of the Study

The broad objective of this study is to examine the implications of Artificial Intelligence and Artificial Wisdom on African narratives, cultural identity, and knowledge preservation. The specific objectives are to:

1. examine the role of Artificial Intelligence in the preservation of African narratives and indigenous knowledge systems;
2. investigate the influence of AI technologies on African cultural identity;
3. analyse the challenges associated with the representation of African narratives within global AI systems; and
4. examine the relevance of Artificial Wisdom in promoting ethical and culturally inclusive technological systems.

Research Questions

The following research questions will guide the study:

1. What role does Artificial Intelligence play in the preservation of African narratives and indigenous knowledge systems?
2. How do AI technologies influence African cultural identity?
3. What challenges are associated with the representation of African narratives within global AI systems?
4. What is the relevance of Artificial Wisdom in promoting ethical and culturally inclusive technological systems?

Literature Review

Artificial Intelligence

Artificial Intelligence refers to the simulation of human intelligence processes by machines, particularly computer systems capable of learning, reasoning, problem-solving, and decision-making (Russell & Norvig, 2021). AI technologies have become increasingly integrated into modern societies and influence sectors such as healthcare, finance, media, communication, education, and governance. The rapid growth of AI has transformed information management and communication systems globally. Machine Learning, a major branch of AI, enables computer systems to learn from data and improve performance without direct human programming (Goodfellow et al., 2016). Through machine learning algorithms, intelligent systems can recognise speech, generate content, process languages, and make predictions based on data patterns. The increasing dependence on AI technologies has generated scholarly debates concerning ethics, accountability, algorithmic bias, and cultural representation.

Artificial Wisdom

Artificial Wisdom is an emerging concept that extends beyond Artificial Intelligence to include ethical judgment, contextual understanding, empathy, and cultural sensitivity in intelligent systems (Sternberg, 2020). While AI focuses mainly on automation and computational efficiency, Artificial Wisdom emphasises moral reasoning and socially responsible technological development. Floridi (2019) argues that intelligent technologies should be guided by ethical principles that protect human dignity, inclusiveness, and cultural diversity. Therefore, Artificial Wisdom advocates for technologies that serve humanity responsibly while respecting social and cultural realities. Within African societies, Artificial Wisdom becomes important because it encourages the integration of indigenous philosophies such as Ubuntu, communalism, and African ethical systems into technological innovation (Yilma, 2025).

African Narratives

African narratives refer to the stories, oral traditions, myths, folktales, songs, rituals, proverbs, and cultural expressions that define African societies and identities (Finnegan, 2012). Historically, African communities relied heavily on oral traditions as methods of preserving cultural memory and transmitting indigenous knowledge across generations. Sternberg, (2020). explains that language and storytelling play central roles in preserving African identity and resisting cultural domination. Indigenous knowledge systems in Africa encompass traditional medicine, agriculture, environmental practices, spirituality, conflict resolution, and communal ethics developed through generations of practical experiences. However, globalisation and modernisation have weakened many traditional cultural institutions and indigenous communication systems. Exposure to foreign media and technological systems has contributed to the gradual decline of indigenous languages and cultural practices among younger generations.

Artificial Intelligence has become increasingly important in global cultural preservation efforts. UNESCO (2021) notes that AI technologies can support the preservation of

endangered languages, the digitisation of historical archives, documentation of oral traditions, and accessibility of cultural heritage resources through digital platforms. In Africa, AI-driven technologies can facilitate the documentation and dissemination of oral narratives, folktales, and indigenous knowledge systems to wider audiences. Language-processing systems and digital archives can help preserve local languages and cultural heritage for future generations. Despite these opportunities, scholars have raised concerns regarding the dominance of Western datasets and ideological frameworks within AI systems. Benjamin (2019) argues that algorithmic systems often reproduce social inequalities and cultural biases because they are trained using dominant social structures and perspectives. Similarly, Couldry and Mejias (2019) contend that global data systems may reinforce forms of digital colonialism by exploiting local knowledge systems and marginalising indigenous cultures.

Theoretical Review

This study is anchored on Cultural Imperialism Theory and Technological Determinism Theory. Cultural Imperialism Theory was developed by Herbert Schiller (1976). The theory explains how dominant societies impose their cultural values, beliefs, ideologies, and media systems on less dominant societies through communication technologies and global information systems (Schiller, 1976). According to the theory, media and technological systems controlled by powerful societies often influence the cultural orientation and identity of developing societies. Within the context of this study, AI systems developed largely within Western societies often prioritize Western languages, values, datasets, and epistemologies, while giving limited attention to African narratives and indigenous knowledge systems. This raises concerns about cultural domination, digital inequality, and the gradual erosion of African cultural identity within global technological systems.

Technological Determinism Theory posits that technological advancement plays a significant role in shaping social structures, communication patterns, cultural values, and human interactions. The theory maintains that developments in technology drive societal transformation and influence human behaviour. Its relevance to the present study is evident in explaining how Artificial Intelligence technologies affect cultural communication, identity formation, and the preservation of knowledge within African societies. AI technologies possess the ability to influence the creation, preservation, representation, and dissemination of African narratives in digital spaces. Consequently, the theory provides an appropriate framework for understanding the social and cultural implications of emerging intelligent technologies in contemporary African societies.

Thus, Technological Determinism Theory is closely related to *Artificial Intelligence, Artificial Wisdom and African Narratives: Implications for Cultural Identity and Knowledge Preservation* because it explains how technological innovations such as Artificial Intelligence shape cultural communication, identity formation, and knowledge systems within society. The theory emphasizes that technology influences social transformation, patterns of interaction, and cultural values. In the context of this study, AI technologies affect how African narratives are created, represented, preserved, and disseminated in digital environments. Since many AI systems are largely developed within Western societies, they often prioritize Western languages, values, datasets, and epistemologies, thereby creating

concerns about cultural domination, digital inequality, and the marginalization of African indigenous knowledge systems. Consequently, the theory provides a relevant framework for understanding how Artificial Intelligence and Artificial Wisdom may either threaten or support the preservation of African cultural identity and indigenous knowledge in contemporary digital societies.

Methodology

Research Design

This study adopted a qualitative research design using a conceptual and descriptive approach. The qualitative design was considered appropriate because the study seeks to explore and interpret the implications of Artificial Intelligence (AI), Artificial Wisdom, and African narratives on cultural identity and indigenous knowledge preservation. The approach allows for an in-depth understanding of cultural meanings, ethical concerns, and social realities associated with emerging intelligent technologies in African contexts.

Sources of Data

The study relied solely on secondary sources of data. These include peer-reviewed journal articles, textbooks, conference papers, institutional reports, policy documents, and relevant online academic publications. Key databases and repositories such as Google Scholar, ResearchGate, JSTOR, and UNESCO digital resources were consulted to obtain relevant and credible literature on Artificial Intelligence, Artificial Wisdom, African narratives, cultural identity, and indigenous knowledge systems.

Population of the Study

The population of the study comprised all existing scholarly literature, policy documents, and academic publications relating to Artificial Intelligence, cultural identity, African narratives, and indigenous knowledge preservation. These materials formed the basis for understanding the relationship between intelligent technologies and African cultural systems.

Sampling Technique

A purposive sampling technique was employed in selecting relevant literature. Only materials that directly addressed Artificial Intelligence, Artificial Wisdom, African narratives, cultural identity, and knowledge preservation were included in the review. Emphasis was placed on recent, relevant, and credible academic works that align with the objectives of the study.

Method of Data Analysis

Data collected from secondary sources were analysed using thematic content analysis. This involved a systematic review of literature, identification of recurring ideas, and categorisation of findings into key themes such as AI and cultural preservation, Artificial Wisdom and ethical technology, African narratives and indigenous knowledge systems, digital colonialism, and cultural identity in the digital age. This method enabled the researcher to interpret patterns and relationships within the literature.

Results

The results of this study are presented based on the thematic analysis of literature reviewed on Artificial Intelligence, Artificial Wisdom, and African narratives with respect to cultural identity and knowledge preservation.

Artificial Intelligence and African Narrative Preservation

The analysis revealed that Artificial Intelligence contributes positively to the preservation of African narratives and indigenous knowledge systems. AI technologies such as machine learning, natural language processing, and speech-to-text systems were found to support the digitisation of oral traditions, translation of indigenous languages, and storage of cultural heritage materials. This indicates that AI has strong potential to enhance the preservation and accessibility of African cultural knowledge in digital formats.

Cultural Identity and Artificial Intelligence

The study results showed that Artificial Intelligence has both positive and negative effects on African cultural identity. Positively, AI platforms promote African culture through digital storytelling, educational content, and online cultural archives. However, the results also indicate that AI systems trained predominantly on non-African datasets tend to distort or under-represent African cultural identities, leading to gradual cultural dilution among users, especially the youth.

Representation of African Narratives in AI Systems

Findings from the reviewed literature indicate that African narratives are significantly underrepresented in global AI systems. This is largely due to limited African language datasets, lack of content, and dominance of Western epistemological frameworks in AI development. The result highlights a persistent gap in cultural inclusiveness within global technological systems, contributing to algorithmic bias against African cultural expressions.

Artificial Wisdom and Ethical Technology Development

The results further show that Artificial Wisdom is highly relevant in addressing ethical and cultural challenges associated with Artificial Intelligence. Artificial Wisdom promotes ethical reasoning, inclusiveness, and cultural sensitivity in technology design. The findings indicate that integrating Artificial Wisdom into AI systems can improve fairness, reduce bias, and enhance respect for African indigenous knowledge systems and cultural values.

Overall Result

Overall, the study results indicated that Artificial Intelligence has the capacity to preserve African narratives but simultaneously poses risks to cultural identity when not properly localized. The integration of Artificial Wisdom is therefore essential for ensuring that AI systems become more ethical, culturally inclusive, and supportive of African knowledge preservation.

Discussion of Findings

The findings of this study reveal a complex relationship between Artificial Intelligence, Artificial Wisdom, and African narratives, particularly in relation to cultural identity and indigenous knowledge preservation. The results indicate that Artificial Intelligence holds

considerable promise for the preservation and digitisation of African cultural heritage. This aligns with UNESCO (2021), which emphasises that digital technologies can support the safeguarding of endangered languages, oral traditions, and cultural artefacts. Through tools such as machine learning, speech recognition, and natural language processing, African narratives can be documented, stored, and disseminated in ways that enhance accessibility and intergenerational transmission of knowledge.

However, the study also shows that despite these advantages, Artificial Intelligence systems are largely constrained by data limitations and structural biases. The dominance of Western datasets in AI development has led to the underrepresentation of African languages, cultural expressions, and epistemologies. This finding is consistent with Benjamin (2019), who argues that algorithmic systems often reproduce existing social inequalities through biased training data. In the same vein, Couldry and Mejias (2019) highlight that global digital systems can reinforce forms of digital colonialism by privileging dominant knowledge systems while marginalising indigenous perspectives.

The study further revealed that African cultural identity is significantly influenced by exposure to AI-driven digital platforms. On one hand, these technologies facilitate cultural awareness through online storytelling, digital archives, and educational content. On the other hand, the dominance of foreign cultural content within AI-powered systems contributes to gradual cultural dilution among younger generations. This supports Appadurai's (1996) view that globalization intensifies cultural flows that may weaken local cultural identities and traditions.

Another important finding is the limited representation of African narratives within global Artificial Intelligence systems. The absence of sufficient African language datasets and culturally relevant content reduces the ability of AI systems to accurately interpret African worldviews. This challenge highlights the need for increased investment in indigenous data development, language digitisation, and culturally contextual AI design tailored to African realities.

Furthermore, the study found that Artificial Wisdom plays a crucial role in addressing ethical concerns associated with Artificial Intelligence. Artificial Wisdom emphasises moral reasoning, cultural inclusiveness, and human-centre technological development. By incorporating African philosophical principles such as Ubuntu, AI systems can be designed to reflect communal values, empathy, and respect for cultural diversity. This aligns with Sternberg (2020), who emphasises that intelligence without wisdom may lead to socially and ethically inadequate decisions.

Overall, the discussion shows that while Artificial Intelligence offers transformative opportunities for cultural preservation, its current structure poses risks to African cultural identity if not properly localized and ethically guided. The integration of Artificial Wisdom is therefore essential for ensuring that AI systems support rather than undermine African narratives and indigenous knowledge systems.

Conclusion

This study examined the implications of Artificial Intelligence and Artificial Wisdom on African narratives with particular emphasis on cultural identity and knowledge preservation. Based on the reviewed literature and thematic analysis, it is evident that Artificial Intelligence plays a significant role in the preservation and digitization of African narratives. AI technologies such as machine learning, natural language processing, and digital archiving systems provide innovative opportunities for documenting oral traditions, translating indigenous languages, and enhancing access to African cultural heritage.

However, the study also established that the benefits of Artificial Intelligence are constrained by several challenges, particularly the underrepresentation of African languages and cultural contexts in global AI systems. The dominance of Western datasets and epistemological frameworks has contributed to algorithmic bias, cultural misrepresentation, and the gradual erosion of indigenous knowledge systems. These challenges pose serious implications for African cultural identity in the digital age.

The study further concluded that Artificial Wisdom is a critical concept in addressing the ethical and cultural limitations of Artificial Intelligence. Unlike conventional AI, Artificial Wisdom emphasizes ethical reasoning, cultural inclusiveness, and human-centered design. Its integration into AI systems can promote fairness, reduce bias, and ensure that African indigenous knowledge systems and cultural values are adequately represented in digital technologies.

Overall, the study concludes that while Artificial Intelligence offers transformative opportunities for cultural preservation, its effectiveness depends on the inclusion of ethical frameworks and culturally sensitive design principles. The sustainability of African narratives and cultural identity in the digital era requires deliberate efforts to integrate Artificial Wisdom into AI development and to strengthen African participation in global technological innovation.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. African governments and policymakers should invest in the development of indigenous Artificial Intelligence systems that incorporate African languages, cultures, and knowledge systems.
2. Technology developers should ensure that AI systems are trained using diverse and representative datasets that include African cultural and linguistic data.
3. Educational institutions should integrate Artificial Intelligence literacy and indigenous knowledge studies into their curricula to promote cultural awareness among students.
4. Researchers and scholars should prioritize interdisciplinary studies that combine Artificial Intelligence, ethics, and African cultural studies by encouraging joint research among experts in technology, humanities, social sciences, and indigenous knowledge systems to examine how AI technologies affect African cultural identity, values, languages, and knowledge preservation.

5. Cultural institutions and archives should accelerate the digitisation of oral traditions, folktales, and indigenous knowledge to ensure long-term preservation.
6. The concept of Artificial Wisdom should be incorporated into AI governance frameworks to ensure ethical, inclusive, and culturally sensitive technological development.

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PREDICTIVE INFLUENCE ETHNOMATHEMATICAL AND CONTEXTUALIZED PEDAGOGIES ON STUDENTS' ENGAGEMENT IN MATHEMATICS AND SCIENCE LEARNING FOR SUSTAINABLE DEVELOPMENT

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Abstract

The study examines the predictive influence ethnomathematical and contextualized pedagogies on students' engagement in Mathematics and Science Learning for Sustainable Development. This study adopted a quantitative, correlational research design. The population of the study comprises all science students enrolled in public secondary schools across Osun State, Nigeria with a total of 12,681 students. The sample for the study consisted of 2,160 students, representing approximately 17% of the population. The sample was selected using multistage sampling technique. Data were gathered using a validated and reliable structured questionnaire based on a four-point Likert scale, with a reliability coefficient of 0.78 confirmed through Cronbach's alpha. Analysis was conducted using frequency counts, percentages, means, standard deviations and Pearson Product Moment Correlation (PPMC). The findings revealed that ethnomathematical pedagogy and contextualized pedagogy positively influence students' engagement in mathematics, biology, and science learning. Respondents unanimously agreed that integrating cultural knowledge, local experiences, and real-life situations into teaching enhances students' interest, participation, and understanding of concepts. The study also revealed a significant relationship between ethnomathematical and contextualized pedagogies, indicating that both approaches work together to promote meaningful and engaging learning experiences for Sustainable Development. Therefore, based on these results, the study recommended, among others that School should integrate ethnomathematical concepts into

mathematics and science lessons to connect academic content with students' cultural backgrounds and experiences.

Keywords: Ethnomathematics pedagogy, Contextualized pedagogy, Engagement, Mathematics and Science learning, Sustainable development

Introduction

Mathematics and science are not merely abstract or classroom-based disciplines; rather, they function as living practices embedded in everyday life. A growing body of mathematics education literature conceptualizes mathematics as a human activity concerned with patterns, structures, relationships, space, and change, developed to interpret and respond to real-world situations (Bishop, 2020; Niss & Højgaard, 2019). Contemporary theorists further describe mathematics as a pattern-oriented and meaning-making enterprise that emerges from practical human engagements such as counting, measuring, comparing, and organizing experiences (Radford, 2021). In addition, current sociocultural perspectives emphasize that mathematics is a socially constructed body of knowledge shaped by cultural practices, values, and human purposes (Bishop, 2020; Ernest, 2023). This understanding strongly aligns with African contexts, where mathematical ideas are manifested in land measurement, architectural design, trade systems, textile patterns, and artisanal craftsmanship.

