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EDITORIAL COMMENTS

This is the 24th volume of Nigerian Journal of Educational Research in Evaluation (NJERE) of the ASSEREN which published some articles presented at the 26th Annual National Conference which held from 14th-19th, July, 24 at Akin Deko Auditorium University of Benin, Benin City, Edo State, Nigeria. The theme of the conference was "Future of Educational Assessment Policy Research and Practice" with 10 contemporary sub-themes designed to provide opportunities for educators researchers and evaluators to share innovative ideas towards the improvement of education in institutions thereby promoting national development.

In this volume there are 29 well researched and peer reviewed articles mostly empirical. The papers published are all based on the main and sub-themes of the conference. the editorial board acknowledges and appreciate the efforts of the editors, reviewers, and contributors for making this edition of NJERE a success.

Specail thanks go to the executive of ASSEREN for the great role they played and the opportunity given to us to serve. We also specially thank the editorial advisers who are distinguished members of the association.

Thank you all as we hope to meet at Federal University Lokoja, Kogi State, Nigeria.

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ASSESSMENT OF TEACHERS' LEVEL OF UTILIZATION OF ALTERNATIVE ASSESSMENT IN ASSESSING SCIENCE STUDENTS IN SENIOR SECONDARY SCHOOLS IN IKORODU LOCAL GOVERNMENT AREA, LAGOS STATE, NIGERIA

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Abstract

The study examined teachers' level of utilization of alternative assessment in assessing science students in senior secondary schools, determined the effect of utilization of alternative assessment and investigated the influence of teachers' sex, and academic discipline on their level of utilization of alternative assessment in assessing science students in senior secondary schools. The research population comprised of 533 science teachers in public senior secondary schools in Ikorodu local government, Lagos State, Nigeria. A sample of 230 science teachers were selected by stratified random sampling technique. Thirteen senior secondary schools were purposively selected from Twenty- eight public senior secondary schools in Ikorodu local government area, Lagos State. Of these, a total of 213 science teachers completed and returned the instrument used for the study which was a questionnaire that elicited demographic information of participants as well as their level of utilization of alternative assessment. The reliability coefficient of the questionnaire was determined using Cronbach Alpha and the coefficient was 0.82. Data collected were analysed using descriptive statistics and Chi- Square. The results showed that science teachers highly utilized alternative assessment (mean value= 3.06). The results further showed that teachers' sex ($\chi^2 = .064$, $p > 0.05$), and academic discipline ($\chi^2 = .739$, $p > 0.05$) had no significant influence on their level of utilization of alternative assessment. It can be concluded from the study that, science teachers of all categories highly utilized alternative assessment in assessing science students in senior secondary schools in Ikorodu local government, Lagos State.

Keywords: Assessment; Alternative assessment; Utilization; Teachers; Science Student.

Introduction

Assessment is a cornerstone of the educational process, providing crucial information about student learning, guiding instructional decisions, and offering feedback to both students and educators. In education, the term assessment refers to the wide variety of methods or tools that educators use to evaluate, measure, and document the academic readiness, learning progress, skill acquisition, or educational needs of students (Abimbola, 2016). Assessment is a critical step in the learning process. It determines whether or not the topic's learning objectives have been met. A learning objective is what students should know or be able to do by the time a lesson is completed. Assessment affects many facets of education, including student grades, placement and advancement as well as curriculum, instructional needs and school funding. People within the educational community which include policy makers, educators, students, parents, administrators have different ideas regarding the implementation of assessment strategies. While some believe traditional assessment methods are more effective, others think that Alternative assessment tools are superior (Lustgarten, 2022). Traditionally, assessments in education have been predominantly summative, relying on standardized testing methods such as multiple-choice tests, essays, and short-answer questions. These traditional assessments often emphasize rote memorization and the recall of factual knowledge. However, they may not adequately capture the diverse skills and competencies that students develop, particularly in the field of science education (Mekhri, 2021).

Alternative assessments, which include methods such as portfolios, performance tasks, peer assessments, self-assessments, and project-based assessments, offer a more comprehensive approach to evaluating student learning. These methods aim to assess not only what students know but also how they can apply their knowledge in practical, real-world situations, thereby promoting critical thinking, creativity, and problem-solving skills (Marissa, 2018). In science education, where experimentation, observation, and application of theoretical knowledge are integral, alternative assessments can provide a more accurate measure of student understanding and abilities (National Research Council, 2014). The implementation of alternative assessments in science education is heavily

dependent on the attitudes, knowledge, and practices of science teachers. Teachers' willingness and ability to incorporate these assessment methods are influenced by several factors, including their familiarity with alternative assessment techniques, their professional development experiences, the availability of resources, and institutional support (Adaramola, & Obomanu, 2017). Understanding these factors is essential for improving the adoption and effectiveness of alternative assessments in the classroom.

In Nigeria, the consistent unsatisfactory performance of senior secondary school students in science subjects at the end of the term leaves one in doubt about the effectiveness of the assessment method popularly used by science teachers for assessing the science subjects (Adaramola, & Obomanu, 2017). Most secondary school teachers adopt the use of traditional method which does not focus on evaluation process of learning more but rather on the product. Many teachers become frustrated when students cannot pass a test that the class has been preparing to take for many weeks. There is the need to find out the effectiveness of other assessment methods, relative to the traditional method especially alternative assessment which is all inclusive. Previous research has highlighted the benefits of alternative assessments in promoting deeper understanding and skill development among students. For instance, studies have shown that alternative assessments can lead to improved student engagement and motivation, better retention of knowledge, and the development of higher-order thinking skills (Marissa, 2018). However, the successful implementation of these assessments requires a supportive environment and adequate training for teachers (Loana, and Luminita, 2017).

Hence this study examined teachers' level of utilization of alternative assessment in assessing science students in senior secondary schools in Ikorodu Local Government Area of Lagos State. By addressing these issues, the research seeks to contribute to the enhancement of assessment practices in science education, ultimately leading to improved student outcomes and better preparation for the challenges of the 21st century.

The following questions were answered in the course of the study:

1. What is the teachers' level of utilization of alternative assessment in assessing science students in senior secondary schools in Ikorodu local government area?
2. What is the effect of utilization of alternative assessment in assessing students in senior secondary schools in Ikorodu local government area?

The following hypotheses were formulated to guide the study:

1. Teachers' sex has no significant influence on their level of utilization of alternative assessment in assessing science students in senior secondary schools in Ikorodu local government area.
2. Teachers discipline has no significant influence on their level of utilization of alternative in assessing science students in senior secondary schools in Ikorodu local government area.

Methods

The study adopted survey research design. The design involves the process of gathering information from a representative sample of a chosen population. The collected data is then analysed, and the result is used to generalize for the entire population. In this study, data were collected from a sample of science teachers in senior secondary schools in Ikorodu local government area using an instrument titled "Teachers' Response to Utilization of Alternative Assessment" (**TRUAA**). The TRUAA elicit information on the feelings and reactions of teachers to their level of utilization of alternative assessment in assessing science students in senior secondary schools.

The population of the study comprised of 533 science teachers in senior secondary schools in Ikorodu Local Government Area, Lagos State. The study covered thirteen senior secondary schools in Ikorodu Local Government Area. Purposive sampling technique was adopted in selecting the thirteen senior secondary schools from thirty- two senior secondary schools in Ikorodu Local Government area. A sample of 230 science teachers were selected from all the thirteen senior secondary schools at 43% of the population using stratified random sampling technique, using teachers' sex, and academic discipline as strata.

The major instrument employed in data collection for this study was a well-structured questionnaire developed by the researcher. The

questionnaire was titled “Teachers’ Response to Utilization of Alternative Assessment” (TRUAA), it comprised of two parts: Section A was structured to elicit teachers’ responses to their sex, cadre, discipline and academic qualification, while section B comprised of 25 items measured teachers’ perception of utilization of alternative assessment in assessing science students. The response format was Likert-type, with four response modes of ‘Strongly Agree’, ‘Agree’, ‘Disagree’ and ‘Strongly Disagree’. The item had a score of 1, 2, 3, and 4, for Strongly Disagree, Disagree, Agree and Strongly Agree respectively. The instrument was subjected to internal consistency reliability, which yielded a Cronbach Alpha reliability of 0.82. The pilot sample consisted of teachers in Oreyo Grammar School, Igbogbo, Ikorodu, Lagos State., who were not part of the study.

Data was collected by administering the structured questionnaires personally to the science teachers with the help of the Heads of Departments in each institution who facilitated the completion and return of the questionnaires by the teachers. Descriptive statistics which involve the use of tables, simple percentages, mean, standard deviation was used to present and analyse data according to the research questions while inferential statistics used for testing the hypotheses was Chi-Square χ^2 at 0.05 level of significance.

Results

Table 1: Level of Utilization of Alternative Assessment in Assessing Science Students

S/N	Item	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	Std. Deviation
1.	I use classroom based tests in addition to alternative assessment	1(0.5%)	5(2.3%)	134(62.9%)	73(34.3%)	3.31	.539
2.	I know how to assess students through oral questions	-	6(2.8%)	147(69.0%)	60(28.2%)	3.25	.497
3.	I assess students by using group and pair work	1(0.5%)	12(5.6%)	144(67.6%)	56(26.3%)	3.20	.548
4.	I have enough skill to implement alternative assessment	1(0.5%)	9(4.2%)	151(70.9%)	52(24.4%)	3.19	.519

5.	I can choose the kind of alternative assessment that suits the skill being assessed	2(0.9%)	10(4.7%)	148(69.5%)	53(24.9%)	3.18	.549
6	I use classroom observation to assess students during activities	2(0.9%)	15(7.0%)	145(68.1%)	51(23.9%)	3.15	.571
7	I feel very confident when I use alternative assessment	4(1.9%)	11(5.2%)	153(71.8%)	45(21.1%)	3.12	.570
8	I read research about the latest method in alternative	2(0.9%)	34(16.0%)	141(66.2%)	36(16.9%)	2.99	.606
9	I do not need a training course in alternative assessment because I am qualified	32(15.1%)	97(45.5%)	60(28.2%)	24(11.3%)	2.65	.881
10	I prefer using traditional written tests to alternative assessment	30(14.1%)	79(37.1%)	84(39.4%)	20(9.4%)	2.56	.848
Grand Average Mean and Standard Deviation						3.06	.257

Source: Field Work (Olagunju & Adeyemi-John, 2024)

Table 1 shows the frequency, percentage, means and standard deviations of the items. It revealed that the means of the responses ranged from 2.56 to 3.31, while the standard deviation of the teachers' responses ranged from .497 to .848. Using mean rating, a large proportion of teachers (3.31) agreed that they use classroom based tests in addition to alternative assessment to assessed their students, followed by I know how to assess students through oral questions (3.25) and I assess students by using group and pair work (3.20). Also, they agreed that they have enough skill to implement alternative assessment (3.19), followed by I can choose the kind of alternative assessment that suits the skill being assessed (3.18), followed by I use classroom observation to assess students during activities (3.15), followed by I feel very confident when I use alternative assessment (3.12), to I read research about the latest method in alternative (2.99). However, the results indicate that most teachers disagreed with the items 9 and 10, as they have the lowest mean scores of (2.65) and (2.56), respectively. This suggests that teachers recognize the need for training in alternative assessment and do not strongly prefer traditional written tests

over alternative methods. In general, overall mean (3.06) of teachers' level of utilization of alternative assessment in assessing science students in secondary schools shows that teachers' level of utilization of alternative assessment in assessing science students in senior secondary schools in Ikorodu Local Government Area is high.

Table 2: Effect of the use of Alternative Assessment in Assessing Science Students

S/N	Item	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	Std. Deviation
1	Alternative assessment assists teachers to identify students' talents and hidden potentials	1(0.5%)	4(1.9%)	136(63.8%)	72(33.8%)	3.31	.530
2	Alternative assessment makes learning interesting to students because it is a shift from statutory traditional assessment	-	5(2.3%)	148(69.5%)	60(28.2%)	3.26	.490
3	Alternative assessment helps students to improve their psychomotor skills, higher thinking order skills and problem solving skills	-	9(4.2%)	143(67.1%)	61(28.6%)	3.24	.520
4	Alternative assessment helps teachers to discover students' difficulties in learning	4(1.9%)	10(4.7%)	142(66.7%)	57(26.8%)	3.18	.598
5	Teachers perceive alternative assessment as interesting teaching skills because it brings varieties to teachers	-	9(4.2%)	157(73.7%)	47(22.1%)	3.18	.482
Grand Average Mean and Standard Deviation						3.23	.369

Source: Field Work (Olagunju & Adeyemi-John, 2024)

Table 2 shows the frequency, percentage and means and standard deviation of the items, it revealed that the means of the responses ranged from 3.18 to 3.31, while the standard deviation of the teachers responses ranged from .482 to .598. Using mean rating, a large proportion of teachers agreed that alternative assessment assists teachers to identify

students' talents and hidden potentials (3.31), followed by alternative assessment makes learning interesting to students because it is a shift from statutory traditional assessment (3.26), followed by alternative assessment helps students to improve their psychomotor skills, higher thinking order skills and problem solving skills (3.24) to alternative assessment helps teachers to discover students' difficulties in learning (3.18) and lastly, to teachers perceive alternative assessment as interesting teaching skills because it brings varieties to teachers (3.18). In general, overall mean (3.23) of the effect of utilization of alternative assessment in assessing science students shows that the use of alternative assessment had positive effect on teachers' assessment of science students in secondary schools.

Table 3: Influence of Teachers' Sex on their Level of Utilization of Alternative Assessment in Assessing Science Students

Gender				χ^2	Df	P
	High	Low	Total			
Male	66(73.3%)	24(26.7%)	90(100%)	.064	1	>.05
Female	103(83.7%)	20(16.3%)	123(100%)			
Total	169(79.3%)	44(20.7%)	213(100%)			

Note:* $p > .05$ Source: Field Work (Olagunju & Adeyemi-John, 2024)

The result of the chi-square in table 3 shows the analysis of the relationship between teachers' level of utilization of alternative assessment and their sex. The result revealed that 73.3% and 83.7% of male and female teachers respectively highly make use of alternative assessment in assessing science students. The chi-square value of $\chi^2 = .846$ indicates that teachers' sex has no significant influence on their level of utilization of alternative assessment in assessing science students ($\chi^2 = .064$, $df = 1$, $p > .05$)

Table 4: Influence of Teachers' Discipline on Level of Utilization of Alternative Assessment in Assessing Science Students

Discipline				χ^2	df	P
	High	Low	Total			
Biology	36(85.7%)	6(14.3%)	42(100%)			
Chemistry	32(78.0%)	9(22.0%)	41(100%)			
Physics	30(83.3%)	6(16.7%)	36(100%)			
Mathematics	23(74.2%)	8(25.8%)	31(100%)			
Further Mathematics	9(64.3%)	5(35.7%)	14(100%)			
Agricultural Science	20(83.3%)	4(16.7%)	24(100%)	.739	8	>.05
ICT	7(77.8%)	2(22.2%)	9(100%)			
Technical Drawing	6(85.7%)	1(14.3%)	7(100%)			
Food and Nutrition	6(66.7%)	3(33.3%)	9(100%)			
Total	169(79.3%)	44(20.7%)	213(100%)			

Note: * $p > .05$ Source: Field Work (Olagunju & Adeyemi-John, 2024)

Teachers' discipline was categorized in to nine, namely: Biology, Chemistry, Physics, Mathematics, Further Mathematics, Agricultural Science, ICT, Technical Drawing, and Food and Nutrition. Table 4 shows that 85.7%, 78.0% and 83.3% of biology, chemistry and physics teachers respectively highly make use of alternative assessment in assessing science students. Also, 74.2% and 64.3%, of mathematics and further mathematics teachers respectively highly make use of alternative assessment in assessing science students. The table revealed further that, 83.3% and 77.8% of agricultural science and ICT teachers respectively highly make use of alternative assessment in assessing science students. In

a similar vein, 85.7% and 66.7% of technical drawing and food and nutrition respectively highly make use of alternative assessment in assessing science students. The chi-square value of $\chi^2 = .739$ indicates that teachers' discipline has no significant influence on their level of utilization of alternative assessment in assessing science students ($\chi^2 = .739$, $df = 8$, $p > .05$)

Discussion of Findings

It was revealed from the study that science teachers highly make use of alternative assessment in assessing students in senior secondary schools. This finding agreed with the finding of Cooper (2019) who conducted research on teachers' level of utilization of alternative assessment in science subject in senior secondary schools. Cooper (2019) finding revealed that teachers were generally aware of alternative assessment and most of them developed the assessment directly from classroom instruction, group work, and related classroom activities and provide an alternative to traditional assessment.

The finding also showed that the use of alternative assessment had positive effect on teachers' assessment of science students in secondary schools. This finding is in agreement with Loana and Luminita (2017) who researched on the effect of alternative assessment in the educational process- Science teachers' perspective. The study found out that science teacher considered alternative assessment as the best methods in assessing students.

The finding showed that teachers' sex and academic discipline had no significant influence on their level of utilization of alternative assessment in assessing science students. This finding is in agreement with (Hassan et al., 2018) who investigated on the impact of alternative assessment on knowledge, discipline, gender and academic degree on teachers. The results showed that discipline and gender had no significant difference on teachers' use of alternative assessment.

Conclusion

It can be concluded from the findings of the study that science teachers of all categories highly utilized alternative assessment in assessing science students in senior secondary schools in Ikorodu local government, Lagos State.

It was found from the study that teachers' sex and academic discipline had no significant influence on their level of utilization of alternative assessment in assessing science students.

Recommendation

From the result of the study, it can therefore be recommended that: (a) all secondary school teachers must be mandated to incorporate alternative assessment in their evaluation practices and frequently utilize same for science students. (b) Students should be made to understand that with the expanded concept of learning, it is increasingly important to remember that paper-and-pencil testing is not the only way to collect information about student learning. Therefore, a broader concept of alternative assessment is more appropriate and students should be duly carried along by their teachers in the implementation.

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ASSESSING THE UNDERGRADUATE STUDENTS' PERCEPTIONS OF THE APPLICATION AND CHALLENGES OF ARTIFICIAL INTELLIGENCE TOOL (CHATGPT) IN THE EDUCATION PROCESS

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Abstract

This study explores the applications, benefits, and challenges of ChatGPT among undergraduate students from various disciplines in Bayelsa State, Nigeria. Four (4) research questions guided the conduct of the study, and one hypothesis was tested. The study employed a descriptive survey research design. The study's population consists of 34,187 students from the five universities in Bayelsa State (Federal University, Otuoke: 11,040 students; Niger Delta University: 16,000 students; University of Africa, Toru Orua: 3,220 students; Bayelsa Medical University: 3,780 students, and Hensard University, Toru-Orua: 147 students). A purposive sampling technique was used to identify a group of 564 undergraduate students who had previous interaction with ChatGPT. A structured questionnaire, which was constructed by the researcher, was used to collect information from the participants through an online Google Form. Two experts in Educational Measurement and Evaluation, and one expert in Computer Science validated the questionnaire. The questionnaire's internal consistency was assessed using the Cronbach's alpha technique, and a reliability coefficient of 0.87 was obtained. The mean and standard deviation were used to answer the research questions, while the analysis of variance (ANOVA) was used to test the hypothesis at the 0.05 significance level. The findings reveal varied perspectives on the application of ChatGPT, such as a research assistant, writing aid, learning tool, and communication enhancer. The study reveals varied perspectives on the challenges of incorporating ChatGPT in the learning process, which include unreliable information on topics with few citations, the potential for plagiarism, being unable to cite sources accurately, and hindering critical thinking development. The study reveals that there is no significant difference in respondents' mean ratings on their perceptions of the application of ChatGPT in the learning process with respect to their different types of institutions. The article concludes by

emphasizing the need for careful consideration and integration of AI technologies in education, highlighting the risks of uncritical reliance on such tools, and advocating for a balanced approach to foster students' critical thinking and intellectual growth.

Keywords: Students' Perception, Application of AI, Challenges, Artificial intelligence, ChatGPT

Introduction

The term artificial intelligence (AI) describes the process of creating computer systems that can perform tasks that typically require human intelligence, such as reasoning, solving problems, learning, perceiving, and processing natural language. Among the field's pioneers, American computer scientist John McCarthy offered one of the most important definitions of artificial intelligence. According to McCarthy (2007), artificial intelligence is "the science and engineering of making intelligent machines". AI comes in a variety of forms, including general artificial intelligence and narrow AI. Narrow artificial intelligence (AI), sometimes referred to as weak AI, and it is made to accomplish particular tasks in a restricted field, including speech recognition or picture classification. Conversely, general artificial intelligence, often known as generative AI, strives to demonstrate human-like intelligence and adaptability in a variety of settings and tasks (Goodfellow, Bengio & Courville, 2016). Recent years have witnessed tremendous progress in the field of artificial intelligence (AI), with applications in a wide range of sectors, including finance, healthcare, education, and transportation. Artificial intelligence (AI) innovations like deep learning, neural networks, and natural language processing have completely changed how computers communicate with people and handle data (Nilsson, 2014). A great example of artificial intelligence (AI) technology is ChatGPT, which uses natural language processing and deep learning to produce text responses in conversational contexts that resemble those of a human.

ChatGPT, which stands for "Generative Pre-trained Transformer" was created in the late 2022 by OpenAI, which is an American artificial intelligence startup. ChatGPT is known as a form of generative AI because of its ability to produce original results. ChatGPT provides users with written responses based on artificial intelligence in response to queries or prompts by leveraging natural language processing to learn from internet data. Large text datasets are used to train these models so that they can

anticipate words in sentences and then provide human-like output that is both coherent and persuasive when responding to statements or questions. The world has taken notice of its remarkable ability to generate replies that are rational, well-organized, and educational (Zhai, 2022). As the leading natural language processing (NLP) model, ChatGPT demonstrates human-like response-generation capabilities, emphasizing personalized and interactive assistance. Notably, it can offer customized recommendations for educational resources based on individual learning objectives and preferences (Tahiru, 2021). Since its official launch on November 30, 2022, ChatGPT has quickly become a revolutionary user application, growing at an unprecedented rate. In just two months, ChatGPT accumulated an amazing user base, reaching 100 million active users as of January 2023 (Rahimi & Abadi, 2023). By August 2023, the number of unique users had increased to over 180 million, making it the most rapidly growing application in terms of usage (Tong, 2023; Hu, 2023).

The use of ChatGPT in education has generated considerable interest due to its potential to enrich the learning experience of students. The use of ChatGPT in education provide immediate feedback, tailor responses to each student's needs, and help students grasp difficult topics by giving them in a timely manner. This makes it a potentially useful tool that encourages student engagement and cognitive development by adjusting to their learning style and providing ongoing assistance with their process of acquiring knowledge (García, 2023). In keeping with this, it has shown to be an effective tool for encouraging students' writing ability improvement. Students can enhance their written communication and gain higher efficacy in their written expression by engaging with the system and receiving thorough feedback on their writing along with grammatical corrections and improvement suggestions (Osorio, 2023). It is important to realize that this application is not a comprehensive solution for creating scientific material, even if it markets itself a useful tool for scientific writing aid. It is up to writers to use their expertise and knowledge to verify and enhance the data that the tool provides. Nevertheless, it also shines at encouraging collaborative student participation in projects and assignments and facilitating group conversations. This encourages communication and idea sharing among students, which strengthens their feeling of community (Qadir, 2022).

However, in addition to its possible benefits, ChatGPT poses novel challenges and obstacles for education (Zhang, 2023; Azaria, 2022). Concerns over the potential for AI-enabled academic dishonesty arise from the technology's ability to precisely respond to user requests. This technology might be abused to complete assignments and tests on the part of students. Teachers are concerned that students may depend too much on ChatGPT to produce appropriate texts quickly, outsourcing their work to the AI system (Mhlanga, 2023). In addition, worries have been raised about plagiarism, false information, and improper referencing (Sallam, 2023). In response to the possible problem of academic plagiarism made easier by AI writing tools such as ChatGPT, Tian, a student at Princeton University, created a program named "GPTZero" that calculates the percentage of AI-generated text in any given document (Mitchell, 2022; Stern, 2022). As a precaution, the New York City Department of Education has blocked ChatGPT access on its public school networks and related devices (Allen, 2022; Rosalsky & Peaslee, 2023). To optimize ChatGPT's advantages while reducing its disadvantages, it is imperative to consider the ramifications of incorporating it into the educational process (Lo, 2023).

There are few studies that explored students' experiences applying ChatGPT in an educational setting, despite the mounting concerns and the necessity for in-depth research. Sok and Heng (2024) focused on the opportunities, challenges, and strategies for using ChatGPT in higher education. The study adopted a literature review approach and employed document analysis as a research design. It reviewed various types of documents, particularly research articles, published since 2022 when ChatGPT was launched. Based on the extensive review, the study showed that ChatGPT offers a variety of opportunities for higher education, including assessment innovation, instructional support, remote learning support, research design and development support, academic writing support, and administrative assistance and productivity. However, ChatGPT also presents a number of challenges and issues related to academic integrity, security and privacy, reliance on artificial intelligence, learning assessment, and information accuracy.

Iyolita and Muhammad (2024) investigated ChatGPT's potential opportunities and challenges in academia. To attain the objective, a review of relevant literature and online resources (news, articles, etc.) was carried

out. The noticing-collecting-thinking approach was adopted to explore and categorize all observed concerns. The outcome of this study revealed that research, education, personal skill development, and social aspects constitute the four broad perspectives that articulate the opportunities and constraints of ChatGPT in academia. For instance, from the education perspective, ChatGPT can help students have a personalized learning experience. On the other hand, it might provide false information as well as lack the ability to generate responses on its own because those responses depend on training datasets, which may contain errors. Similarly, from the point of view of the personal skill development, this model may impair a person's capacity for critical thought and content production; while providing reading and writing practice sessions and relevant content, it can improve a person's language proficiency.

Ngo (2023) investigated how the 200 Vietnamese university students perceive using ChatGPT for learning, including benefits, barriers, and potential solutions. A questionnaire was distributed to the 200 students via an online survey, and 30 students participated in semi-structured interviews. The research results showed that, in general, students had a favorable opinion of ChatGPT's application. The benefits of ChatGPT, according to students, included saving time, providing information in various areas, providing personalized tutoring and feedback, and illuminating ideas in writing. Also, several barriers to using ChatGPT were recognized, and some solutions were suggested for improvement of using ChatGPT in education. The most concerning issues for students while using ChatGPT were inability to assess the quality and reliability of sources, inability to cite sources accurately, and inability to replace words and use idioms accurately. The study suggested the some potential solutions can be implemented; for example, verifying ChatGPT's responses with reliable sources; using ChatGPT as a reference source or a consultant tool; providing guidelines for use; and promoting academic integrity to ensure ethical uses of ChatGPT in an academic context. United Nations Educational, Scientific and Cultural Organization (2023) enumerated that the possible applications of ChatGPT in higher education are: teaching and learning (ChatGPT can perform many simple or technical tasks (e.g., basic research, calculations, proofing); research (ChatGPT has been used to generate entire academic journal articles,⁸ opening an ethical debate about whether a non-human author can be

considered a contributor to the creation of knowledge); administration (ChatGPT is used respond to queries from students; finding news, resources, and other information; helping students to sign up for courses, complete course requirements, check administrative information e.g., exam timetables, location of classes), and community engagement (ChatGPT is used to develop sound strategies for community engagement).

Chan and Hu (2023) explored university students' perceptions of generative AI (GenAI) technologies, such as ChatGPT, in higher education, focusing on familiarity, their willingness to engage, potential benefits and challenges, and effective integration. A survey of 399 undergraduate and postgraduate students from various disciplines in Hong Kong revealed a generally positive attitude towards GenAI in teaching and learning. Students recognized the potential for personalized learning support, writing and brainstorming assistance, and research and analysis capabilities. However, concerns about accuracy, privacy, ethical issues, and the impact on personal development, career prospects, and societal values were also expressed. Canedo (2023) explored the impact of ChatGPT, an OpenAI language model, on undergraduate students in Brazil, aiming to uncover its benefits and challenges in higher education. A survey of 206 undergraduate students was conducted to gather data on profiles, usage frequency, and perceptions of ChatGPT's impact in education. The findings from the study revealed that the participants recognized ChatGPT's value in enhancing productivity, organization, study orientation, code writing, and text revision. Concerns were also raised about user dependency, answer reliability, and ethical considerations.

Tlili et al., (2023a) examined the use of ChatGPT as a virtual assistant to support students in their learning processes, exploring the benefits and limitations of utilizing chatbots in education. To support the research, they considered factors such as student engagement, personalized learning experiences, and the ability to provide timely and relevant feedback. Overall, the study concluded that ChatGPT can provide personalized and interactive experiences, but it also acknowledges challenges such as the limitations of chatbots in understanding complex or context-specific queries and potential ethical concerns in terms of data privacy and bias. Maphoto et al., (2024) investigated students'

perspectives on the utilisation of generative AI in South African open distance e-learning (ODEL) university. The study found complex perspectives, which reflected the discourse surrounding the integration of generative AI in academic writing, where students grapple with the dual-edged nature of technological assistance. The study revealed that amidst the prevalent fears of generative AI potentially altering individual writing styles, a subset of students emerges, expressing a sense of optimism about the technology's potential to assist in overcoming specific writing challenges. This optimistic outlook resonates with scholarly discourse portraying generative AI as a supplementary tool, particularly effective in addressing issues related to grammar and structural elements in writing. It suggests an acceptance among students of generative AI's role as a facilitator rather than a disruptor in the writing process

Managwu (2022) explored the integration of AI-chatbot into teaching and learning: A remedy for enhancing educational and administrative responsibilities among institutions in Nigeria's South-South geopolitical zone. A descriptive survey research approach was used in the study. The study's population consists of 252,000 students from South-South public universities (Delta state, Edo State and Bayelsa). The sample size for this study was 399 respondents (274 students, 67 professors, and 58 administrative employees) from state and federal institutions across the country. The 20-item AICHATBOTSQ (AI-chatbot structured questionnaire) was utilized to collect data. The mean, standard deviation, and analysis of variance were used to examine the data collected (ANOVA). According to the findings, there is no significant difference in respondents' mean ratings of the necessity for AI-chatbots in teaching and learning, as well as completing administrative chores, across institutions in the South-South. Low internet infrastructure, instability in governance, insufficient financing, and poor energy supply, among other problems, are obstacles impeding the deployment of AI-chatbot technology in performing administrative responsibilities among institutions in South-South Nigeria. The study suggests that universities in the South-South of Nigeria fully integrate artificial intelligence tools (AI-chatbots) into teaching and learning as a method of enhancing educational and administrative responsibilities.

From the related literature review, it can be shown that several existing works have focused on deriving the strengths and weaknesses of

ChatGPT in the context of academic integrity, teaching and learning environment, research and publication, and the like. None to very few articles combined all these as their research area. Therefore, extensive research with elaborated and extended visualization of the application and challenges of ChatGPT in education is required. Therefore, the purpose of this study is to assess how students view using ChatGPT in the educational setting. It will do so by examining the students' general perception of the tool, as well as their perceptions of its benefits, challenges and potential solutions for efficient use. The researcher seeks to narrow the current research gap and advance scientific knowledge of artificial intelligence in education through this work. Furthermore, as students are one of the main consumers and benefactors of these technologies, learning more about how they view ChatGPT is essential. Educational practitioners, researchers, and policymakers will find great value in the insights this study provides, as it will help them comprehend the consequences of incorporating ChatGPT into educational settings and provide guidance for the responsible and efficient use of this technology.

Research Questions

The following research questions guided the study:

1. What are the perceptions of students on the use of ChatGPT in the education process?
2. What is the students' perception of benefits of using ChatGPT in the education process?
3. What is the students' perception of the challenges of using ChatGPT in the education process?

Hypothesis

The following hypothesis was tested at 0.05 significant level:

1. There is no significant difference in the respondents' mean ratings on their perceptions of the application of ChatGPT in the education process with respect to the ownership of institutions.

Methods

The study employed a descriptive survey research design. The study's population consists of 34,187 students from the five universities in Bayelsa State, which comprised Federal, State and private universities. A

purposive sampling technique was used to identify a group of 564 undergraduate students who had previous interaction with ChatGPT. A structured questionnaire, which was constructed by the researcher, was used to collect information from the participants through an online Google Form. Two experts in Educational Measurement and Evaluation, and one expert in Computer Science validated the questionnaire. The questionnaire's internal consistency was assessed using the Cronbach's alpha technique, and a reliability coefficient of 0.87 was obtained. The mean and standard deviation were used to answer the research questions, while the analysis of variance (ANOVA) was used to test the hypothesis at the 0.05 significance level. A mean score of 2.50 served as the criterion mean for judgement.

Results

Research Question One: What are the perceptions of students of the use of ChatGPT in education process?

Table 1: Students' Perception of the Use of ChatGPT

S/N	Students' perception of the use of ChatGPT	Mean	Standard Deviation
1	ChatGPT is used as a supplementary tool for research	3.63	0.78
2	ChatGPT is used to gather information and generate ideas.	3.43	1.07
3	ChatGPT provides a platform for practicing and improving writing skills	3.44	0.86
4	ChatGPT aids in collaborative projects, facilitating communication and idea exchange among students.	3.88	0.48
5	ChatGPT serves as a virtual tutor, answering queries related to coursework and providing additional explanations.	3.63	0.48
6	ChatGPT is used to refine one's arguments and write clear, concise messages.	3.04	1.14

Table 1 shows the perceptions of students of the use of ChatGPT in education process. The mean scores of the participants for the items 1 to 6 are greater than the criterion mean of 2.5, which shows that the

participants agreed on the items 1 to 6. Therefore, the result in table 1 is summarized that the participants perceived that ChatGPT is used for research assistant, writing aid, learning tool, and communication enhancer.

Research Question Two: What is the students' perception of the benefits of using ChatGPT in the education process?

Table 2: Students' perceived benefit of ChatGPT

How helpful do you find ChatGPT for your academic work?	Frequency	Percentage
Not helpful at all	-	-
Slightly helpful	35	6.2%
Moderately helpful	34	6.0%
Very helpful	495	87.8%
Extremely helpful	-	-
Total	564	100%

Table 2 shows the students' perception of benefits of using ChatGPT in education process. Table 2 shows that none of the students agreed that ChatGPT is not helpful at all, or extremely helpful in the education process. Thirty-four participants (6.0%) opined that ChatGPT is moderately helpful, followed by 35 participants (6.2%), who opined that ChatGPT is slightly helpful, while 495 participants (87.8%) opined that ChatGPT is very helpful.

Research Question Three: What are the students' perception of the challenges of using ChatGPT in education process?

Table 3: Students' perception of the challenges of ChatGPT

S/N	Students' perception of the challenges of ChatGPT	Mean	Standard Deviation
1	ChatGPT can provide unreliable information on topics with few citations	3.94	0.24
2	ChatGPT can produce inaccurate or false factual references	3.25	1.09
3	ChatGPT is unable to cite sources accurately	3.75	0.66
4	ChatGPT is unable to replace words and use	3.14	0.99

	idioms wisely		
5	ChatGPT is unable to examine quality and reliability of sources	3.44	0.86
6	ChatGPT can exhibit logical errors and contradictions	3.94	0.24
7	ChatGPT is prone to plagiarism	3.87	0.33
8	Limited access to up-to-date databases	3.75	0.43
9	Overreliance on ChatGPT can hinder a student's ability to develop critical thinking and research skills.	3.97	0.17

Table 3 shows the students' perception of the challenges of using ChatGPT in education process. The mean scores of the participants for the items 1 to 9 are greater than the criterion mean of 2.5, which shows that the participants agreed on the items 1 to 9. Therefore, the result in table 3 is summarized that the participants' perception of challenges of using ChatGPT areunreliable information on topics with few citations, the prone to plagiarism, being unable to cite sources accurately, limited access to up-to-date databases, and hindering critical thinking development.

Hypothesis One: There is no significant difference in the respondents' mean ratings on their perceptions of the application of ChatGPT in the education process with respect to their different types of institutions.

Table 4: Analysis of Variance Statistics of the Differences in the Respondents' Mean Ratings on their Perceptions of the Application of ChatGPT in the Education Process with Respect to their Different Types of Institutions

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	40.481	2	40.481	3.990	0.057
Within Groups	2252.358	561	10.146		
Total	2292.839	563			

$\alpha = 0.05$

Table 4 shows the analysis of variance (ANOVA) statistics of the differences in the respondents' mean ratings on their perceptions of the

application of ChatGPT in the education process with respect to their different types of institutions. Table 4 shows the F-value of 3.990, and p-value of 0.057. Testing the hypothesis at 0.05 significant level, the p-value (0.057) is greater than the alpha value of 0.05. This shows that there is no significant difference, and the null hypothesis is retained. Therefore, there is no significant difference in the respondents' mean ratings on their perceptions of the application of ChatGPT in the education process with respect to their different types of institutions.

Discussion of Findings

Findings from research question one revealed that the participants' perceptions on the application of ChatGPT are for research assistant, writing aid, learning tool, and communication enhancer. The finding of this study is in agreement with the findings of Iyolita and Muhammad (2024), who investigated ChatGPT's potential opportunities and challenges in academia by reviewing relevant literature and online resources, and found that students use ChatGPT for research, education, personal skill development, and social aspect. United Nations Educational, Scientific and Cultural Organization (2023) also enumerated the possible applications of ChatGPT in higher education, such as teaching and learning, research, administration, and community engagement. Sok and Heng (2024) focused on the opportunities, challenges, and strategies for using ChatGPT in higher education., and revealed that ChatGPT offers a variety of opportunities for higher education, including assessment innovation, instructional support, remote learning support, research design and development support, academic writing support, and administrative assistance and productivity.

Findings from research question two revealed that the participants' perception on benefits of using ChatGPT in learning is that ChatGPT is very useful in their education process. This result is in line with the findings of Chan and Hu (2023), who explored university students' perceptions of generative AI (GenAI) technologies, such as ChatGPT, in higher education, and revealed that the participants have positive attitude towards GenAI in teaching and learning. Moreover, Maphoto et al., (2024) investigated students' perspectives on the utilisation of generative AI in South African open distance e-learning (ODEL) university. The finding revealed that a subset of students expressed sense of optimism about the

technology's potential to assist in overcoming specific writing challenges, and ChatGPT is accepted among students as a facilitator rather than a disruptor in the writing process.

Findings from research question three revealed that the participants' varied perspectives on the challenges of incorporating ChatGPT in the learning process include unreliable information on topics with few citations, potential for plagiarism, unable to cite sources accurately and hindered critical thinking development. The findings of this study are in agreement with the findings of Tlili et al., (2023a), who examined the use of ChatGPT as a virtual assistant to support students in their learning processes, and found that the challenges of using ChatGPT are limitations of chatbots in understanding complex or context-specific queries and potential ethical concerns in terms of data privacy and bias. Canedo (2023) explored the impact of ChatGPT, an Open AI language model, on undergraduate students in Brazil, aiming to uncover its challenges in higher education, and found that challenges are user dependency, answer reliability, and ethical considerations.

The finding from hypothesis one revealed that there is no significant difference in respondents' mean ratings on their perception towards the application of ChatGPT in the education process with respect to their different types of institutions. Managwu (2022) explored the integration of AI-chatbot into teaching and learning, and found that, there is no significant difference in respondents' mean ratings of the necessity for AI-chatbots in teaching and learning across institutions in the South-South Geopolitical region of Nigeria.

Conclusion

Based on the findings from the study, the study concludes that the varied perception of undergraduate students in Bayelsa State of the ChatGPT application are for research assistant, writing aid, learning tool, and communication enhancer, while the challenges of ChatGPT are the unreliability of information on topics with few citations, potential for plagiarism, unable to cite sources accurately and hindered critical thinking development as result of incorporating ChatGPT in the learning process.

Recommendations

Based on the conclusion, the study recommends that:

1. Undergraduate students, researchers should not take ChatGPT's word as gospel, rather verify the information it provides with credible sources.
2. Ethics education should be integrated in the school curricula so as to raise awareness about responsible Artificial intelligence (AI) use, plagiarism, and the importance of critical thinking.
3. Providing professional development for teachers and developing policies and regulations can help to mitigate the ethical concerns of generative AI.

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UTILIZING MOBILE DEVICES FOR ON-THE-GO TEST ITEMS GENERATION OF ARTIFICIAL INTELLIGENCE IN TECHNICAL AND VOCATIONAL EDUCATION: A HANDS-ON TUTORIAL

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Abstract

Education is undergoing dramatic and fundamental changes due to advances in technology. Technical and vocational education (TVE) is not an exception in using technology to foster learning. Mobile devices have been utilized in technical education to provide innovative learning methods and impart knowledge more efficiently. Despite the great potential that mobile devices offer for instruction and assessments, many TVE educators do not know enough about Artificial Intelligence (AI) and what they can do, therefore, they cannot adopt it in the teaching and learning process, especially in areas of learning assessment test items creation. TVE educators need to develop test items right on the go, at any time and place they want, assessment in their environments, of which AI in line with mobile devices has the potential. This paper has attempted to provide a conceptual framework for Artificial Intelligence of On-The-Go Test Items Generation (AIoOTG-TIG) to facilitate the TVE educators' hands-on authentic test items generation and the possibilities of using artificial intelligence. Desk research and non-structured interview sources of data were used in this study. The paper gives insight into potential strategies for effective uses of artificial intelligence in test items generation of TVE content. It presents a hands-on tutorial on using AI Chatbot Assistant to create test items with mobile phones. Finally, it offers some policy recommendations on improving AI usage to inform policymakers and other stakeholders in the technical and vocational education and training (TVET) sectors. It is hoped that the paper will be useful to practising teachers, student teachers, principals, and other stakeholders in the educational sector having concerns about technical and vocational education.

Keywords: Technology, Mobile Devices, On-the-Go Test Items Generation, Assessment, Technical and Vocational Education, Artificial Intelligence Chatbot Assistant.

Introduction

The business of technical and vocational education (TVE) is undergoing significant change and this change is made possible, in part, by innovative uses of technology. New learning paradigms are being developed and the blending of the educational enterprise with the workforce and the marketplace is creating a dynamic new world of performance-based measures. Concurrently, the recent advances in the use of technology have led to the creation of powerful technologies like mobile devices and artificial intelligence that are transforming many aspects of the educational system. It can help education and workplace environments to be outcome, results, and assessment-oriented. It has the potential to improve education and assessment. Assessment is an integral part of technical and vocational education (TVE). This is because, without assessment, teaching and learning in TVE is meaningless. Technical and Vocational Education has been geared towards providing learners with practical skills, attitudes, work habits and knowledge essential for employment in a given occupation (NTI, 2008; Ogwo & Oranu, 2006). It prepares an individual for employment in a world of work in a specialized occupation.

Assessment in TVE therefore, is a process of gathering data to pass judgement about the learners' learning outcomes. It obtains information about how much the learner has learnt and organises such data into interpretable forms on several factors. Assessment data is obtained using a variety of instruments like tests, observation and questionnaires. Tests developed by the TVE educators for use in measuring the progress made by their learners are known as teacher-made tests. A review of related literature on assessment in TVE revealed that the assessment: should cover the three domains of skills (cognitive, affective and psychomotor); must be systematically carried out using marking schemes or scoring guides; should be carried out several times in the life of learners not just once, it should be formatively used to deliver lessons; and the data must be from various sources including the learner being assessed. Assessing the quality and quantity of learning in TVE classrooms is a recurring challenge, with

educators facing difficulties in generating effective test items and managing large numbers of students. The increasing number of TVE learners and limited number of educators exacerbate the issue, making it time-consuming to grade responses and provide feedback. Artificial intelligence via mobile devices may offer a solution to these constraints, providing opportunities for innovative assessment systems and addressing technical challenges.

Mobile devices have been utilized in technical education to provide innovative learning methods and impart knowledge more efficiently. Mobile devices include any portable, connected technology, such as basic mobile phones, smartphones, e-readers, netbooks, tablets, iPads and computers. Despite the great potential that mobile devices offer for instruction and assessments, many TVE educators do not know enough about Artificial Intelligence (AI) and what they can do, therefore they cannot adopt it in the teaching and learning process, especially for assessment purposes. TVE educators need to develop test items right on the go, at any time and place they want, assessment in their environment, and which AI in line with mobile devices has the potential.

This paper has attempted to provide a conceptual framework for an AI-based test items generation in TVE that combines a powerful AI computing system with mobile technology as one of the most important sources of big data generation. It looks at the ways it might be employed within the classroom besides, the simply didactic and how an educational model might be applied to act as a framework for design. It gives insight into potential strategies for effective use of artificial intelligence in test items generation of TVE concepts. It offers some policy recommendations on improving AI's usage to inform policymakers and other stakeholders in the technical and vocational education and training (TVET) sector. It is hoped that the paper will be useful to practising teachers, student teachers, principals, and other stakeholders in the educational sector having concerns about technical and vocational education.

The Concept of Tests in TVE

Teaching in TVE is geared towards behavioural change and all planned teaching has intended outcomes. A good TVE educator assesses the learning progress of their learners periodically either at the end of a lesson or the end of a course, and keeps the records of tests. Tests

generally are instruments/devices used for measurement. Measurement in education is the quantitative description of learners' change in behaviour. It does not imply judgments concerning the worth or value of the behaviour measured. Therefore, Testing in TVE is defined as the process of measuring a sample of a learner's behaviours. Tests are used to find the quality, value or composition of a process or product (Okoro, 2002 and Ogwo & Oranu, 2006). They are employed to determine the extent a trait or construct is possessed by a person or group of persons. For this paper, tests encompass both internal and external assessments, administered on a weekly, termly, annual, or end-of-program basis. The need to give an account of what has been achieved; make value judgments of a programme and its products; take decisions about a programme and its products; give guidance to learners and the system; or satisfy administrative obligations necessitated to give/administer tests. Therefore, achievement test is designed to measure learners' mastery of subject matter objectives. It may be divided into two categories: teacher-made tests and standardized tests, depending on the mode of preparation (Harbor-Peters, 1999 and Okoro, 2002). The standardized achievement test is designed to obtain and interpret scores in some objective form to evaluate individual testee's performance based on an acceptable standard. It is a test, carefully constructed by expert test developers and it has an established administrative condition, uniform instruction, items of known psychometrics, and a standard condition for grading and interpreting results. The use of standardized tests helps conserve the time and effort the teacher would have spent in constructing teacher-made tests. Psychological tests are mostly standardized and it is pertinent to note that most international intelligence and aptitude tests are also standardized.