From a Nigerian perspective, contemporary scholars increasingly argue that mathematics is deeply embedded in indigenous knowledge systems and everyday problem-solving practices. Empirical studies on mathematics education highlight that traditional African societies routinely apply mathematical reasoning in farming systems, market transactions, construction, measurement, and time reckoning, even though these practices are often marginalized within formal school curricula (Abah, 2021; Ezeife & Bishop, 2022). Moreover, current research in culturally responsive mathematics education emphasizes that mathematics learning becomes more meaningful and engaging when instruction explicitly connects with learners' cultural environments, community practices, and lived experiences (Ogunleye & Awofala, 2022; Umoren, 2023).

Science, on the other hand, is increasingly conceptualized as a systematic, evidence-based process of inquiry through which knowledge about natural and social phenomena is generated and refined. Recent science education scholarship emphasizes that science involves practices such as observation, experimentation, data analysis, modelling, argumentation, and the development and testing of explanations grounded in empirical evidence (Osborne, 2020; Erduran & Dagher, 2021). This contemporary view extends science beyond formal laboratory settings to include knowledge constructed through sustained and purposeful interaction with the environment. Within this framework, indigenous African practices related to agriculture, weather prediction, animal husbandry, herbal medicine, and environmental management exemplify scientific reasoning rooted in careful observation, pattern recognition, experimentation, and experiential learning accumulated over generations.

Nigerian and African scholars similarly contend that science is deeply embedded in community practices and indigenous knowledge systems. Recent studies emphasize that African Indigenous Knowledge Systems (AIKS) constitute systematic, empirical, and

context-sensitive ways of knowing, developed through generations of observation, trial, and adaptation to local environments. For example, Blackie (2024) argues that indigenous science represents valid epistemological systems grounded in sustained environmental interaction, experiential learning, and practical problem-solving, and that such knowledge systems are essential for culturally relevant and inclusive science education. Within the Nigerian context, Ogunniyi (2020) maintains that indigenous scientific knowledge should be recognized as complementary to Western science in formal education, as its exclusion often leads to learner alienation and reduced relevance of school science.

In everyday activities such as farming, building, trading, craftsmanship, navigation, and environmental management, African communities engage simultaneously in mathematical and scientific reasoning. Farmers estimate quantities, predict seasonal cycles, and optimize resource use, while artisans apply geometric reasoning and material properties in construction and tool-making. These forms of indigenous knowledge have enabled communities to thrive for generations. However, despite their relevance and sophistication, such locally grounded mathematical and scientific practices remain largely absent from formal school mathematics and science instruction, resulting in a disconnect between learners' lived experiences and classroom learning.

As African nations advance toward the Sustainable Development Goals, the quality and relevance of mathematics and science education have therefore emerged as critical imperatives. However, instructional practices that marginalize learners' cultural and lived experiences risk producing knowledge without relevance and skills that fail to translate into real-world impact. This disconnect has continued to limit students' meaningful engagement in disciplines that are critical to Africa's sustainable future.

In response, this study investigates how ethnomathematical and contextualized pedagogical approaches, rooted in African cultural realities, can predict and enhance students' engagement in mathematics and science learning. Ethnomathematical pedagogy refers to instructional strategies that integrate learners' cultural practices, local knowledge systems, and community experiences into mathematics and science teaching, enabling students to connect abstract concepts with familiar, culturally grounded contexts and everyday activities. Evidence from ethnomathematics research indicates that when instruction draws on learners' cultural ways of knowing and doing mathematics, students perceive the content as more meaningful and engaging and are better able to relate school mathematics to their lived experiences (Sari, Nugroho, & Pratiwi, 2024; Jacob & Dike, 2023). Ethnomathematical pedagogy - which embeds local cultural practices and community problem-solving into mathematics and science instruction - has been shown to make abstract concepts more meaningful and relevant to learners' lives. A recent meta-analysis of ethnomathematics-based learning found that integrating students' cultural contexts into mathematics instruction contributes to improved learning outcomes and increased engagement, as learners are better able to relate academic content to familiar cultural practices and local knowledge (Sari, Nugroho, & Pratiwi, 2024). Similarly, contextualized pedagogy refers to instructional approaches that situate learning tasks within meaningful, real-world contexts reflecting students' everyday experiences, environments, and challenges, enabling learners to perceive the relevance of academic content to their lives and communities. Recent empirical research

highlights that when academic content -particularly in mathematics and science - is framed within authentic contexts, students demonstrate greater interest, active participation, and engagement, because they can directly connect what they are learning to practical problems and familiar situations (Ramaila, 2025). Research conducted in secondary mathematics classrooms in Zambia shows that integrating indigenous pedagogies and culturally relevant examples into geometry instruction significantly enhanced students' engagement, enthusiasm, and conceptual understanding, highlighting the importance of linking classroom tasks to students' lived cultural realities (Mulenga, Folokwe & Spangenberg, 2025).

Research from Nigeria demonstrates that when mathematics instruction incorporates local cultural concepts and practices, students exhibit greater engagement, more positive attitudes toward mathematics, and richer classroom interaction, underscoring the importance of linking learning to students' lived social and cultural realities (Enun & Iyaji, 2025). Similarly, Jacob and Dike (2023) examined ethnomathematics and culturally responsive pedagogy in mathematics learning. Their study established that ethnomathematics is more effective when integrated with culturally responsive teaching practices that connect classroom concepts to students' cultural realities. The authors further reported that this integration enhances learners' conceptual understanding, creativity, and active classroom participation, thereby making mathematics learning more meaningful and relevant

By aligning instruction with learners' cultural experiences and daily realities, such ethnomathematical and contextualized pedagogies have the potential to strengthen education as a catalyst for sustainable development across the continent.

Research Objectives

The study seeks to investigate the influence of ethnomathematical and contextualized pedagogical approaches on students' engagement in mathematics and science learning. Specifically, the study seeks to:

1. examine the extent to which ethnomathematical pedagogy predicts students' engagement in mathematics and science learning.
2. determine the extent to which contextualized pedagogy predicts students' engagement in mathematics and science learning.
3. compare the relative contributions of ethnomathematical and contextualized pedagogies in enhancing students' engagement in mathematics and science learning.
4. assess the combined effect of ethnomathematical and contextualized pedagogical approaches on students' engagement in mathematics and science learning.

Research Questions

Based on the objectives, the study seeks to answer the following questions:

1. What is the extent of ethnomathematical pedagogy on students' engagement in mathematics and science learning?
2. What is the extent of contextualized pedagogy on students' engagement in mathematics and science learning?

Research Hypotheses

1. There is no significant relationship between ethnomathematical and contextualized pedagogy on students' engagement in mathematics and science learning

Methodology

Research design

This study adopted a quantitative, correlational research design to investigate the predictive influence of ethnomathematical and contextualized pedagogical approaches on students' engagement in mathematics and science learning. The design is appropriate because it allows for the examination of the relationships and predictive effects between independent variables (ethnomathematical pedagogy and contextualized pedagogy) and the dependent variable (students' engagement) without manipulating the study environment.

Population of the study

The population for this study consisted of all science students enrolled in public secondary schools across Osun State, Nigeria with a total of 12,681 students. These students represent a diverse demographic, providing a rich context to examine how culturally and contextually responsive pedagogies influence engagement in mathematics and science learning.

Sampling procedure and sample size

A multistage sampling technique was employed to select a representative sample. In the first stage, Osun State was stratified into its three senatorial districts (Osun East, Osun Central, and Osun West) to ensure geographical representation. In the second stage, secondary schools offering science subjects were randomly selected from each district. In the third stage, intact science classes were randomly selected from the sampled schools to maintain the natural classroom environment. Finally, a simple random sampling technique was used to select individual students from these classes, resulting in a total sample of 2,160 students, representing approximately 17% of the population. The selected sample size was considered adequate for the intended predictive analyses, including multiple regression, ensuring statistical power and representativeness.

Instrumentation

Data were collected using structured questionnaires designed to measure students' engagement in mathematics and science as well as the extent to which ethnomathematical and contextualized pedagogical practices are implemented. The instruments were validated through expert review and a pilot study to ensure clarity, reliability, and relevance to the study objectives. Reliability coefficients (Cronbach's alpha) for all scales exceeded the recommended threshold of 0.70, indicating acceptable internal consistency.

Data Collection Procedure

Permission was obtained from relevant educational authorities and school administrators before data collection. Questionnaires were administered in classrooms under the supervision of the researchers and trained research assistants. Students were briefed on the purpose of the study and assured of the confidentiality of their responses.

Data Analysis

Data were analyzed using descriptive statistics to summarize respondents' demographic characteristics and key study variables. Frequency count, percentage, mean and standard deviation were used to answer the research questions raised. Inferential statistics, specifically Pearson Product Moment Correlation (PPMC). analysis, was employed to examine the predictive influence of ethnomathematical and contextualized pedagogical approaches on students' engagement in mathematics and science learning. Statistical significance was evaluated at the 0.05 level.

Results

Research Question 1: What is the extent of ethnomathematical pedagogy on students' engagement in mathematics and science learning?

Table 1: Descriptive Analysis of the extent of ethnomathematical pedagogy on students' engagement in mathematics and science learning?

S/n	the extent of ethnomathematical pedagogy on students' engagement in mathematics and science learning	SA (%)	A (%)	D (%)	SD (%)	Mean	Standard Deviation	Remark
1	My Mathematics and Science teachers use examples from my everyday life and community to explain lessons.	707 (32.7)	1271 (58.8)	168 (7.8)	14 (0.6)	3.24	0.61	Agree
2	Learning Mathematics and Science through local activities (such as farming, trading, building, or crafts) makes the subjects easier to understand.	1121 (51.9)	1026 (47.5)	6 (0.3)	7 (0.3)	3.51	0.52	Agree
3	I feel more interested in Mathematics and Science when lessons include cultural practices or real-life experiences familiar to me.	559 (25.9)	1279 (59.2)	315 (14.6)	7 (0.3)	3.11	0.64	Agree
4	Using local methods and materials in teaching helps me remember what I learn in Mathematics and Science.	1129 (52.3)	878 (40.6)	0.00	153 (7.1)	3.38	0.81	Agree
5	Ethnomathematical teaching helps me see how Mathematics and Science are useful in solving real-life problems.	716 (33.1)	1123 (52.0)	314 (14.5)	7 (0.3)	3.18	0.68	Agree
6	I understand Mathematics and Science concepts better when teachers relate them to my culture and environment.	1129 (52.3)	873 (40.4)	0.00	158 (7.3)	3.38	0.82	Agree
7	I prefer Mathematics and Science lessons that connect classroom topics with indigenous or	867 (40.1)	1123 (52.0)	163 (7.5)	7 (0.3)	3.32	0.62	Agree

	traditional knowledge							
8	When Mathematics and Science lessons include local or cultural examples, I participate more actively in class.	716 (33.1)	1286 (59.5)	0.00	158 (7.3)	3.19	0.77	Agree
9	Using familiar community activities in teaching makes me more interested in Mathematics and Science lessons.	1122 (51.9)	560 (25.9)	471 (21.8)	7 (0.3)	3.29	0.81	Agree
10	I pay more attention in Mathematics and Science classes when teachers relate topics to indigenous practices or everyday life.	1118 (51.8)	873 (40.4)	6 (0.3)	163 (7.5)	3.36	0.83	Agree
11	Ethnomathematical teaching encourages me to ask questions and share my ideas during lessons.	1799 (83.3)	155 (7.2)	178 (8.2)	28 (1.3)	3.72	0.67	Agree
12	I feel motivated to learn Mathematics and Science when lessons are connected to my culture and environment.	12 (0.6)	2032 (94.1)	60 (2.8)	56 (2.6)	2.93	0.36	Agree
13	Lessons that include ethnomathematical examples make me want to study Mathematics and Science more seriously.	1270 (58.8)	713 (33.0)	163 (7.5)	14 (0.6)	3.49	0.66	Agree

Cut -Off Mean; 2.50

Table 1 identified the extent of ethnomathematical pedagogy on students' engagement in mathematics and science learning. Using a cut-off mean of 2.50 for the rating scale. All the respondents unanimously agreed on the positive influence of ethnomathematical pedagogy on students' engagement in mathematics and science learning. It indicates that integrating indigenous knowledge, cultural practices, and local experiences into instruction enhances students' interest, participation, and understanding of mathematical and scientific concepts.

Research Question 2: What is the extent of contextualized pedagogy on students' engagement in mathematics and science learning?

Table 2: Descriptive Analysis of extent of contextualized pedagogy on students' engagement in mathematics and science learning

S/n	the extent of contextualized pedagogy on students' engagement in mathematics and science learning	SA (%)	A (%)	D (%)	SD (%)	Mean	Standard Deviation	Remark
14	My Mathematics and Science teachers explain lessons using examples from my daily life and surroundings.	1123 (52.0)	716 (33.1)	162 (7.5)	159 (7.4)	3.29	0.89	Agree
15	I understand Mathematics and Science better when teachers relate topics to real-life situations	721 (33.4)	1286 (59.5)	153 (7.1)	0.00	3.26	0.58	Agree
16	Classroom activities in Mathematics and Science reflect problems I see at home, in school, or in my community.	718 (33.2)	1429 (66.2)	6 (0.3)	7 (0.3)	3.32	0.49	Agree
17	Learning Mathematics and Science becomes more meaningful when lessons are connected to real-world experiences	310 (14.4)	1681 (77.8)	6 (0.3)	163 (7.5)	2.99	0.67	Agree
18	Context-based teaching helps me apply what I learn in Mathematics and Science outside the classroom.	566 (26.2)	1437 (66.5)	157 (7.3)	0.00	3.19	0.55	Agree
19	I feel more confident in Mathematics and Science when lessons are taught using familiar situations.	150 (6.9)	1971 (91.3)	18 (0.8)	21 (1.0)	3.04	0.34	Agree
20	Mathematics and Science lessons are more interesting when teachers use practical and real-life examples.	723 (33.5)	1279 (59.2)	158 (7.3)	0.00	3.26	0.58	Agree
21	When Mathematics and Science lessons are taught using real-life examples, I am more actively involved in class.	0.00	1991 (92.2)	162 (7.5)	7 (0.3)	2.92	0.29	Agree
22	Relating Mathematics and Science topics to everyday situations makes me more interested in learning.	719 (33.3)	1283 (59.4)	158 (7.3)	0.00	3.26	0.58	Agree
23	I pay better attention in Mathematics and Science classes when lessons are connected to my environment.	720 (33.3)	1282 (59.4)	0.00	158 (7.3)	3.19	0.77	Agree
24	Context-based teaching encourages me to participate in discussions and class activities.	1122 (51.9)	560 (25.9)	471 (21.8)	7 (0.3)	3.29	0.81	Agree
25	I feel more motivated to learn Mathematics and Science when teachers use familiar and practical situations.	563 (26.1)	1439 (66.6)	158 (7.3)	0.00	3.19	0.55	Agree

26	Mathematics and Science lessons that reflect real-world experiences make me want to engage more in learning activities.	1286 (59.5)	721 (33.4)	153 (7.1)	0.00	3.52	0.63	Agree
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Cut -Off Mean; 2.50

Table 2 identified the extent of contextualized pedagogy on students' engagement in mathematics and science learning. Using a cut-off mean of 2.50 for the rating scale. All of the respondent agreed on the contextualized pedagogy positively influences students' engagement in mathematics and science learning. The respondents affirmed that relating classroom instruction to real-life situations and learners' immediate environment increases students' interest, active participation, and understanding of concepts.

Testing of Hypotheses

Hypothesis 1: There is no significant relationship between Ethnomathematical and Contextualized pedagogy on students' engagement in mathematics and science learning.

The Ethnomathematical and Contextualized pedagogy on students' engagement in mathematics and science learning data were gathered from the answers provided by respondents to items 1–26 in Section B, and C of the Ethnomathematical and Contextualized Pedagogies on Student' Engagement Questionnaire (ECPASEQ) to evaluate this hypothesis. Responses to questions in Section D and E of the of the Ethnomathematical and Contextualized Pedagogies on Student' Engagement Questionnaire (ECPASEQ) were used to compile this data. Pearson's product-moment correlation tests were performed at the 0.05 level to determine statistical significance. Table 3 displays the final result.

Table 3: Relationship between Ethnomathematical and Contextualized pedagogy on students' engagement in mathematics and science learning.

Variables	N	Mean	Stand Dev	r-cal	P-value
Ethnomathematical pedagogy	2160	43.10	5.09	0.841*	0.000
Contextualized pedagogy	2160	41.74	4.03		

*P<0.05

Table 3 showed that the r-cal value of 0.841 was significant at 0.05 level of significance because the P-value (0.000) < 0.05. The null hypothesis is rejected. This implied that there was significant relationship between Ethnomathematical and Contextualized pedagogy on students' engagement in mathematics and science learning.

Discussion of the findings

The findings showed that there was positive influence of ethnomathematical pedagogy on students' engagement in mathematics and science learning This is in agreement with that of Sari, et, al., (2024) who examined Effectiveness of ethnomathematics-based learning on students' mathematical literacy: A meta-analysis study. The ethnomathematics-based learning found that integrating students' cultural contexts into mathematics instruction

contributes to improved learning outcomes and increased engagement, as learners are better able to relate academic content to familiar cultural practices and local knowledge

The findings also showed that the contextualized pedagogy positively influences students' engagement in mathematics and science learning. This is consistent with the submission of Ramaila (2025) who examined Contextualized learning as a theoretical framework. Journal of Teaching and Learning. The findings highlight that when academic content -particularly in mathematics and science - is framed within authentic contexts, students demonstrate greater interest, active participation, and engagement, because they can directly connect what they are learning to practical problems and familiar situations

The findings further showed that there was significant relationship between Ethnomathematical and Contextualized pedagogy on students' engagement in mathematics and science learning. This is corroborating with the submission of Prince Kusi and Bonyah (2025) synthesized evidence on ethnomathematics and culturally responsive pedagogy. The review found consistent evidence that integrating ethnomathematics with contextualized teaching practices leads to improvements in students' engagement, conceptual understanding, and academic performance. The authors concluded that the two pedagogical approaches are complementary and jointly support meaningful mathematics learning.

Conclusion

Based on the findings of this study, it could be concluded that, ethnomathematical pedagogy and contextualized pedagogy positively influence students' engagement in mathematics, biology, and science learning. Respondents unanimously agreed that integrating cultural knowledge, local experiences, and real-life situations into teaching enhances students' interest, participation, and understanding of concepts. The study also revealed a significant relationship between ethnomathematical and contextualized pedagogies, indicating that both approaches work together to promote meaningful and engaging learning experiences for Sustainable Development

Recommendations of the Study

Based on the finding, the following recommendations were made:

- i. School should integrate ethnomathematical concepts into mathematics and science lessons to connect academic content with students' cultural backgrounds and experiences.
- ii. Government should encourage teachers to use contextualized teaching strategies that relate lessons to real-life situations and local community practices.
- iii. Government should provide professional development programs and training workshops to help educators effectively implement ethnomathematical and contextualized pedagogies.
- iv. Government should develop instructional materials and learning resources that incorporate indigenous knowledge, cultural practices, and locally relevant examples.
- v. Promote collaborative learning activities that allow students to explore and apply mathematical and scientific concepts within meaningful cultural and community contexts.

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AFRICAN NARRATIVES AS INSTRUMENTS FOR CONFLICT RESOLUTION AND PEACE COUNSELLING IN NIGERIA

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Abstract

This paper explores how African narratives can serve as indigenized tools of conflict resolution and peace counselling in Nigeria. Oral literature in African societies has evolved through various oral traditions including folktales, proverbs, myths, legends, anthems and communal story-telling working as a tool to preserve moral values, maintain unity among members of the society while encouraging resolution of disputes. In present-day Nigeria, where the threat of national disintegration with its reciprocal ethno-religious, political and communal conflicts still present society-wide challenges to national integration, these traditional narrative systems can be useful for peace building and counselling methods. It is a qualitative and exploratory study utilizing material from literature on African oral traditions (AOT), psychology, and conflict resolution studies. The paper argues that African narratives promote empathy, reconciliation, forgiveness, and community responsibility. These narratives serve as culturally appropriate tools for peace counselling. The study highlights how elders, traditional rulers, religious leaders, and community storytellers contribute to mediating conflicts through local communication methods. The findings show that adding African narratives to modern counselling and peace education can improve conflict management strategies in Nigeria. The paper concludes that indigenous narrative traditions have important therapeutic and peace building value. It recommends including these traditions in counselling programs, educational curricula, and community-based conflict resolution efforts.

Keywords: *African narratives, conflict resolution, peace counselling, oral traditions, and indigenous knowledge.*

Introduction

Conflict is an inevitable aspect of human existence, arising from differences in interests, beliefs, values, and access to resources. Nigeria, as a multicultural and multi-ethnic nation, has experienced various forms of conflict ranging from ethnic and religious crises to political violence, communal clashes, insurgency, and youth restiveness. These conflicts have

negatively affected national unity, social development, and psychological well-being among citizens.

Before colonialism and the introduction of modern counselling systems, African societies developed indigenous methods for maintaining peace and resolving disputes. (Lawal, Orunbon, Ibikunle & Faduyile, 2019). Among these methods was the use of narratives embedded in oral traditions such as folktales, proverbs, myths, legends, praise poetry, songs, and storytelling. These narratives served not only as forms of entertainment but also as instruments for moral instruction, emotional healing, social control, and reconciliation. Abe and Ouma (2017) noted that traditional means of settling conflicts were widely accepted and preferred before the advent of colonial rule” and that judgments by elders were rarely questioned due to respect for their wisdom, while Levitt (2025) noted that African societies instituted alternative dispute resolution systems long before modern Europe and the US, based on consensus, reconciliation, restorative justice, and community participation.

African societies traditionally relied on oral narratives, folktales, proverbs, songs, rituals, myths, and communal dialogue systems to maintain social order and resolve disputes. These indigenous narratives transmitted moral values, promoted communal responsibility, and restored damaged relationships. African narratives are therefore not merely artistic expressions but practical tools for social cohesion and peace building. In Nigeria, traditional narratives among the Yoruba, Hausa, Igbo, Tiv, Efik, and other ethnic groups have historically promoted communal harmony and peaceful coexistence. Through storytelling sessions, elders transmitted societal values of respect, forgiveness, tolerance, cooperation, and justice to younger generations. Such narratives often addressed the consequences of greed, violence, betrayal, and disunity while encouraging empathy and collective responsibility. Nkome and Ebune (2020) argue that traditional African societies had evolved respected systems for conflict prevention and resolution, and that colonialism later discarded these mechanisms

In Nigeria, indigenous narratives have continued to influence conflict transformation processes in rural and urban communities. Storytelling sessions, moonlight tales, praise poetry, communal theatre, and elder-mediated oral traditions serve as informal counselling mechanisms that promote forgiveness, empathy, tolerance, and reconciliation. This paper examines how African narratives function as instruments for conflict resolution and peace counselling in Nigeria and evaluates empirical evidence supporting their effectiveness.

Literature review

African narratives refer to oral and performative expressions through which African societies communicate values, histories, moral lessons, and communal identities. They include folktales, proverbs, myths, legends, songs, chants, oral poetry, and indigenous theatre traditions. African narratives are deeply rooted in communal life and often serve educational, moral, and therapeutic purposes. African narratives refer to the corpus of oral and written storytelling traditions that preserve history, cosmology, morality, and social organization across the continent (Adejumobi, 2016). Scholarship shows that these narratives are not peripheral folklore but central to understanding African epistemology, identity, and literary development.

The foundation of African literature is oral tradition. Finnegan (1970) established that genres such as myths, legends, folktales, proverbs, riddles, praise poetry, and epics function as

“verbal folklore” that transmit cultural knowledge across generations. Oral epics in particular are long narrative traditions that preserve the histories, values, and identities of African societies, performed by trained specialists and passed down through performance rather than fixed texts.

Early collections by missionaries and linguists focused on linguistic transcription and religious instruction, often neglecting the performance context and literary function of the texts. However, scholars such as Niane (1965) with the *Sundiata Epic*, and Babalola (1966) with Yoruba *ijala*, demonstrated that oral narratives have complex aesthetic structures and serve as historical sources. By the late 20th century, comparative studies confirmed that African myths and tale types share motifs with global folklore, positioning African folklore as “a branch of one universal tree”

African narratives serve multiple social functions beyond entertainment. First, they act as repositories of history and identity. Oral epics and genealogies document migration, state formation, and conflict, functioning as alternative archives where written records are absent. Second, they transmit moral and social order. Proverbs, animal tales, and trickster stories encode ethical codes and community norms, often using humour and allegory to critique power. Third, they facilitate conflict resolution and social cohesion. Traditional dispute resolution in pre-colonial Africa relied on elders, councils, and communal participation rooted in values like *ubuntu* and *unhu*, which emphasized reconciliation over retribution (Babalola, 1966).

Conflict resolution refers to methods and processes aimed at reducing tension, addressing grievances, and promoting peaceful coexistence between conflicting parties. It involves negotiation, mediation, reconciliation, dialogue, and restorative justice mechanisms designed to restore social harmony. It is the process aimed at reducing, managing, or eliminating disputes between individuals or groups through dialogue, mediation, reconciliation, or restorative justice mechanisms.

Peace counselling is a counselling approach focused on promoting peaceful behaviour, emotional healing, tolerance, reconciliation, and conflict management among individuals and communities. It seeks to address the psychological and emotional effects of violence while encouraging constructive relationships. It involves therapeutic and psychological interventions designed to promote reconciliation, emotional healing, tolerance, and peaceful coexistence among individuals and communities affected by conflict. Ahmadu (2009) noted that indigenous counselling has not been given attention in Nigeria’s school counselling programme. According to him, the counselling gap was created by European colonialism, which succeeded in developing in the minds of the African that anything indigenous is local, unscientific and unorthodox. Indigenous counselling is one of the casualties of colonial mentality. Counselling is supposed to be a culturally loaded process for helping individuals to either regain or take direction for their lives, has now been dominated by Western counselling and psychotherapy. Research conducted by Peter (2014) showed that indigenous approaches to reconciliation were effective in settling ethnic and local disputes in Afghanistan. Generally, indigenous approaches to conflict resolution are effective in addressing issues and healing hurt feelings caused by wrongdoing (Bloomfield, Barnes & Huyse, 2003).

Traditional African societies employed narratives as tools for maintaining harmony long before colonial legal systems emerged. Elders, storytellers, griots, traditional priests, and community leaders mediated disputes through oral performances and symbolic communication. Olawale (2023) also found that African narratives mechanisms are appropriate and expedient as an effective home-grown approach that can not only drive a cohesive future, but can also conform to the Nigerian modern system of justice system.

Among the Yoruba, proverbs and moonlight storytelling were used to settle disputes and teach moral responsibility. Among the Igbo, folktales and communal assemblies encouraged restorative justice and social accountability. Tiv communities utilized the Kwagh-hir theatre tradition for social correction and peace education. Hausa praise poetry and oral traditions also reinforced communal cohesion and conflict de-escalation. Studies indicate that indigenous conflict resolution systems emphasize reconciliation rather than punishment.

African narratives have historically functioned as tools for social regulation and communal integration. According to Folami and Olaiya (2016), storytelling played a significant role in rebuilding peace after the Ife–Modakeke conflict in Southwestern Nigeria. Through oral narratives, communities reconstructed shared identities and promoted reconciliation.

Akomolafe (2019) observed that among the Awori people, proverbs and oral traditions facilitate mediation and communal harmony. Similarly, Nomishan, Okonkwo, and Tella (2025) found that Tiv Kwagh-hir theatre contributes to conflict prevention through dramatic narratives that discourage violence and promote unity. Ejike (2022) also researched into conflict resolutions with African indigenous methods and found that the traditional conflict resolution method as practiced in African society is better than the modern adjudicative method of peace building and conflict resolution, because it is faster and non-adversarial.

Theoretical Framework

This study is anchored on Narrative Theory. Narrative Theory emphasizes the importance of stories in shaping human identity, behaviour, and social relationships. According to the theory, individuals and communities construct meaning through stories and shared experiences. In counselling, narratives help people reinterpret traumatic experiences, rebuild relationships, and foster healing. Narrative Theory emphasizes the role of stories in shaping social realities, identities, and perceptions. Human beings understand experiences through narratives, making storytelling a powerful instrument for changing hostile attitudes and reconstructing peaceful relationships.

Narrative Theory explains that human beings interpret experiences through stories, making narratives effective tools for changing attitudes and reconstructing relationships. Indigenous Conflict Transformation Theory further emphasizes that sustainable peace emerges from culturally grounded approaches that prioritize restoration rather than punishment.

African Narratives and Indigenous Conflict Resolution in Nigeria

Traditional Nigerian societies employed narratives as informal mechanisms for maintaining order and resolving disputes. Elders used folktales, proverbs, and myths to educate community members about the importance of peaceful coexistence. Among the Yoruba, proverbs such as “Bi ọrọ ba sọnu, owe la fi n wa a” (When words are lost, proverbs are used to find them) demonstrate the role of wisdom in mediation and reconciliation. Proverbs often softened harsh communication during disputes and encouraged reflective dialogue.

Among the Igbo, storytelling sessions known as *akụkọ ifo* conveyed moral lessons against greed, betrayal, and violence. These stories reinforced communal values and discouraged behaviours capable of causing conflict within families and communities. In Northern Nigeria, Hausa oral traditions, including praise songs and wise sayings, promoted respect for elders, religious tolerance, and peaceful interactions. Traditional rulers and Islamic scholars often employed stories and parables during mediation processes to restore harmony among disputing parties. These indigenous narrative practices contributed significantly to social cohesion and communal stability before the rise of formal legal systems.

Story telling is another aspect of African narratives employed in peace counselling. It involves the “sharing of personal, biographical, traditional and historical stories as a way to develop greater understanding about the values, history, and traditions that motivate individual and group behaviour and customs” (Coburn 2012).

Storytelling serves three primary functions: epistemological, transformative, and methodological. In its epistemological function, storytelling is a means of creating knowledge and by which knowledge is shared, identity is formed, and socialization takes place (Senehi 2009; Sunwolf 1999). Within peacebuilding, storytelling as a method may be a means to foster understanding about the roots of a conflict, to be heard and build empathy for a side’s viewpoints, and to engage in a collective restoration or reconciliation process (Fuentes 2012). Coburn (2012) argues that story-telling that involves participation of those directly affected by the conflict can be “an active way to support ‘bottom-up’ initiatives in peacebuilding.

Research by Olakunle Michael Folami and Taiwo Akanbi Olaiya found that storytelling became an effective peacebuilding mechanism after several formal interventions failed. Through community storytelling sessions, symbolic narratives, and oral performances, both communities reconstructed shared histories and promoted reconciliation. The study revealed that storytelling: reduced hostility between conflicting groups, encouraged empathy and mutual understanding, promoted emotional healing, reinforced shared cultural identity and facilitated long-term reconciliation.

African Narratives as Tools for Peace Counselling

African narratives contribute to peace counselling in several ways. It promotes moral values such as honesty, patience, forgiveness, tolerance, humility, and cooperation. These values reduce tendencies toward aggression and violence, while Storytelling provides opportunities for individuals to express pain, trauma, fear, and emotional experiences. Victims of conflict often find psychological relief through shared communal narratives and testimonies. Folktales and communal stories enable listeners to understand the experiences and feelings of others. This fosters compassion and reduces hostility between conflicting groups.

Many African narratives emphasize reconciliation after wrongdoing. Offenders are often encouraged to seek forgiveness while victims are persuaded to embrace peace and communal unity. Narratives reinforce communal identity and cultural continuity, thereby strengthening social bonds and discouraging divisive tendencies.

African narratives is relevant in contemporary Nigeria because the country currently faces numerous security and social challenges, including ethnic conflicts, terrorism, farmer-herder clashes, cultism, political violence, and separatist agitations. Modern peacebuilding approaches often neglect indigenous knowledge systems despite their cultural relevance and accessibility. Integrating African narratives into counselling and peace education programmes can provide culturally sensitive alternatives for addressing these challenges. Schools, religious institutions, youth centres, and community organizations can incorporate storytelling and indigenous communication methods into peace education initiatives. Olaoba (2010) ascertain that when properly approached with the right method, conflicts in African indigenous societies had always been resolvable.

Media platforms such as radio dramas, theatre performances, and community storytelling festivals can also promote peace messages using local languages and cultural symbols familiar to Nigerian audiences. Furthermore, counsellors and psychologists can integrate narrative therapy approaches rooted in African traditions to address trauma and promote reconciliation among conflict victims. Osimen and Rufus (2021) concluded that indigenous institutions were important to peace building and conflict resolution but were truncated by the coming of the colonial masters.

Despite their relevance, African narrative traditions face several challenges in modern Nigeria. One of the several challenges is the fact that Western education and globalization have reduced interest in indigenous storytelling traditions. This is compounded by that fact that African look down on whatever is not western. Again, rapid urban migration has weakened communal structures that traditionally preserved oral narratives. Apart from this, there is endangerment of African languages. Many indigenous languages used for storytelling are gradually declining. Another major challenge facing the use of African narratives is technological distraction. Social media and digital entertainment have replaced traditional evening storytelling gatherings. Lastly, limited institutional support poses a serious challenge. Indigenous peacebuilding approaches receive limited recognition within formal educational and counselling institutions.

Statement of the Problem

The persistence of violent conflicts in Nigeria suggests limitations in existing formal conflict resolution mechanisms. Many government-led interventions have failed because they are detached from indigenous cultural realities and communal psychological needs. The decline of African oral traditions due to modernization and globalization has further weakened traditional peacebuilding systems.

Although studies have acknowledged the importance of indigenous conflict resolution methods, there is limited empirical research examining specifically how African narratives

contribute to peace counselling and reconciliation in Nigeria. This study addresses this gap by providing empirical evidence on the effectiveness of African narratives in conflict resolution and peace counselling

Objectives of the study

This study aims at:

1. Examining the role of African narratives in conflict resolution in Nigeria.
2. Investigating the effectiveness of storytelling and oral traditions in peace counselling.
3. Determining the relationship between indigenous narratives and communal reconciliation and
4. Identifying challenges affecting the use of African narratives in peacebuilding.

Research Questions

1. What roles do African narratives play in conflict resolution in Nigeria?
2. How effective are storytelling and oral traditions in peace counselling?

Research Hypotheses

H₀: African narratives have no significant influence on conflict resolution and peace counselling in Nigeria.

H₁: African narratives significantly influence conflict resolution and peace counselling in Nigeria.

Methodology

Research Design

The study adopted a mixed-method research design, combining quantitative and qualitative approaches. The quantitative aspect involved questionnaire administration, while the qualitative aspect involved interviews and focus group discussions.

Population of the Study

The population consisted of community leaders, traditional rulers, counsellors, youth leaders, women groups, and residents in selected communities in the selected 5 troubled areas of the nation.