The teacher-made achievement test is constructed by the TVE educator and is specially designed to test the level of achievement of a learner in a particular lesson unit. It could be in the following forms: placement, formative, diagnostic or summative. These forms are subject to the purpose the evaluation result will serve. To assess the entry behaviour of learners, a placement test is used; to assess a unit or lesson, a formative assessment is used; to determine a problem area, a diagnostic test is used, and to certify a learner as a finished product of a course, a summative test is used. Tests take two broad types: the essay type, where no restrictions are placed on the answers (extended or restricted response types) and the

structured response type like multiple choice, alternate response, completion or matching types. Performance or Non-testing instruments like observation, questionnaires, socio-metric instruments and interviews are usually made of a series of items to which, is attached a response format such as a rating scale or checklist.

Notably, every test is made up of several items and it is these items that are scored to determine the learner's level of mastery in achieving the subject matter objectives. Despite the importance of tests in measuring learning outcomes, the frequency of tests has been limited, this is because the development of a meaningful test takes some time. In other words, generating test items for effective evaluation of the learners' understanding of the TVE concept is a difficult challenge and takes time. For effective evaluation, the cognitive, psychomotor and affective domains are evaluated. Each domain is made up of objectives which are hierarchically arranged namely: The cognitive domain – remembering, understanding, applying, analyzing, evaluating and creating; the psychomotor – perception, set (mindset), guided response, mechanism, complex overt responses, adaptation origination; and the affective: receiving, responding, valuing, organization of value, and characterization of value. The cognitive domain is properly assessed by classwork, homework, quizzes, projects, and assignments; the psychomotor domain is assessed by classwork, speed tests, projects, and assignments while the affective domain is assessed using observation, questionnaires, sociometry, anecdotal records, and interviews.

Emergence of Mobile Devices and Artificial Intelligence for on-the-go test items generation.

The advancements in technology have made a profound impact on educational assessment over the last decade. Today's smartphones are advanced due to the integration of hardware and software, they have a wide range of capabilities. As mobile devices become more advanced in hardware design and software implementation, they are now useful in diverse educational settings. Mobile devices like smartphones, tablets, laptop computers, notebooks, smart watches, e-readers, and handheld gaming consoles are widely used in higher education settings as learning tools. Mobile devices have introduced a new generation of educational tools that afford creative use and instant access to a wealth of resources.

These devices hold great potential for transforming learning and the introduction of artificial intelligence has transformed this technology into personal assistants who have been playing an instrumental role in the teaching-learning process.

Artificial intelligence (AI) concerns building into the computer thought capability of the human brain. It means building into computers human-like intellectual faculties - common sense, memory and reasoning, sensation and perception, spatial ability, numerical ability, verbal ability, learning and transfer of knowledge (Nwana, 2009). The term AI, coined by John McCarthy in 1955, is defined as a computer with the capability to perform a variety of human cognitive tasks, such as communicating, reasoning, learning, and/or problem-solving (Nilsson, 1998). Baker and Smith (2019) further explain that AI represents a generic term describing a wide collection of different technologies and algorithms (e.g., machine learning, NLP, data mining, and neural networks). In the earlier stage, AI in the education area normally refers to intelligent tutoring systems, which aim to solve problems such as enhancing operator performance automatically (Hwang, 2003). Currently, AI refers to using big data to perform complex tasks. It is a computing system capable of engaging in human-like processes such as adapting, learning, synthesizing, correcting and using various data required for processing complex tasks (Guan, Mou & Jiang, 2020; Chatterjee & Bhattacharjee, 2020).

However, the potential benefits of integrating AI in education generally (University of San Diego, 2024) include,

- *Personalization*: “It can be overwhelmingly difficult for one teacher to figure out how to meet the needs of every student in his/her classroom. ... AI systems easily adapt to each student’s individual learning needs and can target instruction based on their strengths and weaknesses.”
- *Tutoring*: AI systems can “gauge a student’s learning style and pre-existing knowledge to deliver customized support and instruction.”
- *Grading*: Sure, AI can help grade exams using an answer key; but it can also “compile data about how students performed and even grade more abstract assessments such as essays.”
- *Feedback on course quality*: For example, if many students are answering a question incorrectly, “AI can zero in on the specific

information or concepts that students are missing, so educators can deliver targeted improvements in materials and methods.”

- *Meaningful and immediate feedback to students:* Some students may be shy about taking risks or receiving critical feedback in the classroom, but “with AI, students can feel comfortable to make the mistakes necessary for learning and receive the feedback they need for improvement.”

Much of the potential envisioned for AI in education centres on reducing time spent by teachers on tedious tasks to free up time for more meaningful ones. By maintaining awareness about the rising potential of AI in education, TVE educators should make preliminary preparations to ensure AI can be deployed effectively in TVE. Up to the present stage of technological development, the expectation of AI to contribute to TVE is based principally on reducing the time required to accomplish routine tasks and focusing on improving the effectiveness of TVE educators' work with better analytics software. The improved understanding of the potential of AI could change the strategic direction of AI use in TVE. Artificial intelligence (AI) tools have the potential to provide different ways of learning and to help TVE educators with lesson planning, test item generation, marking and other tasks. The following are recommended for educators who want to incorporate AI learning assessment tools into practice and are grouped by type of platform - Machine Learning-Driven Assessment Systems, Natural Language Processing Platforms and Adaptive Testing Platforms.

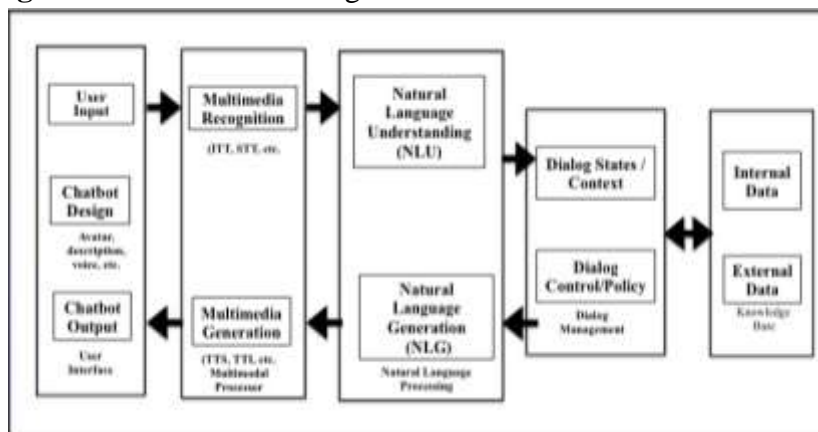
Machine Learning-Driven Assessment Systems Platforms help grade multi-choice questions and offer consistent and efficient assessments. They can also provide insights into performance, assisting educators in identifying areas where extra support is needed. Excellent examples of machine learning-driven assessment systems include Quizalize, PrepAI and Typeform. Natural Language Processing Platforms like EssayGrader or VideoAsk are perfect for assessing language-based tasks like essays or oral assignments. These tools analyse responses for coherence and the quality of the arguments, streamlining the process for instructors. They also provide detailed feedback to learners while Adaptive Testing Platforms leverage AI to adjust the difficulty of assessments in real time based on the learner's performance. Excellent examples here include Opus and ChatGPT. Adaptive testing platforms

ensure learners are challenged at the right level, promoting growth and engagement. Research suggests that generative AI tools such as ChatGPT can produce text capable of passing some exams, which risks undermining the validity of some assessment methods.

AI Chatbot Assistant is built on ChatGPT APIS better than GPT & GPT3 – Chat AI Assistant writer and generator. ChatGPT, a chatbot from OpenAI, has taken the world by providing real-time, plausible-looking responses to input questions. ChatGPT has a good performance in text generation, language understanding, and translation. As a chatbot, it can be applied in various fields, such as education, healthcare, marketing, environmental research, etc. The prevalence of ChatGPT has made chatbots a focus of attention. Leading technology companies have also released their chatbots. With the help of AI, chatbots have become more intelligent and can answer people's questions smoothly. On the other hand, chatbots are not as neutral as expected, raising ethical concerns among the general public. The architecture of a general chatbot consists of five main modules:

- 1) User interface,
- 2) Multimedia processor,
- 3) Natural language processing,
- 4) Dialogue management, and
- 5) Knowledge base.

Figure 1: Architecture of a general chatbot.



The user interface module is responsible for the input and output of the chatbot. It is the module that interacts with users directly. The input and output can be multi-modal. Multi-modal data is processed by the

multimedia processor's module. The NLP module understands the user's input language and generates the desired output language based on text answers. The dialogue management module is responsible for recording the current chat status and guiding the direction of conversations. It can access the database module and get answers for users. Because of the introduction of end-to-end LLMs, boundaries between various modules may not be as clear as those in the traditional chatbot design. Yet, there are still sub-modules that are responsible for the above-mentioned functions. This paper adopted AI Chat Assistant to demonstrate a tutorial on how to generate on-the-go test items in TVE. This is because, according to some users of AI apps, it is better than some AI apps and much more affordable and user-friendly. As AI tech keeps evolving, chatbot solutions are getting cheaper and easier to implement, one doesn't need to be a tech whiz or have a massive budget anymore. Other benefits of AI Chatbot Assistant in test items creation with mobile phone include:

- *Efficiency and Time-Saving:* It provides fast answers to teacher queries. No one likes to wait for an answer. It answers questions quickly and around the clock (operates 24/7), helping to ensure that teachers can access information and support outside regular school hours. Chatbots provide instant responses to inquiries, leading to faster query resolution and an improved teacher journey. By using an AI Chatbot assistant, TVE educators can automate repetitive tasks, manage their schedule, set reminders, and perform various functions with ease. This increased efficiency can save them valuable time and energy that they can redirect towards more important endeavours.
- *Consistency and Accuracy:* It can quickly comprehend queries, find the necessary information, and provide answers based on the teacher's knowledge base or website instantly. Being a bot, it also ensures consistency and precision in the answers provided. This enhances the overall efficiency of the teacher service process and leaves a positive impact on the teacher's perception of the concept.
- *Personalization and Adaptability:* It also anticipates teacher needs, and delivers useful results. It analyses their interactions to provide recommendations. It can be deployed across a variety of platforms and tools to meet teachers where and how they prefer. Teachers

prefer to complete simple tasks independently. Chatbots can prompt them and provide more self-service options and resource directions, saving teachers time and reducing teachers' needs and workloads.

- *Scalability and Flexibility:* It can be engaged through digital ads, mobile or messaging apps, telephone, web pages etc. The teacher can contact the chatbot from almost any country globally. Instead of forcing them to communicate in the developer's home language, enterprise-grade chatbots can support multiple languages, and can even make an educated guess based on the initial input, whether it's in chat, text or voice.

However, this study employed a mixed-methods approach, integrating desk research and non-structured interviews to develop a conceptual framework for AI-based test item generation in Technical and Vocational Education (TVE). The research design consisted of the following stages:

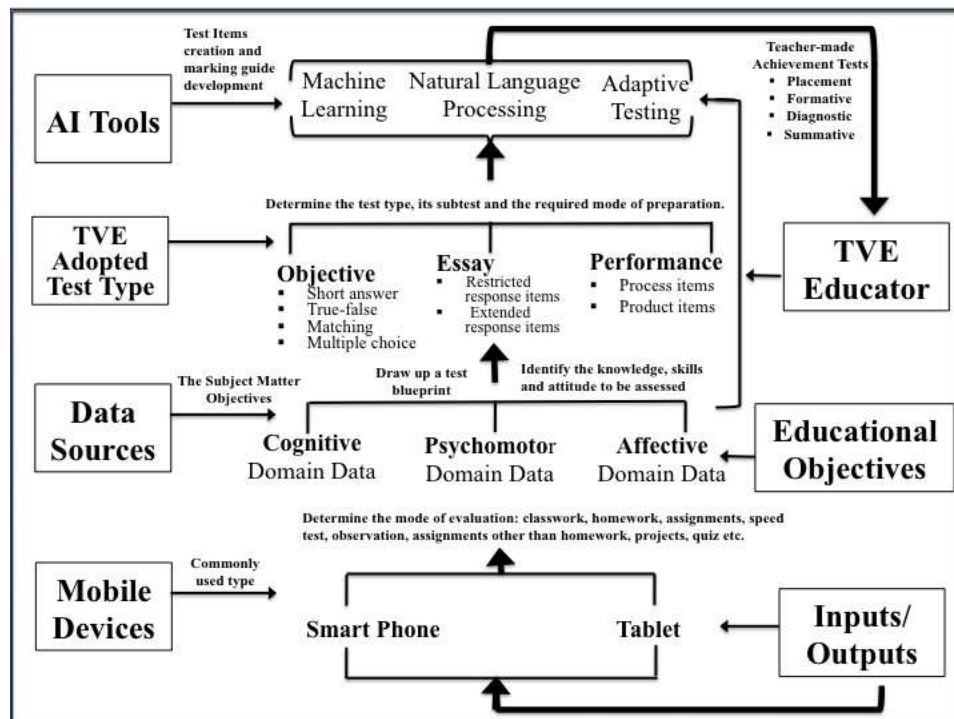
1. Comprehensive literature review: A thorough review of existing literature and previous studies was conducted to identify key components and effective strategies for utilizing AI in assessment.
2. Data extraction: Relevant data was extracted from the literature review.
3. Strategy identification: Strategies for using AI to generate test items for course concepts were identified.
4. Development of a step-by-step guide: A step-by-step guide was developed for TVE educators on using AI tools, specifically AI Chatbot Assistants, for test item generation.

The framework was face validated, and opinions were gathered from experts in Technical and Vocational Education, Measurement and evaluation experts and IT professionals familiar with AI and mobile technology. The study used a qualitative approach to analyze the data. Data from the literature review was analyzed to identify patterns, themes, and relationships while the data from expert opinions was analyzed to inform the development of the conceptual framework as given in **fig 2**.

Artificial Intelligence of On-The-Go Test Items Generation (AIoOTG-TIG) in Technical and Vocational Education

Artificial Intelligence of On-The-Go Test Items Generation (AIoOTG-TIG) in Technical and Vocational Education means using mobile devices to generate test items with the help of AI integration. To create a conceptual framework for expressing the connections between transformational tools such as mobile devices and artificial intelligence, all the basic parts of the assessment were separated using the opinions of the experts. Then, by reviewing the literature, the key elements in each section were extracted and confirmed by experts in measurement and evaluation, TVE and familiar with information technology and transformational technologies. Then the causal relationship between the elements was identified and put together in a conceptual framework.

Fig. 2: Framework of the proposed Artificial Intelligence of On-The-Go Test Items Generation (AIoOTG-TIG).



Hence, the proposed framework shows the clear relationships between the effective parameters in mobile usage based on the AI tool in test item generation.

Potential strategies on the use of AI to generate test items of TVE course concepts.

This presents a general approach for TVE educators on the use of AI to create test items that assess learners' knowledge and understanding of course contents.

Figure 3: Procedures on the use of AI to generate test items of course concepts.

Procedures	Descriptions
I: Choose the AI platform.	Choose a platform or tool that supports AI chat functionality for generating test items. Consider options like ChatGPT, OpenAI API, or specific AI chat platforms designed for quizzing purposes.
II: Familiarity with the AI chat platform and its capabilities.	Understand how to interact with the AI model and retrieve responses to specific queries or prompts.
III: Define the parameters and requirements for generating test items.	<ul style="list-style-type: none"> ▪ Determine the subject or topic for the test. This could be a specific concept or a broad subject area. ▪ Identify the learning objectives to achieve by the learners through the test. These objectives should be specific, measurable, achievable, relevant and time-bound (SMART). ▪ Determine the level of difficulty and any other specifications. Prepare the test blueprint or table of specification. ▪ Determine the format of questions. This could be a multiple-choice, true/false, short answer etc.
IV: Develop a set of prompts or questions.	Create a set of prompts or questions that can be used to generate test items. These prompts should be specific enough to obtain relevant and accurate responses from the AI model.
V: Use the AI chat platform to generate test items based on the prompts or questions.	<ul style="list-style-type: none"> ▪ Use ChatGPT to generate questions related to the learning objectives and the chosen test type. ▪ Input each prompt individually and retrieve the AI-generated responses. You can provide ChatGPT with a prompt, such as "Please generate five multiple-choice questions about the topic of X," and it will provide you with questions to choose from.
VI: Review and evaluate the AI-generated responses for each prompt.	<ul style="list-style-type: none"> ▪ Ensure that the questions are clear, concise and aligned with the learning objectives. ▪ Determine if the response aligns with the intended answer or if any modifications are required.
VII: Modify the prompts	<ul style="list-style-type: none"> ▪ Refine the prompts if necessary and repeat the

if necessary and repeat the process.	process of generating test items using the AI chat platform.
VIII: Organize the generate items.	<ul style="list-style-type: none"> ▪ Iterate as needed until satisfactory test items are generated. ▪ Gather the generated test items and organize them according to the desired test format or structure. ▪ They may need to categorize according to difficulty level, topic, or question type. ▪ It has to be guided by the test blueprint or table of specifications. Usually, more than the requisite number of items is chosen to take care of item mortality. ▪ Prepare the marking scheme / guide.
IX: Edit the generated items.	<ul style="list-style-type: none"> ▪ Proofread and check the generated test items for accuracy, relevance, and consistency. ▪ Make any necessary edits or adjustments to ensure the quality of the test items.
X: Finalize the generated items.	Once the questions and answer choices are reviewed and edited, finalize the test by creating a clear and concise set of instructions for the learners, specifying the time limit, grading criteria, and any other relevant information.
XI: Prepare the test using the generated items	<ul style="list-style-type: none"> ▪ Depending on the platform or tool you are using, you may need to input the questions manually or import them using a specific format or file type. ▪ Trail-test the test to ensure that the generated test items are functioning as expected. ▪ Make any final revisions or changes if necessary and ensure that the necessary characteristics or qualities of a good test have been established.
XII: Administer the test for the purpose it is supposed to serve.	Deploy or share the test with the intended audience through your preferred means of distribution. This could be done through an online platform, a learning management system, or any other means suitable for the audience.
XIII: Monitor and gather feedback on the test items generated through AI chat.	<ul style="list-style-type: none"> ▪ Once the test is completed, grade the responses according to the grading criteria you established. ▪ Evaluate the effectiveness and accuracy of the generated items and make improvements based on the feedback received. ▪ Provide feedback to your audience on their performance on the test, including areas where they did well and areas where they could improve.
XIV: Test item revision	The test items need to be revised time to time especially if there is a change in the curriculum or the norm.

However, it is crucial to understand the limitations and potential biases of AI chat platforms while using them for generating test items. The quality and accuracy of the generated items heavily rely on the training data and algorithms used by the AI model. Therefore, human review and supervision are essential in ensuring the quality and appropriateness of the generated test items.

Use of AI Chatbot Assistant in Generating Test Items with Mobile Phone: A Hands-on Tutorial

This section illustrates an application of the proposed procedures/strategies for using AI to generate test items of course concepts using mobile phones. It is important to note that the tutorial is only preliminary and one should take careful consideration if any possible implications are relevant to one's training. Therefore, in this training section, the focus is on the use of an AI Chatbot Assistant in generating test items.

Do-it-Yourself Training Session

Topic: Generating a Test Items Using AI Chatbot Assistant: A Step-by-Step Guide.

Objectives: Upon successful completion of the training, the participant should be able to demonstrate at least 85% knowledge of understanding on how to:

- Install AI Chatbot Assistant on his/her Phone
- Create test items using the installed app
- Copy and share results (validated test items).

Resources required: A smartphone, network data, a set of prompts or questions.

Prerequisite Skills:

- General keyboarding skills – familiarity with editing keys such as delete, backspace, shift, etc.
- Ability to find information in a phone using search feature
- Ability to open, save and share information in a phone.


Presentations

Training objective 1: To Install AI Chatbot Assistant on Mobile Phone

To use AI Chat Assistant on the mobile phone, first download the app from the Play Store. Then follow the step-by-step guide below for the details. It is the way you would via a web browser – type a prompt into the chat box and be on a roll.

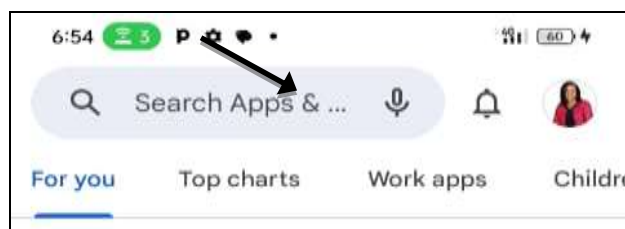
Step 1: Locate play store in your phone

The Play Store app comes pre-installed on Android devices that support Google Play, and can be downloaded on some Chromebooks. It is usually located on your home screen but can also be found through your apps. On some devices the Play Store will be in a folder labelled Google.

- On your device, go to the Apps section.
- Tap Google Play Store .



- The app will open and you can search and browse for content to download.

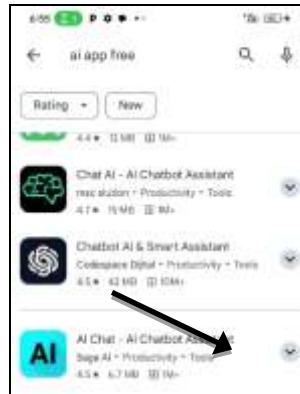


Step 2: Type in the entry – ‘AI App free’ to search for AI Chatbot Assistant

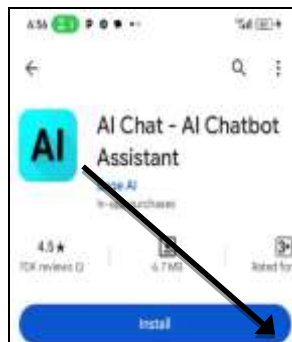
Enter a search ‘AI App Free’ into the search bar and click the search button to begin the search.



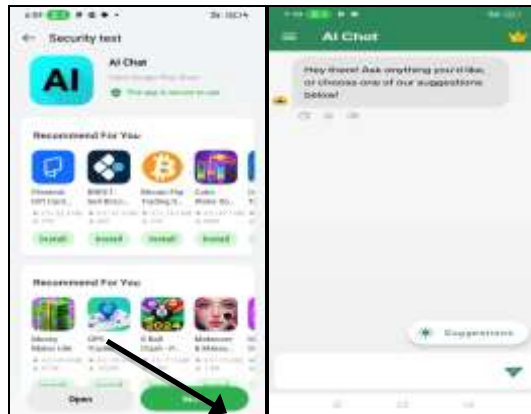
Step 3: Search and select AI Chat (Chatbot Assistant with orange crown icon)



Step 4: Install / Download it in your phone



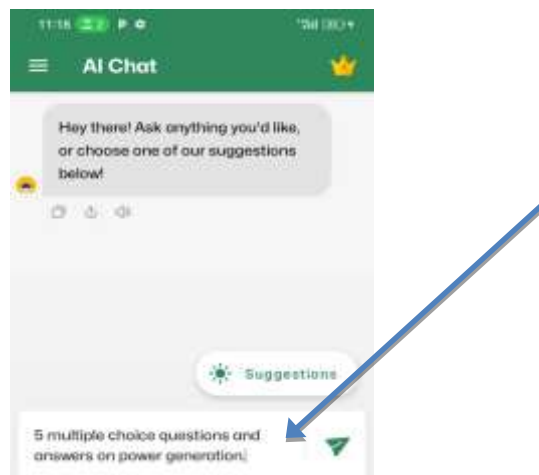
Step 5: Click on Open button to launch into the AI Chat environment (platform).



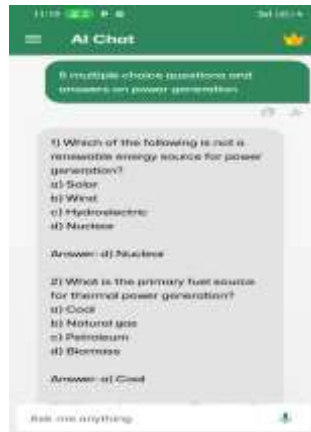
Once the app is installed, tap on the app open icon and launch into the AI Chat platform. Start using the Chatbot just like you would on the web. Type and submit a prompt (command or query) into the chat box and watch AI Chatbot Assistant generate a response.

Training objective 2: To create test items using the installed app

- Go to the pane “Ask me anything” and type “5 multiple choice questions and answer on power generation” or “5 true and false questions and answer on power generation” or 5 essay questions on power generation.



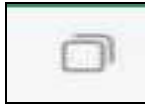
- Click on the arrow beside the suggestion pane to send the command / query.



- Review and validate the findings.
- Select and copy the test items that suit the learning objectives.

Training objective 3: To copy and share results.

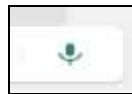
- Click on the copy icon to copy



- Click on the share icon to share.



- Click on microphone icon to record audio or operate through voice commands.



- Click on AI Chat icon to view recent chat share wit friends, report issue / buy more times (It can be on monthly or annual usage)



However, through frequent utilization of AI Chatbots in test items development, TVE educators can gain insights into the inner workings of this technology and discover how they can be utilized to build practical solutions.

Some Limitations and Potential Biases of AI Chatbot Assistant

The deployed AI chatbot assistant contains biases from various sources, which can be categorised into three types for ease of analysis, biases can arise from:

- *Chatbot design:* A chatbot development team is made up of people from different educational and cultural backgrounds. Their personal biases will have an impact on the designed chatbot system. A chatbot system is composed of an external user interface and several internal modules; the user interface design is directly influenced by the development team while the internal modules rely on training data and ML algorithms. Different data source groups contribute to data acquisition and annotation, which can be biased as well. The final data used for training needs to be screened by the development team, leading to another bias source.
- *User interactions:* After a chatbot is deployed, it interacts with users and biases can be enhanced in the interaction process. The bias can even affect user's view and value. In other words, when the service is launched, the chatbot interacts with users. It gets prompts and feedback from users. It learns from interactions, which makes it more capable but introduces bias. Users first give the chatbot a prompt to start a conversation. The chatbot will return with a response. Users can grade the response, and ask for regeneration or give a new prompt. In this way, users and the chatbot can exchange information with their biases being propagated mutually.
- *Social deployment:* Biases may come from the environment where chatbots are deployed. For example, people's attitudes toward chatbots and the way chatbots are used can lead to biases. A biased chatbot system and people affected by the bias may result in representation and allocation harms to social justice. Therefore, user's attitudes toward a chatbot determine how they use it and the impact it can have. Since chatbots reason differently from humans and make different mistakes, they would perform better when humans and chatbots work together. Different chatbots are designed for various applications (Janssen, Passlick, Cardona and Breitner, 2020). Open-domain chatbots like the AI Chatbot assistant can talk to people without being limited by topics and domains while domain-specific chatbots master the knowledge in specific domains, and they are designed for specific

tasks. Their social environments and served user groups' can be quite different. And the three key factors of deploying chatbots in a specific domain are the social needs, design goals, and actual effects; of which these are not taking care of in open-domain chatbots.

Policy Recommendations for Enhancing AI Chatbot Assistant Usage on Test Item Generation in TVE.

AI Chatbot Assistants have become much more powerful with the rapid advancement of LLMs and computing resources in recent years. On the other hand, they have brought controversy about bias and fairness. From development teams to users, every human interacting with an ML-based chatbot has the potential to spread the bias. In designing and deploying a fair chatbot system, the development team needs to know social needs, design goals, and actual effects. Based on the above context, the study made three major recommendations for improving its usage in TVE to inform policymakers and other stakeholders in the technical and vocational education and training (TVET) sectors.

- *Establish AI Chatbot Assistant specifically for TVET.* Open-domain chatbots, like AI Chatbot Assistant, can handle prompts in multiple domains of complex social contexts and from a wide range of user groups. Generally, it is difficult to mitigate biases and develop fair open-domain chatbots. But domain-specific chatbots are different. They have specific user groups and pre-set application scenarios, making it easier to consider possible biases, choose the appropriate fairness metrics, and implement a relatively fair system. Besides, open-domain chatbots with LLMs usually require a large amount of training data and computing resources. While domain-specific chatbots have limited knowledge, they demand much less training data and computing resources. They are easier to control. In some fields like TVET, health etc. where accuracy or user privacy is important, domain-specific chatbots are more likely to obtain accurate responses than open-domain chatbots under the same amount of resources. It is also easier to protect users' privacy in domain-specific chatbots with a smaller model size that runs locally without uploading data to the public server.
- *Make the TVET Chatbot multi-modal:* Chatbots with multi-modal input/output can control bias and will become the main trend in the

future. Multimodal chatbot assistants utilize various modes of interaction, such as text, speech, images, and videos, to provide a seamless and versatile user experience. It is designed to assist users in performing various tasks, from simple information retrieval to complex multimedia reasoning. Such chatbots not only need to take care of NLP and dialogue management, but they also need multiple models for modality conversion and integration. To realize a fair chatbot system, modality conversion and integration models have to satisfy their respective fairness metrics. After putting them together in the system, they may affect each other and the overall output may be biased. It is important but challenging to mitigate the bias of the whole system.

- *Make the TVET Chatbot green and interpretable:* With the rapid increase in the size of ML models and the required training resources, green AI has gradually gained attention. Green AI technologies may have the potential to be used in developing chatbots with clearer reasoning processes, smaller model sizes, fewer training resources, and more environmental friendliness. The green learning (GL) methodology has been shown to offer comparable performance with Deep Learning (DL) in many applications. It has much smaller model sizes and lower inference complexities (for FLOPs).

Conclusion

There are many changes in technical and vocational education (TVE) every year. New technologies improve the teaching and learning process of TVE programmes, this makes the teaching-learning process more efficient and meaningful. Also, integrating mobile devices with artificial intelligence in the TVE field of study will play an essential role in developing the field. When the technologies are combined, they reduce costs and activate the next level of automation and productivity. So as the TVE educators begin to use AI in various processes of teaching and learning like use of it in items creation of the learning assessment, the teaching world will change dramatically, allowing flexibility in teaching and learning. This process is rapidly changing everything in the teaching and learning process. Thus, the combinations of AI and Mobile devices for on-the-go generation of test items in TVE create a concept called Artificial Intelligence of On-The-Go Test Items Generation (AIoOTG-TIG) in

Technical and Vocational Education. This paper has provided knowledge of understanding on the use of mobile devices with AI chatbot assistants in creating on-the-go test items of TVE concepts.

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GENDER AND LOCATION AS CORRELATES OF SECONDARY SCHOOL STUDENTS' INTEREST IN COMPUTER STUDIES

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Abstract

This study investigated gender and location as correlates of students' interest in computer studies. The study adopted survey design. Three research questions and two corresponding hypotheses guided the study. Population of the study was sixteen thousand, two hundred and fifty-one (16251) JSS 3 and SSS 3 secondary school students from Bayelsa State. Multi stage sampling techniques were adopted. Study sample was 437 students. A scale titled "Computer Studies Interest Scale" (CSIS) was used for collection of data. Reliability of the scale was a coefficient of .823. The findings showed that Bayelsa state secondary school students mean for computer studies interest was 102.40. Findings showed that mean computer studies interest for male students was 101.94, and 102.75 for female students, it was however revealed that there was no statistically significant mean computer studies interest difference between male and female secondary school students in Bayelsa state. Mean computer studies interest difference between urban and rural secondary school students of Bayelsa State was statistically significant; the mean for urban students was 106.94 and mean for rural students was 96.34. Some recommendations were thus made; strategies should be employed to make students cultivate computer studies interest and government should provide computer systems and their components in secondary schools in the rural area and also employ qualified computer studies teachers and create enabling environment for effective teaching and learning of computer studies.

Key words: Computer studies, gender, interest, location, secondary school.

Introduction

In our current educational setting, the field of computer studies plays a prominent role; this is so because it offers vital necessary skills to students to enable them succeed in this digital age. The importance of computer studies in our educational system cannot be overemphasized, as technology continues to permeate into almost all aspects of our lives. It is however worth noting that despite increasing importance of computer studies, a significant difference exists in students' interest and participation in the subject, with reference to gender and location. Gender and location affect how students perceive, act, and aspire towards the learning of computer studies. Generally, there has been a prevailing notion where many believe that computer studies is majorly for males, and this seems to have created a somewhat disparity in participation level between male and female students. It is most likely that student's interest in computer studies can be affected by location, due to likely difference that can arise in accessibility to resources and exposure to opportunities between schools in urban areas and schools in rural areas.

Gender purely represents males and females. World Health Organization in Newman (2018) refers to "gender as the socially constructed features of women and men, inclusive of norms, roles, and relationships of and between groups of women and men". Location mainly represents the place, geographically where the school is situated. Allahnana et al (2018) asserted that "school location refers to the particular position where the school stands".

Computer studies in our present dispensation holds great importance, especially seeing how useful it is in almost every area of life. Chelmer Valley High School (no date) opined that "computer studies is a life skill subject as the skills acquired through its study is useful in other areas of study and in daily life". Aravindan (2017) sees computer studies as "a branch of science and technology comprising of every aspect of a computer system, computer software, hardware and networking inclusive". Individuals get prepared for self-reliance as they acquire knowledge and skills attained through the study of computer studies, because they get empowered to be self-employed and this is a goal of the national policy. Despite the widespread recognition of the importance of computer studies, there is a significant disparity in students' interest and

engagement with the subject, influenced by demographic factors such as gender and location.

Irrespective of the importance of computer studies to our students in our present dispensation, there seem to be shortage of research examining gender and location influence on secondary school students' interest in computer studies, particularly within the context of government secondary schools in Bayelsa State of Nigeria. This research gap is significant, especially given the challenges likely to be faced by the female gender due to stereotype issues. In like manner, challenges are likely to be faced by the rural populace due to location issues in having access to computers and having opportunity to practice with same to acquire adequate skill for immediate and future use. This study thus sought to investigate how gender and location influence students' interest in computer studies. This study hence, is set with the job of ascertaining mean computer studies interest of secondary school students in Bayelsa State, finding out mean disparity with regards to gender and location.

Gender may or may not influence students' interest in computer studies. Studies vary in their findings on influence of gender on students' learning. Adam et al (2022) investigated gender difference in performance in four science subjects in Borno State College of Education. Ex-post facto design was adopted and stratified sampling technique was used. The population of the study consisted of all students of chemistry, mathematics, physics and biology of 2010/201, 2011/2012 and 2012/2013 sessions at Umar Ibn Ibrahim El-Kanemi College of Education, Science and Technology, Bama. The result verified that there was a significant gender difference in academic performance in physics in favour of male students. Astalini et al (2022) researched on students' interest in physics education based on gender. Quantitative research method was adopted. The population/sample of the study was 91 students. Female students were found to have higher interest in physics than male students.

School location can be a factor that will affect students' interest in computer studies. Studies have shown varying results of location influence on students' learning. Agbadobi et al. (2023) investigated the influence of location on secondary school students' academic performance in Mathematics. An ex-post facto design was employed. The population was 22,158 and multi-stage sampling technique was applied to draw a sample of 392 Senior Secondary Two (SS2) students from secondary schools in

Delta Central Senatorial District of Delta State. Location was found to have a significant influence on students' mathematics achievement in favour of urban students. Okorie and Ezeh (2016) investigated how gender and location influences students' achievement in chemical bonding. The study adopted Pre-test-post-test non-equivalent control group quasi-experimental design. The population was 5,966 senior secondary class one (SS1) chemistry students and purposive sampling technique was used to select 311 SS1 students. Study verified that location had significant influence on students' achievement in chemical bonding in favour of rural students.

Investigating gender and location influence as correlates of students' interest in computer studies will not only throw light on the differences that will be identified in the variables but it will also go a long way to provide educators, policymakers, curriculum planners and other stakeholders valuable insights on how to develop strategies and interventions that can enhance more participation in the study of computer studies amongst all categories of students.

The following research questions and hypotheses guided the study:

1. What is the mean computer studies interest of secondary school students of Bayelsa State?
2. What is the mean computer studies interest difference between male and female secondary school students of Bayelsa State?
3. What is the mean computer studies interest difference between urban and rural secondary school students of Bayelsa State?

Ho1: There is no significant mean difference in computer studies interest between male and female secondary school students of Bayelsa State.

Ho2: There is no significant mean difference in computer studies interest between urban and rural secondary school students of Bayelsa State.

Methods

The study adopted survey design. Survey design is appropriate for the study since its concern was on gathering information to determine the opinion of people about a phenomenon. The population of the study was 16251 students drawn from JSS 3 and SSS 3 secondary school students in Bayelsa State. Multi stage sampling technique and convenience sampling

technique were adopted. Taro Yamane's method for sample size was applied. A sample size of 390 was obtained, however, the adopted sample size was four hundred and fifty students drawn from ten schools among the schools in local government headquarters of Yenagoa, Ogbia and Sagbama; this was done to make allowance for non-response and instrument mortality. To sample proportionately, ratio method was used to calculate the sample size for each chosen local government headquarter, thus, Sagbama was ninety-eight (98) students, Ogbia was one hundred and eleven (111) students, and Yenagoa was two hundred and forty-one (241) students. Final workable questionnaires that were retrieved amounted to four hundred and thirty-seven which were used for analysis (representing 97.11% retrieval). Sample for the study was thus four hundred and thirty-seven (437) JSS 3 and SS 3 secondary school students; with male students comprising 189, and female students 248. Urban secondary school students comprising 250 and rural secondary school students 187.

Three local government areas of Bayelsa state were selected, one from each senatorial district; Bayelsa Central senatorial district (Yenagoa local government area), Bayelsa East senatorial district (Ogbia local government area) and Bayelsa West senatorial district (Sagbama local government area). Schools in the chosen local government headquarters were randomly selected for the study.

A scale titled "Computer Studies Interest Scale" (CSIS) was developed and used for data collection. Section A contained demographic variables, while section B comprised of thirty-four items to elicit responses on interest in computer studies. The respondents were required to respond to the items of the scale (CSIS) on a four-point scale, ranging from, strongly agree to strongly disagree. The face and content validation of the items were verified by two measurement and evaluation experts and one computer studies expert. The scale had a reliability co-efficient of .823 using the Cronbach alpha method for analysis. Statistical Package for Social Sciences (SPSS) was used for analyses. The research questions were answered with mean and percentage, while the hypotheses were tested using independent sample t-test analysis at 0.05 level of significance.

Results

Research question One: What is the mean computer studies interest of secondary school students of Bayelsa State?

Table 1: Mean computer studies interest of Bayelsa state secondary school students.

	N	N of items	Sum	Mean
SCORE	437	34	44749.00	102.40
Valid N (listwise)	437			

Table 1 shows that the mean computer studies interest of Bayelsa state secondary school students was 102.40.

Research question Two: What is the mean computer studies interest difference between male and female secondary school students in Bayelsa State?

Table 2: Descriptive for mean computer studies interest difference between male and female secondary school students in Bayelsa state.

Gender of student	Mean	N	% of Total N
Male	101.94	189	43.2%
Female	102.75	248	56.8%
Total	102.40	437	100.0%

Table 2 shows that mean computer studies interest for male students was 101.94, and for female students was 102.75.

Male students constitute one hundred and eighty-nine (representing 43.2%) while female students are two hundred and forty-eight (representing 56.8%).

Research Question Three

What is the mean computer studies interest difference between urban and rural secondary school students of Bayelsa State?

Table 3: Descriptive for mean computer studies interest difference between urban and rural secondary school students in Bayelsa state.

School Location	Mean	N	% of Total N
Urban	106.94	250	57.2%
Rural	96.34	187	42.8%
Total	102.40	437	100.0%

Table 3 shows that the mean computer studies interest for urban students was 106.94, and for rural students was 96.34.

Urban secondary schools are two hundred and fifty (representing 57.2%) while rural secondary school students are one hundred and eighty-seven (representing 42.8%).

H₀ 1: There is no significant mean difference in computer studies interest between male and female secondary school students of Bayelsa State.

Table 4: T-test Analysis of No Significant Mean Difference in Computer studies interest between male and female secondary school students in Bayelsa state.

Gender	N	Mean	Df	Mean difference	t-value	Sig(2-tailed)	Remark
Male	189	101.94		-.81752			Not sig
Female	248	102.75	435		-.752	.452	

Table 4 t-test result showed that mean computer studies interest difference between male and female secondary school students in Bayelsa state was not statistically significant, hence null hypothesis (H₀ 1) of no significant mean computer studies interest difference between male and female secondary school students in Bayelsa state was retained at $t(435) = -.752, p > .05, 2$ tailed.

Ho2: There is no significant mean difference in computer studies interest between urban and rural secondary school students of Bayelsa State.

Table 5: T-test Analysis of No Significant Mean difference in Computer studies interest between urban and rural secondary school students in Bayelsa State.

School location	N	Mean	Df	Mean difference	t-value	Sig(2-tailed)	Rem
Urban	250	106.94	435	10.59910	11.005	.000	Sig
Rural	187	96.34					

Table 5 t-test result showed that the mean computer studies interest difference between urban and rural secondary school students of Bayelsa State was statistically significant, hence null hypothesis (H_0 2) of no significant mean computer studies interest difference between urban and rural secondary school students of Bayelsa State was rejected at $t(435) = 11.005$, $p < .05$, 2 tailed.

Discussion

The research question two was stated with the intention of establishing the mean computer studies interest difference between male and female students. Mean for males was 101.94 while the mean for female students was 102.75. Hence, female students showed higher positive interest towards the study of computer studies than the male students. The result however, showed that the mean computer studies interest difference between male and female secondary school students was not statistically significant.

The result complements the findings of Astalini et al (2022) which verified that female students had higher interest in physics than male students. However, the result disagrees with Adam et al (2022) who found that gender had significant influence on academic performance of students in physics; in favour of male students.

Female students seem to be more exploitative, have higher desire to search out and more given to secretarial jobs, these may have likely led to their attaining a higher interest in computer studies than the male students.

Research question three was formulated to establish the mean computer studies interest difference between urban students and rural students. Urban students had a mean of 106.94 while rural students had a mean of 96.34. The result showed that urban students had a higher positive interest towards the study of computer studies than the rural students. It was also established that mean computer studies interest difference between urban and rural secondary school students was statistically significant.

The result agrees with Agbadobi, Ossai, Otue and Efeludu (2023) who verified that location had significant influence on students' academic performance in Mathematics in favour of urban students. The result however, disagrees with Okorie and Ezech (2016) whose findings showed

that rural students performed better than the urban students and concluded that location had significant influence on students' achievement in chemical bonding.

The outcome of urban students having more interest in computer studies than rural students can be as a result of the location advantage; urban communities have regular electricity which is rare with rural communities and computers when available require electricity to power them. Accessibility to computers and power supply are usually more available in urban settings than in the rural areas. Another reason for urban students showing higher interest than rural students may be lack of or insufficient computer studies teachers in rural secondary schools.

Conclusion

The study generally revealed that, secondary school students in Bayelsa state have interest in the learning of computer studies. Female secondary school students are found to be more interested in computer studies than the male students, though the difference was not statistically significant. Secondary school students in urban area showed higher interest in computer studies than students in the rural areas; the difference in computer studies interest between urban and rural secondary school students was statistically significant.

Recommendations

Based on the findings, the researcher made the following recommendations:

1. Teaching of computer studies should be encouraged in our secondary schools; the boys as well as the girls should be encouraged to cultivate interest in the subject.
2. Government should equip rural secondary schools with computers and their accessories and employ computer studies teachers as well as provide alternative power supply (in the absence of electricity), for proper utilization of computers and their components, as availability and effective utilization can create interest in the students in the rural areas.

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**FACTORS AND OBSTACLES RELATED TO STUDENT
DROPOUTS IN TECHNICAL AND VOCATIONAL,
ENTREPRENEURSHIP EDUCATION IN KEBBI STATE,
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Abstract

Vocational entrepreneurship education is linked to particular approach and instructional strategies, such as in person interactions with the students and methods for aligning knowledge with the demand of the labor market .We contend that entrepreneurship education often has unique advantage in terms of varied educational practices for various professions. The study involved technical course students at a Nigerian public polytechnic. This study looks in to how student's attitudes and views about entrepreneurship education in a vocational teaching context are influenced by factors such as profiles and entrepreneurial experiences. Findings of this study include: that family financial issues, peer pressure , teacher and school policies among others are some factors that influence school dropout; the solution to school dropout could be could include system building approach, family environmental approaches and school based approach . The study therefore recommendthat government should implement small scale business to help generate income.

KEYWORDS: Vocational, Technical, Entrepreneurship, Education, Skills, Dropout and School

Introduction

Numerous government socio-economic policies that aim to provide access to long-term employment, grow the general public as well as to grow the economy through the establishment of new businesses including

entrepreneurship Apart from formulating policies it is commonly believed that a creation of new businesses and entrepreneurship presents prospects for both economic growth and social revitalization. Thus, this is a perspective that is essential to the idea that is giving vocational workers a path to start new businesses and build their entrepreneurial talent (Katz, 2003, Fayolle. 2013, Jones, 2014; Blenker, 2014). Research on entrepreneurship education in higher education has been conducted extensively by academics.

- What is known about entrepreneurial education in various institutions and programmes?.
1. The subject mostly focuses on higher education activities and programmes? Since there are undoubtedly various contexts in which entrepreneurship is practiced, it is worthwhile to look to vocational programs and, in particular, the kinds of conditions necessary to give vocational entrepreneurship education (Figuerdo- Nery, 2008). Although their economies are extremely different, the UK and Nigeria both work to advance policies that appear to integrate entrepreneurship education in to public institutions and support it through a strategy for sustained social and economic benefit little data on entrepreneurship education initiatives in Nigeria, and even less is known especially when they take place in classroom. According to Smith and Paton (2014), Promoting entrepreneurship education at all educational levels primary, in technical and vocational education offers greater accessibility and inclusivity when integrated into the curricula of educational programs. This approach is relatively new in nations like Nigeria, but there is evidence to suggest that change is taking place.

The goal of an initiative launched by Nigeria's Ministry of education is to integrate and democratize the nation's offerings of technical and vocational education programs. Naturally, the benefits of nationally directed initiatives might be seen more locally which is why entrepreneurship is necessary.