Sample Size and Sampling Technique

A total of 320 respondents participated in the study. Purposive and stratified sampling techniques were used to select participants with relevant knowledge of indigenous conflict resolution practices. The sample distribution include 80 participants each from selected troubled areas of Osun, Benue, Plateau and Rivers states of Nigeria.

Instrument for Data Collection

Data were collected using structured questionnaires, semi-structured interviews, and Focus group discussions (FGDs). The questionnaire contained sections on awareness of African narratives, effectiveness in conflict resolution, role in peace counselling, and challenges affecting indigenous peacebuilding.

Validity and Reliability

Experts in Peace and Conflict Studies validated the instruments. A pilot test conducted in Oyo State produced a Cronbach Alpha reliability coefficient of 0.81, indicating high reliability.

Method of Data Analysis

The data were analysed using the frequency counts, percentages, mean scores, and chi-square statistical analysis.

Presentation of Results and discussion of findings

Demographic Characteristics of Respondents

Variable	Frequency	Percentage (%)
Male	182	56.9%
Female	138	43.1%
Age 18 - 30	94	29.4%
Age 31 - 50	146	45.6%
Age 51 and above	80	25.0%

The data indicate balanced participation across gender and age categories. The demographic table revealed that 56.9% of the respondents were male, while 43.1% were female. This indicates that both genders participated actively in the study, although males constituted the majority of participants. The implication is that conflict resolution and peacebuilding issues are concerns shared across gender lines in Nigerian communities.

The age distribution further showed that respondents between the ages of 31–50 years constituted the largest group (45.6%). This category represents mature adults who are often actively involved in community leadership, mediation, counselling, and peacebuilding activities. Respondents aged 18–30 years accounted for 29.4%, while those aged 51 years and above represented 25.0% of the sample population.

The significance of this demographic distribution is that the study captured views from both younger and older generations. Elderly participants contributed indigenous knowledge and experiences relating to oral traditions and traditional conflict resolution mechanisms, while younger respondents provided perspectives on the contemporary relevance of African narratives in modern Nigerian society.

Research Question One:

What roles do African narratives play in conflict resolution?

Response	Frequency	Percentage (%)
Promote reconciliation	118	36.9%
Encourage dialogue	86	26.9%
Preserve communal values	64	20.0%
Prevent violence	52	16.2%

The findings indicate that respondents perceive African narratives primarily as tools for reconciliation and dialogue promotion.

Research Question Two

How effective are storytelling and oral traditions in peace counselling?

Response	Frequency	Percentage (%)
Very effective	154	48.1%
Effective	112	35.0%
Moderately effective	38	11.9%
Not effective	16	5.0%

A majority of respondents (83.1%) considered storytelling and oral traditions effective in peace counselling. The findings presented in Table 2 revealed that 36.9% of respondents identified reconciliation as the major role of African narratives in conflict resolution. Another 26.9% stated that African narratives encourage dialogue, while 20.0% believed they preserve communal values. Furthermore, 16.2% indicated that African narratives help prevent violence.

These findings demonstrate that African narratives function primarily as mechanisms for restoring broken relationships and promoting peaceful coexistence. The fact that reconciliation recorded the highest percentage suggests that indigenous narratives are deeply rooted in restorative justice rather than punitive approaches. Traditional African societies prioritize social harmony and communal unity, and narratives such as folktales, proverbs, and oral histories are used to heal divisions and rebuild trust among conflicting groups.

The findings also imply that storytelling and oral traditions create opportunities for dialogue. Through stories and symbolic expressions, disputing parties are encouraged to communicate peacefully and reflect on the consequences of violence. This supports the traditional African belief that wisdom embedded in narratives can guide individuals toward peaceful behaviour.

The table equally indicates that African narratives preserve communal values and cultural identity. Oral traditions transmit moral lessons relating to honesty, patience, tolerance, and communal responsibility. By reinforcing these values, narratives reduce tendencies toward aggression and violence.

Hypotheses Testing

Hypothesis 1: African narratives have no significant influence on conflict resolution and peace counselling in Nigeria. The hypothesis was tested using Chi-square analysis.

Table 3: Chi-Square Result

Variables	χ^2 Calculated	χ^2 Critical	df	Decision
African narratives and peace counselling	42.76	9.49	4	Reject H_0

Since the calculated chi-square value (42.76) is greater than the critical value (9.49), the null hypothesis was rejected. This indicates that African narratives significantly influence conflict resolution and peace counselling in Nigeria.

The chi-square analysis presented in Table 3 revealed a calculated chi-square value of 42.76, which exceeded the critical value of 9.49 at 0.05 level of significance. Consequently, the null hypothesis stating that African narratives have no significant influence on conflict resolution and peace counselling in Nigeria was rejected.

This statistical result confirms that African narratives significantly influence peacebuilding processes in Nigerian communities. The finding provides empirical support for the argument that indigenous storytelling, oral traditions, and communal narratives are effective tools for managing conflicts and promoting reconciliation.

The implication is that African narratives should not be viewed merely as cultural entertainment but as practical mechanisms for emotional healing, moral education, dialogue promotion, and communal peacebuilding. Their significance lies in their cultural legitimacy, accessibility, and ability to address the psychological dimensions of conflict.

Hypothesis 2: African narratives significantly influence conflict resolution and peace counselling in Nigeria.

Table 4: Chi-Square (χ^2) Analysis of the Influence of African Narratives on Conflict Resolution and Peace Counselling in Nigeria

Response Category	Observed Frequency (O)	Expected Frequency (E)	(O – E)	(O – E) ²	(O – E) ² / E
Strongly Agree	140	80	60	3600	45.00
Agree	96	80	16	256	3.20
Undecided	38	80	-42	1764	22.05
Disagree	28	80	-52	2704	33.80
Strongly disagree	18	80	-62	3844	48.05
Total	320	320			152.10

The calculated chi-square value of **152.10** is greater than the critical table value of **9.49** at 0.05 level of significance and 4 degrees of freedom. Therefore, the null hypothesis (H_0) is rejected while the alternative hypothesis (H_1) is accepted. This indicates that African narratives significantly influence conflict resolution and peace counselling in Nigeria. The result implies that storytelling, proverbs, oral traditions, indigenous theatre, songs, and folktales contribute meaningfully to reconciliation, emotional healing, dialogue promotion, and communal peacebuilding in Nigerian society.

The study established those African narratives remain relevant instruments for peacebuilding in Nigeria. Storytelling, proverbs, indigenous theatre, and oral traditions promote emotional healing, empathy, and reconciliation. The findings support Folami and Olaiya's (2016) position that storytelling fosters reconciliation in divided communities. The study also aligns with Akomolafe (2019), who observed that indigenous mediation systems promote communal harmony through culturally accepted narratives.

The effectiveness of African narratives derives from their cultural legitimacy and emotional appeal. Unlike formal legal systems that emphasize punishment, narrative-based conflict resolution focuses on restoring relationships and communal unity. However, modernization and declining indigenous knowledge systems threaten the continuity of these practices.

Conclusion

This empirical study demonstrates that African narratives significantly contribute to conflict resolution and peace counselling in Nigeria. Indigenous storytelling, oral traditions, proverbs, songs, and communal theatre remain culturally effective mechanisms for promoting reconciliation, emotional healing, and peaceful coexistence. The study concludes that integrating African narratives into formal peacebuilding frameworks can strengthen sustainable conflict management efforts in Nigeria.

Recommendations

1. Indigenous narrative systems should be integrated into national peace education programs.
2. Counsellors and mediators should adopt storytelling techniques in trauma healing and reconciliation processes.
3. Government agencies should collaborate with traditional institutions in peacebuilding initiatives.
4. African oral traditions should be incorporated into school curricula.
5. Cultural festivals and indigenous theatre should be promoted as tools for peace advocacy.

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ANALYSIS OF DOG TICK DISTRIBUTION IN NIGERIA

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Abstract

*Dog tick infestation is a global phenomenon that could pose threats to the environment, animals and humans but reports about their distribution across Nigeria remain sparse. Thus, there is a need to investigate and have updated report about tick infestation on dogs in Nigeria. Using a cross-sectional study, ticks were randomly collected from dogs of known age, breed and sex across Nigeria. Harvested ticks were identified to species level using standard morphological keys noting the developmental stages and sex of the ticks. Data obtained were analyzed using descriptive statistics presented as percentages and inferential statistics to determine association between infestation and studied variables, with p -value <0.05 taken as significant. A hundred and twenty dogs were gotten from 11 locations in Nigeria: Ogun, Oyo, Osun, Lagos, Kaduna, Kebbi, Benue, Sokoto, Taraba, Federal Capital Territory (Abuja), and Plateau. Out of the 120 dogs, 44.2% (53/120) and 55.8% (67/120) were male and females respectively. Exotic breeds of dogs were 46.7% (56/120) and 53.3% (64/120) were local. 1223 ticks were gotten from the dogs; Benue had the highest number of ticks, 21.4% (262/1223) and Lagos had the least, 2.5% (31/1223). Three genera of ticks were reported from this study grouped into the following species identified: *Rhipicephalus sanguineus*; 68.9% (843/1223), *Rhipicephalus turanicus* 12% (147/1223), *Haemaphysalis leachii* 14.3% (175/1223), and *Amblyomma latum* 4.7% (58/1223). The diverse species of ticks demonstrated in this study are indicative of the need to find lasting solution to piroplasms, a consequence of ticks being vector borne diseases. Also, the presence of *Rhipicephalus turanicus* suggests that dog importation through the ports should be subjected to proper screening to control the introduction of new tick species into the country. Thus, further research is recommended for effective control of new species of ticks discovered, piroplasm management and proper tick control.*

Keywords: Dog ticks, *Rhipicephalus*, *Rhipicephalus* (*Boophilus*), *Haemaphysalis*, *Canis familiaris*.

Introduction

Ticks are obligate hematophagous arthropods belonging to the order Acari and are widely recognized as one of the most important vectors of pathogens affecting both human and animal health globally. Their medical and veterinary significance is largely attributed to their ability to transmit a wide range of infectious agents, including bacteria, protozoa, viruses, and rickettsiae (Gray *et al.* 2013; Dantas-Torres & Otranto 2016).

Ticks are classified into two major families: Ixodidae (hard ticks) and Argasidae (soft ticks). Hard ticks are of greater epidemiological importance due to their prolonged feeding duration, which increases the likelihood of pathogen transmission (Jongejan & Uilenberg 2004; Šlapeta *et al.* 2021).

Domestic dogs are among the most important hosts for ticks, particularly members of the *Rhipicephalus sanguineus* species complex, commonly known as the brown dog tick. This species is widely distributed in tropical and subtropical regions and is a competent vector of several clinically important pathogens, including *Ehrlichia canis*, *Babesia vogeli*, and *Anaplasma platys* (Gray *et al.* 2013; Akande *et al.* 2018). Its ability to complete its life cycle in domestic environments makes it particularly successful in urban and peri-urban settings.

Recent global studies have highlighted that tick populations and tick-borne diseases are expanding in distribution due to environmental changes, climate variability, and increased movement of companion animals across regions (Dantas-Torres & Otranto 2024; Giannelli *et al.* 2024). These changes have intensified the public health importance of ticks under a One Health framework, which integrates human, animal, and environmental health perspectives.

In Nigeria, *Rhipicephalus sanguineus* remains the most frequently reported tick species infesting dogs across different ecological zones (Konto *et al.* 2014; Akande *et al.* 2018). However, emerging reports have indicated the possible presence of other species such as *Rhipicephalus turanicus*, suggesting potential shifts in tick population structure and the introduction of non-native species through animal movement and trade. Nigeria is characterized by diverse ecological and climatic conditions ranging from the humid rainforests in the south to the savannah zones in the north. These environmental variations strongly influence tick survival, reproduction, and seasonal abundance. Studies have shown that tick populations are generally higher during rainy seasons due to favorable humidity and vegetation conditions (Arong *et al.* 2013).

Despite the close association between humans and dogs in Nigeria, surveillance data on tick distribution remain limited and fragmented, with most studies restricted to specific states or regions. This limits a comprehensive understanding of the national epidemiology of tick infestation in dogs. Furthermore, tick-borne diseases remain a significant but underdiagnosed public health concern in Nigeria, partly due to clinical similarities with other endemic febrile illnesses such as malaria and typhoid fever, as well as limited diagnostic capacity (Oguntomole *et al.* 2018). The growing importance of companion animals in zoonotic disease transmission, roles of dogs as zoonotic reservoirs and the need for integrated disease surveillance indicates a clear necessity for an updated and nationwide data on tick infestation patterns in dogs (Overgaauw *et al.* 2020; Haynes *et al.* 2024). Therefore, this study evaluated the distribution, species composition, and geographical distribution of ticks infesting dogs across selected geopolitical zones of Nigeria.

Methodology

A cross-sectional design was adopted for this investigation. The study was conducted across selected locations within four geopolitical zones of Nigeria: North-Central, North-West, North-East, and South-West.

A total of 120 dogs, comprising both indigenous and exotic breeds as well as pet and hunting dogs, were examined. Ticks were manually removed using sterile forceps and immediately preserved in universal sample bottles containing 70% ethanol.

The preservation solution was prepared by mixing absolute ethanol and distilled water in a 7:3 ratio to achieve the required concentration.

Specimens were cleaned using ethanol and cotton wool to remove debris prior to microscopic examination. Identification was performed using standard morphological keys under a compound microscope following Walker *et al.* 2014.

Data obtained was recorded in Microsoft Excel and analyzed using SPSS. Descriptive statistics such as frequencies and percentages were used to summarize infestation patterns across host and environmental variables.

Results

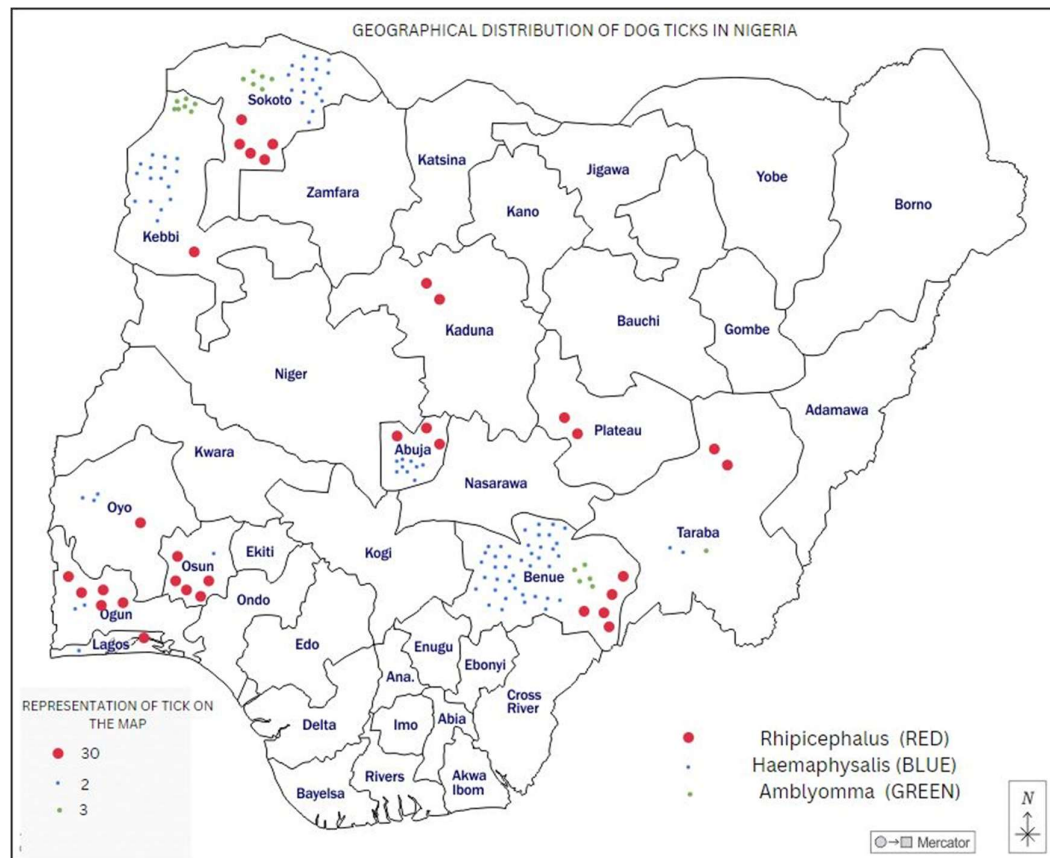


Figure 1: Geographical Distribution of Dog ticks in Nigeria.

A total of 1,231 ticks were recovered from 120 dogs, indicating that all sampled animals were infested.

Table 1: Host-related findings

s/n	Host	Frequency
1	Exotic breeds	53.7%
2	Indigenous breeds	45.7%
3	Puppies	56.6%
4	Adults	42.7%
5	Females	54.3%
6	Males	45.0%

Table 2: Developmental stages

s/n	Developmental stage	Frequency
1	Adult ticks	87.7%
2	Nymphs	11.3%
3	Larvae	1.0%

Adult ticks were most abundant (87.7%), followed by nymphs (11.3%) and larvae (1.0%).

Table 3: Species composition

s/n	Species Composition	Frequency
1	<i>Rhipicephalus</i>	80.5%
2	<i>Haemaphysalis</i>	14.1%
3	<i>Amblyomma</i>	4.7%

The dominant species was *Rhipicephalus sanguineus* complex, with *Rhipicephalus turanicus* detected.

Table 4: Geographical distribution

s/n	Geographical location	Percentage distribution
	North-Central	34.8%
	South-West	31.4%
	North-West	28.0%
	North-East	5.1%

At the state level, Benue recorded the highest infestation rate (21.3%), while Lagos recorded the lowest (2.5%).

Discussion

The findings reveal a consistently high level of tick infestation among dogs across the surveyed regions, suggesting widespread exposure to tick vectors in Nigeria. The dominance of the *Rhipicephalus sanguineus* complex aligns with its well documented adaptation to domestic environments and its close association with dogs (Gray *et al.* 2013; Baneth 2023). Its widespread occurrence has been reported across tropical and subtropical regions and is linked to its ability to complete its life cycle in indoor and peri-domestic settings. The detection of *Rhipicephalus turanicus* is of epidemiological concern, as it may indicate changes in tick distribution patterns or introduction through animal movement and trade networks (Šlapeta *et al.* 2021; Ogo *et al.* 2023). Recent taxonomic revisions emphasize that members of the *Rhipicephalus sanguineus* group are more diverse than previously assumed,

and accurate identification may require molecular confirmation rather than morphology alone (Estrada-Peña *et al.* 2022).

Higher infestation levels observed in puppies may be attributed to immature immune responses and increased vulnerability to environmental exposure (Abdullahi *et al.* 2022; Usip *et al.* 2022). Similar patterns have been reported in previous studies across West Africa, where younger dogs consistently show higher tick burdens due to limited acquired immunity. Slightly higher infestation in females may reflect behavioral or physiological differences, although the variation was not statistically significant (Odeniran *et al.* 2021).

The observed geographical variation likely reflects differences in environmental humidity, vegetation cover, and climatic suitability for tick development. Higher infestation rates in the North-Central and South-West zones may be associated with favorable ecological conditions that support tick survival and reproduction cycles (Arong *et al.* 2013; Usip *et al.* 2022).

Overall, the high prevalence of adult ticks indicates active transmission potential and raises concerns regarding the risk of tick-borne infections in both animals and humans, consistent with global trends in tick expansion under changing environmental conditions (Giannelli *et al.* 2024).

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IMPACT OF INSECURITY ON INCLUSIVE EDUCATION IN PUBLIC SECONDARY SCHOOLS IN FCT, ABUJA, NIGERIA

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Abstract

This study investigated the impact of insecurity on inclusive education in public secondary schools in the Federal Capital Territory (FCT), Abuja, Nigeria. A descriptive survey research design was adopted for the study. The population comprised school administrators and teachers in public secondary schools within the FCT, Abuja. A sample size of 230 respondents consisting of principals, vice principals, and teachers was selected using simple random sampling techniques. Data were collected through a structured questionnaire titled "Middle East Crisis and Inclusive Education Questionnaire (MECIEQ)." The instrument was validated by experts in educational administration and measurement and evaluation. Data collected were analyzed using mean scores and standard deviation. Findings revealed that the Middle East crisis negatively affected inclusive education through rising inflation, inadequate funding of schools, shortage of instructional facilities, increased poverty among parents, and inability of schools to adequately support learners with special educational needs. The study also found that unstable economic conditions reduced government capacity to finance inclusive education programmes in public secondary schools. Based on the findings, the study recommended increased government investment in inclusive education, diversification of Nigeria's economy, provision of special learning facilities, and the establishment of emergency education support policies to cushion the effects of global crises on Nigerian schools.

Keywords: Insecurity, inclusive education, public secondary schools, school administration, educational development, FCT Abuja.

1.0 Introduction

Education remains one of the most important instruments for national development and social transformation. Inclusive education specifically seeks to ensure that all learners, irrespective of disability, social background, gender, ethnicity, or economic status, have equal access to quality education within the same learning environment. The concept of inclusive education promotes equity, social justice, and equal participation in educational opportunities. Inclusive Education has become a major educational objective in many countries, including Nigeria, due to its role in promoting national unity and reducing educational inequality (Ogunode, 2026). The Federal Government of Nigeria has introduced various policies aimed at improving inclusive education in public secondary schools. Despite these efforts, the implementation of inclusive education continues to face numerous challenges such as inadequate funding, shortage of trained teachers, insufficient learning facilities, poor infrastructure, and weak policy implementation. In recent years, global economic and political crises have further complicated the administration of inclusive education in Nigeria.

One of the major global crises affecting developing nations is the persistent Middle East crisis. Middle East crisis has led to fluctuations in global oil prices, inflation, economic instability, displacement of populations, and disruptions in international trade. Nigeria, as an oil-dependent economy, is significantly affected by developments in the Middle East because global oil markets directly influence government revenue and national economic stability (Suleiman & Gladstone, 2026). The Middle East crisis has contributed to rising fuel prices, inflation, and increased cost of living in Nigeria. These economic difficulties affect government expenditure on education and reduce the ability of parents to provide educational support for their children. Public secondary schools in FCT Abuja are not exempted from these challenges. School administrators struggle with inadequate funding, shortage of teaching materials, unstable electricity supply, and insufficient facilities for learners with disabilities and special educational needs.

Inclusive education requires specialized instructional materials, trained teachers, accessible infrastructure, assistive technologies, and continuous funding. However, during periods of economic hardship caused by global crises, governments often reduce educational spending, thereby affecting vulnerable learners the most (Obiakor, & Offor, 2021). The economic consequences of the Middle East crisis have therefore created additional obstacles for the successful implementation of inclusive education in public secondary schools in FCT Abuja. Researchers have examined different global factors affecting educational development in Nigeria. Previous studies have examined the relationship between economic crises and educational management in Nigeria. For instance, Unachukwu and Stephen (2026) investigated the impact of the Middle East crisis on the Nigerian economy. The study revealed that the crisis contributed to inflationary pressures, exchange rate instability, increased fuel prices, rising production costs, and economic uncertainty in Nigeria. The study concluded that external geopolitical conflicts can negatively affect developing economies through energy market disruptions and rising living costs.

Similarly, Dahiru, Madugu, and McBrow (2026) examined economic hardship and curriculum implementation in Nigerian basic schools. The study found that rising inflation and economic difficulties negatively affected teachers' job performance, morale, and

effective curriculum delivery in public schools. The researchers concluded that worsening economic conditions reduce teachers' productivity and create challenges for educational management and school administration in Nigeria.

This study by Kasimu, Lawan, Pajo, and Okoh (2026a) examined the socio-economic implications of the Middle East crisis, particularly the conflict in Iraq, on Nigeria's development. The findings revealed that instability in the Middle East contributed to fluctuations in global oil prices, which negatively affected Nigeria's economy through inflation, fiscal instability, and reduced investment in critical social sectors. The study further showed that the education sector suffered from inconsistent government funding and declining household income, while the health sector experienced increased operational costs and reduced access to healthcare services. In addition, economic hardship arising from the crisis intensified security challenges and worsened social welfare conditions through rising poverty and cost of living. The study concluded that Nigeria's dependence on external economic forces increases its vulnerability to global shocks. It therefore recommended economic diversification and stronger social protection measures to improve national resilience.

Kasimu, AbubakarLawan and Okaula (2026) investigated the political and socio-economic implications of the ongoing conflict involving the United States, Israel, Iran, and Iraq on Nigeria. The findings indicated that the crisis contributed to rising energy prices, inflation, foreign exchange instability, and declining household welfare in Nigeria. The study also identified ceasefire initiatives, diplomatic mediation, inclusive regional dialogue, and strengthened governance structures as important political measures for resolving the conflict. The study concluded that sustainable political and diplomatic solutions are essential not only for stability in the Middle East but also for protecting Nigeria's economy and social well-being. It further stressed the need for Nigerian policymakers to strengthen domestic economic resilience against external shocks. Dickson, (2026), Ogunode, and Toliboyeva, (2026), Suleiman, and Gladstone, (2026) have shown that economic crises often result in increased school dropout rates, reduced access to learning materials, poor teacher motivation, and inadequate school facilities. However, limited studies have specifically investigated the impact of the Middle East crisis on inclusive education in public secondary schools within the FCT Abuja. This study was therefore conducted to fill this gap.

1.2 Statement of the Problem

Inclusive education is designed to ensure that all learners, including those with disabilities and special educational needs, receive quality education without discrimination. Despite government efforts to improve inclusive education in Nigeria, public secondary schools in FCT Abuja continue to experience numerous challenges that hinder effective implementation. The recent Middle East crisis has contributed to economic instability in Nigeria through inflation, increased fuel prices, rising transportation costs, and reduced government revenue. These economic difficulties have negatively affected educational administration and school operations in many public secondary schools. School administrators find it difficult to provide adequate facilities, instructional materials, and specialized services needed for inclusive education.

Many parents experience economic hardship, making it difficult to support the educational needs of their children. Learners with disabilities and other vulnerable groups are particularly affected because inclusive education requires additional financial and institutional support. If these challenges are not properly addressed, the objectives of inclusive education may not be achieved in public secondary schools in FCT Abuja. It is against this background that this study examined the impact of the Middle East crisis on inclusive education in public secondary schools in FCT Abuja, Nigeria.

1.3 Objectives of the Study

The main objective of this study was to examine the impact of the Middle East crisis on inclusive education in public secondary schools in FCT Abuja, Nigeria. Specifically, the study sought to:

1. Examine the impact of the Middle East crisis on funding of inclusive education in public secondary schools in FCT Abuja.
2. Determine the impact of the Middle East crisis on the provision of facilities and instructional resources for inclusive education in public secondary schools in FCT Abuja.

1.4 Research Questions

The following research questions guided the study:

1. What is the impact of the Middle East crisis on funding of inclusive education in public secondary schools in FCT Abuja?
2. What is the impact of the Middle East crisis on the provision of facilities and instructional resources for inclusive education in public secondary schools in FCT Abuja?

2.0 Literature Review

2.1 Concept of Inclusive Education

Inclusive education is a modern educational approach that advocates equal learning opportunities for all children regardless of physical, intellectual, emotional, social, linguistic, or cultural differences. The philosophy of inclusive education is rooted in the principle of equity and social justice, emphasizing that every learner has the right to participate fully in educational activities within regular school settings. Inclusive education opposes all forms of segregation and discrimination against learners with disabilities and special educational needs. According to United Nations Educational, Scientific and Cultural Organization (UNESCO), inclusive education involves restructuring school culture, policies, and practices to accommodate the diverse learning needs of students. UNESCO (2009) explained that inclusive schools must ensure access, participation, and achievement for all learners through curriculum adaptation, teacher support services, flexible instructional methods, and the provision of assistive learning materials. Inclusive education therefore goes beyond physical placement of learners with disabilities in regular classrooms; it also includes meaningful participation and academic success (Carter, 2019).

Similarly, Ainscow (2020) described inclusive education as a process of strengthening the capacity of the education system to reach all learners. This implies that schools must continuously adjust their instructional practices, school environment, and administrative

structures to eliminate barriers to learning. Inclusive education encourages collaboration among teachers, parents, school administrators, communities, and governments to ensure that all children benefit from quality education. The concept of inclusive education gained global recognition following the Salamanca Statement of 1994, organized by UNESCO in Salamanca, Spain. The declaration emphasized that ordinary schools should accommodate all learners regardless of their disabilities or learning difficulties. The statement further maintained that inclusive schools are effective means of combating discriminatory attitudes, promoting social integration, and achieving education for all.

In the Nigerian context, inclusive education has become a major educational policy direction due to increasing awareness of the educational rights of persons with disabilities. The Nigerian National Policy on Education recognizes education as an instrument for national development and advocates equal educational opportunities for all citizens irrespective of disabilities, gender, religion, or socio-economic background. The policy encourages the integration of learners with special needs into regular schools while providing specialized support services where necessary. Scholars have argued that inclusive education contributes significantly to national development because it promotes social cohesion, tolerance, and equal participation in society (Echeita, & Ainscow, 2011). David Mitchell observed that inclusive education enhances learners' self-esteem, improves social interaction, and prepares students for participation in democratic societies. Learners without disabilities also benefit because inclusive classrooms promote empathy, cooperation, and appreciation of diversity.

Despite the growing acceptance of inclusive education in Nigeria, implementation remains a major challenge. Several studies have identified inadequate funding, shortage of trained special education teachers, poor infrastructure, lack of assistive technologies, and weak policy implementation as major obstacles confronting inclusive education in public secondary schools. In many schools, facilities such as ramps, braille materials, hearing aids, and specialized instructional materials are inadequate or unavailable. Teachers also experience difficulties in managing diverse classrooms because many of them lack professional training in inclusive instructional methods. In the Federal Capital Territory (FCT), Abuja, efforts have been made to improve inclusive education through educational reforms and intervention programmes. However, public secondary schools still experience inadequate learning facilities, overcrowded classrooms, and insufficient government support for learners with disabilities. These challenges become more severe during periods of economic hardship and national instability. Inclusive education is therefore not merely an educational programme but a human rights issue that requires continuous commitment from governments, educational administrators, international organizations, communities, and families. Effective implementation of inclusive education requires adequate funding, policy consistency, teacher training, provision of learning resources, and strong institutional support.

2.2 Middle East Crisis and Nigerian Economy

The Middle East region occupies a strategic position in the global economy because of its enormous oil and gas resources. Conflicts and political instability in the region often affect international oil supply chains, global energy prices, transportation systems, and economic activities across the world. For developing countries such as Nigeria, whose economy depends heavily on crude oil exports, crises in the Middle East have significant economic

implication for Nigeria's economy. Consequently, fluctuations in global oil prices directly influence national income, public expenditure, inflation rates, exchange rates, and the financing of social services such as education and healthcare. Political conflicts in countries such as Iraq, Iran, Syria, and Israel frequently create instability in global oil markets, thereby affecting oil-producing economies including Nigeria (Ogunode, 2026).

According to the World Bank (2023), disruptions in oil production or transportation in the Middle East often lead to sudden increases or decreases in crude oil prices. While temporary increases in oil prices may appear beneficial to oil-exporting countries, prolonged instability usually creates economic uncertainty, inflationary pressures, and fiscal instability. In Nigeria, Ahmed, and Tochukwu, (2024) opined that unstable oil revenue affects government planning and implementation of developmental projects. Economic experts have noted that global crises contribute to rising inflation, unemployment, and depreciation of national currencies. During periods of economic instability, governments often reduce budgetary allocation to education and other social sectors. This situation affects school administration, teachers' welfare, infrastructural development, and implementation of educational policies.

The Nigerian educational sector is highly vulnerable to economic shocks because many educational programmes depend on public funding. During economic downturns, school construction projects are abandoned, teaching materials become scarce, and maintenance of educational facilities declines. Inclusive education suffers more because learners with disabilities require additional support services, specialized equipment, and trained personnel (Afolabi, 2024). The Middle East crisis also contributes to increased transportation costs and rising prices of goods and services in Nigeria. Inflation reduces the purchasing power of families, making it difficult for parents to finance their children's education. Poor households often withdraw children from school during periods of severe economic hardship. Learners with disabilities are usually more affected because their education requires additional financial commitment for medical care, mobility support, assistive devices, and specialized learning materials. UNESCO (2020) have argued that economic instability weakens educational planning and policy implementation in developing countries. School administrators experience difficulties in managing schools effectively due to inadequate operational funds. Educational managers are often forced to operate under severe financial constraints, thereby reducing the quality of service delivery in schools.

Instability in the global economy affects donor agencies and international organizations that support educational programs in developing countries. Several intervention programs designed to improve inclusive education may experience delays or reduction in funding during global economic crises (Sabitu, 2023; Ugo-onyeka, Nonyelum & Ogunode, 2024). In the FCT Abuja, public secondary schools have experienced challenges associated with inadequate funding, shortage of instructional materials, and insufficient infrastructural facilities. These conditions negatively affect effective implementation of inclusive education policies. Educational administrators therefore face increasing pressure to manage scarce resources efficiently while ensuring equal educational opportunities for all learners.

2.3 Impact of Economic Crisis on Inclusive Education

Economic crises have serious consequences for educational development, particularly in developing countries where educational systems rely heavily on government funding. Periods of economic instability reduce the capacity of governments to finance educational programs effectively. Inclusive education is usually among the most affected areas because it requires additional resources, specialized personnel, assistive technologies, and supportive learning environments. One major effect of economic crisis on inclusive education is inadequate funding. When government revenue declines, educational budgets are often reduced. Reduced funding affects the provision of instructional materials, classroom facilities, assistive devices, and teacher training programs necessary for inclusive learning. Public secondary schools may find it difficult to maintain educational standards under conditions of financial hardship.

Researchers have observed that inadequate funding contributes to poor implementation of inclusive education policies. According to Mel Ainscow, inclusive education requires systematic investment in school restructuring, teacher preparation, curriculum adaptation, and learner support services. Without sufficient financial commitment, schools cannot effectively accommodate learners with disabilities and special educational needs. Economic crises also affect teacher motivation and job performance. Poor salaries, irregular payment of wages, and lack of professional development opportunities reduce teachers' commitment to effective teaching. Teachers handling inclusive classrooms experience additional stress because they must attend to learners with diverse educational needs under limited resource conditions. This situation contributes to poor learning outcomes and weak classroom management.