2. Entrepreneurship education courses are currently being taught in Nigeria to all students registering for vocational education programs. Nowadays, entrepreneurial education included into vocational education provides a path to greater sustainable incomes and the

decrease of poverty for a large number of Nigeria individuals. Since Nigerian law undoubtedly links entrepreneurship education to the context of vocational education, conducting and promoting applied research, culture development, entrepreneurship, cooperation, and scientific and technology advancements are the key goals in advancing the policy narrative. Efforts to advance applied research highlight the necessity of looking for new paradigms for instruction in Nigerian schools. (Bagudi, 2021). Educational institutions responded by attempting to offer students instructional strategies that support successful learning in various industrial markets and vocational contexts. (Pache and Chowdhury, 2012). Simultaneously, there was an understanding that the outcome of entrepreneurship education should satisfy the social economic need of all parties involved, including students, families, organizations, and society (Fayolle, 2013). Consequently, this article reports on a study in to the necessary surroundings and setting in order to contribute to an understanding of the condition for vocational entrepreneurship education in the context of Nigeria. Research has looked in to how students perceive their lecturers entrepreneurship attitude (Lenzi. 2008 Rezaei, 2014), how teaching strategies and methods like business plans and reflection are used (Carrier, 2017), how case studies and group discussions are used (Samel-Mwalwiba, 2017), and how these factors positively affect student's attitudes towards entrepreneurship. This study provides insight into entrepreneurial education for the vocational students by using a qualitative data collection instrument based on Martins, (2010) and testimonial registered at a public institution giving vocational education.

The study goes on to show how the Nigerian education system has undergone major changes. It then considers entrepreneurship education how it fosters entrepreneurial learning environments in vocational educational systems, wrapping up the topic

The oldest type of education in the world vocational education has undergone numerous changes through the years to become what it is today. These changes have affected both terminology and practice. It began informally within the term "home apprenticeship system" applied to this every culture had to take it differently, leading to individuals trying to

meet their everyday necessities and make ends meet while also managing their physical surroundings.

Because of its broad breadth and ability to adapt to new technologies, vocational education is still an evaluable tool for developing the human capital required for national development everywhere. Developmental trends in Nigerian vocational education: As previously goes all the way back to the earliest human societies. Traditional forms of vocational schooling were in place, and people had to labor to make ends meet. It was used in family earliest for practice. Nigerian children were taught a variety of talents through weaving, sculpture, blacksmithing, carving, farming and other methods under the indigenous system or traditional education (Fafunwa, 2011). In pre-colonial Nigeria, the aforementioned was the case. In Nigeria during the colonial era, the missionary school system did not value practical education highly. Similar to most previous British colonies, education was literally. For nearly a century, someone who read classical literature such as Latin, Greek, Shakespeare, and Milton was considered educated in Nigeria. According to Fafunwa, the majority of Nigeria's early intellectuals were known for their "Much book learning" or literary erudition. Considering the aforementioned, education had a highly controversial start in Nigeria. It was not awarded the same overwhelming governmental recognition as grammar school education, despite being called "Mother" of all types of education.

Numerous writers attributed this unfortunate circumstance to the impact of missionary education in Nigeria. The primary goals of the missionary education system were to teach catechesis and clerks. Programs for training in vocational skill were not offered by the nation's official education institutions. The technical wing of the NASSARAWA School, which was established in **1909** in the North, offers instruction in book binding, carpentry, leather work, and smithing. The Hope Waddell Training also had a technical section where students could learn carpentry and tailoring, among other crafts. Despite this, these institutions were pioneers in the field of vocational education. Their mission is to support vocational education policy on Education and to oversee its efforts to ensure that the work is done to a high standard. The National Board for Technical Education (**NBTE**), the national university commission (**NUC**),

and the National commission of colleges of Education (**NCCE**) are these agents.

Every agent has supplied a minimal standard that the training facilities can utilize. Following the government's announcement of nine-year basic education program, the National council on Education (**NCE**) approved new curriculum structure, in 2005.

The council for research and development in education in Nigeria, was ordered to reorganize the curriculum with the following goal in mind; cultivate a passion for science and technology; utilize their knowledge and abilities in science and technology to artless societal needs, seize the many career opportunities in science and technology and get ready for additional study in science and technology.

The purpose of basic technology as a prevocational education subject at the upper basic level is to achieve the following: to instilling students a position attitude toward work as a source of human identity, level hood, and power; to expose them to the working and interest for wise vocational choice; and to instill in the technology.

Literature Review

According to Larson (2000), there are various factors that have been identified to explain dropout from technical and vocational education school studies namely socio-demographic factors, academic competence, motivation to study, social and academic integration of in technical and vocational education and living conditions that will pay major roles in explaining the dropout from in technical and vocational education school.

The American professor in sociology Vincent Tinto social anthropological approach to American college student dropout which focuses on longitudinal and multi-factorial process leading to dropout in technical and vocational education is still almost paradigmatic within the research field of in technical and vocational education dropout in the U.S as well as within a broader international research setting (Tinto. 1975, 1987, 1998). His student integration model as first described in his seminal article from 1975 (ibid, 1975) regards a students, social and academic integration in college to be crucial factors within the process leading the individual student to dropout or not (Malene, Larson, Hanna, 2021).

According to Tinto (2007) these factors that possibly lead to school dropout in technical and vocational education have been identified as family background, personal characteristics and prior schooling, which will contribute to certain abilities or skills and prerequisite to help student to further their study. Hence Tinto's model emphasizes the process based interaction between the individual student attributes and the institutional structures frameworks. In fact, the main points of Tinto's (1993) Student integration theory are social and academic integration in relation to a student's commitment to the school and / or outside efforts. Students bring to in technical and vocational education prior schooling skills and abilities. When these three things are combined, they lead to a set of commitments, goals and intentions from and to an institution. In other words, students are aware of what they want to achieve prior to their enrolment in their first academic year. This means that school must set out student expectations which in turn aid student success. It also very important that student have the ability to develop social and academic integration skills in both informal and formal ways (Alexandros, Ejaz & Rupert, 2017).

Nonetheless, even if Tinton's.(1993) students integration theory is sound, Guiffrida (2006) stated that Tinton's theory requires students to move beyond their tradition and affiliations In order to accept the associations and traditions of the in technical and vocational education education environment. Student who manage to affiliate with the in technical and vocational education education environment eventually complete their studies and graduate from the in technical and vocational education (Alexandros, Ejaz & Rupert 2017). However, not all students are able to affiliate. Those who do not reach an adequate level of affiliation tend to dropout of in technical and vocational education and so integration with the school is the key. In this context, initial goal and institutional commitments influence student integration within the academic and social system of their school (Tinto, 1993).

On the other hand, academic integration includes normative and structural dimensions. Normative integration involves an individual's identification with an academic system's attitudes and values structures (e.g) interacting with other staff of the schools outside of the class room) structural integration relates to meeting the school specific standard for instance curriculum structures. Social integration indicates the extent of

compatibility between a school's social system and an individual student (Alexandros, Ejaz & Repert, 2017).

Tinto (1993) also notes that interactions, with school and administrations, extra-curricular activities and informal group association are classed as social integration mechanisms. During the final analysis, it is the interaction between the student's commitment to both school completion and school it Self that define whether the student chooses to leave (Tinto, 1993). In brief, Tinto recognizes that the influences outside of the school can play a major role in student dropout problem, but their consequences can only be viewed inferentially as shifts in the students educational objectives and institutional obligations.

Tinto's model of college student dropout has later severed as inspiration for and has been refined by Ultrich Heublein et al (2003,2010) to work in a European college context like Tinto, Heublein et al. include both pre-college and within in technical and vocational education factors in their theoretical model. More explicitly then was the case for Tinto, Heublein et al. points at specific factors that influence dropout and are at work during the course of study, but which are external to the school setting. These external factors comprise the students financial situation including whether he has a (study relevant) job, the students living conditions including family and other opportunities for counseling as well as the student's own future plans (Malene Rode Larsen, Henna, Sommersel & Michael Sogaard Larsen 2013).

To date, there are many related studies as listed below that can be referral to in this study.

This paper adopt a qualitative research, which can be understood as a method for exploring and understanding the meaning individuals attribute to a social problem (Cresswell, 2014).Merriam and Tisdell (2016) further conformed that the aims of qualitative research is to make known the meaning of an incidence for people who are involved in it. In conducting a study qualitatively, researchers are interested in identifying how people describe their own experiences, how they conceptualized their worlds, and what meaning they attribute to their experiences (Merriam & Tisdell, 2016).providing another clarification, Braun and Darke (2013) noted that qualitative research users word as data collected and analyzed in different ways.

Ethical practices of the researchers recognize the importance of the subjection of their own lens acknowledge the powerful position they have in the research, and admit that account between the researchers and the participant or the co-construction of the account between the researchers and the participants are true owners of the information collected.

According to UNICEF (2021) one in every five of the world's dropout school children is in technical and vocational education in Nigeria. National bureau of statistics (NBS, 2021) also states that 10.5 million of the country's children aged 5-14 years are not in school. UNICEF (2022) revealed that, although primary education is officially free and compulsory, about 18.5 million of the Nigerians children aged 5-14 years are not in school. While, only 61% of 6-11 years old frequently attend primary school and only 35.6% of children aged 36-59 months receive early childhood education. However, in the north of the country, which is the setting of this study, the situation is even bleaker, with a total attendance rate of 5.3%. More so, getting out of school children back into education poses a massive challenge, therefore, the need to probe in to the problems and offer the possible solution.

The aims of this study are to :

- Explore factors that influence the technical and vocational education children dropout in kebbi state.
- Investigate the challenges among the technical and vocational education children dropouts in kebbi state.
- TO develop a conceptual frame work for the technical and vocational education dropout in kebbi state.

Methods

The research design employed in this study was exploratory qualitative design of phenomenological types. Phenomenological design is a types of qualitative research which focuses attention on answering the 'what is it' question rather than questions of frequency or magnitude such as 'how much' and 'how many' It is research design that explores what people experienced and focuses on their experience of a phenomenon (Pelin & Soner, 2015).

Therefore, a qualitative method is the most suitable and certainly the main method of accomplishing the objectives set for this study which

is intend to explore an examination of the Nigerian context's entrepreneurial culture in vocational education.

In depth interview was the primary method of this study data collection. Based on this. The interview questions were designed as open end. The open tenderness permitted the interviews to give as much detailed information as they desire about their lived experience on both entrepreneurial and vocational education. It also allowed the interviewer to ask probing questions as a means of follow up.

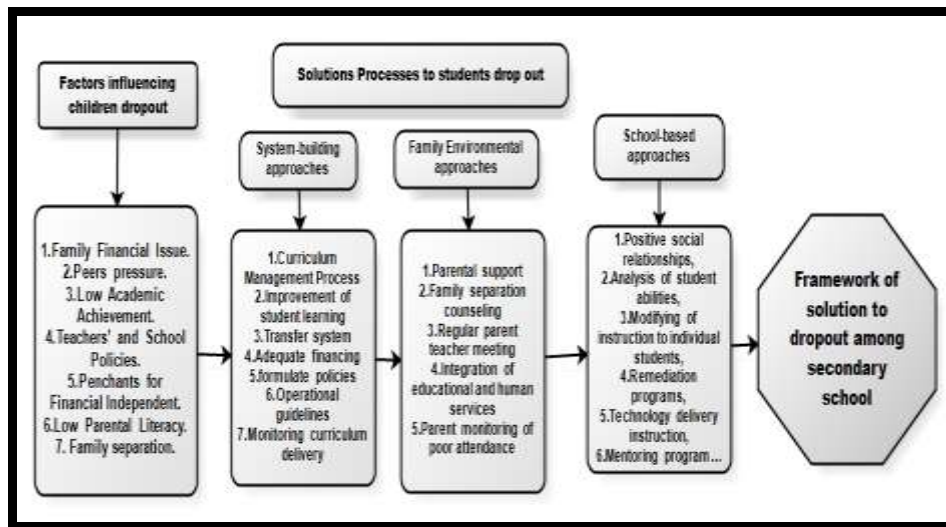
The severity of school dropout in vocational and technical education has become a phenomenon as it manifest itself in numerous ways in the society. These have been a problem over decades and crate major concern among the school anthologies AI community at large. Therefore the significant of this paper is correlated to indentifying solutions to address the school dropout in technical vocational AI entrepreneurship education. This to further investigate on factor and obstacles associate to the problems of school dropout in technical and vocational education, it required the perspectives form the students that dropout of school, their school teachers and their parent. Subsequently and in-depth interview is adopted in this study to gather related information.

In this paper a thematic analysis was used to conduct interviews with the informants whose perception served as the foundation for this analysis. The analysis yieldable four themes and 13 sub-themes correspondingly, the study identified the factors AI causes of school dropouts in technical vocational entrepreneurship education in school in Kebbi State.

Results

The paper aims to investigate the factors and courses of school dropouts in technical vocational AI entrepreneurship education in Kebbi State the research also set out to develop a model of solution of dropout in technical vocational education.

PROPOSED MODEL FRAME WORK OF SOLUTION TO DROPOUT SYNDROME



Recommendations

- 1) Governments should concentrate on ways to help people cope with stress by introducing them to related better jobs incomes as well as on ways to support students from all background to succeed in school especially technical vocational and entrepreneurship, and hence reducing the dropout problem.
- 2) The government should implement small scale business entrepreneur programme to help them generate some income so they can provide their children with better education that will develop them into better & skills acquisition individuals.

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EFFECTS OF ARTIFICIAL INTELLIGENCE ON STUDENTS' ACADEMIC INTEREST AND ACHIEVEMENT IN FARM BIOMETRICS IN UNIVERSITIES IN SOUTH EAST, NIGERIA

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Abstract

Artificial intelligence (AI) has emerged as a powerful tool with the potential to revolutionize various aspects of education. In universities in South East Nigeria, there is low students' academic interest in farm biometrics that results in their poor academic achievement, and performance in the world of work. This study, therefore, determined effects of artificial intelligence learning on academic achievement of students of Agricultural Education in Universities in South east Nigerian. Two research questions and one hypothesis in line with specific purposes guided the study. The quasi-experimental study adopted Solomon four research design and was carried out in federal universities in South East Nigeria. A purposive sampling technique was used to pick four from 10 universities with Agricultural Education programme in South-East Nigeria. Twenty item interest inventory and ten item essay questions developed from the content of the course both validated with acceptable reliabilities of 0.91 and 0.78 were used for data collection. Data collected by the researchers and four assistants were analyzed using percentage. The study found out that students taught with artificial intelligence developed interest and performed better. It was recommended among others that artificial intelligence should be utilized in teaching farm

Biometrics to enhance students' interest and academic achievement.

Keywords: intelligence, biometrics, academic achievement, interest.

Introduction

Technology is advancing and new farm inputs are emerging, hence the need for farmer's knowledge and skills in determining physical measurement and biological data of animals and crops in their care. A farmer can effectively determine physical measurement and biological data of animals and crops in their care if found competent in farm biometrics. Biometric refers to identification and authentication of physiological or behavioral characteristics of a person by analyzing physical or behavioral characteristics that are unique to the individual (Ashok 2010, Jaiswal, Bhadauria & Jodan, 2011). As a course offered in Agricultural Education programme, Biometrics involves determination of physiological or behavioral characteristics of plants or animals through measurements. The physiological or behavioral characteristics of plants or animals determined through measurement are very necessary as accurate information needed in daily activities is facilitated (Briscoe et al., 2023).

Biometrics enhances development of password for easy verification, uniform automation with minimum training, and small storage space thereby reducing size of data base (Phadike 2013). Biometrics is advantageous as it generates summary of daily, weekly, monthly or annual activities; gets rid of forged documents, monitors workers at remote locations, tracks employees' time by calculating the amount of total working hours for each employee, captures hardworking employees for reward and enhances productivity/profit (Mir, Balkhi, Lala, Sofi, Kirman, Itaq, and Hamid, 2018). Due to these benefits it becomes necessary for commercial farms in their daily care of plants or animals for optimum production to apply farm biometrics.

Farm Biometrics is one of the obligatory courses offered by first year students of Agricultural Education programmes in universities. This course is designed to train and prepare students with knowledge and skills in measurements and allied areas. The course covers such topics as introduction to agricultural biometrics, units of measurement, quadratic equations, organization and presentation of data, measures of central tendency and dispersion among others. It is expected that after studying

this course, students should be able to apply knowledge and skills acquired in their day to day activities in farm production/business; such knowledge and skills are to calculate length and width of a given area of land, quantify farm input to utilize in a farmland, quantity/volume of fertilizers, pesticides or herbicides appropriate in a piece of land; plant depth, spacing and population of any named crop and consequently teach the acquired competencies to students in schools and colleges. To enable the students to gain useful knowledge and skills packed in this course, lecturers teach the contents with appropriate methods and instructional materials.

Instructional materials constitute alternative channels of communication, which a teacher uses to convey information more vividly to learner (Amadoha, 2009). The instructional materials can be used to extend the range of vicarious experience of learners in teaching/learning situation (Asogwa, Onu & Egbo, 2013). Instructional materials are educational resources used to improve students' knowledge, abilities and skills, to monitor their assimilation of information and contribute to their overall development and upbringing (Soft Skill 2020). Agwu (2001) and Asogwa, Isiwu and Ugwuoke (2021), noted that instructional materials are apparatus of teaching which include textbooks, workbooks, charts, audio visual aids, chemicals, specimens and other relevant tools used by teachers to effectively enhance students' interest and academic achievement.

Interest refers to the positive feelings, likeness and curiosity to participate in an activity. Interest is the feelings of intents, concerns or curiosity about an object or a condition of wanting to know, learn or an energizer to learn (Ezike & Obodo, 2001 & Abakpa, 2011). In this study, interest is the power or quality that attracts the attention of students in learning Farm Biometrics in Universities in Nigeria. In farm Biometrics course where a student has no interest, there is usually low personal effort and inability to achieve as expected. This means that interest gives students the concern or curiosity to learn and concentrate in order to enhance their academic achievement.

Academic achievement refers to standardized test scores, grades and overall academic ability and performance outcomes (Bacon, 2011). Academic Achievement is a measurable index that depicts a student's cognitive, affective and psychomotor domain in an educational setting and therefore, a yardstick for ascertaining the capabilities of a student from which the overt, covert and inherent or unraveled abilities could be

inferred (Kpolovie, 2014). Academic achievement is determined through assessment in order to find out what students have learned (Asogwa, Isiwu & Ugwuoke, 2021). In this study, academic achievement measured the extent to which students of agricultural education acquired knowledge, skills and attitude in farm biometrics taught through artificial Intelligence in order to be able to practice acquired competencies in the world of work. The ability of students to achieve higher academically depends on instructional strategy adopted during learning. This is because poor and ineffective instructional strategies/method were found out to be the major factors responsible for declining interest and poor academic achievement of students in subjects like Chemistry (Ifeakor, 2000; Okeke, 2010; Federal Ministry of Education, 2013; Asiegbu, 2015). Despite the efforts of teachers in deriving home the course contents of Farm Biometrics adopting different instructional strategies, most of the students still perform low. The interactions of the researchers with the students during Farm Biometrics revision classes revealed that many of them are scared of calculations in the course contents, thereby losing interest. In addition to loss of interest many of the students perform very low.

Low interest rate and poor academic achievement of students in Farm Biometrics in the university results to poor performance of graduates in the world of work. This is because many of the graduates that are into agric-business find it very difficult to keep records of farm activities which make them unable to determine improvement in crops or animals under their care. The inability to keep records in any business, results to wastage of time, shortage of expected revenue/profits, tediousness in finding and analyzing marketing processes, employees not easily monitored and disorganized environment (Kokemuller, 2019). The effect is that many Agricultural Education Graduates who establish farms, report high failure in the business while others fold within few years of establishment. Poor record keeping and accounting leads to failure in time and productivity, miscommunication and data loss causing companies/firms to close their doors in addition to other risks (Hilinski, 2020). In bid to attract students' interest and enhance their academic achievement so as to realize the objectives of the course, the researchers tend to teach the course-contents of biometrics through Artificial Intelligence.

Artificial Intelligence is an enabling technology or machine to perform assigned tasks skillfully by using intelligent software (Mohammed & Elihab 2016). Artificial Intelligence is the scientific process of getting computers to perform and act like humans to improve learning over time in autonomous fashion, by feeding data/information in form of observations and real-world interactions (Vansh 2018). Artificial Intelligence utilizes computer system independently to find solutions to identified problems by recognizing patterns on basis of existing algorithms and data sets (Klass, 2018). In this study Artificial Intelligence is act of programming computer to teach contents of Farm biometrics to students of Agricultural Education.

Artificial Intelligence is important in developing volume and assortments of accessible information, computational handling that is less expensive and more ground-breaking and moderate information by stockpiling (Mathew 2018). Artificial Intelligence is the key to unlock the value of corporate and customer data and enacting decisions that keep a company ahead of the competitors; provide data driven decisions in order to make a difference between keeping with the competition or falling out further behind (Home Knowledge Center, 2020). Artificial Intelligence is applied in teaching-learning situation with the aim of permitting learners to progress at their pace and with trend of events in the society. Implementations of artificial Intelligence helps in predicting students' performance and achievement, improves retention and enhance student's abilities in the field (danijel, Vedran, & Goran 2018). In order to find ways of increasing students' interest and achievement in Biometrics necessitated this study. The general purpose of the study was to determine the effect of artificial Intelligence on academic achievement and interest of students in Farm Biometrics in universities in South East Nigeria. Specifically, the study determined the effects of:

1. Artificial Intelligence methods on students' interest in Farm Biometrics; and
2. Artificial Intelligence methods on students' academic achievement in Farm Biometrics.

Methods

The quasi-experimental study adopted Solomon four-group research design and was carried out in South East Nigeria. Quasi-experimental

research is a scientific approach where one or more independent variables are manipulated and applied to one or more dependent variables in an already existing environment without any interference (Formplus, 2020). This means that in this study on Artificial Intelligence was manipulated to find the effect on interest and academic achievement of year one students in Biometrics course in their respective classes in Federal Universities that study Agricultural Education programme in South East Nigeria. Solomon four-group research design is adopted when there is a concern that the treatment group might be sensitized by the pre-test (Allen, 2017). It is also referred to as two treatments and two controls. In this design, four groups A, B, C, D had different experiences which were pretest ($\sqrt{}$) treatment (X) post-test (y) or absence of pre-test, treatment or post-test (0).

	pre-test,	treatment	post-test
Group A	$\sqrt{}$	X	y
Group B	$\sqrt{}$	0	y
Group C	0	X	y
Group D	0	0	y

The effectiveness of the treatment was evaluated by comparing the academic achievement of all the students in groups A, B, C & D.

The population for the study was 5,250 from 16 (five federal, five State and six Private) universities in South East Nigeria. Purposive Sampling technique was used to select two Federal Universities with Agricultural Education programmes and Biometrics or its related course. The universities were Michael Okpara University of Agriculture, Umudike with 46 year-one students and University of Nigeria, Nsukka with population of 36 year-one students, all were in 2018/2019 academic session (students' nominal roll 2019). In-tact classes were used and the students in each school were randomly assigned to group A, B, C or D through balloting. Two instruments titled Farm Biometrics Interest Inventory (FBII) and Biometric Achievement Test (FBAT)" were developed by the researchers and used for data collection. The FBII was adapted from Strong-Campbell Interest Inventory (Borgen & Bernard, 1982), and modified to suit the course Farm Biometrics course content. The FBAT was developed from Farm Biometric course content from the university. FBAT was a teacher made test structured by the researchers based on the instructional objectives contained in curriculum of the universities sampled for the study. The test blueprint guided the

formulation of 10 item essay questions and was anchored on the six levels of cognitive educational objectives of Bloom (1968). The first and second forms of the instruments were used as pre-inventory (pre-FBII) and pre-test (pre-FBAT) and post-inventory (post-FBII) and post-test (post-FBAT) to measure the student's prior interest, knowledge, and achievement in Farm Biometrics. However, the post-FBAT was produced by re-arranging and reconstructing pre-FBAT so as to alter its structural view and number from the pre-FBAT but retain the same content. The topics listed to be taught during the study were divided into 10 units to cover the semester. Ten lesson notes were planned and written on each unit to guide the lecturers (the class lecturers of Farm Biometrics) in the experimental and control groups. Both groups used conventional method, but the experimental group utilized relevant instructional materials. The difference between the two groups was in the use of instructional materials during class lessons. For consistency and objectivity in scoring the students' pre-FBAT and post-FBAT items, a marking scheme was developed. The 10 items had a total of 100% (a score of 10 marks per number). The instrument was face and content validated by three experts, two from Agricultural Education Department and one from Measurement and Evaluation: Science Education Department all from University of Nigeria Nsukka. At the same period of the study, the instrument was trial tested on 27 students from University of Calabar (intact class), South-South region which have similar characteristics with the area of the study. The trial testing helped to calculate the testing period which was obtained by computing the average time taken by first, tenth and twentieth students to finish the test (Iji, 2002). The average time for the inventory and test computed was one hour, twenty-five minutes. The reliability of the FBII was established using Cronbach Alpha method and a coefficient of 0.92 was obtained. Kuder-Richardson formula (K-R21) was used to determine reliability of the test items which gave a coefficient of 0.78 which means that the instrument was reliable for the study. To conduct the study, the sampled schools were visited, and permission was obtained from the Dean of Students Affairs and Head of Departments of the universities to carry out the study.

Data was collected with the help of four assistants. The assistants were lecturers who teach farm biometrics course in universities involved in the study. Prior to the assignment research assistants were instructed on

how to group the students and collect data. Two assistants in each of the university was requested to group the class into four (ABCD) two control and two treatments as indicated by Solomon four-group pretesting and teaching where necessary making use of the lessons note provided by the researchers. In each of the universities the class of 46 (MOUA) and 36 (UNN) students were divided into four groups A, B, C & D (MOUA had A=12, B=12, C=11, D=11 & UNN had ABCD with 9 students each). The research assistants were requested to pre-test group A and B students in each of the universities and then teach group 'A' and C farm biometrics course through artificial Intelligence. At the end of the teaching, which lasted for a semester (4 months October to February) all the groups were post-tested using the same interest inventory and test items, but which were reframed and reshuffled. The only different from pre-test and post-test was that the item numbers written as posttest were reshuffled. The researchers acted as invigilators during the examination which lasted for two hours. The answer scripts were collected, scored, and analyzed.

The marking scheme prepared was used to score the tests. Both descriptive and inferential statistics were used to analyze the data collected. Mean was used to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the null hypotheses at .05 level of significance. The choice of ANCOVA was to help in equating the initial differences that might exist among the non-randomized groups, using pretest as covariate with the post-test. In testing of hypotheses, the hypothesis of no significant difference was not upheld where the p-value was less than the alpha value of .05 while it was up-held where the p-value was equal to or greater than the alpha value of .05.

Result

The result of the study was obtained from the research questions answered and hypothesis tested and presented in Tables 1- 4.

Research Question One: What are the effects of Artificial Intelligence methods on students' interest in Farm Biometrics?

Data for answering research question one was presented in Table 1

Table 1: Effects of Artificial Intelligence on students' Interest in Farm Biometrics Course in Universities in South East Nigeria

N = 82 (46 +36)

S/N	Item statement on interest of students in farm biometrics	Pre-test score \bar{X}_1	Post-test score \bar{X}_2	Gain score $\bar{X}_1 - \bar{X}_2$
1	I am interested in calculation aspect of farm biometrics.	1.50	3.82	2.32
2	I find it very difficult to cope with biometrics course	3.92	1.95	1.97
3	The way biometrics course is taught is very interesting	2.00	3.56	1.56
4	I can effectively draw bar chart.	1.36	3.55	2.19
5	I can draw Histogram	2.31	3.50	1.19
6	I can equally draw Pie Chart.	1.20	2.69	1.49
7	I can conveniently draw frequency polygon	0.19	2.50	2.34
8	Computation of angles in a pie chart is not a problem for me	0.21	2.55	2.34
9	Determining of profit from the farm business is easy.	2.30	3.57	1.27
10	I can easily prepare a frequency table	3.00	3.95	0.95
11	If set of scores are provided, I can easily find the mean	2.11	3.87	1.76
12	Calculation of variance is not a problem	3.66	1.56	2.10
13	Computation of standard deviation is easy for me	1.25	3.86	2.61
14	I can compute the mean of grouped data	0.56	3.84	3.28
15	Measuring of farmland is easy for me	3.12	3.81	0.69
16	I can estimate the volume of herbicides and fertilizers appropriate for a given area of land.	2.14	3.64	1.50
17	I can estimate the plant population for a piece of land	1.15	3.16	2.01
18	I can forecast quantity of farm produce to be harvested in an area of land.	1.65	2.58	0.93
19	I don't like entering biometrics class.	3.87	0.98	.2.89
20	I like the way farm biometrics course is taught presently.	0.56	3.55	2.99

Data in Table 1 revealed that all the 20 items in the interest inventory (3 negatively & 17 positively warded items) indicated that students had their interests enhanced in farm biometrics as a result of artificial Intelligence method.

Research Question Two: What are the effects of artificial Intelligence methods on students' academic achievement in farm biometrics course in universities in South East Nigeria?

Data for answering research question two were presented in Table 2

Table 2 Effects of Artificial Intelligence Methods on Students' Academic Achievement in Farm Biometrics Course in Universities in South East Nigeria

Groups	Pre-test	Treatment	Post-Test	%gain	A & B	A & C	B & D
A	38.46	√	67.35	28.89			
B	34.15	-	36.42	2.27	30.93		
C	-	√	63.69			3.66	
D	-	-	37.69				-
							1.27
Summary	31.31		51.29	19.98			

Data in Table 2 revealed that group A exposed to pretest, artificial Intelligence and posttest had a mean gain score of 28.89 (67.35 –38.46); Group B exposed to pretest and posttest without treatment had a mean gain of 2.27 (36.42-34.15), indicating a treatment influence of 30.93 (67.35-36.42); group C exposed to treatment and posttest but was not pretested had a mean score of 63.69; indicating a pre-test influence of 3.66 (67.35-63.69) when compared with group A. Group D exposed to only posttest had a mean score of 37.69 and when compared with group B that were exposed to pre-test had a negative mean score of -1.27 (36-42-37.69); indicating that pretest had no influence on the achievement of students.

Hypothesis I: There is no significant difference in the mean scores of students taught Farm Biometrics course through artificial Intelligence method. Data for testing hypothesis one was presented in Table 3

Table 3

ANCOVA statistic on effects of artificial Intelligence method on students' academic achievement in Farm Biometrics course in Universities in South East Nigeria

Tests of Between-Subjects Effects					
Dependent Variable: Test Results					
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	12928.013 ^a	2	6464.006	40.091	.000
Intercept	54441.603	1	54441.603	337.661	.000
Type	5148.000	1	5148.000	31.929	.000
Test	11851.090	1	11851.090	73.504	.000
Error	24668.423	153	161.232		
Total	371938.000	156			
Corrected Total	37596.436	155			

Data in Table 2 revealed a significant difference of 0.00 which was less than the benchmark (0.05); indicating that there was significance difference in the academic achievement of students taught Farm Biometrics through artificial Intelligence method. To determine the source of difference, the data were further subjected to Scheffe's test and presented in Table 4

Table 4: Scheffe's test result

Test Results				
	Type	N	Subset	
			1	2
Scheffe ^{a,b}	B01	26	34.1538	
	B02	26	36.4231	
	D02	26	37.6923	
	AT1	26	38.4615	
	CT2	26		63.6923
	AT2	26		67.3462
	Sig.		.503	.680

Data in Table 4 revealed that group BO₁, BO₂, DO₂ and AO₁ were in the same subset and with a significant level of 0.503; meaning that there was no significance difference in the academic achievement of students in these groups. Furthermore, Table 3 showed that group CT₂ and AT₂ had a

significant level of 0.680; indicating that there was no significant difference in academic achievement between the two groups that were taught through artificial Intelligence. Therefore, the source of significance difference was coming from 'C' and 'A' who were taught through artificial Intelligence.

Discussion Of Findings

The study found out that use of machine learning in teaching Farm Biometrics at universities increased students' interests. This finding aligns with the findings of Asiegbu (2015), who found out that use of a land laboratory method in teaching soil in senior secondary schools led to better academic achievement compared to the field trip method. On the contrary, Sadeghpour (2014) found no significant influence of interest on immediate recall and delayed recall of readings for EFL learners. This discrepancy suggests that the impact of interest on reading performance may vary depending on the specific context and measures used in different studies.

The study revealed that artificial Intelligence had positive effect on students' achievement. The findings of the study in these directs were in consonance with the findings of Danijel, Vedran and Goran (2018) that implementations of artificial Intelligence help improve achievement, retention and enhancement of student's abilities in the field. The findings of the study were in conformity with the findings of Erdem (2014) who found out that activities that are more personalized, guide and introduce students to a topic at home before they apply what they have learned in the classroom through online learning materials. The finding of this study was also in line with the findings of Umar (2015) who stated that instructional method and strategy enhanced students' academic achievement in social studies in junior secondary school in Kogi state. Govinda and Venkata (2014) also found that concept mapping was effective teaching strategy when compared to conventional method.

The findings of the study were consonance with the findings of Agbo-egwu (2014) in a study on effects of metha-linguistic learning approaches on students' achievement, interest and retention in statistics and found out that students exposed to treatment improved more than similar students exposed to conventional method in their academic achievement in statistics in secondary schools in Benue State, The

findings of the study were also in line with the findings of Michael (2014), who found out that blended learning through online engagement with face-to-face method on computer mediated activities enhanced students' interest. Ogbu (2008) revealed that interaction pattern (artificial Intelligence) enhances students' interest. In a related study Owodunni (2010) found out that reflective inquiry instructional technique was more effective in improving students' achievement and interest. The findings of the authors consulted added credence to the findings of this study on effects of artificial Intelligence on students' achievement and interest in Farm Biometrics course in Universities in South-east Nigeria.

Conclusion

It is the wish of lecturers teaching Farm Biometrics to maintain students' interest and enhance their academic achieve in the course but due to abstract and calculation contents of the course many of the students losetheir interest and academically achieve low. This study determined the effect of artificial Intelligence on students' achievement and interest and found out that artificial Intelligence had positive effect on students' interest and achievement in farm Biometric course.

Recommendation

Based on the findings of the study, it was recommended that

1. Lecturers of Agricultural Education should adopt artificial Intelligence in teaching biometrics to make the course interesting and subsequently enhance students' academic achievement.
2. The students should purchase laptops, android phones and other necessary materials and embrace artificial Intelligence.
3. The university authority should provide appropriate learning environment to make it possible for adoption of artificial Intelligence.
4. Government should supply laptops and other facility to both students and Lectures to help them utilize on-line and off-line teaching and learning for enhancing students' achievement and interests in the course.

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**PREDICTIVE VALIDITY OF THE SENIOR
SECONDARY CERTIFICATE EXAMINATION
(SSCE) GRADES AND THE UNIFIED TERTIARY
MATRICULATION EXAMINATION (UTME)
POINTS ON THE FINAL CUMULATIVE GRADE POINT
AVERAGE (CGPA) OF UNDERGRADUATE STUDENTS**

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Abstract

This study examined the predictive validity of the Senior Secondary Certificate Examination (SSCE) and the Unified Tertiary Matriculation Examination (UTME) scores on the final Cumulative Grade Point Average (CGPA) of undergraduate students at Gombe State University. The study raised main objectives with corresponding hypotheses. A correlation design was used for this research. The population of the study consisted of all level four undergraduates, totaling 2704, from which a sample of 348 students was drawn. A survey form was designed to collect data on students' SSCE grades and UTME scores. The survey form was validated by experts and considered reliable for use in this study. The data collected were analyzed using inferential statistics. Hypotheses one and two were tested using t-test of significant relationship, while hypothesis three was tested using multiple regression. Results show that there is a significant relationship between SSCE and UTME scores and the CGPA of undergraduates. The study concludes that SSCE and UTME scores, both individually and collectively, can predict undergraduates' CGPA. The study recommends that GSU should continue to place significant emphasis on SSCE and UTME scores during the admission process, ensuring that students admitted have demonstrated academic competence in both examinations.

Keywords: Predictive validity, SSCE, UTME, Cumulative Grade Point Average, Undergraduate.

Introduction

The poor academic performance of Nigerian undergraduate students has become a significant concern for those committed to ensuring quality education in the country (Eduwem et al, 2017). For instance, the University of Ibadan withdrew 97 students in the 2021/22 academic year and 328 students in the 2022/23 academic year due to poor performance (Premium Times, 2024). The Federal University of Technology, Minna expelled 700 students in the 2022/23 academic year, and the Federal University Dutse, Jigawa State expelled 485 students in the 2022/23 academic year for similar reasons (The Sun, 2023; Vanguard, 2024). These cases reflect a broader trend of academic underachievement across Nigerian universities.

Gombe State University, established in 2005 as the second state university in North-Eastern Nigeria, is experiencing similar issues. The 2022/2023 second semester results indicated a significant number of students on probation or withdrawn due to poor performance. In the 2019/2020 academic year, approximately 30% of first-year students in the Faculty of Education were withdrawn, and 15% were on probation. The Faculty of Arts and Social Sciences saw 35% of first-year students withdrawn and 12% on probation, and the Faculty of Science had 35% of students withdrawn and 15% on probation, all due to poor academic performance (Maikamba & Adepoju, 2021).

Several factors are cited in the literature as contributing to the low academic performance of undergraduate students. Key among these are issues related to the Senior Secondary Certificate Examination (SSCE) and the Unified Tertiary Matriculation Examination (UTME).

The SSCE, administered by bodies such as the West African Examinations Council (WAEC), the National Examinations Council (NECO), and the National Business and Technical Education Board (NABTEB), has been a fundamental requirement for university admission in Nigeria (Adewale, et al, 2016; Adeyeye & Omotere, 2019; Eme & Akpan, 2023). The WAEC was founded in 1953 to conduct external examinations and issue certificates to candidates in Anglophone West African countries. NECO, established in 1999, and NABTEB, established

in 1993, function as alternative examination bodies conducting the SSCE (Eme & Akpan, 2023).

Over time, it became evident that the SSCE alone failed to effectively screen and select the most qualified candidates due to prevalent irregularities and malpractices. Examination malpractice has significantly undermined the credibility and integrity of the SSCE (Okeke, 2018). This erosion of confidence led to the introduction of additional examinations, such as the Unified Tertiary Matriculation Examination (UTME), conducted by the Joint Admissions and Matriculations Board (JAMB) (Papoola, 2018; Adamu & Isaac, 2022).

JAMB was established in 1977 to oversee matriculation examinations for all accredited universities in Nigeria, introducing the UTME as an additional prerequisite for university admission. This centralization aimed to streamline the admission process and mitigate challenges such as multiple admissions and irregularities. However, concerns arose about the efficacy of JAMB, given persistent malpractices in its examinations. This led universities to implement Post-UTME aptitude tests as part of the admission process (Imam, etal, 2015).

The predictive validity of the SSCE and UTME scores in relation to the final Cumulative Grade Point Average (CGPA) of undergraduates is a significant concern. Predictive validity addresses how effectively a test predicts future performance. Despite being admitted based on these criteria, many undergraduates are performing poorly. This discrepancy suggests a potential issue with the enrollment process (Hamman-Tukur, 2013).

Validity is a crucial attribute of any assessment, determining its utility based on the data it generates. Predictive validity, in particular, focuses on whether current test scores can forecast future performance. The SSCE grades and UTME scores are expected to correlate with the final CGPA, indicating a student's academic preparedness and potential success in tertiary education. However, the poor performance of many students suggests a misalignment between these scores and actual academic outcomes.

1. The main objective of this study was to examine the difference between SSCE and UTME score on of level four undergraduates in Gombe State University.

Based on the raised objectives, the following null hypotheses were formulated and tested at a 0.05 level of significance.

- H01:** There is no significant difference between SSCE and CGPA of level four undergraduates in Gombe state university.
- H02:** There is no significant difference between UTME and CGPA of level four undergraduates in Gombe state university.
- H03:** There is no significant interactive effect of SSCE and UTME grades on the final CGPA of 400 level undergraduates in Gombe State University.

Methods

This study employed a correlational research design. The population consisted of all 400-level students from three faculties at Gombe State University: The Faculty of Arts and Social Sciences, the Faculty of Education, and the Faculty of Science, totaling 2,704 students. Specifically, there were 787 students from the Faculty of Arts and Social Sciences, 709 students from the Faculty of Education, and 1,208 students from the Faculty of Science. A representative sample of 348 level four students was selected using random sampling. The sample size was determined using a Research Advisor statistical calculator (2006). Data were collected using a survey form designed by the researchers, titled "Survey Form for Predictive Validity of SSCE Grades and UTME Scores on Final CGPA of 400 Level Undergraduates of Gombe State University." The form comprised four sections: section A: Demographic information of respondents. Section B: CGPA of respondents. Section C: SSCE grades of respondents and section D: UTME scores of respondents. To ensure the validity of the survey form, it was reviewed by experts in the Faculty of Education at Gombe State University. Corrections and amendments were made based on their feedback. The survey form was distributed to the selected sample of 400-level students from the three faculties. The collected data included CGPA, SSCE grades, and UTME scores. For data analysis, inferential statistics was used. Hypotheses 1 and 2 were tested using a t-test of significant correlation, while hypothesis 3 was tested using multiple regression.

Results

H01: There is no significant relationship between SSCE and CGPA of level four undergraduates in Gombe state university.

Table 1. Pair sample t-test for correlation between SSCE and CGPA

Variables	N	Mean	SD	Df	t.	Sig.
Senior Secondary Certificate Examination (SSCE)	348	7.59	.67	347	77.57	.000
Cumulative Grade Point Average (CGPA)	348	3.08	.93			

Note from table 1 that the t-test obtained in the correlation between SSCE and CGPA of the 348 participants was $t(77.57)$, and the p-value was .000. Therefore the null hypothesis which earlier stated that there is no significant difference between SSCE and CGPA of the undergraduates in Gombe State University is hereby rejected. The reason is because based on the analysis above, the t-test obtained in the correlation between the SSCE and CGPA showed a significant relationship (77.57). However, the p-value (0.000) obtained is less than the alpha value of 0.05; hence the relationship is statistically significant.

H02: There is no significant relationship between UTME and CGPA of level four undergraduates in Gombe state university.

Table 2. Pair sample t-test for correlation between UTME and CGPA

Variables	N	Mean	SD	Df	t.	Sig.
Unified Tertiary Matriculation Examination (UTME)	348	1.75	.700	347	-22.65	.000
Cumulative Grade Point Average (CGPA)	348	3.08	.933			

Note from table 2 that the t-test obtained in the correlation between UTME and CGPA of the 348 participants was $t(-22.65)$, and the p-value was .000. Therefore the null hypothesis which earlier stated that there is no significant difference between UTME and CGPA of the undergraduates in Gombe State University is hereby rejected. The reason is because based on the analysis above, the t-test obtained in the correlation between the UTME and CGPA showed a significant

relationship (-22.65. However, the p-value (0.000) obtained is less than the alpha value of 0.05; hence the relationship is statistically significant.

H03: There is no significant interactive effect of SSCE and UTME grades on the final CGPA of 400 level undergraduates in Gombe State University.

Table 3. Model Summary for Interactive Effect of SSCE and UTME on CGPA of undergraduates in Gombe State University

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.162 ^a	.026	.021	.92413

a. Predictors: (Constant), UTME, SSCE

Note that from the model summary (Table 3), $R = .162^a$ and $R^2 = .021$. This coefficient of determination indicates that SSCE and UTME have significant effect on the dependent variable (i.e. CGPA), with standard error estimate of .92413. This percentage was used in determining the goodness of fit for the model (regression equation). The adjusted R^2 yielded 2.1% variation which is significant in this analysis.

Table 4: Analysis of Variance for the Whole Model (ANOVA) ^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.949	2	3.975	4.654	.010 ^b
	Residual	294.634	345	.854		
	Total	302.583	347			

a. Dependent Variable: CGPA

b. Predictors: (Constant), UTME, SSCE

From the Analysis of variance table (Table 4), the overall regression model significant $F(2, 345) = 4.654$, $p = .010$. Now since the p-value (.010) was less than the alpha value (.05), the null hypothesis was rejected. This simply means the independent variables (SSCE & UTME) predict the dependent (CGPA) variable significantly.

Table 5: Summarized Regression Analysis of the Interactive Effect of SSCE and UTME on CGPA among Undergraduates in Gombe State University.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.762	.563		3.131	.002
Senior Secondary Certificate (SSCE)	.139	.074	.100	1.868	.063
Unified Tertiary Examination (UTME)	.151	.072	.113	2.101	.036

a. Dependent Variable: CGPA

The table 5 presents a summarized regression analysis examining the interactive effect of Senior Secondary Certificate Examination (SSCE) scores and Unified Tertiary Matriculation Examination (UTME) scores on the Cumulative Grade Point Average (CGPA) among undergraduates at Gombe State University. The constant (intercept) of the regression equation is 1.762, which is the predicted CGPA when both SSCE and UTME scores are zero. The p-value (Sig.) is 0.002, indicating this value is statistically significant at the 0.05 significance level. For each unit increase in SSCE scores, the CGPA is predicted to increase by 0.139 units, holding UTME scores constant. The standardized coefficient (Beta) of 0.100 suggests a positive but relatively small effect. The p-value (Sig.) is 0.063, which is slightly above the conventional threshold of 0.05, indicating that the effect of SSCE on CGPA is not statistically significant at the 0.05 level. For each unit increase in UTME scores, the CGPA is predicted to increase by 0.151 units, holding SSCE scores constant. The standardized coefficient (Beta) of 0.113 indicates a positive effect. The p-value (Sig.) is 0.036, showing that this effect is statistically significant at the 0.05 level. The effect of UTME scores on CGPA is statistically significant, whereas the effect of SSCE scores is not statistically significant at the 0.05 level. The regression model suggests that while both entrance exam scores positively impact undergraduate CGPA, UTME scores have a more significant and noticeable effect.