Another major impact of economic instability is deterioration of school infrastructure. Inclusive education requires facilities such as ramps, accessible toilets, spacious classrooms, braille machines, hearing devices, and instructional technologies. During economic crises, many schools are unable to provide or maintain these facilities. Consequently, learners with disabilities face difficulties in accessing education effectively. Economic hardship also increases school dropout rates among vulnerable learners. Parents experiencing financial difficulties may be unable to provide school fees, transportation, uniforms, textbooks, and medical support for their children. Learners with disabilities are particularly vulnerable because their educational needs are more expensive to meet. In many cases, families prioritize the education of children without disabilities when financial resources become insufficient.

Studies conducted in Nigeria have shown that economic crises negatively influence educational administration and policy implementation. Educational managers often encounter challenges related to inadequate funding, overcrowded classrooms, shortage of qualified teachers, and insufficient learning resources. In public secondary schools within the FCT Abuja, these problems have affected effective implementation of inclusive education programs. Furthermore, economic instability contributes to social problems such as child labor, juvenile delinquency, insecurity, and emotional stress among students. These conditions negatively affect teaching and learning processes in schools. Learners experiencing economic hardship may develop low self-esteem, poor academic concentration, and behavioural problems.

The COVID-19 pandemic further exposed the vulnerability of inclusive education during periods of crisis. Many learners with disabilities were unable to access online learning opportunities because of poverty, poor internet access, and lack of assistive technologies. This situation demonstrated the importance of sustainable educational financing and crisis-responsive educational policies. Educational administrators therefore have a critical responsibility to develop effective management strategies for sustaining inclusive education during periods of economic instability. Governments should prioritize educational funding, strengthen social welfare programs, provide teacher support services, and collaborate with international organizations to improve inclusive educational practices.

3.0 Methodology

The study adopted a descriptive survey research design. The design was considered appropriate because it enabled the researcher to collect data from respondents regarding their opinions on the impact of the Middle East crisis on inclusive education in public secondary schools in FCT Abuja. The population of the study consisted of school administrators and teachers in public secondary schools in FCT Abuja, Nigeria.

A sample size of 230 respondents was used for the study. The sample comprised principals, vice principals, and teachers selected from public secondary schools within the six Area Councils of the FCT Abuja. Simple random sampling technique was used to select the respondents. The instrument used for data collection was a structured questionnaire titled “Middle East Crisis and Inclusive Education Questionnaire (MECIEQ).” The questionnaire was divided into two sections. Section A collected demographic information while Section B contained items related to the objectives of the study.

The questionnaire adopted a four-point Likert scale of Strongly Agree (SA) – 4, Agree (A) – 3, Disagree (D) – 2 and Strongly Disagree (SD) – 1. The instrument was validated by experts in educational administration and measurement and evaluation. A reliability coefficient of 0.82 was obtained using Cronbach Alpha method, indicating that the instrument was reliable. Data collected were analyzed using mean scores and standard deviation. Any item with a mean score of 2.50 and above was accepted while items below 2.50 were rejected.

4.0 Results and Data Analysis

Research Question One:

Q1: What is the impact of the Middle East crisis on funding of inclusive education in public secondary schools in FCT Abuja?

Table one: Impact of the Middle East crisis on funding of inclusive education in public secondary schools in FCT Abuja

S/N	Items	Mean	Decision
1	The Middle East crisis has reduced government funding for inclusive education programmes.	3.42	Accepted
2	Economic instability has negatively affected school budget allocation.	3.31	Accepted
3	Inflation caused by global crises affects procurement of learning materials.	3.27	Accepted
4	Parents find it difficult to support students due to rising cost of living.	3.48	Accepted
5	Funding challenges affect support services for learners with disabilities.	3.35	Accepted
Grand Mean		= 3.37	

The result indicated that the Middle East crisis has reduced government funding for inclusive education programmes (3.42), Economic instability has negatively affected school budget allocation (3.31), Inflation caused by global crises affects procurement of learning materials (3.27), Parents find it difficult to support students due to rising cost of living (3.48), and Funding challenges affect support services for learners with disabilities (3.35). The result showed that respondents agreed that the Middle East crisis negatively affected funding of inclusive education in public secondary schools in FCT Abuja.

Q2: What is the impact of the Middle East crisis on the provision of facilities and instructional resources for inclusive education in public secondary schools in FCT Abuja?

Table Two: Impact of the Middle East crisis on the provision of facilities and instructional resources for inclusive education in public secondary schools in FCT Abuja

S/N	Items	Mean	Decision
1	Schools experience shortage of instructional materials due to economic hardship.	3.40	Accepted
2	The crisis has affected maintenance of school facilities.	3.29	Accepted
3	Learners with disabilities lack adequate assistive learning devices.	3.33	Accepted
4	Transportation costs affect school attendance and supervision.	3.36	Accepted
5	Schools lack adequate inclusive learning infrastructure.	3.44	Accepted
Grand Mean		= 3.36	

The result collected showed that respondents agreed that Schools experience shortage of instructional materials due to economic hardship (3.40), The crisis has affected maintenance of school facilities (3.29), Learners with disabilities lack adequate assistive learning devices (3.33), Transportation costs affect school attendance and supervision (3.36) and Schools lack adequate inclusive learning infrastructure (3-44). The result collected indicated that the Middle East crisis negatively affected provision of facilities and instructional resources for inclusive education in public secondary schools in FCT Abuja.

4.1 Discussion of Findings

The findings of the study revealed that the Middle East crisis negatively affected funding of inclusive education in public secondary schools in FCT Abuja. Respondents agreed that economic instability reduced government capacity to finance educational programs, especially inclusive education initiatives. Rising inflation and unstable economic conditions also affected procurement of instructional materials and support services for learners with disabilities.

The findings support previous studies which reported that global economic crises often reduce government spending on education and weaken implementation of educational policies. The findings also revealed that many parents experienced financial difficulties due to rising cost of living, thereby reducing their ability to support their children's education (Ogunode, Ukozor, Ayoko & Devi, 2026).

The study further revealed that the Middle East crisis negatively affected provision of facilities and instructional resources for inclusive education. Public secondary schools lacked adequate assistive devices, specialized instructional materials, and inclusive learning infrastructure. School administrators also experienced challenges in maintaining school facilities due to increased operational costs (Adeosun, &Owolabi, 2021; Chiripanhura & Niño-Zarazúa, 2016).

This finding agrees with Wahab Mfon-Ette & Ashefor. (2026) and Ogunode, Ayoko,Ukozor, and Devi, (2026)that economic crises contribute to poor educational infrastructure, shortage of teaching materials, and weak support systems for vulnerable learners. Inclusive education requires adequate facilities, trained personnel, and specialized resources which are difficult to sustain during periods of economic instability.

In practical terms, many public secondary schools in FCT Abuja struggle to provide ramps, hearing aids, braille materials, specialized learning technologies, and accessible classrooms for learners with disabilities. Increased transportation and utility costs have also affected school administration and supervision (Ogunode, 2026).

4.3 Conclusion and Recommendations

The study concluded that the Middle East crisis has significant negative impacts on inclusive education in public secondary schools in FCT Abuja, Nigeria. Economic instability resulting from the crisis reduced government funding for education, increased inflation, and weakened the provision of instructional materials and facilities required for inclusive education.

The study further concluded that learners with disabilities and special educational needs are among the most affected groups during periods of economic hardship because inclusive education requires specialized support and continuous funding. Without adequate intervention, the goals of inclusive education may not be fully achieved in public secondary schools in FCT Abuja.

Based on the findings of the study, the following recommendations were made:

1. The Federal Government should increase budgetary allocation to inclusive education programmes in public secondary schools. Government should provide special intervention funds for schools to cushion the effects of global economic crises. School administrators should prioritize maintenance of inclusive learning facilities and instructional resources.
2. Teachers should receive regular training on inclusive education practices and crisis management strategies. Government should diversify the Nigerian economy to reduce excessive dependence on oil revenue. Special learning facilities and assistive technologies should be provided for learners with disabilities in public secondary schools.

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STATUTORY BUDGETARY ALLOCATIONS TO EDUCATION IN NIGERIA: AN ANALYSIS OF COMPLIANCE WITH INTERNATIONAL BENCHMARKS

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Abstract

This study analyzes Nigeria's compliance with UNESCO's recommended benchmarks for education funding, which advise allocating 15-20% of the national budget and 4-6% of GDP to the sector. Despite a nominal increase in the 2026 education budget to ₦3.52 trillion, a critical review reveals this constitutes only 6.1% of the total federal expenditure, a figure that falls dramatically short of international standards. The analysis traces chronic underfunding, examines the conflicting narratives of increased nominal budgets versus shrinking real value, and explores the severe implementation challenges that undermine even allocated funds. It argues that Nigeria's approach is characterized by fiscal indiscipline, where rising debt burdens and opaque spending mechanisms crowd out meaningful investment in human capital. The conclusion links this systemic failure directly to the nation's enduring learning crisis and security challenges. Recommendations call for legislative action to enforce benchmarks, radical transparency in fund utilization, and a fundamental reordering of national spending priorities to treat education as critical infrastructure.

Keywords: Education Budget, UNESCO Benchmark, Fiscal Compliance, Budget Implementation, Debt Servicing, Nigeria.

Introduction

With an estimated 20 million out-of-school children and a severe learning crisis, Nigeria's need for a robust, well-funded education system has become more urgent. For decades, the international community, led by UNESCO, has provided a clear roadmap: nations should dedicate 15-20% of their annual public budget to education to build a foundation for sustainable development (UNESCO, 2024). This paper asks a direct question: Does Nigeria's statutory budgetary allocation reflect this global consensus on priority?

The government's narrative has recently emphasized increased investment. Officials proudly cite the education budget's rise from ₦1.54 trillion in 2023 to ₦3.52 trillion in 2025 and 2026 (Statehouse Press Release, 2025; Usman, 2024). President Tinubu's administration frames this within a "Renewed Hope Agenda," positioning education as a pillar for "human capital development" (Federal Republic of Nigeria, 2025). However, this paper contends the fact that nominal increases mask a deeper, more troubling reality of structural non-compliance and fiscal misalignment. When measured against total national spending and competing priorities like debt servicing and security, education consistently loses. This analysis moves beyond surface-level budget figures to interrogate the percentage share, implementation fidelity, and

the tangible outcomes of Nigeria's funding choices. The evidence suggests that despite rhetorical commitments, education financing remains an area of profound policy failure, with dire consequences for national productivity and social stability (UNESCO, 2024).

The UNESCO Benchmark and Nigeria's Chronic Non-Compliance

The UNESCO benchmark of 15-20% of the national budget is not an arbitrary figure but a distillation of global evidence on the minimum investment required for a functional education system. It accounts for the high recurrent costs of quality teaching, adequate infrastructure, and inclusive access (Abiona, 2025). A companion benchmark further recommends that 4-6% of a nation's GDP be directed to education (Abiona, 2025; Usman, 2024). These targets serve as a universal gauge of a government's commitment to its future workforce.

Nigeria's performance against this gauge is one of consistent and significant shortfall. An analysis of the proposed 2026 budget is illustrative. While the allocated ₦3.52 trillion for education is a record nominal figure, it represents a mere 6.1% of the total ₦58.18 trillion federal expenditure (Usman, 2026). To meet the lower end of the UNESCO benchmark (15%), Nigeria's 2026 education budget would need to be approximately ₦8.7 trillion, more than double the current allocation (Usman, 2026). This gap is not a one-year anomaly but an entrenched pattern. Allocations have fluctuated but remained largely in the single-digit percentages for over a decade, consistently ranking Nigeria near the bottom in regional comparisons (Usman, 2026).

A flicker of hope exists at the subnational level, demonstrating that compliance is possible with political will. For instance, the Federal Capital Territory (FCT) under Minister Nyesom Wike has allocated over 26% of its capital budget to education, explicitly surpassing the UNESCO benchmark (Acka, 2025). Similarly, 17 states met or exceeded the 15% target in their 2025 budgets (Usman, 2026). This stark contrast between state-level commitment and federal-level neglect underscores that Nigeria's underfunding is a choice, not an inevitability. It raises urgent questions about the federal government's strategic priorities, which the next section will explore.

Comparative Analysis: Nigeria's Performance Against African Peers

Benchmarks gain meaningful context through comparative analysis. When Nigeria's educational funding is examined alongside regional peers, its exceptional underperformance becomes starkly evident. UNESCO data indicates that in 2023-2024, Ghana allocated 23.4% of its national budget to education, Senegal 22.1%, and Kenya 17.6%. Even South Africa, facing its own fiscal constraints, maintained allocations above 18%. Nigeria's approximate 7% allocation places it not merely below the UNESCO benchmark, but at the bottom tier of major African economies (Gbesoevi, Ogunkoya, Odedele and Gbenu, 2025; Ohaegbulem, 2023).

This comparative failure cannot be explained by economic constraints alone. Nigeria's GDP per capita (\$2,184) exceeds Ghana's (\$2,175) and Kenya's (\$2,099), yet both outspend Nigeria on education by substantial margins. The difference lies in political prioritization rather than resource availability. Ghana's constitutional requirement that education receives at least 20% of the national budget demonstrates how legal frameworks can institutionalize

commitment (Ohaegbulem, 2023). Similarly, Senegal's decision to exempt educational materials from VAT and dedicate specific tax revenues to education shows innovative fiscal prioritization. Nigeria's peer nations recognize education not as consumption but as investment, treating it as infrastructure deserving of protected funding (Gbesoevi et al., 2025).

The consequences of this divergent prioritization manifest in educational outcomes. While Nigeria struggles with over 20 million out-of-school children and learning poverty exceeding 70%, Ghana has achieved near-universal primary enrollment with significantly higher learning outcomes. Kenya's technical and vocational education system produces skilled graduates at scale, supporting its manufacturing sector. These comparative successes are not accidents but direct results of sustained, benchmark-compliant funding. Nigeria's educational outcomes, ranked among the world's worst in international assessments, directly mirror its exceptional underinvestment relative to regional standards. This comparative analysis refutes the notion that Nigeria "cannot afford" benchmark compliance, demonstrating instead that it has chosen not to afford it through conscious fiscal decisions.

Budget Composition Analysis: What the Education Budget Actually Funds

Critical examination of Nigeria's education budget reveals problematic allocations that further undermine its effectiveness. The ₦3.52 trillion 2026 education budget distributes across four major categories with concerning implications for actual educational delivery.

First, personnel costs consume approximately 68% of the total education budget, covering salaries and benefits for teaching and non-teaching staff across federal institutions. While necessary, this disproportionate allocation reflects Nigeria's fundamental challenge: the education budget functions primarily as an employment program rather than a transformative investment (CBN, 2024). With such a high fixed cost, only 32% remains for capital projects, instructional materials, teacher training, and student support, the very expenditures that improve educational quality.

Second, the capital allocation within education reveals further misprioritization. Of the portion dedicated to infrastructure and development, a substantial share funds "constituency projects" with tangential educational value, construction of town halls, road repairs near schools, and other politically motivated expenditures (NISER, 2023). Genuine educational infrastructure like classroom construction, laboratory equipment, and digital resources receives fragmented, inadequate funding. The Universal Basic Education Commission (UBEC) has reported that over 60% of primary schools lack basic furniture, 75% lack libraries, and 85% lack computer facilities, directly reflecting these capital allocation deficiencies (UBEC, 2024).

Third, the distribution across educational levels demonstrates systemic inequity. Tertiary education receives approximately 45% of the total education budget, serving less than 15% of the student population. Basic education, serving over 80% of Nigerian students, receives only about 30% of total education funding (Adesiyan, 2017). This inverted pyramid contradicts global best practices emphasizing foundational learning, effectively subsidizing elite higher

education at the expense of mass basic education. The budgetary composition thus perpetuates inequality: poor funding for basic education ensures that only children from wealthier families who can afford private schooling develop the foundational skills to eventually benefit from subsidized tertiary education.

Finally, implementation failures compound allocation problems. The Tertiary Education Trust Fund (TETFund), designed to supplement capital funding, suffers from bureaucratic delays, with institutions often waiting 18-24 months for approved allocations. At the state level, counterpart funding requirements for UBEC grants frequently go unmet, leaving federal allocations unaccessed. This budget composition analysis reveals that Nigeria's educational funding crisis extends beyond insufficient quantity to encompass profound qualitative deficiencies in how allocated funds are distributed and deployed.

Fiscal Realities and Distorted Priorities in the 2026 Budget

The reason for Nigeria's educational underfunding becomes clear when the federal budget is examined as a whole. The 2026 fiscal plan reveals a structure where education is crowded out by other, seemingly more pressing, claims on the treasury. The proposed total expenditure of ₦58.18 trillion is built on what analysts call "unrealistic assumptions" about revenue, leading to a massive projected deficit of ₦23.85 trillion (Onigbinde, 2026; Statehouse Press Release, 2025). This means for every ₦100 the government plans to spend, it must borrow ₦70, pushing the nation deeper into debt (Onigbinde, 2026).

Within this strained fiscal framework, priority allocations are revealing. The single largest claimant is debt servicing, which is projected to consume ₦15.9 trillion (Onigbinde, 2026). This enormous sum, necessary to service past borrowing, dwarfs the education budget and highlights the long-term cost of fiscal mismanagement. Furthermore, national security continues to receive a dominant share, with combined allocations for defense, police, and interior totaling over ₦5.4 trillion (Onigbinde, 2026; Statehouse Press Release, 2025). While security is undeniably important, its funding often lacks the same public scrutiny for outcomes as social sectors (Onigbinde, 2026).

This imbalance is not merely about competing needs; it reflects a deeper crisis of fiscal discipline. Watchdog organizations like BudgIT critique the budget for being "crowded with fragmented micro-projects" and for the increasing centralization of capital expenditure outside of the responsible Ministries, which dilutes accountability (Statehouse Press Release, 2025). When education must compete in this environment against opaque security votes and the inflexible, growing cost of debt, it is consistently deprioritized. The government's own directive for stricter budget execution in 2026 is an admission of past failures, but without a rebalancing of these core allocations, the promise rings hollow (Onigbinde, 2026). This misallocation directly fuels the crises within the education sector itself.

Consequences: Multidimensional Impacts of Chronic Underfunding

The consequences of chronic underfunding are not theoretical; they manifest in tangible failures across the education system. First and foremost is the infrastructure and learning deficit. Nigeria is in the grip of a severe learning crisis, with a large proportion of children in school not acquiring basic literacy and numeracy skills (UNESCO, 2024). Students score an

average of 309 on a harmonized test where 300 represents minimum attainment, indicating that many are barely learning the fundamentals (UNESCO, 2024). This is directly linked to overcrowded classrooms, a lack of teaching materials, and dilapidated facilities that the current funding levels cannot remedy.

Second, there is a critical governance and implementation gap. Experts note that underfunding is "compounded by inefficiencies in accessing allocated capital" (Usman, 2026). Funds budgeted for infrastructure and development in tertiary institutions often remain "underutilised due to delays in disbursement and gaps in transparency" (Usman, 2026). The federal government has repeatedly had to issue directives mandating universities to publish their financial data, a sign of systemic opacity in how even existing funds are used (Usman, 2026). This creates a vicious cycle where underfunding is used to justify poor outcomes, while a lack of accountability erodes the argument for increased investment.

Third, underfunding exacerbates social and security vulnerabilities. The psycho-social trauma from mass school abductions, like those in Kebbi and Niger states, has long-term effects on enrollment and stability (Usman, 2026). Yet, the Safe Schools Initiative remains under-resourced. As analyst Ishiaq Ishowo argues, schools are not treated as "critical infrastructure that requires protection" (Usman, 2026). This neglect creates fertile ground for insecurity, which in turn diverts more public funds to security budgets, further starving education, a perfect, self-reinforcing cycle of failure. These interconnected crises demonstrate that budget percentages are not just numbers; they are determinants of national security and cohesion.

Pathways to Compliance: Recommendations for a Fundamental Reset

Closing Nigeria's education funding gap requires more than incremental adjustment; it demands a fundamental reset in fiscal policy and political will. The following recommendations provide a pathway from chronic non-compliance to sustained investment:

1. **Legislative Action to Enforce Benchmarks:** The National Assembly should move beyond symbolic approval of inadequate budgets. It must exercise its power of appropriation to draft and pass an Education Funding Compliance Act. This law would legally mandate that a minimum of 15% of the annual federal budget and 4% of GDP be allocated to education, with a clear glide path to reach 20%. The FCT example proves this is feasible (Acka, 2025). The Act should include strict penalties for non-compliance and require the Ministry of Finance to publicly justify any deviation.
2. **Radical Transparency and Accountability in Implementation:** Increased funding without accountability is futile. The government must fully and forcefully implement its directive for the Tertiary Institution Governance and Transparency Platform (TIGTP), making the detailed budgets, expenditures, and performance metrics of every university and polytechnic accessible to the public in real-time (Usman, 2026). For basic education, the Universal Basic Education Commission (UBEC) should publish state-by-state reports on grant utilization and project completion. This data

should be linked to subsequent budget releases, rewarding transparency and effectiveness.

3. **Strategic Reallocation and Debt Management:** Nigeria must initiate a national conversation on debt sustainability and spending priorities (Onigbinde, 2026). While not suggesting reckless cuts to security, a comprehensive audit of "security votes" and non-essential capital supplementation is needed (Onigbinde, 2026). The goal must be to reduce the deficit and gradually reallocate spending from unproductive or opaque lines toward human capital. Every ministry, including Defence, should be tasked with identifying efficiency savings that can be channeled into education and health, framed as a long-term national security imperative.
4. **Empowering Subnational Success and Private Collaboration:** The federal government should create a matching grant incentive fund to reward states that meet or exceed the UNESCO benchmark, using the model of UBEC but at a larger scale. Furthermore, acknowledging that government cannot act alone, a formal framework for Public-Private Co-investment in education infrastructure, research centers, and vocational hubs must be established, as called for by the Vice President (Statehouse Press Release, 2025). This can mobilize alternative financing while ensuring private sector engagement aligns with national educational goals.

Conclusion

This analysis leads to an unequivocal conclusion: Nigeria is in a state of deliberate non-compliance with international education funding benchmarks. The recently celebrated nominal increase to ₦3.52 trillion is a distraction from the sobering reality that education's share of the national budget remains stuck at a paltry 6.1%, hopelessly distant from the 15-20% benchmark. The problem is systemic, rooted in a fiscal architecture that prioritizes debt repayment and opaque security spending over human capital development.

The consequences of this choice are visible in every under-resourced classroom, every unqualified teacher, and every child trapped in learning poverty. It is felt in the trauma of communities scarred by school abductions that a robust Safe Schools Initiative could help prevent. Nigeria's budgetary decisions are effectively outsourcing national crisis to the next generation.

The path forward requires a decisive break from the past. It demands recognizing education not as a social welfare line item, but as the most critical infrastructure for economic resilience and national security. The recommendations outlined—legislative benchmarks, radical transparency, strategic reallocation, and collaborative funding—are not merely technical fixes. They are components of a necessary political compact that places the future of Nigeria's youth above short-term political calculations. Without this fundamental reset, the budget will remain, as critics warn, "a record of deferred promises, rising debt, and missed opportunities". The time for consolidation and shared prosperity, as the 2026 budget theme suggests, must begin with a genuine investment in the minds of Nigeria's people.

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LECTURERS' INTEGRATION OF TECHNOLOGY-BASED ASSESSMENT FOR SUSTAINABLE MANAGEMENT OF INSTRUCTIONAL PRACTICES IN PUBLIC UNIVERSITIES IN ANAMBRA STATE

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Abstract

This study investigated lecturers' integration of Technology-Based Assessment (TBA) to support sustainable management of instructional practices in public universities in Anambra State, Nigeria. Four research questions guided the study. The study adopted a descriptive survey research design. The study population comprised all 3,247 lecturers at the two public universities in Anambra State. A sample of 974 lecturers was selected from the population using a multistage sampling procedure. A 40-item self-structured questionnaire titled "Lecturers' Integration of Technology-Based Assessment for Management of Sustainable Instructional Practices Questionnaire (LITBAMSIPQ)" and rated on a 4-point scale was used for data collection. Both the validity and reliability of the questionnaire were established. Findings revealed, among others, that only a few TBA tools, such as Computer-Based

Tests (CBT), Google Forms, Learning Management Systems (LMS) like Google Classroom, Zoom, or Microsoft Teams, and Turnitin plagiarism detection software, were utilized by lecturers for sustainable management of instructional practices in public universities in Anambra State. However, the extent of integration remained relatively low. Among the recommendations proffered included that the University management, administrators and government agencies in partnership with non-governmental organizations (NGOs) and financial institutions should provide adequate funding and improved ICT infrastructure to enable lecturers facilitate utilization of these TBA tools.

Keywords: Technology-Based Assessment, Sustainable Instructional Practices

Introduction

Technology has been making a significant and positive impact in different sectors of the economy across nations of the world, including the Nigerian education system. Nowadays, many educational institutions across African nations are incorporating emerging digital technologies into the management of educational practices and processes. With globalization, universities are expected to integrate technology-driven approaches into instructional management and assessment systems to improve educational effectiveness, quality assurance, and sustainable learning outcomes (UNESCO, 2023). Since education remains a fundamental instrument for nation-building, national development, social change, and economic sustainability, as indicated by the Federal Republic of Nigeria (FRN, 2014) in the National Policy on Education (NPE), there is a need for technological advancement and its appropriate integration into instructional practices in public universities.

The integration of technology into educational practices has transformed the global higher education system in the twenty-first century. Consequently, universities are expected to adopt technology-driven approaches that enhance instructional delivery, learning processes, communication systems, assessment practices, research, and educational management. Therefore, public universities must give serious consideration to the effective integration of technology into their educational and operational practices to meet the demands of the contemporary knowledge society. Lam (2016) noted that among the various technology-driven approaches in universities, technology-based assessment has become important in facilitating the evaluation of students' learning outcomes and academic performance.

Assessment constitutes one of the major components in the management of instructional practices because it enables lecturers to evaluate students' academic progress, monitor learning outcomes, determine instructional effectiveness, and provide feedback for continuous improvement. As described by Siti et al. (2025), assessment involves the active participation of students in self-directed learning to improve the learning process. It is also a useful tool for monitoring and evaluating students' learning and academic progress in the attainment of instructional goals and objectives. Traditionally, assessment practices in universities relied heavily on paper-and-pen examinations, manual grading systems, physical assignments, and face-to-face evaluations. However, rapid technological advancement has altered these conventional approaches. With the integration of technology into education,

assessment practices have taken a new dimension, leading many universities to adopt Technology-Based Assessment (TBA) to improve efficiency and effectiveness in instructional management.

Technology-Based Assessment (TBA) includes computer-based tests, electronic assignments, automated grading systems, online feedback systems, learning management systems, online assignment submission platforms, and interactive educational applications utilized to facilitate assessment and instructional management in educational institutions (Redecker& Johannessen, 2013). TBA enhances assessment flexibility and efficiency in instructional practices management. Similarly, Wiliam (2011) explained that technology-enhanced assessment supports formative learning by enabling timely feedback, data-driven instructional decisions and continuous monitoring of students' academic development. The increasing dependence on digital learning environments has further necessitated the need for lecturers to integrate technology-based assessment into sustainable management of instructional practices. According to UNESCO (2023), the pandemic showed the importance of digital learning infrastructures and technology-enhanced assessment systems for sustaining educational activities during disruptions.

Thus, integration of TBA in instructional practices is relevant because lecturers can administer continuous assessment and examinations electronically, supervise students' projects, provide automated feedback, promote self-directed learning, and improve student engagement (Siti et al., 2025). TBA supports sustainable management of instructional practices by improving effectiveness, accountability, efficiency and accessibility in university education systems. In the view of OECD (2021), technology-enhanced assessment improves educational quality and instructional practices by supporting learner-centered instruction, personalized feedback, and data-driven decision-making. Most empirical studies have also shown that digital assessment platforms improve students' engagement, promote active learning, and enhance instructional efficiency in universities (Babo, Azevedo & Almeida, 2022). Technology-based assessment in the management of instructional practices is an advanced form of digital assessment that not only evaluates students' learning outcomes but also improves instructional delivery through interactive feedback systems, data analytics, adaptive testing, collaborative learning tools, and real-time monitoring of students' academic progress.

Instructional practices in this study are the methods, strategies, and activities lecturers use to facilitate teaching and learning, including lesson delivery, classroom management, student engagement, assessment, feedback, and instructional supervision. Iloh and Ogogor (2022) noted that sustainable management of instructional practices refers to effective planning, organization, implementation, monitoring, and continuous improvement of teaching and learning activities to enhance long-term educational quality and efficiency. It emphasizes continuity, digital integration, and quality assurance in instructional delivery in response to changing societal and technological demands. In university education, it includes classroom management, student engagement, digital learning integration, continuous assessment, instructional supervision, and academic record management, with sustainability increasingly advocated in curriculum design and delivery (Nwankwo, 2014).

The integration of Technology-Based Assessment (TBA) for sustainable management of instructional practices in universities has become increasingly important due to challenges such as large class sizes, student overpopulation, rising enrolment, and the growing demand for flexible and distance learning. Iloh and Ogogor (2022) noted that these realities require efficient academic management systems, with lecturers in public universities playing a central role in adopting technology-based assessment practices. Lecturers are expected to design digital assessments, use Learning Management Systems (LMS), manage online platforms, provide electronic feedback, and monitor students' academic activities effectively. Common tools include Computer-Based Testing (CBT), online quizzes, virtual classrooms, digital assignment systems, plagiarism detection tools, and automated grading systems. The successful integration of TBA depends largely on lecturers' digital literacy, technological competence, attitudes toward technology, and willingness to adopt innovative assessment methods (Scherer, Siddiq & Tondeur, 2021).

Despite the benefits of educational technologies, many lecturers still rely on traditional assessment methods such as written examinations, manual grading, and face-to-face project supervision. This reliance may limit the quality, flexibility, and sustainability of instructional management in universities. Therefore, greater integration of technology-based assessment is necessary to improve instructional effectiveness and promote sustainable educational practices. Studies have highlighted factors such as inadequate technological infrastructure, poor internet connectivity, unstable electricity supply, insufficient digital competencies, lack of institutional support, inadequate funding, resistance to technological change, and limited professional development opportunities as hindrances to effective technology integration among lecturers (Adarkwah, 2021; Okoye & Nwankwo, 2024).

There is still uncertainty regarding the various TBA utilized by lecturers in managing instructional practices, coupled with the extent to which lecturers in public universities in Anambra State integrate TBA for sustainable management of instructional practices. Studies have been conducted in the areas of digital technologies, ICT utilization, e-learning adoption, digital teaching strategies and online learning systems in higher education (Afolabi, 2022; Akinsolu & Fadokun, 2022; Eze, Chinedu-Eze & Bello, 2021; Yusuf & Balogun, 2021). However, limited scholarly attention has been paid to TBA tools utilized by lecturers, the extent of lecturers' integration of TBA and the relevance of TBA to sustainable instructional management. Based on this, the study sought to examine lecturers' integration of Technology-Based Assessment for sustainable management of instructional practices in public universities in Anambra State.

Statement of the Problem

The rapid advancement of digital technologies has made Technology-Based Assessment (TBA) an important component of instructional management in higher education. Through tools such as computer-based tests, Learning Management Systems, online quizzes, electronic assignments, automated grading systems, and online feedback platforms, TBA is expected to enhance instructional effectiveness and sustainable management of teaching and learning. Despite these benefits and the increasing demand for digitalized instructional practices in universities, observations indicate that many lecturers in public universities still

rely heavily on conventional assessment methods. Although various TBA tools are available for instructional management, it is unclear which of these tools are utilized by lecturers in public universities, particularly in Anambra State, and the extent to which they are integrated into instructional practices. This uncertainty raises concerns about the level of digital transformation and the sustainability of instructional management in these universities.

Furthermore, inadequate integration of TBA may undermine effective instructional delivery, students' engagement, feedback processes, and academic accountability. The situation may be associated with lecturers' perceptions of the relevance of TBA and challenges such as inadequate technological infrastructure, poor internet connectivity, unstable power supply, and limited opportunities for professional development. While TBA has been widely recognized as a means of improving instructional management, there is limited empirical evidence on the technology-based assessment tools utilized by lecturers, the extent of their integration, and the challenges affecting their use in public universities in Anambra State. It is this gap in knowledge and practice that necessitated the present study on lecturers' integration of Technology-Based Assessment for sustainable management of instructional practices in public universities in Anambra State.

Purpose of the Study

The purpose of this study was to examine lecturers' integration of Technology-Based Assessment (TBA) for sustainable management of instructional practices in public universities in Anambra State, Nigeria. Specifically, the study sought to:

1. identify the various Technology-Based Assessment (TBA) tools utilized by lecturers for sustainable management of instructional practices in public universities in Anambra State, Nigeria;
2. determine the extent to which lecturers integrate Technology-Based Assessment (TBA) for sustainable management of instructional practices in public universities in Anambra State, Nigeria;
3. examine the relevance of integrating technology-based assessment (TBA) for sustainable management of instructional practices in public universities in Anambra State, Nigeria; and
4. ascertain the constraints to lecturers' effective integration of Technology-Based Assessment (TBA) for sustainable management of instructional practices in public universities in Anambra State, Nigeria.

Research Questions

The following research questions guided the study:

1. What are the various Technology-Based Assessment (TBA) tools utilized by lecturers for sustainable management of instructional practices in public universities in Anambra State, Nigeria?
2. To what extent do lecturers integrate Technology-Based Assessment (TBA) for sustainable management of instructional practices in public universities in Anambra State, Nigeria?
3. What is the relevance of integrating technology-based assessment (TBA) for the sustainable management of instructional practices in public universities in Anambra State, Nigeria?

4. What constraints hinder lecturers' effective integration of Technology-Based Assessment (TBA) for sustainable management of instructional practices in public universities in Anambra State, Nigeria?

Methods

The study adopted descriptive survey research design. The population of the study comprised 3,247 lecturers in the two public universities in Anambra State. A sample of 974 lecturers was selected from the population using a multistage sampling procedure.