Discussion Of Findings

The study presents three primary findings concerning the academic performance of undergraduates at Gombe State University (GSU). Each

finding is indicative of the predictive and interactive effects of secondary school academic performance and standardized university entry examinations on university-level academic performance. The first finding reveals a significant relationship between the Senior Secondary Certificate Examination (SSCE) scores and the cumulative grade point average (CGPA) at level four (senior year) of undergraduates. This suggests that the academic performance in SSCE, which is typically a measure of a student's proficiency in secondary education subjects, is a strong predictor of their performance at the university level. This relationship underscores the predictive validity of SSCE scores, indicating that students who perform well in secondary school are likely to maintain high academic performance in university. The significant correlation may also imply that the curriculum and assessment methods at secondary schools align well with the demands of university education, preparing students effectively for higher academic challenges. Universities might consider SSCE performance more critically in their admission processes, recognizing its role in forecasting student success at the tertiary level. The second finding highlights a significant relationship between scores on the Unified Tertiary Matriculation Examination (UTME) and the level four CGPA of undergraduates. UTME is a standardized entry examination used for university admissions in Nigeria. This finding emphasizes the importance of standardized tests like the UTME in gauging the potential academic performance of students. High UTME scores are indicative of a student's readiness for university-level education. Admissions committees might give greater weight to UTME scores, understanding that these scores can reliably predict long-term academic outcomes. Identifying students with lower UTME scores who may need additional support could help in implementing targeted educational interventions to enhance their academic success at the university. The third finding points to a significant interactive effect of SSCE and UTME scores on the level four CGPA of undergraduates. This suggests that the combined influence of these two variables is more substantial than their individual effects. This interactive effect highlights the need for a holistic approach to university admissions, where both SSCE and UTME scores are considered together rather than in isolation. The interplay between these scores can provide a more comprehensive assessment of a student's potential. Universities could develop more sophisticated predictive models for student success that

incorporate both SSCE and UTME scores, potentially improving the accuracy of their admissions decisions. Secondary education institutions and preparatory programs might focus on balancing efforts to improve both SSCE and UTME performance, recognizing that success in both areas is crucial for long-term academic achievement. The findings from this study offer valuable insights into the factors influencing academic success at Gombe State University. The significant relationships between SSCE, UTME scores, and level four CGPA, as well as their interactive effects, underscore the importance of these assessments in predicting and enhancing student performance. These results can inform admissions policies, curriculum development, and preparatory education strategies, ultimately contributing to better educational outcomes and student success at the tertiary level.

Conclusion

The findings from the study on the academic performance of undergraduates at Gombe State University (GSU) highlight crucial insights into the factors influencing their success. First, there is a significant relationship between students' Senior Secondary Certificate Examination (SSCE) scores and their Level Four Cumulative Grade Point Average (CGPA). This indicates that students who perform well in their SSCE tend to maintain higher academic performance at the university level. Second, a significant relationship also exists between Unified Tertiary Matriculation Examination (UTME) scores and Level Four CGPA, suggesting that UTME performance is a strong predictor of academic success in higher education. Third, the study reveals a significant interactive effect of both SSCE and UTME scores on the Level Four CGPA of undergraduates. This interaction underscores the combined influence of secondary school performance and university entrance examination scores on students' academic achievements at GSU.

This study investigated the predictive validity of the SSCE and UTME scores on the final CGPA of undergraduate students at Gombe State University. The findings highlight significant challenges in the current admission and evaluation processes, emphasizing the need for ongoing efforts to enhance the integrity and effectiveness of the examination system to improve educational outcomes in Nigerian universities.

Recommendations

Based on these findings, several recommendations can be made to enhance academic performance and improve student outcomes at Gombe State University:

1. GSU should continue to place significant emphasis on SSCE and UTME scores during the admission process, ensuring that students admitted have demonstrated academic competence in both examinations.
2. Develop and implement support programs for students who may have lower SSCE or UTME scores, including tutoring, mentoring, and academic workshops, to help them adjust to university-level coursework and improve their academic performance.
3. Introduce early intervention strategies for students identified as at-risk based on their SSCE and UTME scores. This could include personalized academic advising and monitoring to address potential challenges before they impact their CGPA.

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**COMPARATIVE ANALYSIS OF RELIABILITY
ESTIMATES OF AI-GENERATED AND TEACHER-
GENERATED MATHEMATICS TEST ITEMS IN
SENIOR SECONDARY SCHOOLS IN RIVERS STATE.**

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Abstract

Test over the years is used in identifying the abilities of students in specific areas. While some tests are generated by subject teachers, others are generated by alternative sources some of which include artificial intelligence (AI). While this innovation have introduced ground breaking pace in education, its reliability and authenticity is sometimes in doubt. Hence, the study compared the reliability estimates of AI generated mathematics test items and that of teachers. Three reliability estimates including KR_{20} , test-retest and split half methods were used comparatively in both tests. Instrumentation research design was used in the study. A sample of 250 senior secondary school students in Rivers state was drawn for the study using the multi-stage sampling procedure. Mathematics Achievement Test (MAT-AI_G version and MAT-T_G version) comprising of 20 items each of the AI-generated (ChatBot AI) and Teacher-generated was used as data collection instruments. Data analysis was done using KR_{20} , PPMC as well as Spearman Brown prophecy formula. Results of the study showed that for AI-generated items, reliability indices of 0.28, 0.58 and 0.83 were realized for KR_{20} , test-retest and split-half reliabilities respectively. On the other hand, reliability estimates for MAT-T_G version were 0.62, 0.71 and 0.63 for KR_{20} , test-retest and split-half reliabilities respectively. This showed that on the average,

teacher generated test had better KR_{20} reliability estimate ($0.62 > 0.28$) as well as better test-retest estimate ($0.71 > 0.58$) than AI-generated items. On the contrary, AI-generated items had better Split-half estimate ($0.83 > 0.63$) compared to teacher-generated items. Based on this, it was recommended among others that test developers and constructors should apply AI sparingly in the process of test development and construction.

Keywords: Test, AI, AI-generated test, Reliability, Teacher-generated test

Introduction

A test in its broader sense is a systematic procedure for observing a person's behaviour and describing it by means of numerical scale or a category system. Opara and Uwah (2018) averred that a test is an instrument or procedure designed to measure the knowledge, intelligence, ability, traits, skills, aptitude, interest, attitude an individual or thing exhibits. Hopkins and Antes (cited in Orluwene, (2012) also noted that a test is an instrument, device or procedure which proposes a sequence of task to which a student is to respond and the results are used as measures of specified traits. Similarly, a test is an instrument which can be utilized in detecting some qualities, traits, characteristics, attributes and the likes possessed by a person, an object or thing. It could as well be seen as an instrument or device used to quantify behaviour or aid in understanding and predicting behaviour. Setiabudi, Mulyadi and Puspita (2019) assert that tests play a vital role in the education system as they are used as tools in measurement and evaluation processes. As Mpofu (2011) states, for a teacher to be able to do his/her work effectively, he/she needs to assess the progress of his or her students from time to time. Good knowledge of where the students are and how he/she is progressing helps the teacher to effectively cater to the needs of students (Chakanyuka, 2000)

When students are tested, the test administrator or classroom teacher desires that the test scores reflect as possible the student's true performance. Kpolovie (2010) opined that "not until the test reflects the true attributes, characteristics and ability of students, then such test is invalid". But quite often, test scores as obtained by students on a subject with the same content items do vary significantly. There are several reasons why students test scores vary. Most often, when students underperform in a test, mutterings are heard about how nervous they were,

how they have to guess their way to arrive at answers especially that of essay questions. However, some of the comments may be accurate while others may just be an excuse for poor performance.

In any way positively or negatively, test scores may be affected by personal factors associated with individual being tested as well as other factors associated with the test- settings which according to Kpolovie (2013) are referred to as test administration factors. Again, the test developers themselves are always fingered as part of the factors that may affect a test positively or negatively. Tests are developed by various individuals. Uwah (2016) mentioned that a test could be developed either by the teacher otherwise referred to teachers-made test or by a standard agencies like WAEC, NECO etc. However it is, it is quite added that the sources of test may play a crucial role in the reliability estimates of the test. Therefore, because it is very important to measure the students' scores, a test should be valid and reliable so that the students' scores will be also valid and reliable.

Disha (2021) stated that carefully constructed teacher-made tests and standardised tests are similar in many ways. Both are constructed on the basis of carefully planned table of specifications, both have the same type of test items, and both provide clear directions to the students. However, the two differ. They differ in the quality of test items, the reliability of test measures, the procedures for administering and scoring and the interpretation of scores. No doubt, standardised tests are good and better in quality, more reliable and valid. If standardized test are more standardized, then it begs the question of efficacy of teacher made test.

Aside from teacher made test, recent innovation in technology have made it possible that artificial intelligence (AI) can be used in generating test items for students. According to Rossi (2023), GPT generates text of any genre on any topic in seconds although Bezirhan and von Davier (2023) had argued that GPT was prone to generating erroneous outputs, especially for certain statistics and numbers. Weingartz and Sulevmano (2021) opined that artificial intelligence can automatically generate test cases by simulating various scenarios and inputs. They further opined that with AI algorithms, one can create thorough test suites to cover many conditions, significantly improving test coverage and reducing the odds of unnoticed bugs raising their ugly heads in production. Zong and Krishnamachari (2022) observed that the writing of test with AI

has many benefits that can significantly enhance the testing process. Livingston (2018) defined reliability as the extent to which test scores are not affected by chance factors or by the luck of the draw. It is the extent to which the test taker's score does not depend on the specific day and time of the test, the specific questions or problems that were on the edition of the test that the test taker took as well as the specific raters who rated the test taker's responses. There are various types of reliability. They include but not limited to Kuder-Richardson 20 and 21, test-retest, split half, Cronbach etc.

The **Kuder-Richardson Formula 20**, often abbreviated KR-20, is used to measure the internal consistency reliability of a test in which each question only has two answers: right or wrong. In other words, it is best used in multiple-choice items format where the answer is either right or wrong. The value for KR-20 ranges from 0 to 1, with higher values indicating higher reliability. Similarly, *Ritter, (2010) stated that* values can range from 0.00 to 1.00 (sometimes expressed as 0 to 100), with high values indicating that the examination is likely to correlate with alternate forms (a desirable characteristic). The KR-20 may be affected by difficulty of the test, the spread in scores and the length of the examination.

Split-half reliability is another form of internal consistency reliability. According to Thompson (2022), the basic assumption of split-half reliability is that the **two halves of the test should yield similar true scores and error variances**. This comes from the assumption that the test items are focused on the construct. Again, Thompson (2022) informed that to use split-half reliability, one needs to take a random sample of half of the items in the survey, administer the different halves to study participants, and run analyses between the two respective "split-halves." A **Pearson's r or Spearman's rho correlation** is run between the two halves of the instrument. Then, these coefficients are entered into the **Spearman-Brown formula** to yield the split-half reliability coefficient.

Test-retest reliability is one of the most commonly practiced types of reliability methods and can be done fairly easily. Opara and Ogbanu (2023) states that it is a statistical measure commonly used to assess the consistency and reproducibility of results obtained from healthy controls in research studies. While time between the first test and the second test differs, the same groups of people receive the same test both times. Then,

test administrators can determine reliability estimates based on the observations and correlations drawn between the two assessment. Through test-retest, one measures the correlation between scores from one administration of an instrument to another, usually within an interval of 2 to 3 weeks. Unlike pre-post-tests, no treatment occurs between the first and second administrations of the instrument, in order to test-retest reliability.

Opara and Ogbanu (2023) agreed to these types of reliability by stating that there are various indices or techniques for measuring reliability such as test-retest method, split half method, Equivalent form method, Cronbach Alpha and Kuder Richardson 20 (Traub, 2018). The equivalent method proposes creating two equivalent versions of the same test, which should yield the same results, administering these tests to the same individuals, and correlating the results to assess how closely the two results coincide. Unfortunately, due to two administrations occasions, the use of test-retest is not achievable in so many testing situations (Burton, 2001). Opara and Ogbanu (2023) observed that at the secondary school level of education, circumstance requires that all students be integrated in mathematics instruction right within the classrooms and be as well tested to determine their level of competence. In this paper, the researchers adopted the test-retest estimates, Split-half and Kuder- Richardson reliability estimates. Hence, the aim of the study is to carry out a comparative analysis of reliability estimates of AI-generated and teacher-generated Mathematics test items in senior secondary schools in Rivers State

The following research questions guided the study

1. What are the comparative reliability indices of MAT-T_G and MAT-AI_G as determined using KR20 methods of reliability?
2. What are the comparative reliability indices of MAT-T_G and MAT-AI_G as determined using Test-retest methods of reliability?
3. What are the comparative reliability indices of MAT-T_G and MAT-AI_G as determined using Split-Half methods of reliability?

Methods

The researchers in this study adopted instrumentation design to compare the reliability estimates of AI generated mathematics test items and that of teachers. Three reliability estimates including KR₂₀, test-retest and split

half methods were used comparatively in both tests. The population of the study consisted of 12,550 senior secondary school students in Rivers State. A sample of 250 senior secondary school students in Rivers state was drawn for the study using the multi-stage sampling procedure. Two versions of a multiple-choice Mathematics Achievement Test dubbed “MAT-AI_G” for version created by artificial intelligence and “MAT-T_G” for the version generated by the teacher was used for the study. As stated, the MAT-AI_G was generated using ChatBot AI while MAT-T_G was generated by the classroom teachers. Data analysis was done using KR₂₀ Formula, Pearson Product Moment Correlation as well as Spearman Brown prophecy formula.

Results

Research Question One: What are the comparative reliability indices of MAT-T_G and MAT-AI_G as determined using KR₂₀ methods of reliability?

Table 1 MAT-T_G and MAT-AI_G reliability indices as determined using KR₂₀ methods of reliability.

TEST	N	\bar{x}	\bar{x}^2	K	$\sum Pq$	KR ₂₀	Remarks
MAT-T _G	250	4.07	16.56	20	6.58	0.62	Good Reliability
MAT-AI _G	250	3.02	9.06	20	7.31	0.28	Poor Reliability

The analysis in the table shows that standard deviation values for respondents from the two type of test are 4.07 and 3.03. Their variance scores were 16.56 and 9.06. The summation of the proportion of those that scored right in each item and those that scored wrong was 6.58 and 7.31 respectively. On the whole, KR₂₀ reliabilities were 0.62 for MAT-T_G and 0.28 for MAT-AI_G respectively. These values show that teacher made test has higher KR₂₀ reliability than artificial intelligence generated Mathematics test.

Research Question Two: What are the comparative reliability indices of MAT-T_G and MAT-AI_G as determined using Test-retest methods of reliability?

Table 2 MAT-T_G and MAT-AI_G reliability indices as determined using Test-retest methods of reliability.

TEST	N	Items	R	Remarks
MAT-T _G	250	20	0.71	Good Reliability
MAT-AI _G	250	20	0.58	Average Reliability

The analysis in the table shows that teacher generated (MAT-T_G) mathematics test had a test-retest reliability index of 0.71 while artificial generated (MAT-AI_G) had an index of 0.58. These values once again show that teacher-generated mathematics test has better test-retest reliability index compared to artificial intelligence generated mathematics test.

Research Question Three: What are the comparative reliability indices of MAT-T_G and MAT-AI_G as determined using Test-retest methods of reliability?

Table 3 MAT-T_G and MAT-AI_G reliability indices as determined using Split-Half methods of reliability.

Test	N	Rht	Rft
MAT-T _G	20	0.47	0.63
MAT-AI _G	20	0.72	0.83

The analysis in table 3 shows that split-half reliability yielded reliability co-efficient of the half test (Rht) of 0.47 for MAT-T_G. However, when Spearman Brown prophecy formula was applied, a reliability of full test (Rft) index of 0.63 was realized. Also, split-half reliability yielded reliability co-efficient of 0.72 for the half test (Rht) for MAT-AI_G. Further analysis using Spearman Brown prophecy formula showed a reliability coefficient of 0.83 for the full test (Rft). Comparatively, it is seen through the indices that artificial intelligence-generated test (MAT-AI_G) had higher reliability index than the teacher-generated test (MAT-T_G).

Discussion of Findings

The finding that teacher-made tests have higher KR-20 reliability than artificial intelligence (AI) generated tests suggests that teacher-made tests are more consistent and reliable in measuring student learning outcomes. It also means that teachers have a deeper understanding of the curriculum, students' needs, and the learning context, allowing them to create tests that are more relevant and valid. It also means that teacher-made tests can capture nuanced aspects of student learning, such as critical thinking and problem-solving skills, which may be harder for AI to assess. It also shows high level of adaptability as they can adapt their tests to suit different learning styles and abilities, making them more inclusive and effective. This finding is consistent with the assertion of Disha (2021) *who acknowledged that teacher-constructed test has significant ability to assess students construct.*

From findings two, it is revealed that teacher-made tests have higher test-retest reliability than artificial intelligence (AI) generated tests suggests that teacher-made tests are more consistent in measuring student learning outcomes over time. The implication here is that teacher-made tests tend to have more stable content, with questions and tasks that remain consistent across administrations. It could also be that teachers are more likely to consistently evaluate student responses, using their professional judgment to score answers. Again, teacher-made tests are often administered in the same context, with the same instructions and timing, which can contribute to higher test-retest reliability. Finally, the findings suggest that teacher-made tests may be more reliable in measuring student learning over time, while AI-generated tests may be more useful for large-scale assessments and efficiency. A balanced approach, combining the strengths of both, could lead to more comprehensive and reliable assessments.

From finding three, it is reported that artificial intelligence (AI) generated tests have higher split-half reliability indexes than teacher-made tests suggests. This means that AI-generated tests are more consistent and reliable in measuring student learning outcomes. Again, higher split-half reliability indicates that the test is more consistent in measuring the intended construct. Hence the findings implies that if an Artificial Intelligence (AI) test has better split-half reliability than a teacher-made test, it means that the AI test is more consistent in measuring the target

skill or knowledge, the AI test has a more robust and reliable internal structure and AI test is less prone to errors or biases in measurement. In other words, the AI test is more precise in assessing student abilities, and the scores are more reliable and consistent. This is likely due to the AI's ability to analyze large datasets and identify patterns, use algorithms to ensure consistent scoring as well as reduce human error and bias. While teacher-made tests may have their own strengths, the AI test's higher split-half reliability suggests that it is a more reliable tool for measuring student learning outcomes through objective scoring, large sample size testing, consistency in format, automatic grading as well as reduced bias. These findings suggest that AI-generated tests may be more reliable in measuring student learning outcomes, particularly in large-scale assessments. However, it's important to note that teacher-made tests still have value in providing nuanced and contextualized assessments, and a balanced approach combining both can lead to more comprehensive and reliable assessments. The findings of the study are in line with the opinion of Thompson (2022) who noted significant benefits of AI developed test in students test consistency.

Conclusion

In conclusion, majority of the findings show that teacher-generated test have higher internal consistency and reliability compared to AI-generated tests. Teachers made test had more credibility in KR20 reliability as well as test-retest reliability, indicating a more consistent and precise measurement of students learning outcomes. The findings suggest that teacher-made test can be a useful tool for large-scale assessments and objective evaluation of student learning, while teacher-made tests can be used to provide more subjective and qualitative feedback. In all, there is potential of AI-generated tests to enhance the reliability and efficiency of assessments, while emphasis on the importance of human judgment and expertise in evaluating student learning should be kept in mind.

Recommendations

The following recommendations are made;

1. Based on the findings that teacher-made tests have higher KR₂₀ reliability than artificial intelligence (AI) generated tests, it is recommended that teacher-made tests should be prioritized for

assessments that require nuanced evaluation of student learning outcomes, such as critical thinking, problem-solving, and writing skills. Again, teachers should be involved in the development and review of AI-generated tests to ensure that they align with curriculum standards and learning objectives.

2. Based on the findings that teacher-made tests have higher test-retest reliability than artificial intelligence (AI) generated tests, it is recommended that teacher-made tests should be used for high-stakes assessments, where consistency and reliability are crucial. Again, efforts should be made to improve the test-retest reliability of AI-generated tests, potentially by incorporating more robust algorithms and larger item pools.
3. Based on the findings that artificial intelligence (AI) generated tests have higher split-half reliability than teacher-made tests, it is recommended that AI-generated tests should be used for large-scale assessments. Educators should consider using AI-generated tests as a foundation and supplementing with teacher-made tests to provide a more comprehensive assessment picture. Also, teachers should be trained on how to effectively use AI-generated tests and interpret results to inform instruction and improve student learning.

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EXAMINING THE INTERACTION OF PARENTAL CHARACTERISTICS AND JUNIOR SECONDARY SCHOOL (JSS) STUDENTS' ACHIEVEMENT IN ENGLISH GRAMMAR

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Abstract

The study intends to examine the influence of Parental characteristics on junior secondary school (JSS) students' academic achievement in English Grammar. Non-experimental design of survey research was adopted and the population consists of all junior secondary school (JSS) students in Akinyele LGA, Oyo State. Simple random sampling technique was used to select 100 students to participate in the study. English Grammar Achievement Test was validated using face and content validity while Cronbach alpha was used to check the reliability coefficient at $r=0.62$. Data was analyzed using two-way Anova in R studio version 4.6.2 and the result revealed that parent's socio-economic status ($F=33.89$; $P=1.22e-11$) plays a role in students' outcomes and parents' education ($F=4.53$; $P=0.00$) was strongly related to junior secondary school (JSS) students' achievement in English Grammar at 0.5 significance. Interaction effect was 0.02. This mean that parent education and socio-economic status to a great extent have high interaction on the students' academic achievement in English Grammar. It was therefore recommended that irrespective of learners' differences in their family background, teachers should help students to gain proficiency in English by engaging more in speaking and using it frequently in school, during instruction or social activities.

Keywords: English grammar, Parents characteristics, Socio-economic status, Parent education, academic achievement.

Introduction

Education aims at promoting understanding and enabling action. It equips the individual for decisions that improve the quality of life (George, Okoye, Efobi and Modebe, 2017); it also promotes literacy and awareness, and confers responsibility to make decisions which guarantee better life for individuals in particular and the economy in general

(Okoye, Omankhanlen, Okoye, Urhie, Okoh, and Ezeji, 2019). While some sees education as a legacy, others view it as an addendum. At the early days of education, the primary goal was to educate the child Wagner, (2017) and that educational objectives in subject such as English language grammar and spelling, vocabulary, and analogy can be influenced by some factors. English is an international language used in most nations. It is important in individual learner's success in the globalize world (Ariani & Ghafournia, 2016). In Nigeria, English language is widely use as the medium of communication. It is also adopted as a medium of instruction in preparatory schools, secondary schools and at the tertiary level. English language is taught as a compulsory subject starting from nursery school to tertiary and are referred to as GSS courses thus, English is very vital in learning. It paves the way to students' achievement in all subjects that are being taught through this medium. This academic demand makes English learning significant, especially in developing students' procedural knowledge and conventions (Dev & Qiqieh, 2016). It is believed that knowledge of English Language is urgent to make learners progress in life and work because it provides them with higher social status and job opportunities (Ariani & Ghafournia, 2016). The language is also used in carrying out most trades. According to Nyamubi (2016), English learning zeal has opened avenues to young learners of the language hence, many countries including Nigeria, introduced English at earlier grade levels in their curricular thereby making English Grammar in children to have strong implications in their academic. English Grammar could be linked to the way learners are exposed to the home and school learning environment.

The concepts of academic achievement and English language proficiency are wide. Academic achievement refers to the rate at which educational objectives are being achieved by those within the school system (Sea, 2020). This implies that students' academic achievement measures the extent to which students are achieving desired educational goals and objectives. Agreeing to the above assertion, James and Anagbogu, (2014) opined that Academic attainment is an important parameter in measuring success in students. According to Atli and Ozal (2017), students' academic achievement and graduation rates have been an area of concern, and investigation of factors relating to academic achievement of secondary students has been a topic of much interest to

scholars. This scenario may arise because since schools were established for the students, their achievement can be used to judge the effectiveness of the school system. Academic achievement is limited to mean the result of activities related to education especially in a college or university undertaken by a student and it can also be defined as the ability to display through speaking or writing what one has learnt in the classroom (Wilson&Komba, 2012).

On the other hand, English Grammar is a set of structural rules and guidelines that ensures the correct and standard use of the English language and this is measured in terms of structure of words, phrases, clauses, sentences and whole texts. The relationship between English language Grammar and academic achievement is expressed in terms of correlation coefficient. According to Olufemi, Adediran, and Oyediran, (2018) students' academic achievement is affected by several factors which include students' learning skills, school environment, parent characteristics, peer influence, teachers' quality, learning resources and infrastructure, among others. Kormos and Kiddle (2013) link students' poor achievement in Grammar to their family background, especially regarding parents' education and socio-economic status. Education is envisaged in terms of social class and in the Nigerian context, we have two classes of socioeconomic status. One is education for a less affluent class usually referred to as the poor, another for the upper-class socioeconomic status of society usually known as the rich. Arguably, the type of education that one gets or receives depends on the class of education, wealth and social position of parents. In the same vein, highly educated individuals see the importance of their children to acquire better education, which in their opinion, is offered in private secondary schools (Kakumbi, Samuel, and Mulendema, 2016). In this regard, an important role that socioeconomic status plays in learners' academic achievement cannot be over emphasized (Owolewa & Olagundoye, 2017). Parent education and interest in the Childs' school work contributes to the choice of English language and this can affect the vocabulary and communication skill of their children (James & Anagbogu, 2014).

Learning English Grammar could also be linked to the way learners are exposed to the home and school learning environment. Kormos and Kiddle (2013) linked students' poor achievement in English to their family background, especially regarding parents' education status

and income. Perna and Titus (2002) declare that family support foreshadows students' achievement. Also, Senechal and Lefevre (2002) assert that parents' involvement is very important to students' academic success. Abdulmalik (2013) opined that inadequate attention to children's academic work by parents and guardians contribute to poor academic achievement.

The term "English Proficiency" does not merely represent one element of listening, reading or writing, but rather a composite evaluation determined by factors such as word classes and phrases, negation, clauses and sentence structure, phrases, clauses, spellings and grammar, vocabulary and analogy. English Language proficiency research is a deeply complex field of study with many intersections, some of these intersections can be linked to student factors such as attitude in school, approach to learning and academic self-concept, parent characteristics such as parent education and socioeconomic status.

Parent education is measured by the degree of educational attainment in terms of their level of education (basic, secondary, and tertiary) while socio-economic status is measured by their level of income. Could the problems of poor success of learners in academic activities be due to inability to understand the materials in English? Who should be blamed for this longstanding problem of students' low achievement? Should the blame be put on parent factors such as parent educational level, socio-economic class etc.? Although they seem to be no uniformity in opinion as educational researchers are yet to find out whether the parent education and socio-economic status can affect students' academic performance in English Language (James & Anagbogu, 2014). But specifically, for the purpose of this research, the aspect of English language that will be considered are spellings and Grammar, Vocabulary and Analogy. The question the research wants to answer is can parent education and socio-economic status influence junior secondary school (JSS) students 'achievement in the aspect of English Language identified above? Just as those born into poverty have a stronger likelihood of remaining impoverished, those born into a family with low education levels are likely to have weak grammar skills themselves (Ferguson et al, 2007). This seems logical, as parents who are not comfortable with English grammar will interact with it less than parents with higher English grammar levels. Similarly, as these parents

are likely not confident in teaching their children how to read, write and speak, these children will lack a strong home English grammar foundation, thus leading to a lower level of literacy. Lupeja and Gubo (2016) opined that failing students believed that having uneducated parents affected their school performance.

Many may argue that the child's school district is solely responsible for developing this aspect of English, but this assumes the child's family is living in an area with a good school district. Being born into a low SES likely means one will attend a school with lower levels of funding, creating a learning environment that is not as strong as their upper-class peers (Ferguson et al, 2007). Considering shortages of teachers and behavioral issues often present in poorly funded school districts, these schools may be unable to teach crucial aspects of English language development, causing students to lack certain foundational skills and lag behind their peers who attend better-funded schools. It is observed that education and socioeconomic status are intertwined in multiple ways. Many people of lower socio-economic statuses have lower Grammar skills, this relationship resulting from how education and SES can influence literacy (Ferguson et al, 2007).

A child from high socio-economic status is likely to do well in their academic achievement than those from moderate or low socio-economic status (James and Anagbogu, 2014). It is agreeable that one's SES influences English Language, specifically aspects of spelling and grammar, sentence structure, clauses, vocabulary and analogy. While lower SES children can still identify words, sentence structures etc. many of them are lacking the decoding skills necessary to understand and interpret text and the meaning. Being able to identify letters or words is a skill entirely different from being able to piece the information together in order to comprehend the meaning. This poses a threat to the English grammar of lower SES students, as the inability to decode what words and sentences truly mean may inhibit growth in subsequent grades. Without being taught crucial skills necessary for proficiency in English Grammar aspect, we cannot expect these lower SES children to move on to higher grade levels, as they will only become further behind. These differences in the English grammar foundation between children of low and high socio-economic groups indicate an egregious disparity that, if unchecked, may prevent them from obtaining a higher socio-economic status later in

life. In as much as English language is concerned, few studies have disseminated the findings of the influence of socio-economic status on language performance. In particular, hardly any studies in this area have been done to examine the influence of parent education and socio-economic status on English language Grammar achievement in junior secondary school. The present study aimed to fill this gap. The school is usually a combination of many families and from varied backgrounds.

Some are rich, poor, educated, uneducated etc. the school houses all these students' background; and their parents' education, profession, socio-economic status etc. may come to play in their level of interaction.

While some families may be educated, others may not be exposed to education early enough, some may be illiterate who speaks their native dialect or language exclusively, this may not allow or give an advantage on their children's achievement in English Grammar; the ability of students in using the language of instruction in the school and class is very minimal. This declining academic performance among students has remained a recurring irritant in Nigeria's educational system, in spite of all efforts of government and major stakeholders to change the narrative in the education sector. The poor academic achievement of students in English Grammar could be traced to parents' characteristics which is linked to parents' educational status and income. There is no iota of doubt that if the parents fail to provide the necessary materials for their children, there is bound to be poor outcomes. Observations revealed that in some families, either or none of the parents is educated which may have adverse effect on their income as their income may not be sufficient enough to sustain the family hence, may have influence on the academic achievement of such students as they may likely be faced with the challenges of lack of educational materials, late or no payment of school fees promptly thereby leading to being absent from school. Students need to be exposed to various textbooks so as to build their vocabularies and to widen their horizons in the area of registers. For this reason, this study intends to examine the influence of parental characteristics on junior secondary school (JSS) students' academic achievement in English Grammar.

This study anchor to Vygotsky's Theory Vygotsky which states that learning is distinct in every individual child whereby the knowledge and skills acquired vary from one individual to another (Communique,

1997 in Dahms, Geonnotti, Passalacqua, Wetzel, Schilk, & Zulkowsky, 2007). Communicative says according to Vygotsky the main aim of education is to internalize culture and social relationships through social learning. The importance of past experiences and knowledge in interpreting present experiences is stressed (Feden & Vogel, 1993 in Dahms, Geonnotti, Passalacqua, Wetzel, Schilk, & Zulkowsky, 2007). Students' culture particularly their home surroundings have a great deal of contribution towards new knowledge and skills that one acquires. Language skills are particularly critical for creating meaning and linking new ideas to past experiences and prior knowledge (Hamilton & Ghalala, 1994:255 in Dahms, Geonnotti, Passalacqua, Wetzel, Schilk, & Zulkowsky, 2007). It is argued that language plays an active role in the development of thought. Vygotsky claims that language played an essential role in cognitive development this is due to the fact that it is through language a child learns how to think and it is through words a child internalizes complex concepts (Feden & Vogel, 1993 in Dahms, Geonnotti, Passalacqua, Wetzel, Schilk, & Zulkowsky, 2007). Thus, learning takes place through the use of language which an external experience transforms into internal process; in this case speech and language being the main means of communication that promotes learning and learning leads to higher levels of thinking. They also explain that according to Vygotsky two main ways of learning are through social interaction and language. Language enables individuals to share experiences, thus, enhancing the ability to participate in social interaction (Dahms, Geonnotti, Passalacqua, Wetzel, Schilk, & Zulkowsky, 2007).

Research Hypotheses

1. There is no significant difference between parent education and junior secondary school (JSS) student achievement in English Grammar.
2. There is no significant difference between parent socio-economic status and junior secondary school (JSS) student achievement in English Grammar.
3. There is no significant interaction of parent education and socio-economic status on junior secondary school (JSS) student achievement in English Grammar.

Methods

The research design adopted for this study is non-experimental design of survey research. The design was adopted because the researcher

had no control over the variables of the study but only investigated the relationship between variables of the study without any form of variable manipulation. The population for the study consisted of all junior secondary school (JSS) students in Akinyele LGA, Oyo State Nigeria. They were chosen because they are permitted to take Junior School Certificate Examinations such as the Junior WAEC, BECE, Checkpoint etc. and they have covered significant session of the syllabus in English Language which includes English Grammar. Purposive sampling technique was used to select Akinyele LGA, Oyo State due to its diverse parental backgrounds in terms of education, occupation and socio-economic status. Simple random sampling technique was used to select 100 respondents. With this technique, respondents have equal chance to be sampled. The researcher used the completely mixed pieces of papers marked "Yes" and "No" in a hat where each individual had to pick one randomly and if any of the student picks the one marked "Yes", they will be involved in the study.

English Grammar Achievement Test (EGAT) was used for data collection. This was developed by the researcher to measure the academic achievement of junior secondary school (JSS) students in English Grammar. It has two sections; Section A was to elicit response on parent education and socio-economic status which was detached to be filled by their parents while section B was on the achievement tests and it had 60 items in all. The multiple-choice question had options ranging from A-E and was scored using right or wrong answer which were coded as 1 or 0. The instrument was validated using face and content and the reliability coefficient was established using Cronbach Alpha at 0.628 with R studio. The data collected for this study were analyzed using two-way Anova with R studio version 4.6.2. Reasons for using the two-way Anova for this study is because the two-way Anova is used when there is more than one independent variable and multiple observations for each independent variable in order to determine if there is a significant interaction between the independent variables. In this study, the two independent variables are parent education at 3 levels and socio-economic status at 4 levels (nominal) while the dependent variable is junior secondary school (JSS) student academic achievement in English Grammar. All analysis were determined based on 0.05 ($p < 0.05$) significance level.

Results

Hypothesis I: There is no significant difference between parent education and junior secondary school (JSS) student achievement in English Grammar

Table 1: Two-way Anova of Parent Characteristics and Junior Secondary School (JSS) Students' Achievement in English Grammar.

	Df	Sum Sq	Mean Sq	Fvalue	Pr (>F)
Parent	4	331.9	83.0	4.553	0.00217 **
Student	2	1235.3	617.6	33.897	1.22e-11***
Par Inc:Par	5	156.2	31.2	1.715	0.13946
Residuals	88	1603.5	18.2		
<hr/>					
Significant at	0.5	0.001	0.01	0.05	0.1 1

Table 1 shows the result of a two-way ANOVA analyzing the interaction of parent socio-economic status which was measured using their income on junior secondary school (JSS) students' achievement in English grammar. Based on the result of the p-values and a significance level of 0.05, it can be observed that parent income was significant ($F=4.55$; $P=0.00$) indicating that to an extent the different levels of income earned by parents plays a role in the outcomes of their children in English Grammar.

Hypothesis II: There is no significant difference between parent socio-economic status and junior secondary school (JSS) student achievement in English Grammar.

The result from Table 1 revealed that parent education status ($F=33.89$; $P=1.22e-11$) is highly significant. This means that the different levels of education attained by parents are associated with their children achievement in English Grammar.

Hypothesis III: There is no significant interaction of parent education and socio-economic status on junior secondary school (JSS) student achievement in English Grammar.

As presented in Table 1, the result shows the interaction effect of parent education and parent socioeconomic status ($F=1.71$; $P=0.13$). This means that the association between parent socio-economic status which is measured by their level of income and parent education on junior

secondary school (JSS) student achievement in English Grammar is not significant.

Since the ANOVA test of parent education and income is significant, multiple pairwise comparison was carried out to check if the mean differences between certain pairs of groups are statistically significant. In this case, Tukey HSD (Tukey Honest Significant Differences, R function: Tukey HSD was computed. The Tukey HSD test was performed on parent income and education variable to check the mean difference between groups.

Table 2: Turkey HSD multiple pairwise comparison on parent income

	Diff	Lwr	Upr	P adj
1-0	-0.48	-12.46	11.	0.99
2-0	3.00	-9.14	15.	0.95
3-0	3.22	-9.30	15.	0.95
4-0	-3.00	-16.02	10.02	0.96
2-1	3.48	0.58	6.3	0.01
3-1	3.70	-0.53	7.94	0.11
4-1	-2.51	-8.04	3.01	0.71
3-2	0.22	-4.45	4.89	0.99
4-2	-6.00	-11.86	-	0.04
4-3	-6.22	-12.85	0.4	0.07
	<i>Below 50,000; 2=50,000-100,000; -200,000; and above 3=101,000 4=200,000</i>			

Table 3:	: Turkey HSD	pairwise	on parent	
	multiple	comparison	education	
	Diff	Lwr	U	P adj
1-0	-4.53	-15.91	6.85	0.72
2-0	-0.29	-11.61	1	0.99
3-0	4.19	-7.16	1	0.76
2-1	4.23	1.45	7.01	0.00
3-1	8.72	5.80	11.64	0.00
3-2	4.48	1.83	7.13	0.00
	1=Primary, 2=Secondary, 3=Tertiary			

Table 2 shows the result of Turkey's Honest Significant Difference (HSD) test for multiple pairwise comparison of parent income to tell where the significant differences are. The table presents the

comparison of the mean performance scores of parent income and parent education. This indicates that parent income level of 50,000-100,000 was statistically significantly different from those below 50,000 income level ($p=0.001 < 0.05$). There was statistically significant difference between income level of 200,000 and above and 50,000-100,000 ($p=0.004 < 0.05$). However, there was no statistically significant difference of income level 101,000-200,000 on any level. It could be concluded that parent income level at 50,000-100,000 was significantly different from those below 50,000 and 200,000 and above.

Table 3 shows the result of the Turkey HSD test for multiple comparison of parent education level which tells where the significant differences differed. The table presents the comparison of the mean performance scores of parent education level. This indicates that parent in secondary level of education was statistically significantly different from those in primary level ($p=0.000 < 0.05$). There was statistically significant difference between tertiary level of education and primary level ($p=0.000 < 0.05$) and also between tertiary level and secondary level of education. It could be concluded that student achievement was significantly different from primary, secondary and tertiary level. In sum, these comparisons reveal that all the three means are significantly different from each other.

Discussion

The researcher explored the influence of parent education and socio-economic status on the students' academic achievement in English Grammar. From the results of the findings, it could be seen that parent's socio-economic status and parents' education are strongly related to high school students' achievement in English Grammar which is significant at 0.05 and interaction at 0.02.

It was found in this study that parents' education significantly influenced students' performance in English Grammar. This means students whose parents were educated contributed to their academic achievement. This also supported the findings of Ariani and Ghafournia (2016) that parents' socioeconomic characteristics mark an important factor in learners' outcomes. Thus, parents' education to a great extent, influenced students' performance in English language. When Parents apply their education and socio- economic status ability on their children's academic, it helps to improve their performance in English

grammar. Learners whose parents have higher education knows the value of educational materials and provide them accordingly because they believe that educational materials promote their children's learning interest and leads to improved academic achievement (Hamid, 2011). It is believed that students who perform better come from families with high educational level that have more contact with English in varied ways Anderson, (2013). As a result, parents who have attained higher educational level and are in the category of high socio-economic status will be able to afford their children's education in high schools with qualified teachers (Rugemalira, 2006). In these schools, just like homes, learners have a high chance of using good English leading to improved class participation and discussion.

The study is in line with the findings of Ogunshola and Adewale (2012) observation, that parents' education level is a predictor of children's performance in English language because parents with higher level of education are equipped with the ability to provide a supportive learning environment. Parents effectively support their children's education when they believe that their role of helping in educating their children is vital. As revealed by Amponsah et al (2018), students whose parents are educated, communicate with their children school work, activities and instruction disseminated at school. Such parents influence endorsement to introduce their children to learn English at earlier ages and they get to master it as they grow (Rugemalira).

Parent socio-economic status is associated with student academic achievement as revealed in the study. This mean that a student from low socio-economic families where academic needs such as availability of educational resources are not always provided results in poor performance. The result is in line with Duncan and Brooks-Gunn (2020) in Nyamubi (2019) found that poverty limits family's ability to provide a comfortable and protective home environment as children from poor families live in poor houses where they are not provided with adequate learning materials such as table, chair or books. This, arguably, limits learners' learning and performance in English language. In relation to the above result, Ariani and Ghafournia (2016) found that socio-economic backgrounds contribute to students' academic performance in school subjects. The study also revealed that when learners are exposed to adequate educational resources, it helps them to learn and retain what

they have learnt. It is argued that learners whose parents have high socio-economic status know the value of educational materials and provide them accordingly because they believe that educational materials promote their children's learning interest thereby leading to improved academic achievement (Hamid, 2011). In this regard, parents with a higher socio-economic status prepare their children for school more adequately and stand in a better position to succeed in their studies than those from the lower status (Kakumbi et al 2016, Vellymalay, 2012; and Pillay 2017). Another socio-economic factor that facilitates students' English language learning is parental involvement. Parents encourage school success among learners in a way that provides structures that are conducive for learning (Hamid, 2011). They also make decisions such as how much time to spend with their children as well as how much income to give for their children's education (Khair, 2014).

It is revealed in the study that English plays a vital role in students' academic achievement. Students' performance in English as a school subject also relies on parents' education in their academic activities to attain higher level quality in academic success because they understand the importance of education (Hamid, 2011). It is therefore very vital that parents' education and socioeconomic status as an influencing factor of students' learning be addressed when planning education for sustainable development

Conclusion

Based on the findings of the study, which centered on students from varied backgrounds depending on their parent education and socio-economic status, their achievement in English grammar differs. This means that parent characteristics have a role to play in students' learning outcomes. Parents with high educational level and socio-economic status understand the value of education and the importance of providing educational resources to their children than those with low education and socio-economic status. Therefore, from the findings of the study it is revealed that parent education and socio-economic status significantly influence junior secondary school (JSS) students' achievement.

Recommendations

- It is recommended that parents' education and socio-economic status should not hold back learners from being exposed to the English

language learning environment in school and at home. To achieve this, schools and parents can work together to facilitate realization of learners' English language learning aspiration. Extra coaching either one-on-one or after school can also be helpful to achieve this.

- Also, irrespective of learners' differences in their family background, teachers should help students to gain proficiency in English by engaging more in speaking and using it often in school, during instruction or social activities.
- Ministry of Education can contribute to helping students attain mastery in English Grammar by providing the schools with relevant text for efficient and effective instruction.

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**LECTURERS SELF-ASSESSMENT SKILLS AS A
CORRELATE OF ACADEMIC ACHIEVEMENT OF
EDUCATIONAL PLANNING AND POLICY
POSTGRADUATE STUDENTS IN UNIVERSITY OF
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Abstract

The researchers examined the relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and Policy postgraduate students in the University of Nigeria, Nsukka. Two research questions and two hypotheses tested at 0.05 level of significance guided the study. A correlation survey research design was adopted for the study with a total participant of 37 lecturers (25 males and 12 females) drawn through a convenient sampling technique. Lecturers' self-assessment skills Questionnaire (LSASQ) and students' gross point average (GPA) proforma were instruments used for data collection and face validation was established. The student's GPA across all the master's courses served as the achievement score. The internal consistency reliability of the LSASQ was established using Cronbach reliability estimate and a coefficient

of 0.84 was obtained. The data collected were carefully analyzed using regression analysis to answer the research questions while ANOVA was used to test the hypotheses. Results showed a low positive relationship between lecturers' assessment of self-skills and academic achievement of Educational Planning and Policy postgraduate students. The amount of variation in lecturers' assessment of self-skills and academic achievement of Educational Planning and Policy postgraduate students is statistically significant. It was also revealed that there is a low positive relationship between the moderating influence of gender on students' academic achievement that can be attributed to lecturers' self-assessment skills. Based on the findings of the study, it was recommended amongst others that government should provide free training on necessary skills for university lecturers.

Keywords: Academic Achievement, Self-Assessment skills, Students, Lecturers, and Gender

Introduction

Effective teaching and proper evaluation of students' learning and academic progress are crucial components of academic success. Lecturers play a major role in informing and shaping the academic journey and progress of students. One major responsibility of lecturers which by implication extends to all teachers is the evaluation of students' learning. This evaluation requires lecturers to possess certain skills that would enable them to be proficient in executing their duties. The ability of lecturers to self-assess their skills is a crucial factor in ensuring high-quality education. Although extensive research exists on various factors that determine students' achievement, the relationship between lecturers' self-assessment skills and the academic achievement of students remains under-researched.

Assessment is a key component of education. It is an integral part of every teaching and learning engagement and it provides feedback on instructional pedagogies and learning progress (Agah & Charles., 2022, Oguguo & Ocheni, 2023). It involves gathering data or information from different sources, with the intention of finding out about instructional efficacies and students' learning (Hanna & Dettmer as cited in Agah, Nwani, Asanga, Ezeanya & Ukwueze., 2021). The skills to conduct effective assessment are crucial for lecturers, not just to evaluate students,

but also for self-evaluation. Evaluating oneself will allow lecturers to assess their self-development and instructional efficacies. This is possible if lecturers possess the required self-assessment skills.

The assessment of self-skills is an important aspect of lecturers' professional development. Self-assessment skills are the skills required by individuals to accurately assess or evaluate their strengths and deficiencies (Regehr, Hodges, Tiberius, & Lofchy, , 1996). These skills are required by lecturers to enable them to adequately evaluate their professional development and pedagogical competencies, including students' learning. Augusta University (2024) sees lecturer self assessment skills as tools or means that lecturers use to measure or evaluate their teaching performance against their goals or instructional objectives. It revolves around clarifying questions concerning their teaching methods and pedagogical competencies, and the impact that it has on what and how the students are learning. It emphasizes collecting and analyzing relevant information and data for the purpose of evaluating lecturers' strengths and areas of deficiencies. Yoder et al. (2018) describe lecturers' self-assessment skills as tools meant to provide lecturers with the opportunity to reflect on their social, emotional and professional development, to create the conditions necessary for learning, and for leaders to help create the working conditions that lecturers need to support learning and lived experiences. Adding to the provided definitions above, lecturer self-assessment skills is concerned with the ability of lecturers to evaluate their professional and pedagogical skills for the purpose of improving instructional delivery, assessment, and students' learning or performance. It is a systematic review by lecturers on the teaching, learning, and assessment process or experiences within the classroom.