The instrument used for data collection was researchers structured questionnaire titled: "Lecturers' Integration of Technology-Based Assessment for Management of Sustainable Instructional Practices Questionnaire (LITBAMSIPQ)". The questionnaire was also structured on a 4-point rating scale of Strongly Agree (SA) - 4 points, Agree (A) - 3 points, Disagree (D) - 2 points and Strongly Disagree (SD) -1 point to answer research questions 1, 3 and 4, while a 4-point rating scale of Very High Extent (VHE) - 4 points, High Extent (HE) -3 points, Low Extent (LE) - 2 points, and Very Low Extent (VLE) -1 point, was used to answer research question 2. The instrument was subjected to face and content validation by three experts from the Departments of Educational Management and Policy and Measurement and Evaluation. All from the Faculty of Education, Nnamdi Azikiwe University, Awka. The reliability coefficient values of 0.81, 0.85, 0.87, and 0.82 were obtained respectively for the four clusters and were added up to give an overall internal consistency value of 0.84, which was considered adequate for the study. A total of 974 copies of the questionnaire were distributed to the respondents, and only 961 copies were retrieved, which gave 98.7% rate of return. The data collated were analyzed using mean and standard deviation. The decision rule for interpreting the questionnaire items was based on a criterion mean of 2.50. Any item with a mean score of 2.50 or above was considered in support of the statement and was therefore interpreted as **Agree or High Extent**, as applicable. Any item with a mean score below 2.50 was considered not to be in support of the statement and was therefore interpreted as **Disagree or Low Extent**, as applicable.

Results

Research Question 1: What are the various Technology-Based Assessment (TBA) tools utilized by lecturers for sustainable management of instructional practices in public universities in Anambra State, Nigeria?

Table 1: Mean and SD Scores of Lecturers on the various TBA tools utilized by lecturers for sustainable management of instructional practices in Public Universities in Anambra State, Nigeria

N = 961 Lecturers

S/N	Please share your opinion concerning using the under-listed TBA tools for the sustainable management of instructional practices	SA	A	D	SD	X	SD	Decision
1.	Computer-Based Tests (CBT) are utilized for students' assessment	204	376	194	187	2.62	1.02	Agree
2.	Google Forms are used for conducting quizzes and examinations	182	397	209	173	2.61	0.99	Agree
3.	Learning Management Systems (LMS) such as Google Classroom are utilized for instructional management, as well as students' assessments	208	402	186	165	2.68	1.00	Agree
4.	Online/electronic assignment submission platforms like Moodle are used for continuous assessment	159	214	391	197	2.35	0.98	Disagree
5.	I utilize video conferencing tools such as Zoom or Microsoft Teams for online instructional or virtual assessment activities	179	367	223	192	2.55	1.01	Agree
6.	Electronic portfolios (e-portfolios) are used for monitoring students' academic progress	106	195	432	228	2.19	0.92	Disagree
7.	Online discussion forums/interactive educational applications are utilized as part of students' assessment processes and classroom assessment activities	113	169	390	289	2.11	0.97	Disagree
8.	Plagiarism detection software such as Turnitin is used for academic assessment, including evaluating students' assignments	186	374	217	184	2.58	1.01	Agree
9.	I utilize Kahoot, Quizizz, or similar digital quiz applications for classroom assessments	105	127	382	347	1.99	0.96	Disagree
10.	Automated or digital grading systems for managing students' assessment records, including result processing, such as Canvas, Google Classroom Grading System	93	101	476	291	2.00	0.89	Disagree
Overall Mean Score & SD =						2.37	1.01	Disagree

Analysis of data in Table 1 revealed that only items from 1-3, 5, and 8 were rated above 2.50 of the acceptable mean score by the university's lecturers to show their agreement with these statements. Items 4, 6-7, and 9-10 were rated below 2.50 of the acceptable mean score by the university's lecturers to show their disagreement with the statements. The overall mean score and standard deviation (SD) of 2.37 and 1.01 indicated closeness in the mean responses of the lecturers. This result indicated that the various Technology-Based Assessment (TBA) tools were less utilized by lecturers for sustainable management of instructional practices in public universities in Anambra State, Nigeria.

Research Question 2: To what extent do lecturers integrate Technology-Based Assessment (TBA) for sustainable management of instructional practices in public universities in Anambra State, Nigeria?

Table 2: Mean and SD Scores of Lecturers on the Extent to which they Integrate TBA for Sustainable Management of Instructional Practices in Public Universities in Anambra State

N = 961 Lecturers

S/N	Please share your opinion concerning the extent to which you integrate TBA for the sustainable management of instructional practices. Extent of your integration of:	VHE	HE	LE	VLE	X	SD	Decision
11.	technology-based assessment, such as Google Classroom, Moodle, and online quizzes, into instructional practices	153	204	408	196	2.33	0.97	Low Extent
12.	online tests and quizzes for students, like Kahoot, CBT, and Google Forms tests	176	245	371	169	2.45	0.98	Low Extent
13.	digital platforms for grading and feedback delivery, such as Moodle, Google Classroom, and LMS portals	128	199	394	240	2.22	0.97	Low Extent
14.	technology-based assessment into both formative and summative evaluations, such as online project presentations via Zoom or Teams, Blackboard assessment tools, and CBT exams	159	200	327	275	2.25	1.05	Low Extent
15.	both traditional and digital assessment methods during instruction, such as blending paper assignments with e-submissions	168	187	262	344	2.19	1.10	Low Extent
16.	technology-based assessment tools, such as e-portfolios, to monitor students' academic progress	147	194	329	291	2.20	1.04	Low Extent
17.	online collaborative assessment activities into classroom instruction, such as group projects on Google Docs	181	252	336	192	2.44	1.01	Low Extent
18.	digital assessment tools during instructional delivery, such as Socrative quizzes, live online polls	136	217	355	253	2.25	1.00	Low Extent
19.	technology-based assessment in large classroom management, such as automated grading systems, online attendance, and CBT	167	173	333	288	2.23	1.06	Low Extent
20.	online assessment activities such as digital quizzes, assigning collaborative online projects	155	201	349	256	2.27	1.02	Low Extent
Overall Mean Score & SD =						2.28	1.02	Low Extent

Analysis of data in Table 2 revealed that none of the items from 11-20 were rated above 2.50 of the acceptable mean score by the university's lecturers to show their agreement with any of these statements. Regardless, all the items were rated below 2.50 of the acceptable mean score by the university's lecturers to show their disagreement with the statements. The overall mean score and standard deviation (SD) of 2.28 and 1.02 indicated closeness in the mean responses of the lecturers. This result indicated that the extent to which the lecturers integrated Technology-Based Assessment (TBA) for sustainable management of instructional practices in public universities in Anambra State, Nigeria, was to a low extent.

Research Question 3: What is the relevance of integrating technology-based assessment (TBA) for sustainable management of instructional practices in public universities in Anambra State, Nigeria?

Table 3: Mean and SD Scores of Lecturers on the Relevance of Integrating TBA for Sustainable Management of Instructional Practices in Public Universities in Anambra State

N = 961 Lecturers

S/N	Please share your opinion concerning the relevance of integrating TBA for the sustainable management of instructional practices This includes the Technology-Based Assessment:	SA	A	D	SD	X	SD	Decision
21.	enhances lesson evaluation accuracy, which improves instructional effectiveness	388	393	101	79	3.13	0.91	Agree
22.	encourages active participation through quizzes, which improve students' academic engagement	375	444	62	80	3.16	0.87	Agree
23.	promotes timely feedback to students through instant scoring of online quizzes, including immediate correction of CBT tests, and quick online comments on assignments	327	484	83	67	3.11	0.83	Agree
24.	improves accuracy in grading and record keeping	356	467	65	73	3.15	0.85	Agree
25.	supports flexible learning and instructional continuity	225	454	194	88	2.85	0.88	Agree
26.	simplifies students' attendance monitoring, which enhances classroom management efficiency	324	379	97	161	2.90	1.05	Agree
27.	reduces examination malpractice, such as using plagiarism detection software or timed online examinations	264	449	155	93	2.92	0.90	Agree
28.	promotes learner-centered instructional practices through self-paced learning and personalized feedback	361	469	72	59	3.18	0.82	Agree
29.	improves lecturers' productivity in instructional management by simplifying assessment administration, likewise, improving the efficient management of students' results.	313	482	89	77	3.07	0.86	Agree
30.	contributes to sustainable educational development in universities, which supports long-term instructional innovation, digital transformation in education, and enhances quality assurance practices	258	357	251	95	2.81	0.94	Agree
Overall Mean Score & SD =						3.03	0.90	Agree

Analysis of data in Table 3 revealed that all the items from 21-30 were rated above 2.50 of the acceptable mean score by the university's lecturers to show their agreement with any of these statements. None of these items was rated below 2.50 of the acceptable mean score by the university's lecturers to show their disagreement with the statements. The overall mean score and standard deviation (SD) of 3.03 and 0.90 indicated closeness in the mean responses of the lecturers. This result indicated the relevance of integrating technology-based assessment (TBA) for sustainable management of instructional practices in public universities in Anambra State, Nigeria.

Research Question 4: What constraints hinder lecturers' effective integration of Technology-Based Assessment (TBA) for sustainable management of instructional practices in public universities in Anambra State, Nigeria?

Table 4: Mean and SD Scores of Lecturers on the Constraints to Effective Integration of TBA for Sustainable Management of Instructional Practices in Public Universities in Anambra State

N = 961 Lecturers

S/N	Please share your opinion concerning the constraints to effective integration of TBA for the sustainable management of instructional practices. This includes:	SA	A	D	SD	X	SD	Decision
31.	Inadequate/insufficient ICT infrastructure, such as computer laboratories, digital devices, and functional digital learning centres	393	484	45	39	3.28	0.73	Agree
32.	Poor internet connectivity	385	430	52	94	3.15	0.91	Agree
33.	Unstable electricity supply	423	401	66	71	3.22	0.87	Agree
34.	Lack of adequate training in the use of technology-based assessment	339	437	98	87	3.07	0.90	Agree
35.	Limited digital competencies/proficiencies among lecturers and students	340	467	101	53	3.14	0.81	Agree
36.	Inadequate institutional support	359	479	79	44	3.20	0.77	Agree
37.	Insufficient funding for the university	417	421	68	55	3.25	0.82	Agree
38.	Resistance to technological change affecting the use of digital assessment tools	121	187	389	264	2.17	0.97	Disagree
39.	Large class sizes, including student overpopulation	388	411	77	85	3.15	0.90	Agree
40.	Lack of adequate technological facilities, such as projectors and smart boards	403	425	82	51	3.23	0.82	Agree
Overall Mean Score & SD =						3.09	0.91	Agree

Analysis of data in Table 4 revealed that only one item from 38 was rated above 2.50 of the acceptable mean score by the university's lecturers to show their agreement with these statements. All the other items, 31-37 and 39-40, were rated below 2.50 of the acceptable mean score by the university's lecturers to show their disagreement with the statements. The overall mean score and standard deviation (SD) of 3.09 and 0.91 indicated closeness in the mean responses of the lecturers. This result indicated the constraints to lecturers' effective integration of Technology-Based Assessment (TBA) for sustainable management of instructional practices in public universities in Anambra State, Nigeria.

Discussion

The findings revealed that Technology-Based Assessment (TBA) tools were generally underutilized by lecturers for the sustainable management of instructional practices in public universities in Anambra State. Only a few tools, such as Computer-Based Tests (CBT), Google Forms, Learning Management Systems (e.g., Google Classroom), Zoom, Microsoft Teams, and Turnitin, were utilized. This finding is consistent with Adarkwah (2021), who reported increased adoption of technologies such as Google Classroom, Zoom, and online testing platforms for instructional continuity in higher education. Similarly, Babo, Azevedo,

and Almeida (2022) found that digital assessment platforms, including LMS and online assessment systems, were gradually being integrated into university instructional practices. The finding also agrees with Okoye and Nwankwo (2024), who observed that although lecturers utilized selected technology-enhanced assessment tools, the level of utilization remained low due to infrastructural challenges. However, several TBA tools, including Moodle-based assignment platforms, e-portfolios, online discussion forums, interactive assessment applications, Kahoot, Quizizz, and automated grading systems, were not utilized. This suggests that public universities in Anambra State may not fully realize the benefits of sustainable instructional management and quality educational delivery if the low utilization of technology-based assessment persists. The finding supports Yusuf and Balogun (2021), who reported that inadequate technological facilities and weak institutional support limited lecturers' use of ICT for instructional delivery and assessment. It also aligns with Okoye and Nwankwo (2024), who found that infrastructural limitations and inadequate technological competencies contributed to lecturers' continued reliance on traditional assessment methods.

The study further revealed that lecturers integrated Technology-Based Assessment (TBA) for the sustainable management of instructional practices in public universities in Anambra State to a low extent. This indicates that digital assessment tools were not regularly or effectively incorporated into teaching, assessment, grading, feedback delivery, and instructional management processes. The finding suggests that achieving sustainable instructional management may remain challenging unless lecturers increase the integration of technology-based assessment into teaching and learning activities. Specifically, tools and practices such as Learning Management Systems, online quizzes and tests, digital grading and feedback platforms, online presentations, collaborative assessment activities, automated grading systems, and other digital assessment applications were integrated only to a low extent. The finding is consistent with the findings of Eze et al. (2021) study, which revealed that lecturers in many Nigerian universities integrated e-learning and digital assessment technologies only to a low or moderate extent. The study identified inadequate ICT competencies and infrastructural challenges as major factors limiting effective integration. The finding also aligns with Teo's (2011) study, which confirmed that lecturers' attitudes toward technology and technological self-efficacy significantly influenced the extent of educational technology integration. Lecturers who possess limited confidence in digital technologies often demonstrate low integration levels. Afolabi's (2022) study also found that poor internet accessibility and high cost of data subscriptions limited lecturers' integration of digital instructional and assessment technologies in Nigerian universities. The study emphasized that inconsistent internet connectivity negatively affected sustainable instructional practices.

The findings revealed that Technology-Based Assessment (TBA) is highly relevant for the sustainable management of instructional practices in public universities in Anambra State, Nigeria. Its relevance is reflected in its ability to improve assessment accuracy and instructional effectiveness, enhance students' engagement through online quizzes and interactive assessments, and provide timely feedback through automated scoring, CBT systems, and instant online comments. TBA also improves grading accuracy and record management, supports flexible and continuous learning, strengthens classroom management through improved attendance tracking, and reduces examination malpractice through tools such as plagiarism detection software and timed online assessments. In addition, it promotes

learner-centered instruction through self-paced learning and individualized feedback, enhances lecturers' productivity by simplifying assessment processes, and contributes to sustainable educational development through digital transformation and quality assurance in universities. This finding is consistent with Redecker and Johannessen (2013), who reported that technology-enhanced assessment improves teaching quality, assessment reliability, student participation, and instructional efficiency in higher education. It also aligns with the OECD (2021), which emphasized that digital assessment technologies support learner-centered instruction, personalized learning, and sustainable educational development. Similarly, Babo et al. (2022) found that technology-enhanced assessment contributes to flexibility in teaching and learning, improved feedback delivery, increased student motivation, and strengthened quality assurance in higher education.

The findings identified a number of constraints to lecturers' effective integration of Technology-Based Assessment (TBA) for sustainable management of instructional practices in public universities in Anambra State, Nigeria. These include inadequate ICT infrastructure, such as functional computer laboratories, digital devices, and learning centres, as well as poor internet connectivity and unstable electricity supply. Other constraints are insufficient training in technology-based assessment, limited digital competencies among lecturers and students, inadequate institutional support, poor funding, large class sizes, and a shortage of technological facilities such as projectors and smart boards. However, resistance to technological change was not identified as a constraint, as lecturers demonstrated willingness to adopt digital assessment tools. This finding suggests that without addressing these infrastructural, financial, and capacity-related challenges, effective integration of Technology-Based Assessment for sustainable instructional management may remain limited in Nigerian public universities. The finding agreed with the findings of Yusuf and Balogun (2021) study, which discovered that inadequate ICT infrastructure and unstable electricity supply were major constraints affecting ICT integration in Nigerian higher education institutions. The universities lacked adequate technological resources necessary for effective digital instructional management. Similarly, Afolabi (2022) study identified poor internet accessibility and high cost of internet services as major barriers to effective technology-enhanced learning and assessment in Nigerian universities. Both lecturers and students struggled with unstable internet networks and expensive data subscriptions during online instructional activities. The finding is consistent with the findings of Adarkwah (2021) study, which also discovered that poor internet connectivity, inadequate technological infrastructure, and limited digital competencies were major barriers to educational technology integration in higher institutions.

Conclusion

This study concludes that lecturers' integration of Technology-Based Assessment (TBA) for sustainable instructional management in public universities in Nigeria is relatively low, despite its high relevance for improving teaching effectiveness, student engagement, feedback, grading, and sustainable educational development. This low integration is constrained by challenges such as inadequate ICT infrastructure, poor internet connectivity, and insufficient funding, making it necessary for universities to strengthen support systems and promote wider adoption of TBA.

Recommendations

Based on the findings, the following recommendations were made:

1. University management, with the help of the government, should provide adequate funding and ICT infrastructure (reliable internet, computer labs, digital platforms, and stable electricity) to support lecturers' effective use of Technology-Based Assessment (TBA) tools for sustainable instructional management in universities.
2. Public university management, with support from the National Universities Commission (NUC) and TETFund, should organize regular workshops, seminars, and training programmes to enhance lecturers' digital literacy and competencies for effective and sustained adoption of Technology-Based Assessment (TBA) in instructional management.
3. Public university management and institutional leaders (including Deans and Heads of Departments) should provide capacity-building programmes and seminars to enhance lecturers' understanding of the relevance of Technology-Based Assessment (TBA) and encourage its effective use in sustainable instructional management.
4. Education stakeholders (Federal and State governments, NUC, university management, private sector, and NGOs) should address the identified challenges by providing adequate funding, supportive ICT policies, clear institutional guidelines, continuous capacity-building, and improved ICT infrastructure to enhance the effective adoption and sustainability of Technology-Based Assessment (TBA) in universities.

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