According to the Pennsylvania Department of Education (2024), self-assessment skills help lecturers reflect upon their current teaching experiences or practices that impact student social-emotional learning (SEL), and their own SEL competencies to implement those teaching experiences and practices. These self-assessment skills provide lecturers with the mechanisms to reflect on their own SEL competencies, and to consider what impacts their capabilities. It also provides lecturers with reflective feedback that can be used as part of their professional development and evaluation plans. According to Augusta University (2024), lecturers can perform self-assessment by observing themselves

through video recordings, compiling portfolios containing lesson plans and sample materials, journaling their experiences through the school year-both good and bad, peer observations, and more. Adopting the skills of self-assessment can empower lecturers to gain insights, identify growth areas, and improve their overall effectiveness. It has been argued that when self-assessment is effectively carried out, it significantly impacts the academic achievement of students (McDonald & Boud, 2003).

Academic achievement is an important indicator in the field of education. Okeke et al. (2022) define academic achievement as the extent to which learners attain the required academic goal after teaching and learning have taken place. It demonstrates learners' ability to meet up with the required learning objectives. Academic achievement does not completely imply academic success as low academic standing also translates to academic achievement (Ocheni, 2021). Oguguo et al. (2022) describe academic achievement as scores, grades, and other learning outcomes that students are able to acquire after being exposed to instructions. From the foregoing definitions, academic achievement could be further explained in this study as numerical values, grades, scores, or skill output that are used to quantify or explain a student's level of success or failure. The academic achievement of students has been linked to so many teacher-related variables, one of which is lecturers' self-assessment skills. Adopting self-assessment allows lecturers to evaluate their learning, devote more time to teaching, and devise enhanced pedagogical approaches which could lead to improved learning and academic achievement of students (Ustabilut, 2021). Karaman (2021) reported from a meta-analysis study that the technique of self-assessment by students has a significant impact on the academic performance of students. In addition, the study by Sharma, et al. (2016) and Yan et al. (2021) reported that when students conduct self-assessment, it significantly improves their academic achievement. The results of these studies demonstrate that self-assessment improves students' achievement but these studies have focused on students' self-assessment, indicating that there are not enough studies that have examined the relationship between lecturers' self-assessment skills and students' academic achievement, especially among Educational Planning and Policy Postgraduate Studies in the University of Nigeria, Nsukka. This is why this present study is required. While investigating the relationship between lecturers' self-assessment skills and students'

achievement, it is also important to consider the moderation of gender on the relationship.

Gender is an important factor to consider in the field of education. It plays a major role in influencing teaching and learning processes (Ocheni, Nwatu, Vita, Ezugwu, Agah, Oguguo, Ekwulugo & Nwatu, 2025). Oguguo & Ocheni (2022) defined gender as a concept that society constructed to differentiate the behavior, roles, attitudes, and characteristics of males and females. This definition demonstrates that gender is a social characteristic that can be used to identify an individual on the basis of male or female. According to (Ocheni, 2024; Oguguo & Ocheni, 2022), gender influences teachers' skills such as their pedagogical competencies. This indicates that lecturers' self-skills assessment can be influenced by their gender. Liang et al. (2024) reported that the influence of gender on the relationship between self-assessment skills and academic achievement is not significant. On the contrary, Kornmehl Patel., Agrawal, Harris, Ba, & Ohyama. (2021) found that gender significantly influences the relationship between self-assessment skills and the performance of students. The results demonstrate that debate exists on gender differences concerning the relationship between the achievement of students and self-assessment.

To address the disparity in the findings, further investigation is required to ascertain whether or not a relationship exists between lecturers' self-assessment skills and academic achievement and to find out whether gender moderates this relationship among Educational Planning and Policy postgraduate students at the University of Nigeria, Nsukka. Specifically, this study answered the following research questions:

1. What is the relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and Policy Postgraduate Students?
2. What is the moderation of gender on the relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and Policy Postgraduate Students?

Hypotheses

H₀₁: There is no significant relationship between lecturers' self-assessment skills and academic achievement of Postgraduate Educational Planning and Policy Students.

H0₂: There is no significant moderation of gender on the relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and Policy Postgraduate Students

Research Methods

This study adopted a correlation research design because it investigated the relationship between lecturers' assessment self-skills and students' academic achievement. The study was conducted at the Department of Educational Foundations, Faculty of Education University of Nigeria, Nsukka (UNN), Enugu State. The population of the study comprised of 37 lecturers (25 males and 12 females) of the Educational Planning and Policy unit at the University of Nigeria, Nsukka, and all postgraduate (master's) students of Educational Planning and Policy at the University of Nigeria, Nsukka for the 2021/2022 academic session. The convenient sampling technique was used for sample selection because the purpose of the study is to investigate only lecturers and students of Educational Planning and Policy at UNN. The Lecturers' Self-Assessment Skills Questionnaire (LSASQ) and students' gross point average (GPA) proforma for collection of students' GPA were self-developed instruments used for data collection. Lecturers' Self-Assessment Skills Questionnaire (LSASQ) has 25 items with 5 scale points on Never (1 point), Rarely (2 points), Sometimes (3 points), Often (4 points) and Always (5 points). The instruments were validated by three experts, two from the Educational Planning and Policy unit and one from the Measurement and Evaluation unit, all from the Faculty of Education, University of Nigeria, Nsukka. The reliability of LSASQ was evaluated to be .84 using the Cronbach alpha method after pilot testing on a sample of 20 Educational Planning and Policy lecturers from a federal university in South-East, Nigeria. The face-to-face method of data collection was used in collecting the data for the study to ensure that the LSASQ instrument was duly filled and returned on the spot, after which the GPA was collected from the office of the secretary Educational Foundations Department. The collected data were subjected to analysis using regression analysis to answer the research questions. Analysis of variance (ANOVA) was used to test hypothesis one at a level of .05 significance, while hypothesis two was tested using the associated t-value with an exact

probability value for moderation analysis with process macro by Andrew Hayes. The null hypotheses were rejected if the associated probability value was less than .05, otherwise, not rejected.

Results

Research Question One: What is the relationship between lecturers' self-assessmentskills and academic achievement of Educational Planning and Policy Postgraduate Students?

Table 1: Regression analysis of the relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and Policy Postgraduate Students

Variable	N	R	R ²
Self-assessment Skills / Student Achievement	37	0.518	0.269

Table 1 revealed that the correlation between lecturers' self-assessmentskills and academic achievement of Educational Planning and Policy Postgraduate Students is 0.52. This means that there is moderate positive relationship between lecturers' self-assessmentskills and academic achievement of Educational Planning and Policy Postgraduate Students. The coefficient of determination associated with the correlation coefficient of 0.52 is 0.27. The coefficient of determination (0.27) shows that 27% of the variation in academic achievement of Educational Planning and Policy Postgraduate Students is attributed to lecturers' self-assessmentskills. This is an indication that 73% of the variation in academic achievement of Educational Planning and Policy Postgraduate Students is attributed to other factors other than lecturers' self-assessmentskills.

Hypothesis (H₀₁): There is no significant relationship between lecturers' self-assessmentskills and academic achievement of Educational Planning and Policy Postgraduate Students.

Table 2: Analysis of variance of the relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and Policy Postgraduate Students

Model	Sum of Squares	df	Mean Square	F	Sig.	Decision
Regression	8687.313	1	8687.313			
Residual	23626.785	35	675.051	12.869	0.001	Significant
Total	32314.105	36				

Table 2 shows that an F-ratio of 12.869 with an associated exact probability value of 0.001 was obtained. Since a probability value of 0.001 is less than 0.05 level of significance set as the benchmark for decision-making on testing the hypothesis, the null hypothesis was rejected. Therefore, the inference drawn is that the relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and Policy Postgraduate Students is statistically significant.

Research Question Two: What is the moderation influence of gender on the relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and Policy Postgraduate Students?

Table 3: Regression analysis on the moderating influence of gender on the relationship between lecturers' self-assessment skills and the academic achievement of Educational Planning and Policy Postgraduate Students

Interaction	R	R ²	SE	T	p	Decision
Gender	0.343	0.18	0.46	0.43	0.003	S

Table 3 revealed the moderating influence of gender on the relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and Policy Postgraduate Students. The result showed the correlation coefficient for the relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and Policy Postgraduate Students as moderated by gender is 0.34. This implies a positive relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and

Policy Postgraduate Students as moderated by gender. The coefficient of determination is 0.18, which indicates that 18% of academic achievement of Educational Planning and Policy Postgraduate Students is attributed to lecturers' self-assessment skills as moderated by gender.

Hypothesis (H₀₂): There is no significant moderating influence of gender on the relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and Policy Postgraduate Students.

The result in Table 3 indicates the moderating influence of gender on the relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and Policy Postgraduate Students. The result revealed that a t-value of 0.43 with an associated exact probability value of 0.003 was obtained. Since the probability value of 0.003 is less than 0.05 set as the level of significance, the null hypothesis which stated that there is no significant moderating influence of gender on the relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and Policy Postgraduate Students is rejected. Thus, the inference drawn is that there is a significant moderating influence of gender on the relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and Policy Postgraduate Students.

Discussion of Findings

The study revealed that there is a moderate positive relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and Policy Postgraduate Students. The study also revealed that the relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and Policy Postgraduate Students is statistically significant. This indicated that lecturers' self-assessment skills have a moderate influence on the students' academic achievement. However, there are other factors that can contribute to the poor academic achievement of students. The finding of the study is in agreement with the study of Karaman (2021) who reported from a meta-analysis study that the technique of self-assessment by students has a significant impact on the academic performance of students. In addition, the study by Sharma, et al. (2016) and Yan et al. (2021) reported that when students conduct self-assessment, it significantly improves their academic

achievement. To the best of the researchers' knowledge, no previous study is in disagreement with the findings of this study.

The study also revealed that there is a positive relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and Policy Postgraduate Students as moderated by gender. Also, there is a significant moderating influence of gender on the relationship between lecturers' self-assessment skills and academic achievement of Educational Planning and Policy Postgraduate Students. The result of the study is in support of the study of Oguguo and Ocheni (2022), that gender influences teachers' skills such as their pedagogical competencies, which indicates that lecturers' self-skills assessment can be influenced by their gender. This finding is also in agreement with the study of Kornmehl et al. (2021) which found out that gender significantly influences the relationship between self-assessment skills and the performance of students. The result of this study is in disagreement with the study of Liang et al. (2024) which reported that the influence of gender on the relationship between self-assessment skills and academic achievement is not significant.

Conclusions

From the findings of the study, it was concluded that effective lecturers' assessment of self-skills will improve the student's academic achievement. Lecturers' assessment of self-skills will make the students to achieve high on what they are supposed to achieve. The results also demonstrated that gender has a significant influence on the relationship between lecturers' assessment of self-skills and students' academic achievement.

Recommendations

From the findings of the study, the following recommendations were made:

1. Government should provide a policy and manual on lecturers' assessment of self-skills.
2. There should be training for pre-service teachers while in school to equip them with all the necessary knowledge needed to be a great teacher.
3. The government should provide educational necessities to improve teaching and learning.

4. Educational Planning and Policy lecturers should consider self-skills as capable of affecting achievement.
5. Only qualified lecturers should be employed in order to improve achievement.

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ASSESSMENT OF THE RELATIONSHIP BETWEEN STUDY HABITS, TEST ANXIETY AND ACADEMIC PERFORMANCE AMONG TERTIARY INSTITUTION STUDENTS IN MAIDUGURI METROPOLITAN

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Abstract

The study examined relationship between study habits, test anxiety and academic performance in tertiary institution Maiduguri, Borno State, Nigeria. Two objectives were set and two null hypotheses were tested at 0.05 alpha level of significance. The purpose of the study was to; determine the prevalent study habits among tertiary and assess the levels of test anxiety experienced. A correlational research design was utilized in this study to examine the relationships between study habits, test anxiety, and academic performance among tertiary institution students in Maiduguri, Borno State. The study used stratified sampling technique to select a sample of 220 students, and data were collected using a structured questionnaire validated by educational experts, with the Cronbach's Alpha coefficient reliability of .781. The obtained data were analysed using frequency and percentage in answering research questions while PPMC was used for research hypotheses. The findings of the study found that inadequate study habits and prevalent test anxiety are common among tertiary institution students. It also revealed significant relationships between both study habits and test anxiety with academic performance. The study concluded that effective study habits and managing test anxiety are crucial for improving academic performance among tertiary institution students. Based on the results of the study the researcher

recommended that, there is a need for school management and government to organize workshops to improve study techniques and time management skills for tertiary students, there is a need for Ministry of Education to establish support programmes to help students cope with test anxiety during exam periods. There is a need for government to integrate stress management strategies into the curriculum to alleviate test anxiety among tertiary students.

Keywords: Assessment, Study habit, Test anxiety, Academic performance, Tertiary institution.

Introduction

If a toddler that is just starting to walk falls down, they will first look up at the grown-ups around to see their reaction to the falling incidence. Often, if the grown-ups show signs of distress or worry, the toddler will become upset and start to cry, but if the grown-ups are cheerful, encouraging, and confident, the toddler will usually get right back up and start walking again. The reactions of the grown-ups are the relationship between study habits, test anxiety and academic performance. How confident and prepared a student study will either increase or decrease test anxiety and also enhance academic performance either positive or negative.

According to Alkharusi (2018) study habits among tertiary students encompass the diverse set of behaviors and routines they employ to enhance their learning experience. These habits may include effective time management, strategic note-taking, preferred study environments, and the utilization of various resources.

In tertiary institutions, students develop a diverse array of studying habits tailored to their individual learning preferences and academic requirements. Effective time management is a common habit, where some students meticulously schedule study sessions, prioritizing tasks and deadlines to maintain a balanced workload.

Test anxiety in tertiary institutions encompasses various dimensions, each presenting unique challenges for students. Cognitive test anxiety often manifests through negative self-talk and anticipatory doubts about one's capabilities. Students experiencing this form of anxiety may struggle with memory blanks, impeding their ability to recall information studied for exams. Emotional test anxiety, on the other hand, brings about

intense feelings of fear, restlessness, and irritability, influencing students' emotional well-being. Physiologically, test anxiety can result in a range of physical symptoms, including sweating, trembling, increased heart rate, and gastrointestinal discomfort. Headaches, dizziness, and nausea may also surface as physical manifestations of heightened stress levels (Okoye, 2023b).

According to Collins (2012) behavioral manifestations of test anxiety include procrastination and avoidance. Some students, under the pressure of upcoming exams, may delay their preparation, contributing to increased anxiety. Situational test anxiety may center around performance apprehension, becoming more pronounced in specific testing situations such as oral exams or timed assessments. Social evaluation anxiety adds a layer of concern about how one's performance will be perceived by others, coupled with the potential for unfavorable comparisons with peers. Communication apprehension may be particularly relevant in oral exams or presentations, where students fear judgment or scrutiny. Perfectionism-driven anxiety introduces fears of imperfection and mistakes, accompanied by excessive self-criticism that may adversely impact academic performance.

Nwamuo (2017) conducted a study on Appraisal of the level of test anxiety among tertiary education students: A case of Alvan Ikoku Federal College of Education, Owerri, Imo State, Nigeria. The study employed a cross-sectional survey design to investigate the levels of test anxiety among students in tertiary institutions. The population consisted of all students enrolled in various programs at a selected university, and a sample of 500 students was randomly selected. The Test Anxiety Inventory (TAI) was used as the research instrument to assess the levels of test anxiety. Data analysis involved descriptive statistics and inferential statistics, including the t-test and ANOVA, to compare the mean scores of test anxiety across different demographic groups. The major findings indicated that students experienced moderate levels of test anxiety, with a significant difference in anxiety levels between male and female students. The study concluded that test anxiety is a significant concern among tertiary institution students and recommended that institutions incorporate strategies to mitigate test anxiety, such as stress management workshops and relaxation techniques, to enhance student well-being and academic performance.

Thiriveedhi (2023) conducted a study on the Assessment of Anxiety and Its Effects on Students Taking the National Eligibility cum Entrance Test for Undergraduates (NEET-UG) 2020. Test anxiety is a prevalent yet often underestimated mental health issue, particularly among students facing high-stakes examinations. In societies where an individual's future is determined by exam performance, the associated stressors, including test anxiety, academic-related depression, and general stress, are not adequately addressed. This study focuses on assessing anxiety levels and their impact on the mental well-being of students preparing for the National Eligibility cum Entrance Test for Undergraduates (NEET-UG) in 2020. A cross-sectional study involving 200 students from a private junior college participating in the NEET-UG 2020 exam was conducted using the Westside Test Anxiety Scale questionnaire. Statistical analysis of the obtained results was performed using SPSS Statistics version 25. The findings revealed that 75.5% of the students experienced stress before the exam, while 24.5% did not report stress. Notably, the study highlighted that a significant proportion of students did not seek professional assistance or counselling to address their mental health challenges or boost their morale. In conclusion, the study emphasizes that a majority of students faced academic performance difficulties due to test anxiety, with such effects being prominent regardless of age or gender. The lack of professional psychological support, guidance, and healthcare professionals in educational institutions exacerbates these challenges. The study underscores the importance of implementing measures such as professional counselling and healthcare services within institutions to effectively address the mental health needs of students, ultimately leading to improved outcomes.

Ismail et al., (2023) conducted a study on measurement of exam anxiety levels among medical students and their association with the influencing factors. Medical education is inherently challenging, often leading to heightened exam anxiety among students. This cross-sectional study aimed to assess anxiety levels among third- to sixth-year medical students and explore potential associations with gender, age, grades, study time, year of study, and learning methods. Participants completed a questionnaire covering personal information, studying methods, and the Westside Test Anxiety Scale, focusing on anxiety levels before final examinations during the 2020-2021 academic year. Data were analysed

using SPSS. Results revealed a significant association between gender and high-test anxiety ($p < 0.001$), with females experiencing a higher prevalence (47.9%) compared to males (22.5%). Although non-significant, higher prevalence was noted among 20-year-olds (34%) and those with a GPA of 4.00-4.49 (37.9%). Anxiety levels decreased with academic progression (37.9% in the third year to 9.1% in the sixth year, $p=0.073$), and students studying five days or more per week reported lower anxiety (26.7%). No significant difference was observed between individual and group study methods. Although not statistically significant ($p=0.754$), learning through textbooks was associated with lower stress levels (29% vs 33%). In conclusion, this study suggests that average-performing and female medical students are more susceptible to high-test anxiety. Progression to senior years and the use of textbooks were associated with lower anxiety levels. The findings highlight the need for a cohort longitudinal study to establish specific factors' association with anxiety levels in medical students.

Sujit (2016) reported a study on Effect of Students' Perceptions of Course Load on Test Anxiety. This study aimed to explore the association between student perceptions of course load, their ability to manage time, and test anxiety within the Doctor of Pharmacy (PharmD) curriculum at the University of Houston. A self-administered survey was distributed to students in professional years 1 through 4, encompassing items measuring test anxiety, perceived course load, and time management abilities. Results from 198 participants (response rates: P1 = 48%, P2 = 52%, P3 = 52%, P4 = 72%) revealed significant differences in students' perceptions of course load, their ability to manage time, and test anxiety scores across the four academic years. The study found a positive correlation between test anxiety and students' perceptions of course load, while a negative relationship was identified with their ability to manage time concerning coursework. In conclusion, this research highlights the association between students' perceptions of course load, time management, and test anxiety within the PharmD curriculum. The findings suggest that addressing stress and time management through programs may be beneficial in mitigating stress and anxiety levels among pharmacy students, emphasizing the need for future studies to evaluate the effectiveness of stress and time management interventions.

The study assessed relationship between study habits, test anxiety and academic performance of Tertiary Institutions students. The researchers being teachers in tertiary institution for many years observed that poor studying habits in time management, lack of prioritizing tasks, poor Note-taking strategies, poor study environments like libraries for focused concentration and avoidance of group study sessions are the perceived issues with study habits. Negative self-talk, anxiousness, over-confidence, fear, nervousness, procrastination and inadequate preparation are some of the perceived test anxieties which subsequently may have negative impact on the academic performance of students in tertiary institutions. Hence, this study examined the relationship between study habits, test anxiety and academic performance of tertiary institution students in Maiduguri Metropolis, Borno State.

The main purposes of the study are to assess the prevalent of study habits and determine the levels of test anxiety experienced by tertiary institution students in Maiduguri Metropolis.

The following research questions were answered in the Study:

- i. What are the prevalent of study habits among tertiary institution students in Maiduguri Metropolis?
- ii. What are the levels of test anxiety experienced by tertiary institution students in Maiduguri Metropolis?

The following research null hypotheses were tested at 0.05 level of significant in the study:

H₀₁: There is no significant relationship between study habits and academic performance of tertiary students in tertiary institutions in Maiduguri, Borno state.

H₀₂: There is no significant relationship between test anxiety and academic performance of tertiary students in tertiary institutions in Maiduguri, Borno state.

Methods

Correlational research design was adopted for this study. The design was adopted for the fact that it is applicable and appropriate to determine relationship between study habits, test anxiety and academic performance of Tertiary Institution students in Maiduguri, Borno State.

The target population for this study was four hundred and forty (440) tertiary institution students from Schools of Health and Information

Technology UMTH, Borno State. Stratified sampling technique was used to select a sample of two hundred and twenty (220) students in the two schools, representing 50% of the population.

The instruments used for data collection was structured questionnaire titled "Study Habit and Test Anxiety (SHTA).The instrument was validated by an expert in the field of Educational Measurement and Evaluation, University of Maiduguri. The questionnaire was structured based on (4) points Likert scale: always, frequently, sometimes, rarely, not at all and were weighted: Always:{4}, Frequently:{3}, Sometimes:{2}, Not at all: {1}.

The collected data were analysed using mean and standard deviation to answer research 1 and 2 while Pearson Product Moment Correlation Coefficient (r) was used to test null hypotheses 1 and 2,

Results

Research Question One: What are the prevalent of study habits among tertiary institution students?

Table 1: Prevalence of Study Habits among Tertiary Institution Students

S/N	Items	Frequencies/Percentages			
		A	F	S	NA
5	I stick to my active reading table	10 (5%)	20 (10%)	100 (50%)	70 (35%)
6	I create time to read my book after lecture?	20 (10%)	30 (15%)	80 (40%)	70 (35%)
7	I do read in the night after every lecture day	30 (15%)	40 (20%)	70 (35%)	60 (30%)
8	I do have and stick to my specific reading technique	40 (20%)	50 (25%)	60 (30%)	50 (25%)
9	I don't procrastinate when it comes to completing assignments and studying for my exams	20 (10%)	10 (5%)	110 (55%)	60 (30%)

Table 1shows the frequencies and percentages of various study habits exhibited by the respondents. The data suggests a mix of both

commendable and less effective practices. For instance, while a minority (20%) adhere to specific reading techniques, a significant number (55%) report procrastinating when it comes to completing assignments and studying for exams. Additionally, although a notable proportion (40%) allocate time for reading after lectures, a similar percentage (35%) adhere to active reading tables. These findings indicate potential areas for improvement in study strategies among students.

Research Question Two: What are the levels of test anxiety experienced by tertiary institution Students?

Table 2: Levels of Test Anxiety Experienced by Tertiary Institution Students

S/N	Items	Frequencies/Percentages			
		A	F	S	NA
10	I feel overwhelmed while preparing for a test or exams	120(60%)	60(30%)	10(5%)	10(5%)
11	I do experience sweating during test and exams	130(65%)	50(30%)	10(0%)	10(35%)
12	I feel anxious about every exam or test I attempted	90(45%)	70(35%)	30(15%)	10(5%)
13	I do experience fear during exams or test	140(70%)	50(25%)	10(5%)	-(-%)
14	I do experience self-doubt during test and exams	80(40%)	80(40%)	10(5%)	10(5%)

Table 2 shows the substantial levels of test anxiety experienced by tertiary institution students, as evidenced by the frequencies and percentages of anxiety-inducing behaviours during exams. The data reveals that a considerable majority of students report feeling overwhelmed while preparing for tests or exams (60%), sweating during exams (65%), anxiety about attempted exams (45%), fear during exams (70%), and self-doubt during tests and exams (40%). These findings indicate a prevalent pattern of test anxiety among the surveyed students.

H₀₁: There is no Significant Relationship between Study Habits and Academic Performance of Tertiary Students.

Table 3: Correlation Coefficient on the Relationship Between Study Habits and Academic Performance of Tertiary Institution Students.

Variable.	N	Mean	SD	df	r	p-value	Remark
Study Habits	200	55.60	10.56	198	0.77	0.009	Reject H ₀₁
Academic Performance	200	41.10	6.154				

Table 3 presents the correlation coefficient between study habits and academic performance. The data, based on a sample of 200 students, demonstrates that the mean score for study habits is 55.60 (SD = 10.56), while for academic performance, the mean is 41.10 (SD = 6.154). The correlation coefficient (r) of 0.77 indicates a strong positive correlation between study habits and academic performance. This correlation is statistically significant, as evidenced by the p-value of 0.009, which falls below the conventional alpha level of 0.05. Therefore, the null hypothesis (H₀₁) is rejected, suggesting that there is a significant relationship between study habits and academic performance among tertiary students.

H₀₂: There is no Significant Relationship between Test Anxiety and Academic Performance of Tertiary Students.

Table 4: Correlation Coefficient on the Relationship Between Test Anxiety and Academic Performance of Tertiary Institution Students.

Variable.	N	Mean	SD	df	r	p-value	Remark
Test Anxiety	200	65.01	11.16	198	0.89	0.003	Reject H ₀₁
Academic Performance	200	41.10					

Table 4 provides the correlation coefficient between test anxiety and academic performance. Based on a sample of 200 students, the mean score for test anxiety is 65.01 (SD = 11.16), while for academic

performance, the mean stands at 41.10 (SD = 6.154). The calculated correlation coefficient (r) of 0.89 denotes a strong positive correlation between test anxiety and academic performance. Importantly, the associated p -value of 0.003 falls below the conventional alpha level of 0.05, indicating statistical significance. Consequently, the null hypothesis (H_0) is rejected, affirming that there exists a significant relationship between test anxiety and academic performance among tertiary students.

Findings

1. There are potential areas for improvement in study strategies among tertiary institutions' students in Maiduguri Metropolis, Borno state.
2. There is prevalent pattern of test anxiety among tertiary institutions students in Maiduguri Metropolis, Borno state.
3. There is strong positive correlation between study habits and academic performance of tertiary institutions students in Maiduguri Metropolis, Borno state.
4. There exists positive relationship between test anxiety and academic performance among tertiary institutions students in Maiduguri Metropolis, Borno state.

Discussion

There are potential areas for improvement in study strategies among tertiary institutions' students in Maiduguri Metropolis, Borno state. The result on the prevalent of study habits among tertiary institution students revealed that reviewing of notes, creating a quiet place, studying in a way that suit personal reading styles, taking regular break while studying and organizing a study group are some of the types of study habits among the students. This agreed with the study carried out by Olutola (2016).

There is prevalent pattern of test anxiety among tertiary institutions students in Maiduguri Metropolis, Borno state. Husain (2000) supported that consistency is a key when it comes to studying, so do your best to make a habit of it! It's a good idea to find a spot-on campus where you feel comfortable and inspired to dive into a successful study session. Kelli (2009) also reported that studying on your own works well for many subjects, but it also might be easier to learn the material if you can bounce ideas off of your course mates. During your first year at college, give

group study sessions a try. There's a good chance your fellow students will be interested in getting together to review course materials. You might discover a new way to study while also making a few new friends. Taking notes during the lecture is a study habit you might already be used to, but do you take the time to review those notes after class? If not, consider reviewing your notes later the same day. Going over your notes after seeing the material in class will improve your memory and can help you more effectively learn the material. This agrees with Hussain (2000).

Study on the levels of test anxiety experienced by tertiary institution students revealed that there is prevalence pattern of test anxiety among tertiary students, as evidenced by substantial frequencies and percentages of anxiety-inducing behaviours during exams. The study correlates with the findings carried out by Nwamuo (2017) who reported that students experienced moderate levels of test anxiety, with a significant difference in anxiety levels between male and female students. The study concluded that test anxiety is a significant concern among tertiary institution students and recommended that institutions incorporate strategies to mitigate test anxiety, such as stress management workshops and relaxation techniques, to enhance student well-being and academic performance.

There is strong positive correlation between study habits and academic performance of tertiary institutions students in Maiduguri Metropolis, Borno state. This study agrees Kudirat (2017) who conducted a study on study habits and academic performance of secondary school students in Mathematics: However, the results revealed that there is significance relationship between note taking, students' use of library, time allocation for study and students' academic performance in mathematics. Based on the result of the findings, it was recommended that group guidance should be organized in schools by professional counsellors in order to create awareness on how students can develop effective study habits which could lead to good academic performance in mathematics and a functional school library should be mounted in all the secondary schools in Uyo Local Government Area of Akwa-Ibom State, Nigeria.

Okesina (2019) who suggested that cultural hindrances to Reading/Study Habits Development of Students in Nigeria Individuals' reading behavior is affected by their cultural differences. People tend to have different perceptions of self and their society. African cultures

assume overt connectivity among individuals. The culture of the people could interfere with their reading habits. Nigerians are perceived as people who like talking and interacting socially when they are in the company of one another. They prefer listening and chatting to reading. However, there are exceptions in which people prefer to keep to themselves. In this regard, the person could disassociate from social interaction and engage in something meaningful (such as reading).

Conclusion

The findings from the study concluded that there is lack of adherence to effective study habits, prevalence of test anxiety. The study concludes that there are significant relationships found between study habits and academic performance, as well as between test anxiety and academic performance. From this study, we can understand that how students' study and their feelings during exams are closely linked to how well they perform academically. Overall conclusion showed that for students in Maiduguri, Borno State, it's important to develop good study habits, manage test anxiety, and seek support when needed, as these factors significantly impact their success in school.

Recommendations

Based on the study the following recommendations were made:

- i. There is a need for school management and government to implement workshops to improve study techniques and time management skills for tertiary students in Maiduguri.
- ii. There is a need for Ministry of Education to establish support programmes to help students cope with test anxiety during exam periods.
- iii. There is a need for government to integrate stress management strategies into the curriculum to alleviate test anxiety among tertiary students.
- iv. There is a need for government to provide resources and counseling services to support students in developing effective study habits and reducing procrastination.

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**FACTORIAL VALIDATION OF AN INSTRUMENT
TO MEASURE STUDENTS EXAMINATION
MALPRACTICES QUESTIONNAIRE AMONG
SECONDARY SCHOOL STUDENTS IN
CROSS RIVER STATE, NIGERIA.**

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Abstract

This study is concerned with the development of instrument for the measurement of examination malpractices behaviour among secondary school students in Cross River State. The researchers raised two research questions for the study. A self-developed instrument called Student's Examination Malpractices Questionnaire (SEMQ) was constructed. Stratified and simple random sampling techniques were adopted in this study. A total of 41 secondary schools were used out of 274 public schools.

The sample of the study consisted of 2,211 students drawn from the population of 18, 433 students in public secondary schools. They were 8,934 males and 9,499 females that form the sample of the study. The statistical techniques used in analyzing the data were factor analysis. The reliability employed was Cronbach's alpha and the values show that the instrument was reliable which ranges from 0.78 – 0.98 respectively. The outcome of factor analysis indicates that communalities for majority of the items loaded well above .40. These results made the researcher to recommend among others, that the final 28 items instrument of SEMQ is a valid and reliable scale which should be used in all the secondary schools in Nigeria.

Key words: Item development, Validation, Examination malpractices, Questionnaire, reliability, Factor Analysis.

Introduction

Exams malpractices is one of the menace in our society which is a form of corrupt practices among the delinquent that involves leakages, usage of unauthorized materials and machines (phones), as well as disclosing answers of exams/test questions during the examinations. According to Dien, Oyo-Ita and Ari (2022) asserts that one wonders if the cause is as a result of lapses on the part of teachers to prepare their students for this higher tasks. Furthermore, they reported that “the attribute of teachers is being queried as student's outcome over the years are so poor and a thing of concern. Secondary school students in most cases perform poorly in internal and external examinations and sometimes cannot defend their certificate. To that effect, most students resort to examination malpractices if not for anything but to circumvent failure.

There are several root causes that lead to the prevalence condition of examination malpractices in Nigeria ranging from the negligence of students, teachers, parents, government as well as the genera pubic. Ari and Ojong (2024) commented that most students including the higher learning education are still very familiar with the use of obsolete insufficient learning materials and also non-compliant in the use of ICT resources. They further lamented that due to the high cost of ICT facilities such as laptops, projectors, iphones, android phones, internet facilities, desk tops, that could have help students build up knowledge, they rather cannot afford these ICT resources thereby making the students novices in their academics which tantamount to huge failures in the academic

performances, hence, generates to examination malpractices. On the other hand, Balogun (2021) cautioned on “the need of adopting proactive measures to minimise the use of mobile phones during examinations”.

Examination malpractices has been the bane in secondary education ranging from different forms of it such as whispering, eye contact, giraffing which refers to stretching one’s neck with intention of stealing from another person, laps/hands write ups, use of cell phones, sorting, writing examination for another person, forgery of examination slips, writing question answers on the chalk board, hiding exams materials inside the caps and clothes / pockets, throwing answers through the windows to the hall usually known as “Missiles”, maintaining sitting arrangement with accomplices that specializes in exams cheating etc. This in turn affects the proper functioning of the educational system. The major problem calling for this study is that, there were not much local instruments that will measure examination malpractices especially in Cross River State to address the problems. Recently, there is an outcry by the universities lecturers calling the attention of every Nigerian teacher to stop exams malpractices in secondary schools. The argument is that university students cannot read textbooks to their understanding, write even a common letter nor solve common arithmetic that was meant for a primary school pupil. This is a very disheartening situation in the country of Nigeria. Few instrument developers on exams cheating/malpractices lack the right procedures in pilot testing, item construction, item selection as well as item banking, in redressing the affective domain component which has been ignored over the years. Hence, the recent results or outcome in secondary schools today regarding cheating is escalating like a wild fire, therefore requires a study of item development and validation on examination malpractices to guide all the stakeholders attack this contemporary social problem.

Ossai, Ethe and Edougha (2020) conducted a study which focuses on tendency of cheating and adopted Tertiary Examination Behaviour Inventory (TEBI). The research design that was expo facto and test-retest reliability was used. Findings explained that factors added 62.73% variance in TEBI instrument whereas 84.19 % and 82.82% were the norming. It was concluded that TEDI instrument has met the criteria for reliability, validity and standardization to be a diagnostic scale.

Dajwan, Malwalai, Davou, Mandung, and Davou (2021) carried out a research on causes of examination malpractices in Nigeria. An instrument known as “A Threat to Educational Reform in Tertiary Institutions in Nigeria Questionnaire” was used. A sample size of 150 respondents was employed. Simple percentages were adopted as statistics for the study. Finding unfold examination malpractices to be a cancerous epidemic to the learning changes.

Dominic (2021) investigated perceived causes and methods of curbing examination malpractices using ICT in higher institutions in Delta State. Three research questions and a survey research design were employed. The study population of 4003 was utilized. Taro Yamene’s formula was used to select sample of 256 respondents. A reliability coefficient of 0.90 was obtained with frequencies, percentages and means used as statistics. The outcome uncover the value attached to certificate, low intellectual ability, laziness, indolence as the root causes.

Gyamfi (2022) examined an empirical paper to find out the perceived impart of Performance Based Assessment (PBA) on examination malpractices at the SHS level. Descriptive design was employed with 275 mathematics examiners and 321 mathematics teachers from 35 schools formed the sample of the study. The research unfolds that most exams cheating among students occurs as a result of the difficulty of the content topics of each subjects or subjects in question as compared to other subjects with lesser task, hence, a PBA Scale.

Chala and Agago (2022) examined key facts about kinds of cheating and ways of eliminating them in national exams. Forms of Examination Malpractices Questionnaire (FEMQ) was introduced in the study and used on 1,359 respondents. Mean and standard deviation was adopted and was reported that several bodies are to be blamed for exams cheating. Pre-examination malpractices were detected during the stages of setting of items, writing items, printing test format, packing exams booklets, storing and transporting booklets.

The main purpose of this study is to develop and validate items of an instrument for the measurement of examination malpractices of secondary school students in Cross River State.

To embark on this research, the following questions guided the study:

1. To what extent are the reliability coefficients of Student’s Examination Malpractices Questionnaire (SEMQ)?

2. What are the psychometric properties regarding factor loading, communalities estimates, eigen values, and percentage variance of SEMQ?

Methods

The design adopted Instrumentation research design applied as a method for describing the phenomenon under examination. Factor rotation was introduced to allow detailed description of the sub-scale without striving and to point toward an apparent constructive or contrary relationship among the sub-scale and factor (or a lack of no association) when the index is nearer to 0. The population of the study comprises of a total of 18, 433 students in public secondary schools. They were 41 secondary schools out of 274 public schools that form the unit of analysis. Fifteen percent (15%) of the total numbers of schools from each of the seven local government areas which make up Cross River State was selected to ensure equal representation of the schools in the areas. The sample of the study consisted of 2,211 students drawn from the population. The researchers use 12% to determine the sample of students selected from the student's population of 18,433 which was 2,211. It forms 8,934 males and 9,499 females form the sample of the study.

Stratified simple random sampling technique was adopted in this study due to the heterogeneous characteristics of area coverage of the research elements. The technique was mostly based on strata which is applicable to Cross River State with eighteen local government area.

The statistics of factor analysis was used to ascertain the 'construct validity' of the developed scale "Student's Examination Malpractices Questionnaire (SEMQ). Initially, 75 items were constructed and administered to 50 students during preliminary validation for pilot study and a reliability coefficient of 0.84 was obtained. There was a psychometric deletion of items using factor analysis which led to the retention of 50 items during validation.

Results

Table 1: Reliability of Student's Exams Malpractices Questionnaire (SEMQ) showing their means and standard deviation.

ITEMS	MEANS	SD		r
1.	It is our right to cheat because we were not taught the course content.	1.02	.322	.20
2.	Everybody in this part of the world engage in exams cheating	1.32	.336	.24
3.	I really know I do cheat in exams/test with materials.	2.70	.805	.91
4.	I enter the exam hall to cheat with my phone.	2.66	.807	.94
5.	We should be allowed to write exams by entering into the hall with text books.	1.11	.251	.30
6.	I practice sorting by using my money to get high grades.	2.72	.806	.90
7.	Let the government legalize exams malpractices since it has come to stay.	1.33	.265	.34
8.	We bluntly refused to report those that cheat in examinations.	1.60	.405	.40
9.	I still cheat without being caught in the presence of the examiner.	2.69	.807	.93
10.	The thought of failing alone pushes me to cheat in examinations.	2.77	.803	.81
11.	I make sure I see leaked examination papers before entering the exam hall.	2.42	.878	.89
12.	We are not happy with the students that report examination leakages	1.06	.366	.36
13.	I use to involve my friends sit the same place for exam malpractices purpose.	.2.88	.809	.95
14.	We can fight any student that shows the exam syndicate whosoever is cheating.	1.44	.207	.29
15.	Both parents and teachers know that we students cheat in exams	1.22	.221	.32
16.	I pretend to be sick by visiting the rest room to lift answers from materials.	2.98	.843	.98
17.	I and others always distract exams in order to cheat.	2.35	.813	.97
18.	The thought of failing alone pushes me to cheat.	2.52	.876	.93
19.	All of us are very happy to write exams in overcrowded classrooms to enable cheating.	1.04	.205	.34
20.	I like cheating in exams/test to impress my parents.	2.96	.868	.95
21.	To me exams malpractice is a normal thing that have come to stay.	2.66	.816	.93
22.	Most parents contributes to exams malpractices in so many ways.	1.27	.300	.20
23.	I position myself at the window side to receive leaked answers of exams questions.	3.12	.894	.98
24.	We all turn it to be a business to write exams for other people.	1.03	.255	.31
25.	I hide my exams answers inside my cap/ headscarf/hair.	3.33	.835	.88
26.	The challenges I faced with lack of retention made exams malpractices part of me.	2.80	.876	.97
27.	Almost all the schools that caught in examination malpractices escape sanctions.	1.44	.246	.33

28.	Most students hate teachers that abate exam malpractices in school.	2.44	.822	.95
29.	It is good to enter exam hall with leaked answers as part of brain support.	2.48	.871	.94
30.	All schools that cheats bribe and stop the supervisors from being present.in exams.	1.15	.289	.36
31.	I always copy answers on my laps to the exam hall.	3.66	.847	.96
32.	We all use magic pen because of easy cleaning for exams malpractices.	1.11	.218	.37
33.	Principals/proprietors, supervisor's/ examination bodies are all involved in exams cheating.	1.08	.312	.40
34.	My parents seldom appear to defend me when caught in exams malpractices.	2.64	.873	.93
35.	All the students who pass exams cannot read and write because of malpractices.	1.17	.331	.30
36.	All communities are involved in promoting examination malpractices.	1.06	.332	.24
37.	I do enjoy copying exams answers on my palm before entering the exam hall.	2.99	.877	.92
38.	Both students, teachers and parents engage in forgery of result slip to gain admission.	1.18	.254	.38
39.	I and others paid money to supervisors to allow us cheat in examinations.	3.26	.890	.98
40.	All culprits conspire with exams bodies for printing of fake result slip.	1.03	.198	.22
41.	Some school heads with government officials agree to encourage malpractices.	2.53	.811	.80
42.	We all belong to different groups of students for the stealing of exams questions.	1.17	.25	.28
43.	I bribed and pass when I did not sit for examination.			
44.	Exams malpractices of sex for grades is on-going in some schools.	2.77	.805	.86
45.	The scores I have in my results after every examination is not my true ability	2.69	.804	.80
46.	All our friends influences us to depends on brain support before they pass exams.	1.42	.344	.41
47.	I usually write answers on my locker with pen/pencil during exams.	2.69	.855	.88
48.	We cause fight in schools with evil intentions to hijack examination questions.	1.00	.231	.26
49.	I join them to copy exam answers provided for us on the chalk board.	3.14	.895	.94
50.	Someone writes exams for me without being caught.	2.60	.818	.83

Table 1 presents summary of reliability values, their means and standard deviation. The research findings uncover that more than half of the test items had a high reliability in the study. For instance, the reliability of Item 3 (.91), item 4 (.94), Item 6 (.90), item 20 (.95), item 25

(.88) respectively. Items that had low reliability were dropped and considered unsuitable but can be revised and can be useful to teachers and students in their ratings.

Table 2: Factor Analysis of Student's Exams Malpractices Questionnaire (SEMQ)

S/N	Item No	Items descriptions	Factor Loading	Communality Coefficient
1.	3	I really know I do cheat in exams/test with materials.	.811	.949
2.	4	I enter the exam hall to cheat with my phone.	.830	.972
3.	6	I practice sorting by using my money to get high grades.	.438	.754
4.	9	I still cheat without being caught in the presence of the examiner.	.815	.960
5.	10	I always ask for answers from my colleagues in the examination hall.	.403	.661
6.	11	I make sure I see leaked examination papers before entering the exam hall.	.786	.825
7.	13	I make sure that I involve my friends sit the same place for exam malpractices purpose.	.819	.940
8.	16	I pretend during exams to be sick by visiting the rest room to lift answers from materials.	.621	.866
9.	17	I and others always distract exams in order to cheat.	.773	.885
10.	18	The thought of failing alone pushes me to cheat.	.644	.974
11.	20	I like cheating in exams/test to impress my parents	.873	.983
12.	21	To me exams malpractice is a normal thing that have come to stay.	.627	.951
13.	23	I position at the window to receive leaked answers of exams questions.	.787	.799
14.	25	I hide my exams answers inside my cap/ headscarf/hair.	.632	.939
15.	26	The problem I faced with lack of retention lead me to exams malpractices.	.862	.963
16.	28	Most students hate teachers that abate exam malpractices in school.	.869	.972
17.	29	It is good to enter exam hall with leaked answers as part of brain support.	.520	.723
18.	31	I always copy answers on my laps to the exam hall	.564	.732
19.	34	My parents seldom appear to defend me when		

		caught in exams malpractices	.442	.646
20.	37	I do enjoy copying exams answers on my palm before entering the exam hall.	.524	.722
21.	39	I and others paid money to supervisors to allow us cheat in examinations.	.776	.896
22.	41	Some school heads with government officials agree to encourage malpractices during exams.	.806	.912
23.	43	I bribed and pass when I did not sit for examination.	.466	.548
24.	44	Exams malpractices of sex for grades is on-going in some schools.	.479	.594
25.	45	The scores I have in my results after every examination is not my true ability.	.890	.945
26.	47	I usually write answers on my locker with pen/pencil during exams without anybody's knowledge.	.747	.861
27.	49	I join them to copy exam answers provided for us on the chalk board.	.794	.927
28.	50	Someone writes exams for me without being caught.	.499	.793

Table 2: presents results of factor analysis of Student's Exams Malpractices

Questionnaire (SEMQ) showing their factor loading and communality. Items that loaded between .40 - .90 were considered good items while items that loaded below 3.30 were considered bad items, should be deleted or ought to be revised. The items that did not load well were deleted. The total variance of the 28 items were 82.56% indicating that the questionnaire is a valid instrument and ready to be used by professionals and classroom situation.

The psychometric properties of factor loading, communalities estimates, eigen values, and percentage variance of SEMQ of the following items such as items 3, 4, 6, 9, 1026, 28, 39, 44, 47, etc. loaded very well above .40. The result of items also provided both moderate and high reliability ranging from 0.60 – 0.98 reliability coefficient which makes the items reliable and valid ready to be used.

Discussions

This study developed and validated an instrument for examination malpractices with the findings of 28 items that loaded well. It indicates responses of students that shows a high level of examination malpractices

from the instrument. Mireku, Bervell and Dzamesi (2024) supported the outcome of this research in Nigeria by stating similar cases, that there are also several studies discussing the scattered trend in examination malpractices in higher education delivery in Sub- Sahara Africa which is becoming a menace globally. Regrettably, Ajayi (2019) presented a serious threat of collusion as a problem during the 2019 West African Senior School Certificate Examinations (WASSCE) and criticized that it requires specific actions to address such issues through increased surveillance and advanced technology in test practices.

Gyamfi (2022) study is in agreement with the researcher's result regarding escalation of exams cheating of students. The researcher reported that mensuration set, equation and inequalities, business mathematics and algebraic expressions proved to be difficult and gave an open floor for cheating to dominate in examinations. Course contents such as graphs, angles and construction on the other hand displayed least participation in academic dishonesty.

Conclusion

The outcome of this study uncover adequate items developed for examination malpractices questionnaire among secondary schools' students in Cross River State, Nigeria. It also reveals a lack of local instruments that capture the present behaviour and conducts seen among Cross River State Students as well as appropriate instrument that can address the challenges of our Nigerian youths in respect to examination malpractices, like what SEMQ has done making a reliable and valid questionnaire appropriate for examination malpractices in our schools.

Recommendations

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

1. The 28 items instrument is a valid and reliable scale which should be use in schools by teachers to guide the conduct of examinations.
2. The Student's Examination Malpractices Questionnaire (SEMQ) should be introduced to schools to help reform students, teachers and parents in the educational system.
3. Effectiveness of monitoring teams for proper exams supervision should be carried out.

4. Introducing a meaningful quality assurance body that over sees all a sundry without compromise and fear of intimidation like that of the university.

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INFLUENCE OF ARTIFICIAL INTELLIGENCE TOOLS IN RESEARCH PRODUCTIVITY OF POST GRADUATE STUDENTS IN TERTIARY INSTITUTION IN RIVERS STATE, NIGERIA

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Abstract

The study focused on Influence of Artificial Intelligence on Research Productivity of Post Graduate Students in Tertiary Institution in Rivers State, Nigeria. Descriptive survey design was used in the study. The population of the study consisted of 43,160 Post Graduate students from University of Port Harcourt (UNIPORT), Rivers State University (RSU) and Ignatius Ajuru University of Education (IAUOE). A sample of 324 PG students was drawn from using multi-stage sampling procedure. A 4-point Likert scale questionnaire titled “AI Influences on PG Student Research Productivity Questionnaire” (AI-PSRPQ) was used in the study. The instrument was validated by two experts in measurements while reliability was determined using Cronbach Alpha method with indices of 0.81, 0.70 and 0.71 respectively for all the sub-sections. Data were analyzed using mean, standard deviation and independent t-test. Findings of the study showed that there is a significant difference in the influence of artificial intelligence tools on paper publication ($p=0.032<0.05$) as conference attendance ($p=0.001<0.05$) among Masters and Doctoral candidates in tertiary institutions in Rivers State differ significantly. On the other hand, there were no significant influence of artificial intelligence tools on funding and research grant ($p=0.72>0.05$) among Masters and Doctoral candidates in tertiary institutions in Rivers State does not differ significantly. Based on this, it was recommended among others

that educational stakeholders at the tertiary level should invite experts to organize AI literacy programs which would offer workshops and courses focusing on AI literacy, research methods, and paper publication strategies.

Keywords: Artificial Intelligence, Research Productivity

Introduction

Production of research is a core business of universities globally, and is crucial in the scientific process as a precursor for knowledge uptake and use (Cloete, Bailey & Pillay, 2011). Research is "creative and systematic work undertaken to increase the stock of knowledge. Creswell (2008) *observed that it involves the collection, organization, and analysis of evidence to increase understanding of a topic, characterized by a particular attentiveness to controlling sources of bias and error. These activities are characterized by accounting and controlling for biases. A research project may be an expansion of past work in the field. To test the validity of instruments, procedures, or experiments, research may replicate elements of prior projects or the project as a whole. Sha, (2019) also noted that research is a process of steps used to collect and analyze information to increase our understanding of a topic or issue". It consists of three steps: pose a question, collect data to answer the question, and present an answer to the question (Creswell, 2008).*

Abramo and D'Angelo (2018) defined Productivity as the quintessential indicator of efficiency in any production system. Research productivity refers to the efficiency and effectiveness of researchers, institutions, or organizations in generating high-quality research outputs (Åkerlind, 2008). Research productivity will include areas like publications in papers, articles, books. It also include presentations in conferences and seminars, patents, research projects, collaborations as well as citations and impact and influence of their work on other areas. According to Brew and Lucas (2009), research productivity encompasses both quantity and quality, considering factors like the frequency of publication, impact factor of journals, citation rates, research funding, awards and recognition as well as peer review and editorial contributions. Edgar and Geare (2013) stated that a high research productivity indicates a strong research performance, contributing to advancements in the field,

institutional reputation, funding and resource allocation, career advancement as well as collaboration and networking opportunities.

While these studies were on factors that bedeviled by the challenges of measuring research productivity within different institutions and disciplines. The literature records a variety of ways in which data is obtained. Again, Fisher (2005) still noted that while institutional and demographic factors, and social structures in which academics operate provide a context for the development of research, within universities there are implicit and explicit messages about research, teaching, administration and community service; what academics should pursue, and how they should position themselves as academics. Ogunyemi et al. (2005) argued that writing a thesis is a fundamental step for post-graduate studies globally. This process inculcates knowledge and skills for scientific enquiry, critical thinking, systematic problem-solving, and appraisal of scientific and lay claims. This is often followed by dissemination of the thesis results to the scientific community, of which publication in a peer-reviewed journal is the highest and most respected form.

Obuku et al. (2017) observed that the academic research productivity of post-graduate students can be considered a surrogate measure of universities' ability to prepare the next generation of health scientists. Imparting research skills is a key aspect of post-graduate training, not only to inculcate scientific inquiry, but also to equip students with the knowledge and skills to critically appraise evidence before applying it. Obuku et al. (2017) had also argued that only two African studies in Cameroon and Zambia (Munung et al, 2014) documented academic research productivity of post-graduate students in the health sector. Brew et al (2015) observed that numerous studies have been carried out to examine factors that contribute to researcher productivity. According to them, potential factors have been suggested and the complexity of variance explained by any one factor has led to an increasing number of multivariate and complex statistical analyses. Factors include institutional features like type and size of institution, demographic variables like gender, family size and age of children (Kim, Wolf-Wendal, Twombly, 2011), academic capabilities, confidence, and self-efficacy of students. Choice of topic as reported by Fisher (2005) as well as various social aspects such as workload, time spent etc. again, the

inventions in technology in almost all aspect of human life has made it possible for research to be possible. One of such technological interventions is artificial intelligence.

Technological optimists have been predicting the artificial intelligence (AI) revolution since the beginning of the past decade. This expectation contrasts with low productivity growth in many countries. However, the commercial release of ChatGPT and other technologically inclined AI interaction interface in late 2022 has leads to rising expectations about a dramatic shift at least equivalent to the one associated with the commercial introduction of the Internet (Saam, 2024).Agrawal (2019) defined artificial intelligence as ‘the theory and development of computer systems able to perform tasks normally requiring human intelligence.’ Again, the OECD (2019) defines an AI system as a “machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments and such systems are designed to operate with varying levels of autonomy (Barrufaldi, et’al 2020). Based on this, Li and Jan (2023) observed that the rapid growth of chatbots and artificial Artificial intelligence (AI) has brought about a new time of learning and exploration. They investigated the profound implications of AI in education, focusing specifically on its impact on post graduates student productivity and stress reduction. The findings highlight the potential of AI-powered educational tools to revolutionize traditional education paradigms by personalizing the learning experience, automating administrative tasks, and providing intelligent support. Again, AI enables effective addressing of the challenges faced by students in today's educational environment, including mounting workloads and pressures. Students are empowered with effective learning strategies by optimizing time utilization through intelligent scheduling, task management, and performance analysis. Furthermore, AI-powered chatbots and virtual mentors are crucial in offering emotional support, effectively reducing post graduates students' anxiety levels (Li & Jan, 2023).Baily and Kane (2024) also affirm that there is evidence that generative AI can improve the productivity of less-skilled employees within an occupation or organization. Artificial intelligence is reshaping the landscape of education, ushering in a new era of innovation and transformation. AI technologies are reshaping traditional educational models, offering

innovative tools that adapt to individual student needs, streamline administrative tasks, and provide valuable insights through data analytics. From intelligent tutoring systems to immersive virtual reality experiences, AI is transforming how knowledge is imparted and acquired. While the potential benefits are immense, there are also ethical considerations, concerns about data privacy, and challenges associated with equitable access. This dynamic interplay between technological advancement and educational evolution underscores the significance of understanding and harnessing the impact of AI to create a more adaptive, inclusive, and effective learning environment.

The integration of Artificial Intelligence (AI) in research has transformed the academic landscape as noted by Li and Jan (2023). However, its impact on the research productivity of postgraduate students remains unclear. While AI has the potential to enhance research efficiency and accuracy, it also poses challenges related to data quality, bias, and ethical considerations. Furthermore, the reliance on AI may lead to a lack of critical thinking and methodological skills among postgraduate students, ultimately hindering their ability to produce original and meaningful research contributions. Despite the growing use of AI in research, it is observed that many post graduate students have not fully grasp the extent to which this could be applied in the area of research productivity. Again, despite its impact on postgraduate students' research productivity in areas of research output, quality, and novelty, many post graduate students are yet to be aware of even the various forms of AI and ways in which they can harness it towards maximum research productivity. According to Riaz (2024), students can adopt AI programs to quickly carry out initial checks for Plagiarism and Formatting, technical Screening and assignment to Reviewers, analyzing Papers to identify key topics and assess quality, reduce bias and improve fairness, streamlining submission and formatting checks automate communication with authors, providing Insights through bibliometric analysis, enabling faster publishing workflows as well as generating content with AI.

According to Elaieess (2023), artificial intelligence (AI) has developed into a powerful tool that Academics can exploit for their research, writing, and cooperation in recent years. AI can speed up the writing and research processes, improve teamwork, and provide fresh perspectives for the academic world. Elaieess (2023) in his findings had

shown that AI is rapidly becoming a powerful tool with huge potential to improve academic work, and it is already being used in a variety of ways. AI can also enhance academic teaching and learning, as Academics can adapt their teaching to the needs of their students by using AI-powered educational tools to aid personalized training. The findings also demonstrate that AI has the potential to be an effective research tool but it also has the ability to be misused to get over moral constraints.

In the light of this, addressing this knowledge gap is crucial for developing evidence-based strategies to support postgraduate students in harnessing the potential of AI, ensuring the integrity and quality of research, and fostering a new generation of researchers equipped to navigate the complexities of AI-driven research landscapes. Fortunately, this observed gap is what the current research tends to bridge.

The aim of the study is to investigate the influence of artificial intelligence on research productivity of post graduate students in tertiary institution in Rivers State.

The following research questions guided the study;

1. To what extent do artificial intelligence tools influence paper publication among Masters and Doctoral students in tertiary institutions in Rivers State?
2. To what extent do artificial intelligence tools influence conference attendance among Masters and Doctoral students in tertiary institutions in Rivers State?
3. To what extent do artificial intelligence tools influence funding and research grant among Masters and Doctoral students in tertiary institutions in Rivers State?

The following hypotheses also guided the study;

1. There is no significant difference in the influence of artificial intelligence tools on paper publication among Masters and Doctoral candidates in tertiary institutions in Rivers State.
2. The influence of artificial intelligence tools on conference attendance among Masters and Doctoral candidates in tertiary institutions in Rivers State does not differ significantly.
3. The influence of artificial intelligence tools on funding and research grant among Masters and Doctoral candidates in tertiary institutions in Rivers State does not differ significantly.

Methods

The researchers in the study adopted descriptive survey design in the study. Nwankwo (2016) maintained that the design allows the researcher to draw a sample from a larger population, analyze it, and describing the features and characteristics of such in a manner that does not manipulate the independent variable. The population of the study consisted of 43,160 Post Graduate students from University of Port Harcourt (UNIPORT), Rivers State University (RSU) and Ignatius Ajuru University of Education (IAUOE). The sample of the study consisted of 360 Masters and Doctoral students drawn from the three Universities in the State using multi-stage sampling procedure. Specifically, at stage one of the sampling processes, the researcher used purposive sampling to draw only students from the three Universities listed above. At stage two, simple random sampling by ballot was used to draw two (2) faculties from each institution. This gave a total of six (6) faculties. At stage three, similar technique was applied to draw three departments from each of the faculties. This gave a total of 18 departments from the six faculties. Non-proportionate sampling technique was applied at stage four to draw 20 PG students from each department. This will give a total of 60 PG students from each faculty and 360 from the six faculties sampled. The instrument for data collection was a 4-point Likert scale questionnaire titled "AI Influences on PG Student Research Productivity Questionnaire" (AI-PSRPQ). This was a two section instrument. In section A, it was designed that the students should indicate their programme type (Masters or Ph.D). This section also carried instructions on how to respond to the questionnaire. In section B, the researcher further divided it into three sub-sections (I, II & III). Sub-section I-III measures the influence of AI on PG students' level of paper publication, conference attendance Interest and level of funding and research grant received. The instruments had 60 items in all. The instrument was validated by two experts in measurements while reliability was determined using Cronbach Alpha method. A reliability coefficient of 0.81, 0.70 and 0.71 respectively were realized for all the sub-sections of AI-PSRPQ. Data was collected face-to face with the aid of two field assistants. Data analysis was done using mean, standard deviation and independent t-test. Data will run using SPSS version 23.

Results

In analysis of data, out of the 360 questionnaire administered, 324 representing 90% of the sample size were successfully returned. Out of this, 171 were Doctoral candidates while 153 were Master students. Both research questions and analysis were analyzed together since there are corresponding

Research Question One: To what extent do artificial intelligence tools influence paper publication among Masters and Doctoral students in tertiary institutions in Rivers State?

Hypothesis One:

There is no significant difference in the influence of artificial intelligence tools on paper publication among Masters and Doctoral candidates in tertiary institutions in Rivers State.

Table 1: Independent t-test analysis of influence of artificial intelligence tools on paper publication among Masters and Doctoral candidates in tertiary institutions in Rivers State.

Programme	N	Mean	Std. Dev.	Df	T	Sig	Result
Masters	153	14.85	8.31	322	2.35	0.032	Significant
Ph.D.	171	16.71	2.84				

The table shows that Masters Students had a means score of 14.85 and a standard deviation of 8.31 while Doctoral candidates had mean scores of 16.71 and 2.84 respectively. This means values show that artificial intelligence has more influence on research productivity (paper publication) of Doctoral students more compared to Masters Students. Calculated t was 2.35 while the sig value was 0.032. Since sig ($p=0.032<0.05$) is less than 0.05 alpha, the null hypothesis is rejected meaning that there is a significant difference in the influence of artificial intelligence tools on paper publication among Masters and Doctoral candidates in tertiary institutions in Rivers State.

Research Question Two: To what extent do artificial intelligence tools influence conference attendance among Masters and Doctoral students in tertiary institutions in Rivers State?

Hypothesis Two: The influence of artificial intelligence tools on conference attendance among Masters and Doctoral candidates in tertiary institutions in Rivers State does not differ significantly.

Table 2: Independent t-test analysis of influence of artificial intelligence tools on conference attendance among Masters and Doctoral candidates in tertiary institutions in Rivers State

Programme	N	Mean	Std. Dev.	Df	T	Sig	Result
Masters	153	10.24	10.11	322	4.58	0.001	Significant
Ph.D.	171	18.02	4.35				

Once again, the table shows that Masters Students had a means score of 10.24 and a standard deviation of 10.11 while Doctoral candidates had mean scores of 18.02 and 4.58 respectively. The mean scores indicates that artificial intelligence has more influence on conference attendance of Doctoral students more compared to Masters Students. Calculated t was 4.58 while the sig value was 0.001. Hence, since sig ($p=0.001<0.05$) is less than 0.05 alpha, the null hypothesis is rejected meaning that the influence of artificial intelligence tools on conference attendance among Masters and Doctoral candidates in tertiary institutions in Rivers State differ significantly.

Research Question Three: To what extent do artificial intelligence tools influence funding and research grant among Masters and Doctoral students in tertiary institutions in Rivers State?

Hypothesis Three: The influence of artificial intelligence tools on funding and research grant among Masters and Doctoral candidates in tertiary institutions in Rivers State does not differ significantly.

Table 3: Independent t-test analysis of influence of artificial intelligence tools on funding and research grant among Masters and Doctoral candidates in tertiary institutions in Rivers State.

Programme	N	Mean	Std. Dev.	Df	T	Sig	Result
Masters	153	7.95	3.45	322	1.42	0.72	Insignificant
Ph.D.	171	8.02	4.49				

Table three shows that Masters Students had a means score of 7.95 and a standard deviation of 3.45 while Doctoral candidates had mean scores of 8.02 and 4.49 respectively. The mean scores indicate that artificial intelligence has slight influence on funding and research grant of Doctoral students more compared to Masters Students. However, calculated t was 1.42 while the sig value was 0.72. Therefore, since sig ($p=0.72>0.05$) is greater than 0.05 alpha, the null hypothesis is retained meaning that truly, the influence of artificial intelligence tools on funding and research grant among Masters and Doctoral candidates in tertiary institutions in Rivers State does not differ significantly.

Summary of Findings

The following findings were made;

1. There is a significant difference in the influence of artificial intelligence tools on paper publication among Masters and Doctoral candidates in tertiary institutions in Rivers State with more influence on the Ph.D students.
2. The influence of artificial intelligence tools on conference attendance among Masters and Doctoral candidates in tertiary institutions in Rivers State differ significantly with more influence on the Ph.D students.
3. The influence of artificial intelligence tools on funding and research grant among Masters and Doctoral candidates in tertiary institutions in Rivers State does not differ significantly.

Discussion of Results

Research finding one reveals that that there is a significant difference in the influence of artificial intelligence tools on paper publication among Masters and Doctoral candidates in tertiary institutions in Rivers State. The findings means that the impact of Artificial Intelligence (AI) on paper publication varies significantly between master's and PhD students. In other words, AI has a different influence on the research productivity of

master's students compared to PhD students who experience much of such influence signifying that the extent to which AI influences paper publication is not the same for both groups. The implication is that PhD students are more likely to use AI in their research, leading to a greater impact on paper publication and Master's students on the other hand may face more challenges in using AI, limiting its influence on their research output. The finding may also come because the type of research conducted by PhD students may be more amenable to AI applications, leading to a greater impact on paper publication. It finally implies that factors such as research experience, field of study, or level of training may influence how students utilize AI in their research, leading to differing outcomes in paper publication. The finding of the study is in line with the assertion of Li and Jan (2003) who reported significant influence of artificial intelligence on research productivity of post graduate students.

From research finding two which reveals that the influence of artificial intelligence tools on conference attendance among Masters and Doctoral candidates in tertiary institutions in Rivers State differ significantly, it suggests that the impact of Artificial Intelligence (AI) on conference attendance varies significantly between master's and PhD students. In other words, AI has a different effect on the likelihood of master's students attending conferences compared to the extent which PhD students attend. This finding could possibly come because PhD students may be more likely to use AI to put up papers that may qualify them to attend more conferences, generate research ideas, or analyze conference papers, leading to increased attendance. Master's students on the other hand may face more barriers in using AI for conference-related tasks, limiting their attendance. Again, PhD students may be more likely to present their AI-related research at conferences, while master's students may be more likely to attend conferences to learn about AI applications in their field. In the findings of Li and Jan (2003) quoted above, there was also significant difference in the research productivity of Masters and Doctoral students. Again, Riaz (2004) also reported difference in research productivity of Post graduate students at various levels.

Finally, finding three shows that the influence of artificial intelligence tools on funding and research grant among Masters and Doctoral candidates in tertiary institutions in Rivers State does not differ significantly. This means that the impact of artificial Intelligence (AI) on

securing funding and research grants does not vary significantly between Master's and PhD students. In other words, the same effect that AI may have in helping Ph.D students to put up research works that may earn them grant and funding is same with the Masters students. It also means that the extent to which AI influences funding and grant acquisition is the same for both groups. This could be because both set of students may be more likely to use AI to identify funding opportunities, generate grant proposals, or analyze funding trends, leading to increased success in securing funding. Both students on the other hand may also be more likely to receive funding for AI-related research projects. The finding of the study is in line with Elaie (2023) who reported significant impact of AI on academic research grant among tertiary education students.

Conclusion

The impact of Artificial Intelligence (AI) on the research productivity of postgraduate students is multifaceted and significant. Our study revealed that AI has a positive influence on research productivity, particularly among PhD students, in terms of paper publication, conference attendance and funding acquisition. However, master's students face more challenges in leveraging AI for research productivity. By embracing AI and addressing the challenges and limitations, postgraduate students can unlock their full research potential, driving innovation and advancing knowledge in their fields.

Recommendations

The following recommendations are made;

1. Based on the finding that there is a significant difference in the influence of artificial intelligence on paper publication among master's and PhD students, it is recommended that educational stakeholders at the tertiary level should invite experts to organize AI literacy programs which would offer workshops and courses focusing on AI literacy, research methods, and paper publication strategies, specifically designed for master's students. There should also be mentorship programmes for master's students in AI-related research and paper publication.
2. Based on the findings that there is a significant difference in the influence of artificial intelligence on conference attendance among

master's and PhD students, it is recommended that PG students especially Masters students should be trained more on ways which they can harness AI programmes in putting up quality papers which can qualify them for conferences. They should as well be offered funding, grants, or travel awards to attend conferences, encouraging them to present their research and engage with AI-related discussions.

3. Based on the findings that there is no significant difference in the influence of artificial intelligence on research grants among master's and PhD students, it suggested that stakeholders should sustain the awareness level as well as exposure which will maintain the level of participation that can increase the PG student's chances of getting grants and funding.

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**ASSESSMENT OF TEACHERS PERCEPTION ON
COMPUTER ADAPTIVE TEST (CAT) IN
EDUCATIONAL ASSESSMENT IN SENIOR
SECONDARY SCHOOLS IN OWERRI.**

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Abstract

This study was aimed at investigating teachers' perception on Computer Adaptive Test (CAT) in educational assessment in Senior Secondary Schools in Owerri education Zone, Imo State. The population of this study comprised all teachers in the Senior Secondary Schools in Owerri education Zone one, Imo State Nigeria. One hundred and Ninety-six (196) was drawn from the population of three hundred and eleven (311). Two research questions guided the study, and instrument used for data collection was a Researchers-made questionnaire, overall reliability index of the instrument was 0.73, obtained using Cronbach Alpha Method. Descriptive Statistics was used to answer the research questions. This showed that Teacher perceived positive impact of Computer Adaptive Test on student's engagement and motivation, among others. The paper recommended that Secondary School education curriculum

should accommodate ICT programs in all levels and computer assessment test should be employed early.

Key words: Assessment, Teachers perception, computer adaptive test, Educational and assessment.

Introduction

Assessment is an important tool of the teaching and learning process as it strengthens what students learn and achieved. In the words of Asuru (2019), assessment generally is the process of organizing measurement data and fashioning them in an interpretable manner on the basis of which judgment (evaluation) could be made. Assessment can focus on the individual learner, in the learning process, the learning community (class, workshop, or other organized group of learners), a course, an academic program, the institution, or the educational system as a whole. Assessment in Senior Secondary Schools refers to the process of determining students' learning progress, knowledge, skills, and understanding within a particular academic subject or course. It typically involves various methods such as tests, examinations, projects, presentations and coursework. The aim of assessment is to measure learners (students) achievement, provide feedback on their strengths and areas needing improvement, and inform instructional decisions to support further learning and development. In education, assessment refers to the whole variety of methods of tools that educators use to evaluate, measure and document the academic preparedness, learning progress, skill acquisition or educational needs of students (Onuekwusi & Onyeka, 2017).

In an age and era of globalization, the importance and necessity of digital technologies in educational process cannot be overemphasized. Computers are increasingly employed to deliver quality teaching and learning, including assessment practices. Educational digital resources have positively assisted the delivery of educational assessments in several ways, such as setting up real-time quizzes, providing feedbacks, scoring assessment tasks, among many other uses (Gjelaj, buza, Shatri, & Zabeli, 2020). Advancement in computer technology have allowed an effective approach, the design and the administration of assessment instruments and educational testing.

Computer Adaptive Testing (CAT) is one of such advancement in recent times. In the words of Magis, Yan & Von, (2017) CAT is a test designed in which the difficulty of the test is adequate to the level of ability of a test taker during the test administration. In other words, a CAT is a system where each test-taker receives a set of questions that meet the test specification and are generally appropriate for their performance level (Brown & Abeywickrama, 2018). In the evolving landscape of educational assessment, Computer Adaptive Testing (CAT) has emerged as a transformative approach, particularly in the Senior Secondary Schools. The ability of this test to adjust difficulties based on a student's response pattern promises a more accurate and individualized assessment experience.

The introduction of CAT represents a shift from the known traditional methods of assessment necessitating an exploration of its implications for teaching strategies, student engagement, and overall educational outcomes. Research has consistently reported the positive use of CATs in supporting teachers to use assessment methods that enhances their practices (Yu & Zhang, 2017).

The benefits and uses of CAT for the teachers are enormous. Its utility has been demonstrated in many projects to support specific group of teachers including the online diagnostic language assessment—as Ttle (Brown, 2014, Brown, & Hattie, 2018; Hattie, Brown & Keegan, 2003) and Tools to Enhance Assessment Literacy for Teacher as an Additional language TEAL (Davison, 2018). The use of computer Adaptive Test (CAT) can ensue teacher consistency in identifying student strengths and weaknesses (Alderson, Brunfaut, & Harding, 2015) streamline the assessment process for large-scale assessment (Chapelle & Voss, 2017). It provides teachers with valuable data for formative assessment literacy which consequently enhances classroom-based assessment system (Aderson, Bruntfaut, & Harding, 2015). Computer Adaptive Tests also provide a real-time reporting of students' performance, which allows immediate feedback that can be used by teachers and students to set learning goals (Brown, Learning, & Hattie, 2018). More so, Student engagement with CATs can develop student's ability to take more responsibility for the assessment process and the use of the results to improve their learning. It motivates and inspires students. CAT provides a

platform for students to showcase their work and achievements, which can be motivating and inspiring for others.

However, the maximum realization of the use of CAT is dependent to a reasonable point on the attitude of the teachers towards the system. Teachers' perception is critical to the extent of success and failure of the integration of CAT in secondary School System in Owerri, Imo State. Perception, is termed as the attitudes, behaviour, Self-beliefs and views that a person has developed towards anything (Bransford, Brown & Cockings, 2015). Teachers' perceptions explain the benefits that teachers have about the importance of integrating CAT into the teaching-learning and the perceived obstacles that are associated with using CAT as a form of assessment. Teachers' perception on this implies the attitudes, levels of receptivity, convictions and the beliefs that teachers placed in the assessment processes and procedures of students.

The following research questions were raised to guide the study;

1. What is the teachers' perception on the effectiveness of CAT in the assessment of the performance of the students in Senior Secondary Schools?
2. To what extent do teachers perceive the impact of CAT on students' engagement and motivation?

Methods

This study adopted a descriptive research of a survey type. The population of this study comprised of all Senior Secondary School teachers in Owerri education, Zone 1, Imo State, who have at least four years' experience or who have knowledge of CAT in educational assessment. They were sampled purposively because they were all witnesses of the introduction of Computer-Based Test by the UTME (JAMB). The target population for the study was all Senior Secondary School teachers in Owerri Education zone one. There are 311 Senior Secondary School teachers in the sampled schools, out of which 196 were selected using a proportionate sampling procedure. This was in line with the Research Advisors (2006) who maintained that the best sample for a population range of 300-400 the best sample should be 196 at a confidence level of 0.05.

Researchers-made questionnaire entitled “Teachers’ perception on computer adaptive test in educational assessment” with psychometrics properties of content validity and reliability index of 0.71 was used to collect the data for this study. A descriptive statistical analysis was employed to analyze the data that were collected for the study. The mean response score was employed to answer the research questions.

Findings

The findings of the study are presented below;

Research question one:

What is the teachers’ perception on the effectiveness of CAT in the assessment of the performances of the Senior Secondary Schools Students?

Table 1: Teachers Responses

S/NO	Statement: The effectiveness of CAT in the assessment of Secondary School Students.	SA	A	D	SD	TOTAL	MEAN	RMK
1.	Very familiar are you with CAT	66 (264)	50 (150)	45 (90)	35 (35)	196 (539)	2.75	Accepted
2.	CAT is easy to navigate and interface	70 (280)	50 (150)	40 (80)	36 (36)	196 (546)	2.78	Accepted
3.	The CAT adjusted to your student skills	60 (240)	56 (168)	50 (100)	30 (30)	196 (538)	2.81	Accepted
4.	CAT is more effective than traditional paper-test	65 (260)	60 (180)	40 (80)	31 (31)	196 (551)	2.78	Accepted
5.	CAT provides satisfied feedback and results	70 (280)	50 (150)	40 (80)	20 (20)	196 (540)	2.78	Accepted
6.	CAT is effective in time management	76 (304)	60 (180)	40 (80)	20 (20)	196 (584)	2.97	Accepted
7.	CAT faces technical issues	80 (320)	76 (228)	30 (60)	10 (10)	196 (618)	3.15	Accepted
8.	Evaluation agencies should make use of CAT in assessment of students	70 (280)	66 (198)	35 (70)	25 (25)	196 (573)	2.92	Accepted

Weighted Average 2.86

In the table 1 above, it was revealed that computer adaptive test (CAT) was perceived by the teachers as effective enough for assessing Senior Secondary School Students, in all ramifications with mean scores above, average 2.86

Research Question two

To what extent do Teachers' perceive the impact of CAT on student's engagement and motivation?

Table 2: Teachers' Responses

S/no	Statement	SA	A	D	SD	TOTAL	MEAN	RMK
	The impact of CAT on students' engagement and motivation in the assessment of Senior Secondary School Students.							
1.	CAT engages students more than traditional paper-based test	46 (184)	60 (180)	50 (100)	40 (40)	196 (504)	2.57	Accepted
2.	I feel more motivated to prepare CAT compared to traditional assessment	70 (280)	66 (198)	35 (70)	25 (25)	196 (573)	2.57	Accepted
3.	CAT is fairer than the traditional-based test	75 (300)	60 (180)	41 (82)	20 (20)	196 (582)	2.96	Accepted
4.	CAT enhances your understanding of the subject matter	76 (304)	60 (180)	40 (80)	20 (20)	196 (584)	2.97	Accepted
5.	Using technologies in assessment is more comfortable	65 (260)	70 (210)	41 (82)	20 (20)	196 (572)	2.91	Accepted
6.	CAT provide immediate feedback that helps students understand their strength& weakness	70 (280)	66 (198)	35 (70)	25 (25)	196 (573)	3.5	Accepted
7.	CAT gives students opportunity to learn from their mistakes.	70 (284)	65 (195)	40 (80)	20 (20)	196 (579)	2.95	Accepted
8.	CAT encourages students to be actively involved in assessment process	65 (260)	60 (180)	40 (80)	31 (31)	196 (551)	2.81	Accepted

Weighted Average 2.98

The weighted average recorded in table 2 above is 2.98, indicating that there is a positive impact of CAT on student's engagement and motivation in the assessment of Senior Secondary School Students.

Discussion

The study investigated assessment of teachers' perception on Computer Adaptive Test (CAT) in educational assessment in Senior Secondary Schools. Research question one is on teachers' perception on the effectiveness CAT in the assessment of the performance of students in the Senior Secondary School students using Computer Adaptive Testing effectiveness.

The level of effectiveness in a Senior Secondary School students' emphasis on students determine the success and usefulness of the programme of activity, can increase their academic success. In the same

vein, Brown, Learly & Hattie (2018), stated that CAT provides a real-time reporting of students' performance. This can only be realized if there is adequate effectiveness of CAT on the student's evaluation process.

The result of the study as presented in table 2 shows the mean ratings and standard deviations of the respondent on the extent on teachers perceive impact of CAT on student's engagement and motivation. The result of the study showed that students are more engaged, motivated and prepare better for CAT than the traditional paper-based tests. However, the result is in agreements with the findings of Yu & Zhang (2017).

Conclusion and Recommendations

The findings of this study showed that Computer Adaptive Test (CAT) is an effective procedure for assessing Senior Secondary School students. Suffice to say that CAT is an effective tool for assessing Senior Secondary School students, in spite of its shortfalls. It is important to engage the students early in the ICT world of today. The use of CAT during assessment of students, will make them very engaged and motivated.

Based on the findings, it was recommended that secondary School Education Curriculum should accommodate ICT from Junior Secondary School. That is ICT should be taught from the beginning of secondary School and assessment should start at early stage of education.

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IMPACT OF AVAILABILITY AND UTILIZATION OF CHEMISTRY LABORATORY EQUIPMENT ON SS II STUDENTS' ACHIEVEMENT IN CHEMISTRY IN ANAMBRA STATE

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Abstract

This study investigated the Impact of Availability and Utilization of Chemistry Laboratory Equipment on Students' Achievement in chemistry in senior secondary schools in Anambra State. The study was carried out in three education zones, namely Awka, Ogidi and Onitsha which were randomly selected from the six education zones in Anambra State. The study adopted the survey research design. The sample of 135 chemistry teachers and 900 chemistry students was used for the study. Five research questions and two null hypotheses guided the study. The instruments used were Chemistry Laboratory Equipment Checklist (CLEC), and Chemistry Achievement Test (CAT). Four experienced lecturers validated the instruments after which they were pilot-tested using chemistry teachers and students who were not part of the sample of study. The reliability coefficient was established using Pearson Product Moment correlation coefficient and was found to be 0.86 and 0.83 for CLEC and CAT respectively. The data collected were analyzed using means and standard deviation for research questions. The null hypotheses were tested at 0.05 level of significance using t-test. The major findings were: Average mean of 2.71 of chemistry teachers indicated the availability and utilization of chemistry laboratory equipment in schools. Students in schools where the equipment were available and utilized by teachers and students, achieved and stated the usage of chemistry laboratory equipment higher than students in schools where the equipment were not available

and not utilized. Recommendations were made to the government to make the chemistry equipment available in secondary schools for teachers and students.

Keywords: Impact, Availability, Utilization Chemistry, Laboratory, Equipment, Students.

Introduction

Nations all over the world, whether developed or developing nations recognize the vital role of science and technology in national development. It is an indisputable fact that no nation can advance scientifically and technologically without a sound science education programme. It is realization of this fact that the Federal Government of Nigeria in her National Policy on Education as cited by Igbaji, Miswaru & Sadiyya (2017) stated that the goals of science education in Nigeria shall be: “to produce scientists for national development; and to service studies in technology and the cause of technological development”. In further pursuance of these goals the Federal government stated that special provisions and incentives shall be made for the study of the sciences at each level of the national education system. For this purpose, the government shall adequately support the functions of all agencies involved in the promotion of the study of sciences; and Government shall popularize the study of the sciences and the production of adequate number of scientists to inspire and support national development (FGN, 2014).

To achieve the above goals and fulfill the promises made by the government, a number of Federal Government secondary schools (unity schools), technical colleges, special science secondary schools, and universities of science and technology were established in different states of the country by the Federal and various State Governments in Nigeria. In addition, government is sponsoring the teaching of science subjects in the secondary schools through building and equipping of science laboratories in schools, and staffing the schools with qualified science teachers. Unfortunately, all these efforts by the Federal Government and various state governments do not seem to be yielding the desired result judging by the persistent poor performance of secondary school students in science subjects in general and chemistry in particular in public examinations.

This under achievement in science; particularly in chemistry is worrisome to the governments, educationist and science educators bearing in mind that it is at the secondary education level that a sound foundation for further study in science and science related disciplines is laid. Sound chemistry education therefore is inevitable in order to produce the desired scientists and technologist needed for the scientific and technological advancement of this country.

Chemistry is a practical oriented subject that requires a lot of practical work using chemistry laboratory equipments. Chemistry laboratory equipments must not only be adequately provided in schools; but must be optimally utilized for effective teaching of chemistry by chemistry teachers and for meaningful leaning of chemistry by students.

Chemistry laboratory equipments are those instructional materials in the form of scientific equipment, materials and chemicals found in chemistry laboratories which are used for laboratory or practical work in chemistry. Laboratory or practical work in chemistry is those contacts or interactions of students with scientific equipment, materials and chemicals which make direct contributions towards understanding or learning of chemistry concepts. The value of utilizing chemistry laboratory equipment in teaching chemistry lies in involving students in concrete experiences with objects for meaningful learning of chemistry concepts and for enhancing achievement in chemistry.

Achievement is a measure of the extent to which a person has acquired certain knowledge or mastered certain skills usually as a result of planned instruction or training. In this study students' chemistry achievement refers to the scores of students in a teacher-made achievement test designed to test their knowledge in chemistry and their ability to identify and state the usage of some chemistry laboratory equipment in school.

A laboratory is a place, a room, where scientific experiments are performed by the use of pieces of equipment (Sneha 2021). A working and vibrant school chemistry laboratory should contain plenty of laboratory equipment. Joan (2017) in her research discovered that most secondary schools have chemistry laboratory in their school while only 35% of them indicated they have enough equipment. She further stated that these material resources should be at the disposal of the teacher to use when the need arises. Researchers as summarized by (Musah & Umar 2017) stated

that there are inadequate resources for teaching and learning of science subjects in public secondary schools in Nigeria. They further stated that where there are little resources at all, they are not in good condition, while the few ones that are in good conditions are not enough to go round and also the few available material are dysfunctional.

Where these materials are available the practical work should be effective if the teachers are serious. The availability of these resources makes the work of the teacher to be easy; it makes the lessons to be concrete, simultaneously and helps to enhance the achievement of students in chemistry. But the studies by Akinwumi (2023) said that in Lagos State, schools had poor laboratory facilities; inadequate supply of chemical reagents.

Chemistry Laboratory equipment is very inevitable tools in effective teaching and learning of chemistry. Many people are clamouring for State and Federal Government as well as stake holders to provide Chemistry Laboratory equipment in secondary schools. It is however surprising to note that the little equipment available in schools are not fully utilized by some teachers and students. Chemistry teaching and learning is more or less practical and involves the use of laboratory equipment. Students when exposed to chemistry laboratory activities and experiments, acquire, understand and retain the basic scientific principles and applications more. When the chemistry laboratory equipment are available and are well utilized by teachers and students the resultant effect is that the students achieved higher in examinations. The researcher however concentrated on the availability of chemistry laboratory equipment and how the usage affects senior secondary school students' achievement in chemistry.

Bruner's theory which shows that learning is an active process is the basis of this study. Facts of the process in this Bruner's theory include selection and transformation of information, decision making, generating hypotheses and making meaning from information and experiences (Hafiz 2023). Bruner's theories emphasize the significance of categorization in learning. To perceive is to categorize, to learn is to form categorizes; interpreting information and experiences is a key concept.

From the above discussions, the need has therefore risen to look into the influence of availability and utilization of chemistry Laboratory

equipment on students' achievement in chemistry in senior secondary schools in Anambra State.

The persistent poor performance of secondary school students in chemistry in senior school certificate examination is causing serious concern in education circles. This is because of the vital role of chemistry education for scientific and technological advancement of this country. The West African Senior School Certificate Examination results for 2006 to 2010 shows a persistent underachievement of student in chemistry Akinwumi (2023).

The main purpose of the study was to investigate the availability and utilization of chemistry laboratory equipment on students' chemistry achievement in senior secondary schools in Anambra State

The study was guided by the following research questions:

1. To what extent are chemistry laboratory equipments available in secondary schools in Anambra state?
2. To what extent do chemistry teachers utilize chemistry laboratory equipments in teaching chemistry in Anambra state?
3. What is the difference between the mean achievement scores of chemistry students in schools with chemistry laboratory equipments and those in schools without chemistry laboratory equipments?
4. What is the difference between the mean achievement score of male and female chemistry students in schools where chemistry laboratory equipment is available?

The following hypotheses were tested at 0.05 level of significance:

1. **HO1:** There is no significant difference between the mean achievement scores of students in schools with chemistry laboratory equipments and those in schools without chemistry laboratory equipments.
2. **HO2:** There is no significant difference between the mean achievement scores of male and female students in chemistry in schools where laboratory equipments are available and utilized.

Methods

The design of the study was a survey research design. This design was considered appropriate and suitable for this study because it focused on obtaining information and analysing data from a group of chemistry teachers and students considered to be representative of the entire

population about the availability and utilization of chemistry laboratory equipment and its effects on students' chemistry achievement in senior secondary schools in Anambra State.

The population of the study comprised all the 213 chemistry teachers, 2,820 SS II chemistry students in 257 senior secondary schools in Anambra State.

The sample consisted of 135 chemistry teachers and 900 chemistry students drawn from 45 senior secondary schools in three education zones in Anambra State. First, simple random sampling technique (balloting with replacement) was used to select three education zones (Awka, Ogidi and Onitsha education zones) out of the six education zones in Anambra State.

Secondly, proportionate sampling technique was used to sample 10 out of 32 schools from Onitsha education zone 15 out of 42 schools from Ogidi education zone, and 20 out of 62 schools from Awka education zone, totalling 45 senior secondary schools out of 136 schools in senior secondary in three education zones used for this study (Table 2 refer). All the chemistry teachers in the 45 schools sampled (total 135 teachers) were used for the study.

Thirdly, simple random sampling technique (table of random digits) was used to select 20 senior secondary year two (SS2) students from each of the 45 schools used for the study totalling 900 students indicating 32% of the population. This sample size seems to be adequate for the study.

According to Mumtaz et al (2020), an appropriate size of a sample to use in a study should be about 30% of the population. Thus a total of 1,035 respondents (teachers and students) were involved in the study.

The following instruments were used for data collection:

Chemistry Laboratory Equipment Checklist (CLEC), and Chemistry Achievement Test (CAT).

Using the test-retest method, the Chemistry Laboratory Equipment Checklist (CLEC) and Chemistry Achievement Tests (CAT) were administered in three schools outside the selected schools. After three weeks, the researcher re-arranged the questions and went back to the schools and re-tested the instruments, the reliability coefficient was established using Pearson Product Moment Correlation and found to be

0.86 for CLEC, and 0.83 for CAT respectively. This indicates that the instrument is adequate for the study.

The data from the copies of questionnaires were analysed by comparing the frequency and percentages of responses based on 135 chemistry teachers and 900 chemistry students respectively. The percentages were used to provide answers to the research questions on availability, usage, familiarity of equipment and students achievement in chemistry.

Results

Research Question 1:

1. To what extent are chemistry laboratory equipments available in secondary schools in Anambra state?

Table 1: Mean Responses of chemistry Teachers on availability chemistry equipment

EQUIPMENT	MEAN	S.D.	REMARK
Beaker	3.60	1.37	Agree
Crucible	2.44	0.70	Disagree
Crucible tonges	2.18	0.55	Disagree
Evaporating dish	1.89	0.49	Disagree
Conical flask	3.58	1.36	Agree
Thermometer	2.38	0.68	Disagree
Pipette	3.56	1.36	Agree
Dropping pipette	3.50	1.34	Agree
First aid kit	3.07	1.19	Agree
Cork bores	1.54	0.39	Disagree
Glass cuter	1.53	0.39	Disagree
Burette stand	3.39	1.28	Agree
Test tube holder	3.56	1.36	Agree
Volumetric flask	3.30	1.27	Agree
Indicator	3.58	1.36	Agree
Test tube	3.64	1.38	Agree
Burette	3.63	1.38	Agree
Lie big condenser	1.39	0.39	Disagree
Wash glass	2.07	0.58	Disagree
Flat bottom flask	3.04	1.18	Agree

Test tube brush	3.22	1.24	Agree
Metre rule	3.01	1.17	Agree
Funnel	3.64	1.38	Agree
Spatula	3.66	1.39	Agree
Pipette stand	2.15	0.54	Disagree
Stop clock	2.33	0.64	Disagree
Rod	3.63	1.38	Agree
Rubber stopper	3.25	1.26	Agree
Wire gauze	2.86	0.87	Agree
Filter paper	2.65	0.73	Agree
Fire blanket	1.46	0.42	Disagree
Fire extinguisher	2.27	0.59	Disagree
Phenolphthalein	2.61	0.71	Agree
Aspirators	1.69	0.45	Disagree
Red litmus paper	3.53	1.35	Agree
Was bottle	2.04	0.51	Disagree
Gas jar	2.01	0.50	Disagree
Brush	3.15	1.24	Agree
Cork ring	2.39	0.65	Disagree
Glass rod	2.70	1.00	Agree
Syringe	1.88	0.48	Disagree
Scissors	3.00	1.05	Agree
Deionizer	1.47	0.42	Disagree
Tripod stand	2.05	0.51	Disagree
Combustion boat	1.53	0.44	Disagree
Ph meter	2.07	0.52	Disagree
Dry tube	2.20	0.55	Disagree
Desecrator	1.98	0.49	Disagree
Splint	1.76	0.47	Disagree
Filter pump	2.52	0.67	Agree
Total	135.52		
Average mean	2.71		

The mean result in Table 1 revealed that greater number of chemistry teachers used for this study indicated from the check list that the following chemistry equipment were available in their chemistry laboratory namely: beaker, conical flask, pipette, dropping pipette, motor,

burette stand, test tube holder, volumetric flask, indicator, test tube, burette, flat bottom flask, test tube brush, funnel, spatula, metre rule, test tube holder, rubber stopper, filter paper, litmus paper, brush; while the rest of the chemistry equipment on the check list were not available. This is accepted as the mean is greater than the instrument scale mean of 2.5. Also, the average mean of 2.71 is greater than the scale mean.

Research Question 2:

To what extent do chemistry teachers utilize chemistry laboratory equipments in teaching chemistry in Anambra state?

Table 2: Mean responses of chemistry teachers on usage of chemistry equipment

EQUIPMENT	MEAN	S.D.	REMARK
Beaker	3.40	1.28	Agree
Crucible	2.42	0.70	Disagree
Crucible tongs	2.18	0.55	Disagree
Evaporating dish	1.59	0.40	Disagree
Conical flask	3.58	1.36	Agree
Thermometer	2.38	0.68	Disagree
Pipette	3.56	1.36	Agree
Dropping pipette	3.50	1.34	Agree
First aid kit	3.07	1.19	Agree
Cork bores	1.54	0.39	Disagree
Glass cutter	1.53	0.39	Disagree
Burette stand	3.31	1.28	Agree
Test tube holder	3.56	1.36	Agree
Volumetric flask	3.30	1.27	Agree
Indicator	3.58	1.36	Agree
Test tube	3.64	1.38	Agree
Burette	3.63	1.38	Agree
Lie big condenser	1.39	0.39	Disagree
Wash glass	2.07	0.58	Disagree
Flat bottom flask	3.04	1.18	Agree
Test tube brush	3.22	1.24	Agree
Metre rule	3.01	1.17	Agree
Funnel	3.64	1.38	Agree

Spatula	3.66	1.39	Agree
Pipette stand	2.15	0.54	Disagree
Stop clock	2.33	0.64	Disagree
Rod	3.63	1.38	Agree
Rubber stopper	3.25	1.26	Agree
Wire gauze	2.86	0.87	Agree
Filter paper	2.55	0.69	Agree
Fire blanket	1.35	0.40	Disagree
Fire extinguisher	2.27	0.59	Disagree
Phenolphthalein	2.61	0.71	Agree
Aspirators	1.69	0.45	Disagree
Red litmus paper	3.53	1.35	Agree
Was bottle	2.04	0.51	Disagree
Gas jar	2.01	0.50	Disagree
Brush	3.15	1.24	Agree
Cork ring	2.39	0.65	Disagree
Glass rod	2.70	1.00	Agree
Syringe	1.88	0.48	Disagree
Scissors	3.00	1.05	Agree
Deionizer	1.47	0.42	Disagree
Tripod stand	2.05	0.51	Disagree
Combustion boat	1.53	0.44	Disagree
Ph meter	2.07	0.52	Disagree
Dry tube	2.20	0.55	Disagree
Desecrator	1.88	0.48	Disagree
Splint	1.76	0.47	Disagree
Filter pump	2.41	0.66	Agree
Total	134.70		
Average mean	2.70		

The mean result in table 3 revealed that greater of the chemistry teachers used for the study indicated from the checklist that the following chemistry laboratory equipment were utilised by chemistry teachers in teaching chemistry: beaker, conical flask, pipette, dropping pipette, motor, burette stand, test tube holder, volumetric flask, indicator, test tube, burette, flat bottom flask, test tube brush, funnel, spatula, metre rule, test

tube holder, rubber stopper, filter paper, litmus paper, brush; while the rest of the chemistry equipment on the check list were not used. This also is acceptable since the mean is greater than the instrument scale mean of 2.5. Also, the average mean of 2.70 is greater than the scale mean.

Research Question 3: What is the difference between the mean achievement scores of chemistry students in schools with chemistry laboratory equipments and those in schools without chemistry laboratory equipments?

Table 3: Mean achievement scores of Chemistry Students in Chemistry achievement test.

Group	N	Mean	S.D.	Difference in X
CLEAV	480	56.33	21.03	20.48
CLENAV	420	35.85	13.72	

Table 3 shows the mean chemistry achievement scores of schools where Chemistry Laboratory Equipment is Available (CLEAV) and schools where Chemistry Laboratory Equipment is Not Available (CLENAV). Mean for CLEAV is 56.33 while mean for CLENAV is 35.85, their mean difference is 20.48 in favour of CLEAV. This indicates that a significant difference exists between schools where Chemistry Laboratory Equipment is Available (CLEAV) and schools where CLE is Not Available (CLENAV). Hence, the null hypothesis is rejected.

Research Question 4: What is the difference between the mean achievement score of male and female chemistry students in schools where chemistry laboratory equipment is available?

Table 4: Mean achievement scores between male and female Chemistry Students in Chemistry achievement test.

Source of Variance	N	Mean	S.D	Difference in X
Male	175	60.25	22.24	7.85
Female	305	52.40	19.81	

Table 4 shows the mean achievement scores between male and female students in chemistry achievement test. Mean for male is 60.25

while mean for female is 52.40, the mean difference is 7.85 in favour of Male, which indicates that there is a significant difference between the male and female chemistry students in the schools where chemistry laboratory equipment is available. Hence, the null hypothesis is rejected.

The two null hypotheses that were postulated in this study were tested and presented here. To test the null hypotheses the percentage scores were used to compute the t-test.

Hypothesis One:

HO1: There is no significant difference between the mean achievement scores of students in schools with chemistry laboratory equipments and those in schools without chemistry laboratory equipments.

Table 5: t-test of difference on mean scores of group A schools where equipment were available and utilized and group B schools where the equipment were not available and not utilized.

Source Of Variance	Mean	STD	N	DF	SD	t-Cal	t-Crit
Group A	56.33	21.03	480	898	0.86	10.430	1.96
Group B	35.85	19.25	420				

Table 5 indicates that at 0.05 confidence level the critical t value is 1.960 while the t-calculated is 10.430. Since the calculated t-value is more than the critical t value the null hypothesis is rejected. This implies that there is a significant difference between the mean achievement scores of students in schools with chemistry laboratory equipments and those in schools without chemistry laboratory equipments.

HO2: There is no significant difference between the mean achievement scores of male and female students in chemistry in schools where laboratory equipments are available and utilized.

Table 6: t-test of difference on mean scores of male and female chemistry students' achievement test.

Source of Variance	Mean	STD	N	DF	SD	T-Cal	T-Crit

Male	60.25	22.24	175	378	0.31	3.89	1.960
Female	52.40	19.81	305				

Table 6 shows that t-calculated (3.89) is greater than t-critical (1.96) at degree of freedom 378 and 0.05 level of significance. Based on the result, the null hypothesis is upheld. This implies that, there is no significant difference between the mean achievement scores of male and female students where the laboratory equipments is available and utilized.

Findings

The findings include:

1. Agreed mean of chemistry teachers that indicated availability of selected chemistry laboratory equipment in senior secondary schools in Anambra State.
2. Agreed mean of chemistry teachers indicated usage of selected chemistry laboratory equipment in senior secondary schools in Anambra State.
3. The availability and utilization of chemistry laboratory equipment positively affect the male students more than the female students.
4. Chemistry students in schools where chemistry laboratory equipment are available and utilized can state the usage of the listed chemistry laboratory equipment higher than Chemistry students in schools where chemistry laboratory equipment are not available and utilized.
5. Availability and utilization of chemistry laboratory equipment enhanced chemistry students' achievement in chemistry.
6. The effect of availability and utilization of chemistry laboratory equipment in students' achievement in schools where chemistry laboratory equipment were available and utilized will differ significantly from students' achievement in schools where the chemistry laboratory equipment were not available and not utilized.
7. Availability and utilization of chemistry laboratory equipment on male chemistry students' achievement will differ significantly from the female chemistry students' achievement.
8. Five implications of the study, five recommendations and three suggestions for further research were made.

Conclusion

The availability and utilization of chemistry laboratory equipment affects the chemistry students' achievement in senior secondary schools in Anambra State. While Nigeria needs to be developed like other countries in the world; the availability and utilization of the chemistry equipment should be taken seriously in the secondary schools.. To be developed educationally, the curriculum of each subject will put into consideration. For example, the contents in the senior secondary chemistry curriculum are designed to facilitate the acquisition of entrepreneurial skills among the students, thereby helping in solving global economic crisis but this is not achieved secondary schools.

Some materials in use in Nigeria has been found to reveal gender bias decisively against female (Abolaji 2014), but this study shows that there are equal treatment of non- availability, inadequacy and non-usage of the resources for male and female students.

The non availability and non-utilization of chemistry laboratory equipment could be one of the reasons for mass failure of chemistry in schools both for internal and external examinations.

Laboratory training is very necessary in our schools. Laboratory training trains students' mind to critical evaluation of facts and principles, elucidates theoretical work, promotes retain learning and discourage role learning. When the Laboratory equipment are available, and students are familiar with them as well as using them, then the school of today will be providing tomorrow's employees, people whose gifts and abilities must be developed to prepare them for life in the rapidly changing society. Therefore, availability and utilization of chemistry laboratory equipment affect the chemistry students' achievement in senior secondary schools in Anambra State.

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REORIENTATION ON THE UTILIZATION OF PROMOTION EXAMINATION RESULT AMONG SECONDARY SCHOOL PRINCIPALS IN IMO STATE

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Abstract

The paper examined the need for reorientation on the utilization of promotion examination results among secondary school principals in taking decision. It identified the poor utilization of student promotion examination results in taking good decisions that would be at the best interest of the major stakeholders of secondary school education. The state of art in the utilization of promotion examination result was x-rayed and the wrongs observed pin-pointed. Classical test theory and functional analysis theory were adopted in explaining some of the issues relating to the use of promotion examination result. The consequences of this undesirable condition in the use of promotion examination results were highlighted and includes fraudulent upload of fake scores to external assessment, increase in examination malpractice among students, demoralizing of teachers, discouraging of serious students. It is recommended among other things that parents should desist from forcing their wards who fail examinations to be promoted, a law criminalizing promotion of students that don't merit promotion should be enacted and enforced, Ministry of Education and other education authorities should punish principals and others that engage in illegal promotion of failed students.

Keywords: Promotion examination, Secondary school principals, Utilization.

Introduction

Examinations are curial part of the educational system. It has been defined as a formal kind of testing that comprises a series of written or/and oral tests used to identify how much of specified skills learners have acquired particularly at the end of course or before admission [Nkwocha, 2015). In the same way, Idea Group Inc (IGI) Global (2024) reviewed examination as the formal test that students take in order to show their knowledge about the particular subject often done in written or oral form. This means that examination is a measuring tool for a student academic progress (Rachh, 2023). It is obvious that examination is a measurement process that produces data upon which many decisions are anchored.

Measurement is indispensable in education. It is viewed as a systematic process of assigning numbers or numerical values to aspects or attributes of an object, person, event or observation or as a product, the numbers that were systematically assigned to aspect or attributes of an object, person, event or observation(i.e. the measurement data) (Ekwoye, Uzoma & Eguzo, 2016). In secondary school, many measurement data regarding students' academic achievement especially in the area of cognitive domain are usually collected through a measurement process which examination is one of them.

In Nigeria secondary school education system, there are two main categories of examination- the internal and external examinations. The internal examination is usually subdivided into three based on the term whose scheme of work is used to develop the questions. They include: First Term Examination (FTE), Second Term Examination (STE) and Third Term Examination (TTE) The TTE is also referred to as promotion Examination (PE) because it is the examination that produce the result that determine who should: be promoted, or repeat the class or be demoted though the FTE and STE result are also incorporated in it according to the concept of continuous Assessment (CA).

The external examination comes at the end of the programme and is purely summative in nature. They are usually organized by examination bodies like: National Examination Council (NECO), West African Examination Council (WAEC) for senior secondary school certificate Examination and National Business and Technical Examination Board (NABTEB) for business and technical subjects at senior secondary school level and Examination Development Centre (EDC) for basic Education

Certificate Examination (BECE) The BECE comes up at the end of three years in junior secondary schools and this examination produces the result that apart from certification of students' education level of academic achievement in the three year programme, it is also used to promote students to senior secondary school 1(SS1). Beside producing data that is used to determine extent student have required the specific skills and knowledge expected of them, exam also help student to develop a wide range of skills like time management and retaining and selling information in order to do well in exam; critical thinking, good communication skills; problems- solving; organization and planning and resilience (Racch, 2023).The school good use of the students examination results to a large extent depends on the school principal.

The secondary school principal is the educational and administrative head of a school. The principal is responsible for overseeing the day-to-day operation of the school, including management staff, implementing educational policies and maintaining a safe and productive learning environment. The school principal sets the school vision and goals, developing curriculum standards to ensure academic excellence (Career explorer, 20204).

It is obvious that the principal has a lot of duties to perform as the head of the school. One of the key roles of the principal is that of ensuring that educational policies which promotion of students based on their academic performance is one of them is effectively implemented. It is in their hands to ensure that the right decision is taken concerning students promotion examination results.

The nexus of principal to the issue of promotion of students is very important. Promotion examination is the examination students take in order to enable the school principal take proper decision on who should: be promoted to the new class; repeat the class; or be demoted to the lower class. Owing to the importance of this examination some steps are taken by school principal to ensure that the measurement data produced are reliable and valid.

The government through Secondary Education and Management Board introduced 'Central Set Paper' (CSP).The CSP include three key subjects: English, Mathematics and Biology subjects at the senior secondary school level. Team of experienced teachers and examiners are usually engaged to develop the questions in these three subjects using the

first term, second term and third term scheme of work for each the three classes of Senior Secondary School (SSS). In other words, the third term promotion examination is broader in content than the first term and second term. The team also prepares the marking scheme and ensures that the teachers are co-ordinated to score the responses of students. It is also expected that this exercise will positively influence other teachers whose subjects are not among the CSP to set questions, produce marking scheme and objectively score students responses so that obtained data would be valid in taking worthwhile decision. This rigorous exercise introduced by the government is very much in tandem with the classical test theory.

Classical Test Theory (CTT) is primarily concerned with the relationship between three important assessment scores of student's academic achievement. They include: Observed score (X_0); True score (X_T); and the Error score (X_E). The relationship is simply expressed in question form as:

$X_0 = X_T + X_E$ (I) (Ekwonye & Eguzo 2011, Kpolovie 2010).

According to CTT, the X_0 is the observed score which every student obtained at the end of the examinations. It is called the raw score or according to equation 1, the sum of the true score and error score. The true score (X_T) is the examinee's real score which indicates the amount of the attributes being measured (for example, knowledge) the examinee possesses. Mathematically from equation 1, it could be deduced that true score (X_T) is equal to observed/raw score minus the error score (that is $X_T = X_0 - X_E$). It could also be referred to as the discrepancy between the true score and the observed score. The third component of the equation 1 that is very vital is the error score (X_E). It is part of the observed score that emanated from errors arising from the: test (that is the measuring instrument/question paper of the examination); the examinee/ testee, the examiner, and testing environment. It would be referred to as the discrepancy between the observed score and the true score (that is $X_E = X_0 - X_T$).

It is obvious that as the error score approaches zero, the observed score also equals true score. It is at this point that the observed student score could be valid and reliable in taking educational decisions. The rigorous activities of: developing examination question papers that are free from errors; administrating them in examination favorable environment (to

reduce error from administration of the questions); and developing the marking scheme and adhering to it to score students response in promotion examination objectively are all geared towards ensuring that the error score is greatly reduced to point very close to zero or zero knowing very well that it is only when this is achieved that the observed score i.e. the student's academic score will approximate the true score (i.e. student's real academic attainment) and the measurement data at this level could be said to be valid and reliable. The state government through The Secondary Education Management Board (SEMB), needs to be applauded in this area.

However, there are still areas of improvement. Most schools do not have trained teachers in some subject areas including the centrally set papers. Even when the question are well structured and marking scheme provided, the untrained teachers may not be very objective in scoring students responses. Secondly because; most schools do not have typing and printing machines, they resort to setting very few questions on chalkboard there by making those examinations question papers (i.e. the question papers whose items are too few to be representative of the entire content of the subject) to lack face and content validity. These notwithstanding are not the abnormality which is gradually becoming the norm especially in the public secondary schools. The major worry of the writer is the indiscriminate and incessant promotion of the undeserved students to new class.

It is known that promotion examination yields result known as promotion examination result which is the cumulative average of the first, second and third term score of students. This is so because the continuous assessment which the secondary school education has adopted among other levels of education recognizes that the present performance of a learner is a resultant effect of previously acquired trait (Nkwocha, 2015).

However, most schools use only the third term result as their promotion examination result not being affected by the student previous score/result in that particular class. It is also worthy of note that the present ugly situation is very much in tandem with the finding that secondary school system does not make effective use of assessment score to improve learning (Ogomaka & Eguzo, 2014). Almost a decade this finding was made it is still surprising that no reasonable effort has been made to reverse the status quo. Also, the reported inappropriate computing

of student's performance in the area of cognitive domain (Onah & Eguzo, 2019) tend to support the writers' claim on this burning issue.

State of the Art in the Utilization of Promotion Examination Result in Public Secondary Schools and Most Private Secondary School in Imo State

It is disheartening that after the government through Secondary Education Management Board has made some effort in ensuring that school promotion examination question papers have face and content validity, consequently producing valid and reliable data for meaningful administrative function, they turn blind eye to what these generated scores are used for. Principals are helpless in encouraging undeserving students based on their academic result to repeat the class because the student can leave and go to a nearly private school that can only admit the student based on the ability his/her sponsor to pay all bills. Students are no longer given admission based on their capabilities and successful acquisition of the pre-requisite knowledge and skills but on only the student's interest and the ability of the parent to pay all the charges. Academic achievement of the student is no longer a salient factor to consider in placing a student in a class. It has become a common practice in both private and public schools for students who on their own refused to write promotion examination to move to a higher class on the beginning of a new academic session. The school principal will not do the right thing for fear of losing his/her students to another nearby school who may not compel the student to produce his/her past result or subject the student to a new test to determine the rightful class the student should be placed based on the student academic attainment or achievements. A student in SSS1 in one school can move to another school and register Senior Secondary School Certificate Examination. What is painful is that when one looks at that student academic history one will be astonished to see that he or she is below average or at most an average student. For the secondary school to be in sound position of achieving its goals- producing people who will live and contribute meaningfully to the society and those who will further their education to tertiary education this ugly and worrisome state of affairs in the poor or none utilization of promotion examination result should be effectively and properly resolved for the good of all stakeholders in secondary school education. It is important to note that it is not in all

cases that promoted students are those that failed in their examinations. Many sincere and dedicated principals ensure that only students that merit being promoted are promoted. Such principals are commended and should be encouraged.

Consequences of Poor or None Utilization of Students' Promotion Examination Result

1. Many schools if not all are under pressure to give some of their students if not all undeserving high scores as Continuous Assess Scores (CAS) and send same to WAEC and NECO for computation of their final result in Senior Secondary School Certificate Examination simply because they would not want their students to fail the certification or external examinations. This is the beginning of examination mal-practice in these external examinations. This so because they failed to compel students to pass their test and internal exams very well.
2. Many schools, because of this category of the students who continue to promote themselves pressure the school principals to allow them engage in examination malpractice as the only way for them to pass the examination since they lack self confidence to pass the examination and they also know that they have not been passing the internal examinations and they will equally fail the external examination without examination malpractice. Most of the schools with this group of students will want to save the image of the school by all means and may see examination malpractice as an option.
3. Teachers are highly demoralized seeing students who are not serious with their academic work being allowed by the school management for them to promote themselves to the next higher class. It is highly problematic to teach a student who is not qualified to be in a class and who is not ready to make the needed scarifies. More so since the school is not making proper use of the assessment records it will discourage the teachers to be committed in the assessment of students' academic achievement.
4. This category of students is capable of discouraging other students who are serious with their academic work. For the Holy Scripture says evil communication corrupts good manners. Promoting themselves can have far-reaching effects in the education sector which include that it

could: lower student attendance; lower student class attendance; discourage other student from studying very hard; and lower student interest in what the teacher is teaching.

Recommendation

The theory of functional analysis is very relevant and should be applied in solving this problem. The school system is taken as an organism that has many parts which must function for the organism to live (Henslin, 2008). Secondary school comprises some main stakeholders: the school principals, teachers, government and its arm through which she works in education (Ministry of Education And Secondary Education Management Board), students and their parents. Each of these major components of the school system has major role to play for the school to realize its goal. According to the functionalism, when all these components fulfill their functions, the school will be in a normal state. If they do not fulfill their functions the school is in abnormal or pathological state. The parents, the school, the government and equally the students need to understand what promotional exam is and work hard and together to ensure they do not abuse it. If there is a synergy between these stakeholders the fight against improper promotion of students will be easily won and the untold consequences of this ugly situation will to individuals and society at large be totally eliminated. Against this backdrop and the issues discussed that following recommendations are made:

1. Parents should not support the wards who fail promotion examination to go to the other school that will allow them to go to a new class when they are not qualified instead they should approach the school to know why their wards failed and join hands with the school for improvement while accepting the decision of the school.
2. There should be a law that will criminalize promotion of students not based on the student present academic performance. This will discourage schools that would like to admit any student into any class whether he/she is not qualified to be.
3. The government through state ministry of education or secondary education management board should set up task force that should ensure that students are promoted based on their academic performance rather than the students' mere choice of going into new class. And defaulters should be punished according to the law. This

will make students to sit up in their classes since their mid-term test and assignment will be part of the score indicating the level of their academic achievement at the end.

4. Typing and printing machines should be made available for school to ensure that quality examination questions papers are developed for the student.
5. Facilities for processing and storage of students' assessment scores should be upgraded.
6. The serving teachers should upgrade their knowledge in setting valid and reliable question papers for their respective subject.
7. The Secondary Education Management Board (SEMB) during her routine school inspection should ensure that teachers comply with all that has to do with the continuous assessment of student academic achievement.

Conclusion

The study has x-rayed the key issues relating to the use of promotion examination result in taking some relevant administrative decisions for the good of all the major stakeholders in education. The consequences of the poor utilization of the measurement data from the promotion results of students and the recommendation in tackling them, it behooves the major stakeholders in education to explore and harness the observations of the researchers in improving the quality of education in the state.

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INFLUENCE OF ARTIFICIAL INTELLIGENCE (AI) ON THE STUDY HABITS OF NURSING STUDENTS IMO STATE, NIGERIA.

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Abstract

This study examines the influence of Artificial Intelligence (AI) on the study habits of nursing students at identifying both the benefits and challenges associated with AI-driven learning. The study was conducted at Imo State, focusing on nursing students enrolled in various levels of study. A descriptive survey design was adopted to explore how AI influences study habits among nursing students. The target population comprised all nursing students in Imo State. A sample of 250 nursing students was selected using a stratified random sampling technique, ensuring equal representation across different academic levels. A structured questionnaire was used to collect data, comprising sections on AI usage, study habits, perceived benefits, and challenges. The instrument was validated by experts in measurement and evaluation to ensure content and face validity. A pilot study was conducted, and the instrument's reliability was established using Cronbach's alpha, yielding a coefficient of 0.82, indicating high reliability. Data were analyzed using descriptive statistics such as mean. The study revealed that AI positively influences study habits by improving information accessibility, time management, and personalized learning experiences. However, challenges such as over-reliance on AI tools, reduced problem-solving skills, and potential distractions were noted. The findings further indicated that students who use AI responsibly demonstrate better academic performance than those who rely entirely on AI-driven learning. It was concluded that AI has a significant impact on the study habits of nursing students, offering both benefits and challenges. While it enhances learning efficiency, improper use can negatively affect students' ability to develop critical thinking and independent

learning skills. The study recommends that educational institutions establish clear guidelines on AI usage, incorporate AI literacy training into the nursing curriculum, and encourage students to balance AI-driven learning with traditional study methods.

Keywords: Artificial Intelligence, Study Habits, Nursing Students, Learning Efficiency, AI in Education, Academic Performance.

Introduction

The integration of Artificial Intelligence (AI) tools, such as ChatGPT, into education has revolutionized the learning process, offering new ways to enhance student study habits (Zawacki-Richter, Marín, & Bond, 2019). AI-powered tools such as adaptive learning platforms, chatbots, and virtual tutors are increasingly being used to personalize learning experiences, improve retention, and provide instant feedback. Nursing education, which demands rigorous study and practical application, has also seen the adoption of AI-driven educational tools to supplement traditional learning methods (Goh & Sandars, 2020).

In the University, nursing students are expected to develop effective study habits to excel in their demanding curriculum. With the emergence of AI applications in education, there is a growing interest in understanding how these technologies influence study habits, including time management, note-taking, self-assessment, and engagement with study materials (Bailey & Ifenthaler, 2021). While AI promises to enhance learning efficiency, concerns have been raised about over-reliance on technology, reduced critical thinking, and potential academic dishonesty (Chin et al., 2022). This study seeks to explore the influence of AI on the study habits of nursing students at IMSU, Orlu Campus, identifying both the benefits and challenges associated with AI-driven learning.

The advent of AI tools, such as ChatGPT, has introduced new dynamics in academic settings. While these tools can enhance learning by providing quick access to information and aiding in content creation, they also raise concerns regarding academic integrity. Instances have been reported where students faced allegations of academic misconduct due to suspected AI misuse, leading to stress and potential delays in their educational progress (The Guardian, 2024). Moreover, the reliability of AI

detection tools is under scrutiny, as false positives can occur, unfairly penalizing students (The Guardian, 2024).

Despite potential drawbacks, when harnessed appropriately, AI can positively influence nursing education. A study involving Chinese university students demonstrated that AI positively impacted academic performance and mental well-being. The study highlighted that smart learning environments, which integrate these technologies, can enhance student engagement and educational outcomes (Xu et al., 2024). Additionally, incorporating social media into nursing education has been shown to improve communication skills, peer support, and collaborative learning, all of which are essential components of nursing practice (BMC Nursing, 2024).

Tools that convert text to speech, combined with calming visuals—a trend referred to as "PDF to Brain Rot" have gained popularity among students. Experts have mixed opinions on this method's efficacy; while it may enhance focus for some learners, there is concern about potential distractions and passive learning Pimmer, Brühlmann, Odetola, & Ajuwon, (2018). When utilized effectively, AI and social media can enhance nursing education. For instance, a study involving nursing students in Oyo State, Nigeria, found that using WhatsApp during clinical placements improved communication with peers and nurses, contributing to the development of professional identity and reducing feelings of isolation.

The influence of AI on the study habits of nursing students is multifaceted. While these technologies offer valuable tools for enhancing education, their misuse or overuse can lead to challenges in maintaining effective study habits and academic integrity. It is crucial for educational institutions, including Imo State University Orlu, to develop guidelines and support systems that promote the responsible use of AI, ensuring that these technologies serve as assets rather than distractions in the academic journeys of nursing students.

Nursing students often struggle with managing their time effectively due to the demanding nature of their coursework and clinical rotations (Sitzmann & Ely, 2018). AI-based scheduling tools such as Google Calendar with AI reminders and smart note-taking apps like Otter.ai help students optimize their study schedules, prioritize tasks, and enhance their efficiency (Topol, 2019). A study by Sharma et al. (2022)

found that students using AI-driven study planners showed a 30% improvement in time management and academic performance.

The use of Artificial Intelligence (AI) in education has seen significant growth, offering students personalized learning experiences, automated tutoring, and data-driven study assistance (Luckin et al., 2021). However, despite its benefits, AI also presents various challenges that may impact students' study habits. These challenges range from overdependence and reduced critical thinking to ethical concerns, accuracy issues, privacy risks, and economic barriers.

One of the primary concerns with AI in education is the risk of overdependence, which can undermine students' ability to think critically and solve problems independently (Selwyn, 2019). AI-powered study tools such as ChatGPT, Grammarly, and automated summarization tools provide instant responses, which may discourage students from engaging deeply with study materials (Bates, 2020). Research by Ma and Siau (2022) found that students who relied extensively on AI tools for writing assignments exhibited lower levels of cognitive engagement and problem-solving skills. This overreliance can also diminish creativity, as students may prefer AI-generated responses over their original thoughts (Tang & Saeedi, 2021).

Another significant challenge of AI in study habits is the potential for misinformation and unreliable outputs. AI-generated content is based on algorithms trained on vast datasets, which may sometimes contain errors, biases, or outdated information (Marcus & Davis, 2019). Studies by Bender et al. (2021) show that AI tools like language models often generate plausible-sounding but factually incorrect content, misleading students who do not critically evaluate the information. Furthermore, AI algorithms may reflect biases present in their training data, resulting in skewed perspectives and incomplete knowledge (Zou & Schiebinger, 2018).

The use of AI in academic settings raises ethical issues, particularly regarding plagiarism and academic dishonesty. AI-powered writing assistants can produce essays and research papers with minimal student input, leading to concerns about authenticity and intellectual ownership (Cotton et al., 2023). A study by Sutherland et al. (2022) highlighted an increase in AI-assisted plagiarism cases among university students, emphasizing the need for academic institutions to develop strict

guidelines on AI usage. Additionally, AI tools sometimes fail to provide proper citations for generated content, making it difficult for students to adhere to academic integrity standards (Brock & Luckin, 2022).

AI study platforms often require users to share personal data, raising concerns about privacy and data security. Many AI applications collect user behavior, study preferences, and browsing history to optimize their services (Wang & Kosinski, 2020). However, these data collection practices pose risks, as sensitive information may be shared with third parties or become vulnerable to cyber attacks (Smith & Anderson, 2021). A report by the European Data Protection Board (2022) warned that AI-based educational technologies could compromise students' privacy if not regulated effectively. Such risks necessitate stricter data protection policies and user awareness regarding AI privacy settings (Tene & Polonetsky, 2019).

AI applications offer solutions such as automated note-taking, content summarization, and interactive learning experiences, they may also foster a dependency that undermines students' ability to engage in independent research and problem-solving (Dwivedi et al., 2023). The increasing integration of Artificial Intelligence (AI) into academic environments has significantly altered students' study habits, particularly in professional fields such as nursing. Nursing education demands rigorous study patterns, critical thinking, and practical application of knowledge. However, the widespread adoption of AI-driven tools, such as ChatGPT, virtual tutors, and AI-powered learning platforms, alongside the pervasive influence of social media, raises concerns about their impact on the study habits of nursing students (Munyengabe et al., 2023).

The study habits of nursing students are crucial to their academic success, as the field requires both theoretical knowledge and practical skills (Goh & Sandars, 2020). While AI offers opportunities to improve learning outcomes, there is limited empirical evidence on its actual impact on nursing students' study habits. Some students may experience improved efficiency and personalized learning experiences, while others may struggle with dependency on AI tools, diminished problem-solving abilities, or a decline in traditional study methods (Holmes et al., 2021).

Nursing students seem to rely on AI-driven applications such as ChatGPT, automated note-taking software, and virtual simulations.

However, it remains unclear whether these tools positively or

negatively influence their ability to retain information, develop critical thinking skills, and maintain disciplined study habits. Despite the growing literature on the role of AI in education, little is known about their specific influence on the study habits of nursing students in Imo State. As nursing education requires high levels of discipline, focus, and hands-on learning, it is crucial to examine whether AI and social media serve as facilitators or barriers to effective study habits in this context. Therefore, this study seeks to investigate the extent to which AI impacts the study habits of nursing students in Imo State, identifying the potential benefits and challenges they pose.

Research Questions

1. How does AI influence the study habits of nursing students in Imo State?
2. What challenges do nursing students face in using AI for studying?

Methods

This study adopts a descriptive correlational design to examine the influence of artificial intelligence on the study habits of nursing students. Descriptive correlational research aims to describe the existing relationships between variables without manipulating them (Polit & Beck, 2021). Correlational research seeks to determine relationships between two or more variables, measuring the degree of association without establishing causality. The descriptive component ensures that the characteristics of the study variables are well-documented, while the correlational aspect helps in quantifying the relationships between AI usage and study habits. This design is justified because it provides empirical evidence on how AI influence study habits without requiring experimental manipulation (Babbie, 2020).

This study is delimited to nursing students in Imo state University, Owerri and was carried out in the Department of Nursing Sciences, Imo State University. Imo State University (IMSU), located in Owerri, Imo State, Nigeria.

The sample size of the study is 125. Stratified random sampling technique was used to select the respondents for the study. Stratified sampling technique ensures equal representation across different academic levels.

The instrument that was used for data collection was a self-designed questionnaire consisting of close-ended questions. The questionnaire was validated by expert in measurement and evaluation and subsequent amendments were made. Face and content validity was ensured as an expert in measurement and evaluation made several corrections which were affected to reflect the above two types of validity. The reliability of the instrument was established with a trial test administered on 20 respondents in the Nursing department of Abia State University Uturu (ABSU). This was so because, these respondents in ABSU have similar experience as it regards to the influence of Artificial Intelligence (AI) and they are not part of the study sample. The reliability of the instrument was determined by using Cronbach's Alpha. The coefficient alpha of the instrument for the 2 sections are 0.832 and 0.876 respectively, which gave overall reliability index mean of 0.854 which shows that the instrument is reliable.

Frequency, Percentage, and mean which are descriptive statistics, were used to answer research question 1 & 2. For answering research questions, 2.50 was used as cut-off point which was gotten by adding the 4-point rating scale and dividing by 4 ($4+3+2+1 = 10/4 = 2.5$). Any item with mean score of 2.50 or above were regarded as agreed while any item with mean score of 2.49 or below were regarded as disagreed. Some of the statistical analyses were performed using Statistical Package for Social Sciences (SPSS), version 22.0.

Table 1: Influence of AI on the Study Habits of Nursing Students (n = 125)

S/N	Items	SA 4	A 3	D 2	SD 1	Tota l	Mean	Remark
1	AI-powered tools (e.g., ChatGPT, Grammarly) have improved my understanding of nursing concepts	119	6	0	0	494	3.95	Agreed
2	I frequently use AI-based platforms for academic research and assignments	125	0	0	0	500	4.00	Agreed
3	The use of AI-generated content has reduced my need for traditional textbooks	57	64	4	0	428	3.42	Agreed

4	AI-assisted study resources have enhanced my problem-solving skills in nursing studies	99	26	0	0	474	3.79	Agreed
5	AI tools have made me more efficient in completing my coursework	124	1	0	0	499	3.99	Agreed
6	Excessive reliance on AI negatively affects my critical thinking ability	125	0	0	0	500	4.00	Agreed
Grand Mean							3.86	Agreed

Source: Field Survey, 2025

Criterion Mean = 2.5

The criterion mean for this study is 2.5. Hence, weighted mean response equal to or above the criterion mean (2.5) indicates acceptance region whereas weighted mean response below the criterion mean (2.5) denotes rejection region. The analysis on table 2 which seeks to assess the influence of AI on the study habits of nursing students at IMSU Orlu campus shows a grand mean of 3.86 which exceeds the criterion mean of 2.5 which show that the respondents accepted the items as the influence of AI on the study habits of nursing students at IMSU Orlu campus. Specifically, the mean values of the items are above the criterion mean (i.e 3.95, 4.00, 3.42, 3.79, 3.99, 4.00 > 2.5) which shows that AI-powered tools (e.g., ChatGPT, Grammarly) have improved the students' understanding of nursing concepts, they frequently use AI-based platforms for academic research and assignments, the use of AI-generated content has reduced their need for traditional textbooks, AI-assisted study resources have enhanced their problem-solving skills in nursing studies, AI tools have made them more efficient in completing my coursework and excessive reliance on AI negatively affects their critical thinking ability.

Table 2: Potential Challenges of AI in Study Habits (n = 125)

S/N	ITEMS	SA 4	A 3	D 2	SD 1	Total	Mean	Remark
1	AI-assisted learning reduces students' ability to think critically and solve problems independently	92	33	0	0	467	3.74	Agreed

2	Relying on AI-generated content decreases creativity in academic writing	125	0	0	0	500	4.00	Agreed
3	AI-generated responses are sometimes inaccurate or misleading	125	0	0	0	500	4.00	Agreed
4	Overreliance on AI-generated essays weakens students' academic integrity	118	7	0	0	493	3.94	Agreed
5	AI study tools may collect personal data without users' full awareness	121	4	0	0	496	3.97	Agreed
6	AI-based learning tools require stable internet access, which may not be available to all students	125	0	0	0	500	4.00	Agreed
7	Some AI platforms have limited features in their free versions, restricting access to full benefits	37	59	22	7	376	3.01	Agreed
Grand Mean						3.81	Agreed	

Source: Field Survey, 2025

The analysis on table 3 which seeks to identify potential challenges associated with the use of AI in study habits of nursing students at IMSU Orlu shows a grand mean of 3.81 which exceeds the criterion mean of 2.5 which shows that the respondents accepted the items as the potential challenges of AI in nursing students' study habits. Specifically, the mean values of the items are above the criterion mean (i.e 3.74, 4.00, 4.00, 3.94, 3.97, 4.00, 3.01 > 2.5) which shows that AI-assisted learning reduces students' ability to think critically and solve problems independently, relying on AI-generated content decreases creativity in academic writing, AI-generated responses are sometimes inaccurate or misleading, overreliance on AI-generated essays weakens students' academic integrity, AI study tools may collect personal data without users' full awareness, AI-based learning tools require stable internet access, which may not be available to all students and some AI platforms have limited features in their free versions, restricting access to full benefits.

Discussion of Findings

Findings indicate that AI-powered tools have improved students' understanding of nursing concepts ($M = 3.95$), with frequent usage of AI-based platforms for academic research ($M = 4.00$). AI-generated content has reduced reliance on traditional textbooks ($M = 3.42$), and AI-assisted study resources have enhanced problem-solving skills ($M = 3.79$). However, excessive reliance on AI negatively affects critical thinking ($M = 4.00$). The hypothesis further revealed that AI usage has significant influence on study habit of Nursing students. Studies support these findings, highlighting that AI tools enhance knowledge acquisition, time management, and personalized learning (Bates, 2020; Davenport & Ronanki, 2018). However, excessive reliance on AI has been linked to reduced problem-solving skills and critical thinking in nursing students (Chiang et al., 2021; Buchanan et al., 2021).

The analysis on table 2 presents the perceived challenges associated with AI in study habits among nursing students at IMSU, Orlu Campus. The key findings indicate that students generally agree on several drawbacks of AI-assisted learning. The study revealed that the potential challenge include reduced critical thinking and problem-solving ability (Mean = 3.74). This finding aligns with the study by Chin et al. (2022), which highlights that excessive reliance on AI-driven learning tools can diminish students' ability to engage in deep cognitive processing. Similarly, Goh and Sandars (2020) argue that while AI can enhance learning efficiency, it may also promote passive learning, where students consume information without critical engagement.

The challenge include decreased creativity in academic writing (Mean = 4.00), Inaccuracy and Misleading AI Responses (Mean = 4.00), weakened academic integrity due to overreliance on AI (Mean = 3.94, Agreed) and many more. The results suggest that students believe AI-generated content may negatively impact creativity. This supports Bailey and Ifenthaler's (2021) research, which found that AI-generated text often follows predictable patterns, limiting originality in academic writing. Furthermore, researchers like Holmes et al. (2021) caution that dependence on AI-generated content can lead to generic and repetitive writing styles. The agreement on AI-generated inaccuracies is consistent with findings by The Guardian (2024), which reported cases where AI tools provided incorrect or biased information. Similarly, Zawacki-Richter

et al. (2019) warn that AI models, despite their sophistication, may occasionally present misleading data due to inherent biases in training datasets. It further aligns with concerns raised by various scholars, including Holmes et al. (2021), who argue that AI-generated essays pose risks of plagiarism and ethical concerns in academia. Chin et al. (2022) also highlight instances where students have faced academic penalties due to improper AI usage.

Conclusion

Based on the findings, it can be concluded that while AI offers many benefits in education, it also presents significant challenges. The key concerns such as diminished critical thinking, academic integrity issues, privacy risks, and accessibility barriers have been widely discussed in previous studies. Addressing these challenges requires a balanced approach where AI is used as a supplementary tool rather than a replacement for traditional learning strategies.

Recommendations

1. Lecturers should incorporate AI tools while emphasizing critical thinking.
2. Universities should educate students on ethical AI usage and implement plagiarism detection tools that can differentiate between original and AI-generated work.
3. Faculty should provide guidelines on how AI can be responsibly used in research and assignments.
4. Institutions should include AI literacy courses in their curriculum to ensure students can critically assess AI-generated information.

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ASSESSMENT OF UNIDIMENSIONALITY OF ENGLISH STUDIES MULTIPLE-CHOICE ITEMS SUBTEST OF DELTA STATE COGNITIVE PLACEMENT EXAMINATION FROM 2020 TO 2022

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Abstract

This study examined the unidimensional structure of the 2020-2022 English Studies multiple-choice items subtest of Delta State Cognitive Placement Examination. The purpose of the study was to ascertain if items in the 2020, 2021, and 2022 English Studies multiple-choice subtest of DSCPE measured one single continuous latent trait. Three research questions guided the study. Survey research design was adopted for the study. The population of the study was 5,271 primary six pupils in 2023/2024 academic session in Oshimili South Local Government Area of Delta State. The sample of the study was 150 English Studies multiple-choice items responded to by 3,015 pupils randomly selected using proportionate stratified sampling technique. Hence, a proportionate sample of 2,418; 353; and 244 primary six pupils were selected from Asaba, Okwe, and Oko districts of the study area. The instruments for data collection in this study were the 2020, 2021 and 2022 English Studies multiple-choice items subtest of Delta State Cognitive Placement Examination (DSCPE). The instruments were adjudged valid because they are standardized achievement test constructed by Delta State Ministry of Basic and Secondary Education (DSMBSE) which strictly followed the guidelines for test construction, editing, trial testing, item analysis and selection. The reliability of the instruments was ascertained using test-retest method and coefficient of stability of 0.94, 0.88 and 0.84 were obtained for the 2020, 2021 and 2022 English Studies subtests respectively. The instruments were administered in one day simultaneously but interchangeably such that a candidate responded to only one out of the three research instruments with the aid of 36 research assistants. The test administration lasted for 65 minutes. Response data were analysed using Principal Component Analysis (PCA) to determine the unidimensionality

of items in the instruments. Results showed that the 2020, 2021 and 2022 English Studies multiple-choice items satisfied the IRT assumption of unidimensionality and measured a single continuous latent trait. It was recommended in the study that similar psychometric analysis be extended to other subjects (Mathematics, General Paper, and Christian Religious Studies) within the DSCPE.

Keywords: English Studies, IRT, Multiple-choice, Pupils, Unidimensionality,

Introduction

In educational assessment, ensuring that test items truly measure a single continuous underlying construct, is required to ensure validity and reliability of results. Unidimensionality refers to the existence of a single latent trait or construct underlying the responses to a set of items. Unidimensionality requires a set of test items to reflect one common latent trait, which is crucial for interpreting test scores meaningfully and making informed educational decisions (Embretson & Reise, 2013). In other words, the unidimensionality assumption of item response theory (IRT) implies that the performance on a set of items can be explained by a single underlying factor (deAyala, 2009).

The implications of unidimensionality in standardized educational assessments has been emphasized in literature. Ubah and Akinyemi (2017) pointed out that the validity of large-scale assessments is crucial for educational accountability and improvement. Failure of tests to adhere to unidimensionality obscure true measurement of specific abilities; hence, misleading conclusions about learners' abilities thereby affecting placement and policy decisions (Bichi & Talib, 2018; Chalmers, 2018; Reise & Revicki, 2015; Wang & Stanley, 2020). Alonge (2016), Okoye and Agholor (2019) resonated the need to ensure that test items in large-scale examinations accurately measure the intended constructs to maintain educational standards.

Previous studies on dimensionality have revealed mixed results. Some confirmed compliance with IRT assumption of unidimensionality while others failed to meet this assumption. Adeyemi and Kasali (2022) assessed conformity of National Examination Council Mathematics multiple-choice test items to the assumption of IRT and found that 12 items do not produce a monotonically increasing function in the form of

forward S-shape for the probability of correct response recommended for good item. Oribhabor (2019) assessed unidimensionality in the 2017 West African Examination Council (WAEC) November/December Mathematics multiple-choice test items and found that the test items met the IRT assumption of unidimensionality. Similarly, Adedoyin and Mokobi (2013) investigated IRT psychometric quality of 2010 junior certificate Mathematics multiple-choice examination test items and found that the test items were unidimensional.

On the contrary, Hamman and Onuh (2022) investigated dimensionality and model fit assessment of National Examination Council of Nigeria 2020 Biology in North Central Nigeria and reported that the test items did not meet the assumption of unidimensionality. Similarly, Alade et al. (2020) assessed the dimensionality and local independence of WASSCE 2018 Mathematics objective test scores in Lagos State, Nigeria and reported that test items did not meet the assumption of unidimensionality. Pila and Adewale (2020) assessed dimensionality and local independence of 2017 state and National Basic Education Certificate Examination in National Values Education in Benue State and reported that BSEB and BECE met the assumption of unidimensionality. Ayanwale et al. (2020) carried out a study on dimensionality assessment of binary response test items using a nonparametric approach of Bayesian item response theory measurement and found that both the BMPAT and STEU ascertained violation of unidimensionality assumption of the test items. Oguoma et al. (2016) assessed dimensionality of 2014 West African Secondary School Certificate Examination mathematics objective test items and reported that the test items were multidimensional; a violation of unidimensionality assumption of IRT.

The Delta State Cognitive Placement Examination (DSCPE) in English Studies, conducted from 2020 to 2022, employs multiple-choice items to evaluate pupils' proficiency. However, the multidimensional nature of language proficiency, encompassing various skills such as reading comprehension, grammar, and vocabulary, raises concerns about whether these items indeed measure a single underlying construct. If the assumption of unidimensionality is violated, it could lead to inaccurate interpretations of pupils' abilities and potentially flawed decision-making regarding their placement. It is in the merits of the foregoing that this study assessed the unidimensionality of the English Studies multiple-

choice items administered between 2020 and 2022 to determine whether these items consistently measure a single dimension of English language proficiency.

The following research questions guided the study.

1. What is the dimensionality of the 2020 English Studies multiple-choice items subtest of the Delta State Cognitive Placement Examination?
2. What is the dimensionality of the 2021 English Studies multiple-choice items subtest of the Delta State Cognitive Placement Examination?
3. What is the dimensionality of the 2022 English Studies multiple-choice items subtest of the Delta State Cognitive Placement Examination?

Methods

Survey research design was adopted for the study. The population of the study was 5,271 primary six pupils in 2023/2024 academic session in Oshimili South Local Government Area of Delta State. One hundred and fifty (150) English Studies multiple-choice items were responded to by a representative sample of 3,015 primary six pupils. Multi-stage sampling technique was used to select 2,418; 353; and 244 primary six pupils from Asaba, Okwe, and Oko districts. The instruments for data collection were the 2020, 2021 and 2022 standardized English Studies multiple-choice items. Coefficients of stability of 0.94, 0.88 and 0.84 were obtained for the 2020, 2021 and 2022 instruments respectively using test-retest method. The instruments were administered in one day simultaneously using systematic test rotation pattern. The administration lasted for 65 minutes and were scored dichotomously. Response data were analysed using Principal Component Analysis (PCA) to determine the unidimensionality of items in the instruments. The PCA enabled the researcher to examine the first principal component to explain the maximum variance expressed as the percentage of total variance. The larger (higher) the amount of variance explained by the first component, the closer the set of items are unidimensional.

Results

Research Question 1: What is the dimensionality of the 2020 English Studies multiple-choice items subtest of the Delta State Cognitive Placement Examination?

Table 3: Total Variance Explained for the 2020 English Studies Multiple Choice Items Subtest of the Delta State Cognitive Placement Examination

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	5.657	11.314	11.314
2	2.678	5.357	16.671
3	1.685	3.371	20.042
4	1.475	2.951	22.993
5	1.441	2.882	25.875
6	1.384	2.768	28.643
7	1.361	2.722	31.365
8	1.344	2.688	34.052
9	1.296	2.592	36.644
10	1.250	2.501	39.145
11	1.232	2.465	41.610
12	1.219	2.437	44.047
13	1.176	2.352	46.399
14	1.120	2.239	48.638
15	1.100	2.200	50.838
16	1.075	2.150	52.988
17	1.036	2.071	55.059
18	1.002	2.003	57.063
19	.990	1.980	59.042
20	.974	1.948	60.990
21	.956	1.912	62.902
22	.934	1.869	64.771
23	.916	1.832	66.602
24	.853	1.706	68.308
25	.842	1.684	69.992
26	.824	1.649	71.641
27	.817	1.634	73.275

28	.799	1.598	74.873
29	.783	1.567	76.440
30	.764	1.529	77.969
31	.756	1.512	79.481
32	.722	1.445	80.925
33	.713	1.425	82.350
34	.671	1.342	83.693
35	.659	1.319	85.012
36	.644	1.288	86.299
37	.635	1.269	87.569
38	.605	1.210	88.779
39	.567	1.134	89.913
40	.550	1.101	91.014
41	.546	1.091	92.105
42	.529	1.059	93.164
43	.497	.995	94.159
44	.495	.990	95.149
45	.456	.912	96.060
46	.436	.872	96.932
47	.426	.853	97.785
48	.395	.790	98.575
49	.370	.740	99.315
50	.343	.685	100.000

The unidimensionality of the 2020 English Studies Multiple-Choice items was assessed using Principal Component Analysis (PCA). There was a presence of a dominant factor of the first Eigen value of 5.66 representing 11.31%, which is larger than the second, third, fourth and fifth et cetera, eigenvalues of 2.68, 1.69, 1.48, and 1.44 which accounted for 5.36%, 3.37%, 2.95% and 2.88% of variance respectively among others. That is, 18 items have eigenvalues greater than one (1) which accounted for 57.063% of the total variance. Similarly, the ratio of the first and second components resulted in 16.671% greater than the 2.00 required ratio. Hence, the 2020 English Studies multiple-choice items satisfied unidimensionality assumption as one principal factor (ability of testees) accounted for variations in the performance of pupils.

Research Question 2: What is the dimensionality assumption in the 2021 English Studies multiple-choice items subtest of the Delta State Cognitive Placement Examination?

Table 4: Total Variance Explained for the 2021 English Studies Multiple Choice Items Subtest of the Delta State Cognitive Placement Examination

Component	Initial Eigenvalues		Cumulative %
	Total	% of Variance	
1	7.559	15.119	15.119
2	2.909	5.819	20.937
3	1.850	3.700	24.638
4	1.680	3.361	27.999
5	1.526	3.051	31.050
6	1.452	2.903	33.953
7	1.400	2.799	36.753
8	1.358	2.717	39.470
9	1.298	2.597	42.066
10	1.285	2.569	44.636
11	1.201	2.401	47.037
12	1.173	2.347	49.384
13	1.167	2.334	51.718
14	1.122	2.245	53.963
15	1.121	2.242	56.205
16	1.055	2.111	58.316
17	1.028	2.056	60.371
18	1.022	2.044	62.415
19	.984	1.969	64.384
20	.945	1.890	66.274
21	.931	1.862	68.136
22	.921	1.842	69.979
23	.879	1.758	71.736
24	.873	1.746	73.482
25	.822	1.644	75.127
26	.817	1.635	76.761
27	.806	1.611	78.373
28	.770	1.539	79.912
29	.747	1.494	81.406
30	.739	1.478	82.884
31	.706	1.411	84.296
32	.677	1.355	85.650
33	.667	1.334	86.984

34	.617	1.234	88.219
35	.586	1.172	89.390
36	.580	1.160	90.550
37	.554	1.107	91.657
38	.489	.978	92.635
39	.467	.934	93.569
40	.416	.832	94.402
41	.380	.759	95.161
42	.376	.753	95.914
43	.366	.731	96.645
44	.328	.655	97.300
45	.303	.605	97.906
46	.261	.521	98.427
47	.223	.445	98.872
48	.208	.415	99.287
49	.200	.400	99.687
50	.156	.313	100.000

The unidimensionality of the 2021 English Studies Multiple-Choice items showed the presence of a dominant factor of the first Eigen value of 7.56 accounting for 15.12%, which is greater than the second, third, fourth, fifth and sixth and so on, eigen value of 2.91, 1.85, 1.68, 1.53 and 1.45 which accounted for 5.82%, 5.82%, 3.70%, 3.36%, 3.05%, 2.90% of variance respectively. In addition, 18 items have eigenvalues greater than one (1) which accounted for 62.415% of the total variance. On the other hand, the ratio of the first and second items (components) yielded 20.937 larger than 2.00 required ratio. Thus, the 2021 English Studies multiple-choice items satisfied the assumption of unidimensionality and that one principal factor (ability of testees) accounted for variations in the performance of pupils.

Research Question 3: What is the dimensionality of the 2022 English Studies multiple-choice items subtest of the Delta State Cognitive Placement Examination?

Table 5: Total Variance Explained for the 2022 English Studies Multiple Choice Items Subtest of the Delta State Cognitive Placement Examination

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	11.645	23.290	23.290
2	1.940	3.881	27.170
3	1.587	3.174	30.345
4	1.531	3.062	33.407
5	1.402	2.803	36.210
6	1.346	2.691	38.901
7	1.292	2.583	41.484
8	1.228	2.456	43.940
9	1.212	2.425	46.365
10	1.157	2.315	48.680
11	1.138	2.276	50.956
12	1.115	2.230	53.186
13	1.096	2.192	55.378
14	1.052	2.104	57.483
15	1.026	2.052	59.535
16	.967	1.935	61.470
17	.958	1.915	63.385
18	.948	1.895	65.280
19	.897	1.795	67.075
20	.891	1.782	68.857
21	.881	1.763	70.620
22	.857	1.715	72.334
23	.842	1.684	74.019
24	.825	1.651	75.669
25	.767	1.533	77.202
26	.753	1.505	78.708
27	.725	1.450	80.158
28	.700	1.401	81.559
29	.677	1.355	82.914
30	.672	1.345	84.259
31	.648	1.295	85.554
32	.615	1.229	86.783
33	.582	1.163	87.946
34	.566	1.133	89.079
35	.547	1.094	90.173
36	.537	1.074	91.247
37	.485	.970	92.217
38	.467	.934	93.151

39	.442	.883	94.034
40	.410	.820	94.855
41	.372	.744	95.599
42	.348	.696	96.295
43	.319	.638	96.933
44	.282	.565	97.498
45	.243	.487	97.984
46	.237	.473	98.457
47	.224	.448	98.905
48	.201	.403	99.308
49	.184	.368	99.676
50	.162	.324	100.000

The unidimensionality of the 2022 English Studies Multiple-Choice items was assessed using PCA. The presence of a dominant factor of the first Eigen value of 11.65 which accounted for 23.29%, which is greater than the second, third, fourth, fifth, sixth, and seventh etc., eigen value of 1.94, 1.59, 1.53, 1.40, 1.35 and 1.29 accounted for 3.88%, 3.17%, 3.06%, 2.80%, 2.69% and 2.58% of variance respectively among others. Consequently, 15 items have eigenvalues greater than one (1) which accounted for 59.535% of the total variance. Again, the ratio of the first and second components yielded 27.170 which is greater than 2.00 the required ratio. This revealed that the 2022 English Studies multiple-choice items were unidimensional and that ability of testees accounted for variations in the performance of pupils.

Discussion of Findings

The finding of the study emanating from research question one revealed that the 2020 English Studies multiple-choice items satisfied the IRT assumption of unidimensionality and measured a single continuous latent trait. This is consistent with Adeyemi and Kasali (2022) who found unidimensionality of items in the 2016 NECO Mathematics test. This is inconsistent with the reported finding of Oguoma et al. (2016) who found that the 2014 WASSCE Mathematics multiple-choice test scores in Imo State failed the IRT assumption of unidimensionality.

The finding of the study emanating from research question two indicated that the 2021 English Studies multiple-choice items satisfied unidimensionality assumption of IRT and measured a single continuous latent trait. This is in line with Pila and Adewale (2020) who reported that

the Benue State Examination Board confirmed to the assumption of unidimensionality. However, this is unrelated to Pila and Adewale (2020) who found that items in the 2017 NECO-BECE violated unidimensionality assumption.

The finding of the study emanating from research question three showed that the 2022 English Studies multiple-choice items satisfied the IRT assumption of unidimensionality. This is consistent with Oribhabor (2019) who reported that the 2017 WASSCE November/December Mathematics multiple-choice test items were unidimensional. This is inconsistent with Alade et al. (2020) who reported that the 2018 WASSCE Mathematics multiple choice items did not meet the IRT unidimensionality assumption.

Conclusion

The study confirmed that the 2020-2022 English Studies multiple-choice items subtest of the Delta State Cognitive Placement Examination (DSCPE) are unidimensional and the items consistently measure a single underlying construct of English language proficiency, validating the reliability and interpretability of the test scores.

Recommendations

1. Psychometric analyses of Mathematics, General Paper, and Christian Religious Studies subtests should be carried out to enhance the integrity of the DSCPE.
2. Delta State Ministry of Basic and Secondary Education (DSMBSE) should conduct regular item analysis of the DSCPE using IRT procedure.
3. Delta State Ministry of Basic and Secondary Education (DSMBSE) should engage in regular review and update of its item bank to reflect current educational standards and practices to further enhance the quality of test items.

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THREE-PARAMETER LOGISTIC MODEL APPROACH TO COMPARING ITEM STATISTICS OF 2022 NECO SSCE AND WASSCE DATA PROCESSING TESTS

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Abstract

This study assessed the psychometric equivalence of the 2022 National Examinations Council Senior School Certificate Examination (NECO SSCE) and the West African Senior School Certificate Examination (WASSCE) Data Processing multiple choice tests using Three-Parameter Logistic Model (3PLM) within Item Response Theory (IRT) framework. A survey research design was adopted, involving 10,400 SS3 Data Processing learners from 13 public senior high schools in Gwagwalada Area Council, with a sample of 1,040 learners selected via a multistage sampling procedure. The 2022 NECO SSCE and WASSCE Data Processing multiple choice tests served as the instruments for data collection. Item parameters (discrimination, difficulty, and guessing) were estimated using jMetrik psychometric software, and independent samples t-tests were employed to test three hypotheses. Results revealed a significant discrepancy in the guessing parameter, with NECO SSCE items exhibiting greater susceptibility to guessing than WASSCE items. Nevertheless, no significant discrepancies were observed in discrimination and difficulty parameters between the two examinations. These results implied that applying 3PLM can aid in detecting and improving multiple choice items prone to guessing, thereby strengthening item quality and assessment accuracy of NECO and WAEC assessments, subsequently.

Keywords: Three-Parameter Logistic Model (3PLM), NECO SSCE, Data Processing, WASSCE

Introduction

The West African Examinations Council (WAEC) and the National Examinations Council (NECO) are the two foremost bodies legally liable for administering high-stakes secondary school assessments in Nigeria. While WAEC oversees the West African

Senior School Certificate Examination (WASSCE) across Nigeria, Ghana, Sierra Leone, Gambia, and Liberia, NECO conducts the Senior School Certificate Examination (NECO SSCE) exclusively for Nigerian students. Both assessment bodies assess students' academic proficiency across various subjects, including Data Processing, and issue certificates that hold equivalent value. Given that WAEC and NECO follow similar syllabi, one would expect their test items to maintain comparable standards and produce consistent outcomes. However, discrepancies in item quality, grading credibility, and overall test administration have raised concerns among educators, policymakers, and researchers over the years.

Despite their roles in standardising assessment, both NECO and WAEC have faced scrutiny regarding the validity and reliability of their test items (Oghenerume & Uyi-Osaretin, 2024; Oghenerume, 2022). Some critics argued that NECO's test items have historically been of lower quality, leading to skepticism about the credibility of its results (Daniel, 2005; Peter, 2012). Others, however, contended that NECO's test items have improved over time and, in some cases, may even surpass those of WAEC (Ahmed, 2014). Empirical studies have produced mixed findings. While Dibu-Ojerinde and Faleye (2005) reported no significant discrepancies between the two assessment bodies, Oghenerume and Uyi-Osaretin (2024) found notable discrepancies, particularly in guessing parameters within multiple choice items for the English Language examination. Moreover, NECO and WAEC statistics from 2022 show that 60 percent of NECO SSCE candidates obtained credit in Data Processing, compared to 76.36 percent in WASSCE. At the same time, 22.83 percent of WAEC candidates had their results withheld due to malpractice, marking a 6.54 percent increase from the previous year (NECO & WAEC, 2022). These inconsistencies raised an important question: Could discrepancies in test item statistics contribute to variations in learners' performance?

To objectively evaluate the quality of test items, item statistics are employed (Oghenerume, 2025). Item statistics are quantitative measures that capture the numerical properties and characteristics of test items. These measures encompass various aspects of test items, including their parameters (Oghenerume, 2022). For a test item to be deemed effective, it ought to meet the criteria for these parameters: discrimination, difficulty,

and guessing. Difficulty assesses how challenging an item is for learners, discrimination assesses how well an item distinguishes between learners with varying levels of understanding, and guessing estimates the likelihood of a correct response by chance (Oghenerume & Uyi-Osaretin, 2024; Oghenerume, 2022). Applying these item statistics allows for a more precise comparison of test quality across assessment bodies (Oghenerume & Uyi-Osaretin, 2024; Aborisade & Fajobi, 2020), including a subject like Data Processing, where multiple choice assessments are key indicators of learners' adeptness.

In the context of Data Processing, which is an elective subject in Nigerian senior high schools, assessment involves both objective multiple choice and subjective essay or problem-solving items. The subject focuses on the collection, processing, analysis, and presentation of data using computational tools. Given its relevance to careers in Entrepreneurship, Machine Learning, Financial Accounting, Artificial Intelligence, Business Analytics, Statistics, Data Science, Economics, Information and Communication Technology, most learners who aspire to these fields often include it as part of their core subjects (Oghenerume, 2022). However, given the observed discrepancies in learners' performances across NECO and WAEC, it became necessary to investigate whether the statistical properties of multiple choice items in Data Processing tests differ significantly between these two assessment bodies. This current study, therefore, explored the guessing, discrimination, difficulty parameters of multiple choice items in the 2022 NECO SSCE and WASSCE Data Processing examinations using Three-Parameter Logistic Model (3PLM).

The theoretical framework for this work is grounded on Three-Parameter Logistic Model (3PLM) by Birnbaum (1968) within Item Response Theory (IRT) framework by Thurstone (1925). Thurstone introduced Item Response Theory (IRT) and established its conceptual foundation in his work titled "A Method of Scaling Psychological and Educational Tests" (Oghenerume, 2022; Oghenerume & Uyi-Osaretin, 2024). In this influential work, Thurstone provided a procedure for accurately positioning the items on the Binet scale (Oghenerume, 2022; Oghenerume & Uyi-Osaretin, 2024). According to Cai and Huang (2022), Item Response Theory (IRT) can be regarded minimally as a set of psychometric models for categorical item-level response data. According to Oghenerume and Uyi-Osaretin (2024) and Chen et al. (2021),

categorical item-level response data refer to responses to test or survey items that fall into discrete categories, either unordered (nominal) or ordered (ordinal). These data are commonly analysed using Item Response Theory (IRT) or Rasch modeling to assess measurement properties (Oghenerume & Uyi-Osaretin; de Ayala, 2022; Bock & Gibbons, 2021; Chen et al., 2021). For instance, Likert-scale responses (ordinal) and multiple-choice selections (nominal) are typical forms of categorical response data (Oghenerume, 2025; von Davier et al., 2021).

Birnbaum (1968) advanced on IRT by suggesting the Three-Parameter Logistic Model (3PLM), which postulates that the probability of a correct answer to an item relies on three parameters: slope ‘a’ (discrimination), threshold ‘b’ (difficulty), and lower asymptote ‘c’ (guessing). The 3PLM allows items to vary in their ability to discriminate among test-takers with differing proficiency levels and in their difficulty, while also accounting for the possibility that test-takers with very low proficiency might guess the correct answers to items (Oghenerume & Uyi-Osaretin, 2024; Birnbaum, 1968). The psychometric formulae of 3PLM as given by Birnbaum (1968) describes the possibility that an unintentionally chosen test-taker with competence ‘ θ ’ upon ‘k’ measure will perfectly reply to ‘j’ item:

$$P(x_j=1 \mid \theta_k, a_j, b_j, c_j) = c_j + \frac{(1-c_j)}{1 + e^{-D a_j (\theta_k - b_j)}}$$

Wherein

x_j = reply to j item;

a_j = discrimination parameter of j item, characterising the slope;

b_j = difficulty of j item, characterising the threshold;

c_j = guessing of j item, accounting for the possibility of test-takers with extremely low proficiency points guessing the correct reply;

D = subjective measuring factor usually fixed to 1.7 to imprecise outcomes in a conventional ogive prototype.

Three-Parameter Logistic Model (3PLM) within IRT framework is relevant to this study because 3PLM runs on selected core assumptions when employed in the analysis of test data, mostly in the context of Data Processing multiple choice tests of NECO SSCE and WASSCE for the year 2022. As elucidated by Ojerinde et al. (2014), Bock and Gibbons (2021), and de Ayala (2022), these assumptions are crucial for the

accurate application of this model. Firstly, it is assumed that the modeled latent trait accurately describes the entirety of the underlying competence and effectively accounts for test-taker performance (Ojerinde et al., 2014; Bock & Gibbons, 2021; de Ayala, 2022). In several occasions, tests assume the necessity of a single latent capacity, a concept known as unidimensionality (Oghenerume, 2022; Oghenerume & Uyi-Osaretin, 2024). Secondly, it is assumed that all items are locally independent when conditioned on the latent trait, meaning an examinee's response to a specific item is not influenced by their responses to other items (Oghenerume & Uyi-Osaretin, 2024; Ojerinde et al., 2014; de Ayala, 2022; Bock & Gibbons, 2021). Furthermore, it is assumed that an examinee's response to a test item can be effectively modeled using the Item Response Function (IRF) (Bock & Gibbons, 2021; de Ayala, 2022; Ojerinde et al., 2014). Relying on the specific IRT model, such as 3PLM, the IRF articulates the probability of achieving a particular score 'X' at various levels of the latent ability, denoted as θ (Oghenerume & Uyi-Osaretin, 2024; Ojerinde et al., 2014; Bock & Gibbons, 2021). This probability correlation stays invariant across diverse distributions of θ within the population (Ojerinde et al., 2014; de Ayala, 2022; Bock & Gibbons, 2021; Oghenerume & Uyi-Osaretin, 2024).

The slope parameter (a) is usually articulated as a value between -2 and +2, where values lower than 1 may signify weaker discrimination, and values higher than 1.5 may suggest extreme discrimination (de Ayala, 2022; Oghenerume & Uyi-Osaretin, 2024). The threshold parameter (b), signifying difficulty, ranges from -3 to +3, with values lower than 1.5 implying easier items and values higher than 2.5 representing more difficult items (Carlson, 2020; de Ayala, 2022; Oghenerume & Uyi-Osaretin, 2024). The guessing parameter (c) is articulated as a value between 0 and 1 (de Ayala, 2022; Oghenerume & Uyi-Osaretin, 2024; Carlson, 2020). Bock and Gibbons (2021) asserted that there is no universally agreed-upon specific numerical value for 'moderate' slope, threshold, and lower asymptote. Nevertheless, a generally referenced recommendation suggests a slope value between 0 and 2, a threshold value between -3 and +3, and a lower asymptote value between 0 and 1 (Carlson, 2020; de Ayala, 2022; Oghenerume & Uyi-Osaretin, 2024; Bock & Gibbons, 2021). For the most part, lower asymptote values surpassing 0.35 are considered in tolerable (Oghenerume & Uyi-Osaretin, 2024; de

Ayala, 2022; Bock & Gibbons, 2021). Typically, 5-option items have lower asymptote rates around 0.20, and 4-option items have lower asymptote rates around 0.25 (de Ayala, 2022; Bock & Gibbons, 2021; Oghenerume & Uyi-Osaretin, 2024; Carlson, 2020).

Empirical studies by Oghenerume and Uyi-Osaretin (2024), Aborisade and Fajobi (2020), and Ogunbamowo et al. (2019) assessed the psychometric equivalence of NECO SSCE and WASSCE multiple choice items across various subjects. Oghenerume and Uyi-Osaretin (2024) conducted an analytical comparison of item statistics in NECO SSCE and WASSCE 2023 English Language multiple choice tests using Three-Parameter Logistic Model (3PLM). Employing a survey design, the study sampled 8,000 SS3 learners from a population of 72,400 in Ogun State. Data analysis via jMetrik and independent samples t-tests revealed a significant discrepancy in guessing parameters but no significant discrepancies in discrimination and difficulty parameters between the two examinations. Aborisade and Fajobi (2020) examined the psychometric properties of NECO and WAEC Mathematics items using IRT. A sample of 1,200 senior high school learners from South-Western Nigeria participated. Results indicated that difficulty and guessing parameters were comparable between the two assessments, while the discrimination parameters differed significantly. Ogunbamowo et al. (2019) assessed the psychometric properties of NECO and WAEC Economics examination items using both Classical Test Theory (CTT) and Item Response Theory (IRT). A sample of 540 senior high school learners in Osun State participated. The study found no significant discrepancies in discrimination and difficulty parameters under CTT. However, IRT analysis revealed significant discrepancies in both parameters, while guessing parameters remained comparable.

Research Questions

The following research questions guided the study:

- i. What is the discrepancy between the difficulty parameters of the 2022 NECO SSCE and WASSCE Data Processing multiple choice items?
- ii. What is the discrepancy between the discrimination parameters of the 2022 NECO SSCE and WASSCE Data Processing multiple choice items?

- iii. What is the discrepancy between the guessing parameters of the 2022 NECO SSCE and WASSCE Data Processing multiple choice items?

Hypotheses

The following hypothesised research questions were tested for significance at .05 alpha level:

1. There is no significant discrepancy between the difficulty parameters of 2022 NECO SSCE and WASSCE Data Processing multiple choice items.
2. There is no significant discrepancy between the discrimination parameters of 2022 NECO SSCE and WASSCE Data Processing multiple choice items.
3. There is no significant discrepancy between the guessing parameters of 2022 NECO SSCE and WASSCE Data Processing multiple choice items.

Methodology

Survey research design was applied in this investigation because this research involved a group of learners from which data were obtained, only from a few learners considered as emissaries of the all-inclusive group needed. This design was suitable for this investigation because the 2022 NECO SSCE and WASSCE Data Processing multiple choice test items were used to obtain data and analyse discrimination, difficulty, and guessing parameters of the items through the Three-Parameter Logistic Model (3PLM). The Federal Capital Territory Secondary Education Board (2024) unveiled that the present population of this assessment involved 10,400 SS 3 Data Processing learners indicative of 5,099 boys and 5,301 girls in thirteen public senior high schools in Gwagwalada Area Council. However, this study's statistical population are sixty Data Processing multiple choice items of NECO SSCE, and forty Data Processing multiple choice items of WASSCE. Exactly 1,040 SS 3 Data Processing learners from four schools were sampled in the area, signifying 10%. They were chosen employing a multistage sampling process. In the first phase, the simple random sampling was utilized to choose four schools via balloting tactic. In the second phase, stratified random sampling was employed to stratify for sex inside the schools in the area. In the third

phase, a simple random sampling via balloting was applied to opt for 130 girls and 130 boys per school. From each senior high school, 260 learners were sampled. Overall, a sum of 1,040 learners were sampled from the four nominated schools in the area.

This investigation made use of the multiple choice items in the NECO SSCE and WASSCE Data Processing tests for the year 2022 as the instruments. The 2022 NECO SSCE Data Processing multiple choice items comprised 60, while the corresponding WASSCE comprised 40. The NECO SSCE for this subject is structured with five choices 'A' to 'E,' and learners were demanded to specify the accurate choice, while the corresponding WASSCE is structured with four options 'A' to 'D,' from which learners were obliged to opt for the approved choice. These instruments were deemed to be valid and reliable because NECO and WAEC are reputable for creating standardised tests. In spite of this, this researcher re-verified the reliability via test-retest by dispensing the instruments the first time to twenty SS3 learners in schools within Abuja Municipal Area Council, ensuring that reliability was conducted outside the sampled population in Gwagwalada Area Council. After an interval of two weeks, the same instruments were dispensed to the same learners. The scores from the first and second dispensations were analysed using Pearson Product Moment Correlation to verify the coefficient. A correlation of .89 was obtained from 2022 NECO SSCE Data Processing multiple choice items, and .91 was obtained from the corresponding WASSCE, further avowing that they were reliable. Subsequently, these instruments were dispensed directly to the SS3 Data Processing learners in the sampled schools with the support of the certified educators of Data Processing. The NECO SSCE multiple choice items were dispensed first. Having finished, they were immediately obtained. After a day, the corresponding WASSCE items were dispensed and obtained through a similar process. The obtained items were scored and analysed using 3PLM within IRT framework with jMetrik psychometric software to derive item parameters, while hypotheses were verified through an independent samples t-test.

Results

Hypothesis One: There is no significant discrepancy between the difficulty parameters of 2022 NECO SSCE and WASSCE Data Processing multiple choice items.

Table 1: Thresholds in 2022 NECO SSCE and WASSCE Data Processing Multiple Choice Items

Data Processing	<i>N</i>	<i>M</i>	<i>SD</i>	<i>DF</i>	<i>t</i>	<i>p</i>
WASSCE 2022	40	2.06	.41	98	-.08	.936
NECO SSCE 2022	60	2.07	.40			

Table 1 revealed the result of an independent samples t-test comparing the difficulty parameters of the 2022 WASSCE and NECO SSCE Data Processing multiple choice items. The mean difficulty levels for WASSCE ($M = 2.06$, $SD = .41$) and NECO SSCE ($M = 2.07$, $SD = .40$) were nearly identical. Statistical analysis showed no significant discrepancy, $t(98) = -.08$, $p = .936$, exceeding the alpha level of .05. Thus, the null hypothesis was retained, indicating comparable difficulty parameters.

Hypothesis Two: There is no significant discrepancy between the discrimination parameters of 2022 NECO SSCE and WASSCE Data Processing multiple choice items.

Table 2: Slopes in 2022 NECO SSCE and WASSCE Data Processing Multiple Choice Items

Data Processing	<i>N</i>	<i>M</i>	<i>SD</i>	<i>DF</i>	<i>t</i>	<i>p</i>
WASSCE 2022	40	1.15	.09	98	1.39	.168
NECO SSCE 2022	60	1.03	.53			

Table 2 showed an independent samples t-test comparing the discrimination parameters of the 2022 WASSCE and NECO SSCE Data Processing multiple choice items. The mean discrimination values for WASSCE ($M = 1.15$, $SD = .09$) and NECO SSCE ($M = 1.03$, $SD = .53$) showed no significant difference, $t(98) = 1.39$, $p = .168$. As the p-value

exceeded .05, the null hypothesis was retained, indicating comparable discrimination parameters.

Hypothesis Three: There is no significant discrepancy between the guessing parameters of 2022 NECO SSCE and WASSCE Data Processing multiple choice items.

Table 3: Lower Asymptotes in 2022 NECO SSCE and WASSCE Data Processing Multiple Choice Items

Data Processing	<i>N</i>	<i>M</i>	<i>SD</i>	<i>DF</i>	<i>t</i>	<i>p</i>
WASSCE 2022	40	.21	.11	98	-2.43	.017
NECO SSCE 2022	60	.26	.08			

Table 3 presented an independent samples t-test comparing the guessing parameters of the 2022 WASSCE and NECO SSCE Data Processing multiple choice items. The mean guessing parameter for WASSCE was $M = .21$ ($SD = .11$), while NECO SSCE had a higher mean of $M = .26$ ($SD = .08$). The analysis yielded a significant discrepancy, $t(98) = -2.43$, $p = .017$, with p less than .05, leading to the rejection of the null hypothesis. This inferred that NECO SSCE items were more prone to guessing than WASSCE items, potentially impacting the validity of the assessment.

Discussion of Findings

The analysis of hypothesis one revealed no significant discrepancy in the difficulty parameters between NECO SSCE and WASSCE Data Processing multiple choice items, indicating comparable difficulty levels. This finding aligned with prior studies, such as Aborisade and Fajobi (2020) for Mathematics, Oghenerume and Uyi-Osaretin (2024) for English Language under IRT, and Ogunbamowo et al. (2019) for Economics under CTT. However, Ogunbamowo et al. (2019) found discrepancies in difficulty when using IRT, likely due to their smaller sample ($N = 540$), as IRT typically requires larger samples for stable estimates (Oghenerume & Uyi-Osaretin, 2024). These results reinforced the notion that difficulty levels across both assessment bodies are largely comparable, though methodological factors could influence findings.

The analysis of hypothesis two showed no significant discrepancy in discrimination parameters, suggesting both tests effectively differentiated between high- and low-performing test-takers. This aligned with Oghenerume and Uyi-Osaretin (2024) for English Language under IRT and Ogunbamowo et al. (2019) for Economics under CTT. However, discrepancies were noted when IRT was applied in the studies of Ogunbamowo et al. (2019) and Aborisade and Fajobi (2020) for Economics and Mathematics, respectively. Differences in test length may explain this variation, as the 2017 WASSCE Mathematics test had 50 items, whereas the 2022 Data Processing test had 40. Since longer tests tend to yield stronger discrimination indices, item count and subject matter may impact comparability across assessments.

The analysis of hypothesis three found a significant discrepancy in guessing parameters, with NECO SSCE items being more prone to guessing than WASSCE items. This aligned with Oghenerume and Uyi-Osaretin (2024), who found similar patterns in English Language multiple choice items, suggesting that some NECO items may allow for random guessing, potentially affecting test validity. However, this finding contradicted Aborisade and Fajobi (2020) and Ogunbamowo et al. (2019), who reported no significant discrepancies in guessing parameters for Mathematics and Economics. This inconsistency may stem from differences in test design and item structure rather than subject area alone. For instance, if NECO SSCE Data Processing items contain more recognition-based items (e.g., definitions, menu options, or common software commands) rather than computational problem-solving, they may be easier to guess compared to WASSCE items, which might include more problem-solving or application-based tasks. Additionally, the observed discrepancy could be linked to variations in the quality of distractors, as weaker or less plausible distractors in NECO SSCE may increase the likelihood of correct guesses. Such factors underscored the significance of periodic item analysis to ensure test integrity across both assessment bodies.

Conclusion

This study assessed the equivalence of item statistics between the National Examinations Council Senior School Certificate Examination (NECO SSCE) and the West African Senior School Certificate

Examination (WASSCE) using Three-Parameter Logistic Model (3PLM) for 2022 Data Processing multiplechoice tests. Results revealed a significant discrepancy in the guessing parameters, with NECO SSCE items being more prone to guessing than WASSCE items. Nevertheless, no significant discrepancies were observed in discrimination and difficulty parameters. These results underscored the usefulness of 3PLM in evaluating item quality, upholding higher psychometric standards, and detecting multiple choice items prone to guessing, thereby strengthening the accuracy of NECO and WAEC assessments.

Recommendations

Based on the results in this study, the researcher advocates that:

- NECO and WAEC should annually apply 3PLM to ascertain the discrimination, difficulty, and guessing parameters of Data Processing items before official conduction, subsequently. It would help discover items that are vulnerable to guessing (if any), allowing for their elimination or alteration to mitigate guessing by learners.
- Past Data Processing test items should be periodically reviewed using 3PLM to track trends in item performance and make necessary improvements.

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LECTURERS KNOWLEDGE AND UTILIZATION OF ARTIFICIAL INTELLIGENCE TOOLS FOR RESEARCH WRITING

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Abstract

The advent of artificial intelligence (AI) has brought transformative changes to various sectors, including academia. This empirical study aims to assess lecturers' knowledge and extent of utilization of AI tools for research purposes. By surveying 129 male and female lecturers from Michael Okpara University of Agriculture, Umudike, Abia state, the study seeks to identify the level of awareness, familiarity, and application of AI technologies in their research activities. Data were collected using a researcher constructed questionnaire, validated by four experts. The reliability index of the questionnaire is .81, obtained with Cronbach alpha method. Data were analyzed using mean, percentages and t-test. Result indicates that lecturers' knowledge of AI tools for research writing is low with grand means of 1.685 and their extent of utilization of the tools is very low with a grand mean of 1.478. There is no significant difference in the knowledge and utilization of AI tools for research due to gender ($t = 1.940$, sig. = .061; $t = .219$, sig. = .828) respectively. The study concludes that lecturers lack adequate exposure on robustness of AI tools in their research activities, and hence do not sufficiently utilize these tools. The researcher recommends, among others, that University management should regularly organize hands-on and professional training programmes for lecturers to create awareness of the many artificial intelligence tools that could enhance the efficiency of their research process and outcome. In addition, University management and lecturers should collaborate with experts in ICT to expose students early to these research tools to assist them in their project works.

Key words: Knowledge, utilization, artificial intelligence, university lecturers, gender.

Introduction

The function of a University lecturer is teaching, research and community service. To efficiently carry out these functions, lecturers need to equip themselves with requisite skills in emerging issues in technology. Technological advancements have continued to permeate various facets of the society, including education. Of particular interest is the Artificial Intelligence (AI) technology. Artificial intelligence (AI) refers to computer-driven technology aimed at developing computer systems that can perform tasks requiring human intelligence, such as reasoning, decision making, feeling, learning, adapting to new situations, and human-specific behaviours (Nabiyev & Erumit, 2022;).

The rapid growth of AI's impact on humans has increased the need to understand it (Yang, Ogata, Matsui, & Chen 2021) and communicate effectively with it. AI seeks to understand how human intelligence works and to mimic it using computers. The ultimate goal of AI is to create computer programs that can solve problems in the world like humans and perform specific tasks. To achieve this goal, one must be able to use AI effectively.

The utilization of digital technologies and AI is revolutionizing education methodologies and processes (Zhang & Aslan, 2021). These applications were first introduced as computer and computer-related systems and have now evolved into online education platforms (Chen, Chen, & Lin, 2020). AI has gained popularity among educators and students across various academic levels and fields. The integration of artificial intelligence (AI) in academic research has the potential to revolutionize the way data is analyzed, interpreted, and utilized. AI tools can enhance research productivity and innovation by offering capabilities such as advanced data mining, predictive analytics, natural language processing, and machine learning algorithms. These technologies allow researchers to handle large datasets, derive more accurate insights, and automate complex processes, thereby improving the efficiency and quality of research outcomes

Researchers have moved from the era of going to physical libraries to source for information for research to the use of internet, through the use of various search engines, to get required information for research writing. It is amazing to discover that artificial intelligence can be robustly used in other aspects of research writing beyond data management. AI

tools can be used to generate topics for research, develop abstract, background to the study, purpose of the research, research questions and hypotheses, literature review, methodology, development of instrument and data analyses. It can also be used in plagiarism checks, grammar and style checking, as well as organization of references. Hence, there are many AI tools that can be employed in different areas of research writing such as writefull, unriddle, elicit, chatgpt, hyper write and so on.

Various researchers have studied the use of AI in various facets of education such as teaching, learning and assessment. (Johnson & Lee 2024; Guler et al, 2024; Luzano 2024; Smith & Garcia 2023; Swiecki et al ,2022; Ezekiel & Akinnyemi, 2022; Johnson & Okonkwo 2021; Lee, & Chen, 2020; Wang & Liu, 2019). The present study aims to build on the previous works by conducting an assessment of lecturers' knowledge and extent of utilization of AI tools for research writing with gender as a moderating variable. The findings of this study will provide valuable insights for educational institutions, policy makers, and educators to develop targeted interventions and support mechanisms that enhance the effective use of AI tools in academic research.

Specific Objectives of the Study

The objective of the study is to assess the level of lecturers' knowledge and extent of utilization of AI tools for research writing

Research questions.

1. What is the level of knowledge and understanding of AI tools for research activities by lecturers?
2. What is the influence of gender on lecturers' level of knowledge and understanding of AI tools for research activities?
3. To what extent do lecturers utilize AI tools in their research activities?
4. What is the influence of gender on lecturers' adoption and utilization of AI tools in research writing?

Research Hypotheses

1. There is no significant difference in lecturers' level of knowledge of AI tools for research due to gender.
2. There is no significant difference in lecturers' level of utilization of AI tools for research writing due to gender.

This study is anchored on Technology Acceptance Model (TAM), developed by Davis in 1989, TAM is one of the most influential models in

understanding how users come to accept and use a technology. The model suggests that two main factors influence the decision to adopt technology: perceived usefulness (PU) and perceived ease of use (PEOU). TAM can help explain lecturers' acceptance and utilization of AI tools in research by assessing their perceptions of the usefulness and ease of use of these technologies. Understanding these perceptions can provide insights into the barriers and facilitators of AI tool adoption.

Methods

The research was carried out in Michael Okpara University of Agriculture, Umudike, Abia state using survey research design. The non- probability sampling technique was used in sample selection. Non-probability sampling method was used due to the difficulty in gaining access to the entire population. The researcher used participants who matched the parameters listed below:

- Lecturers who were working at Michael Okpara University of Agriculture in the year 2024.
- Lecturers that had worked at the University for at least two years by the time the study was carried out.
- Lecturers who were available and willing to complete the research instrument.

Data were collected from one hundred and fifty (150) lecturers. However, only one hundred and twenty nine (129) provided complete response to all items in the instrument for data collection and hence were used for the study.

The instrument for data collection was a 4-point scale questionnaire constructed by the researcher. It was validated by four experts (two lecturers from Computer Science Education and two lecturers from Measurement and Evaluation). Its reliability index is $r = .81$, obtained using Cronbach Alpha method. Data collected were analysed using descriptive statistics (frequency counts, mean, and real limit of numbers) and inferential statistics (t- test at .05 level of significance).

Results and Discussions

1. Research question 1: What is the level of knowledge and understanding of AI tools for research activities by lecturers?

Table 1: Lecturers Knowledge of AI tools for research

S/N	Items	VHL	HL	LL	VLL	Mean	Remarks
	Knowledge of or ability to						
1	Concept of AI.	16	21	42	50	2.023	Low Level
2	Use of AI tools in research.	10	18	56	45	1.946	Low Level
3	Trainings on AI tools for research.	7	15	51	56	1.791	Low Level
4	Explain basic principles of AI to others.	5	7	56	61	1.659	Low Level
	Use Of AI Tools in the Following Research Areas						
5	Abstract	1	3	25	100	1.264	Very Low Level
6	Research objectives, questions and hypotheses	2	4	19	104	1.264	Very Low Level
7	Accessing research papers.	10	20	48	51	1.915	Low Level
8	Summarizing research papers	1	3	25	100	1.264	Very Low Level
9	Providing connected papers.	2	3	20	104	1.248	Very Low Level
10	Using chat bots eg ChatGPT, geminine and copilot.	5	10	38	76	1.566	Low Level
11	Methodology of a research paper.	2	3	23	101	1.271	Very Low Level
12	Construction of instrument for data collection.	2	3	21	103	1.256	Very Low Level
13	Data analyses	3	5	31	90	1.388	Very Low

14	Interpretation of result	1	3	24	101	1.341	Level Very Low
15	Paraphrasing / Grammar checking	40	61	18	10	3.016	Level High level
16	Plagiarism checks	50	59	12	8	3.171	High level
17	Reference management	2	4	20	103	1.264	Very Low Level
	Mean of means					1.685	Low level

VHL=Very high level; HL= High level; LL=Low level; VLL=Very low level

Decision: 3.5 – 4.00 VHL, 2.50 – 3.49 HL, 1.50 – 2.49 LL, 1.00 – 1.49 VLL

Results in table 1 show that items 15 and 16 have means within the range of 2.5 – 3.49. This indicates that lecturers' knowledge of AI tools for paraphrasing/grammar and plagiarism checks is high. However, the mean of items 1, 2,3,4,7 and 10 lie within the range of 1.5 to 2.24. This shows that lecturers' training and familiarity of the concept of AI and AI tools for research is low. Similarly, the means of items 5, 6, 8, 9, 11, 12, 13, 14, 17 lie in the range of 1.00 to 1.49. The implication is that the lecturers' level of knowledge of the use of AI tools in the following research areas is very low: generation of abstract, research objectives/questions/hypotheses, literature review, methodology, data analyses/interpretation and management of references. Generally, the grand mean of 1.685 indicates that the lecturers possess low level of knowledge of AI tools for research writing.

Research question 2: What is the influence of gender to lecturers' level of knowledge and understanding of AI tools for research activities?

Table 2: Lecturers Knowledge of AI tools for research by gender

S/N	Items	Mean for males	Remarks	Mean for females	Remarks
1	Knowledge of / ability to Concept of AI	2.234	Low Level	1.815	Low level

2	Use of AI tools in research	2.094	Low Level	1.800	Low Level
3	Trainings on AI tools for research	2.016	Low Level	1.567	Low Level
4	Explain basic principles of AI to others	1.891	Low Level	1.431	Very Low Level
Level of Knowledge of Use of AI Tools in the Following Research Areas					
5	Abstract generation	1.344	Very Low Level	1.185	Very Low Level
6	Research objectives, questions and Hypotheses	1.422	Very Low Level	1.092	Very Low Level
7	Accessing research papers.	2.422	Low Level	1.370	Very Low Level
8	Summarizing research papers	1.344	Very Low Level	1.185	Very Low Level
9	Providing connected papers.	1.391	Very Low Level	1.108	Very Low Level
10	Using chat bots eg ChatGPT, geminine and copilot.	1.906	Low Level	1.231	Very Low Level
11	Methodology of a research paper.	1.453	Very Low Level	1.092	Very Low Level
12	Construction of instrument for data collection.	1.422	Very Low Level	1.092	Very Low Level
13	Data analyses	1.547	Low Level	1.231	Very Low Level
14	Interpretation of result	1.359	Very Low Level	1.154	Very Low Level
15	Paraphrasing / Grammar checking	3.406	High Level	2.631	High Level

16	Plagiarism checks	3.360	High Level	2.985	High Level
17	Reference management	1.422	Very Low Level	1.154	Very Low Level
	Mean of means	1.654	Low level	1.478	Very low level

VHL=Very high level; HL= High level; LL=Low level; VLL=Very low level
Decision: 3.5 – 4.00 VHL, 2.50 – 3.49 HL, 1.50 – 2.49 LL, 1.00 – 1.49 VLL

Comparative analyses of the lecturers' level of knowledge of AI tools for research writing by gender showed slight difference in the mean scores of male and female in items 4, 7, 10, and 13. The grand mean for males (1.654) is greater than that of females (1.478). Hence, gender seems to influence lecturers' level of knowledge of AI tools for analyses.

Hypothesis 1: There is no significant difference in lecturers' level of knowledge of AI tools for research due to gender.

Table 3: t- test summary showing the difference in knowledge of AI tools for research by gender

	Gender	N	Mean	Std Dev	Df	t	Sig	Decision
Knowledge of AI Tools for Research	Male	17	1.65359	.661938	32	1.940	.061	Do not reject Ho
	Female	17	1.47782	.554925				(.05<.061)

The t-test analysis of the difference in the means of male and female lecturers' knowledge of AI tools for research has $t = 1.94$, $\text{sig} = .061$. Hence, the null hypothesis is upheld. Therefore, the difference in the mean rating of male and female lecturers' knowledge of AI tools for research is not significant.

Research question 3: To what extent do lecturers utilize AI tools in their research activities?

Table 4: Lecturers' Extent of Utilization of AI tools for research

S/N	Items	VHE	HE	LE	VLE	Mean	Remarks
	Used AI Tools						
1	In my research projects.	8	11	64	46	1.853	Low extent
2	To enhance efficiency of my research processes.	7	10	65	47	1.822	Low extent
3	To improve the quality of my research outcomes.	7	11	64	47	1.830	Low extent
4	Confidently and effectively in research	6	10	66	47	1.806	Low extent
	Extent of Utilization of AI Tools in the Following Research Areas						
5	Abstract	0	2	19	108	1.178	Very Low extent
6	Research objectives, questions and Hypotheses	2	3	15	109	1.217	Very Low extent
7	Accessing research papers.	8	17	53	51	1.860	Low extent
8	Summarizing research papers	1	3	21	104	1.233	Very Low extent
9	Supporting empirical review of literature by providing connected papers.	0	2	18	109	1.171	Very Low extent
10	Using chat bots eg ChatGPT, gemini and copilot.	5	9	75	40	1.837	Low extent
11	Methodology of a research paper.	1	3	21	104	1.256	Very Low extent
12	Construction of instrument for data collection.	1	4	20	104	1.240	Very Low extent
13	Data analyses	1	2	33	93	1.310	Very Low extent

14	Interpretation of results	0	2	18	109	1.163	Very Low extent
15	Paraphrasing / Grammar checking	25	65	25	14	2.783	High extent
16	Plagiarism checks	35	62	15	17	2.891	High extent
17	Reference management:	2	3	15	109	1.217	Very Low extent
	Mean of Means					1.627	Low extent

VHE=Very high extent; HE= High extent; LE=Low extent; VLE=Very low extent
Decision: 3.5 – 4.00 VHE, 2.50 – 3.49 HE, 1.50 – 2.49 LE, 1.00 – 1.49 VLE

Results in table 4 show that items 15 and 16 have means within the range of 2.5 – 3.49. This indicates that the lecturers' extent of utilization of AI tools for paraphrasing/grammar and plagiarism checks in research writing is high. However, the mean of items 1, 2,3,4,7 and 10 lie within the range of 1.5 to 2.24. This shows that lecturers' extent of use of AI tools in their research projects in order to enhance the efficiency and quality of their research process and outcome is low. Similarly, the means of items 5, 6, 8, 9, 11, 12, 13, 14, 17 lie in the range of 1.00 to 1.49. The implication is that the lecturers' extent of utilization of the use of AI tools in the following research areas is very low: generation of abstract, research objectives/ questions/hypotheses, literature review, methodology, data analyses/interpretation and management of references. Generally, the grand mean of 1.627 indicates that the lecturers' extent of utilization of AI tools for research writing is low.

Research question 4: What is the influence of gender on lecturers' adoption and utilization of AI tools in research writing?

Table 5: Lecturers extent of utilization of AI tools for research by gender

S/N	Items	Mean for Males	Remarks	Mean for Females	Remarks
1	Used AI Tools In my research projects.	1.906	Low extent	1.800	Low extent

2	To enhance efficiency of my research processes.	1.860	Low extent	1.785	Low extent
3	To improve the quality of my research outcomes.	1.906	Low extent	1.754	Low extent
4	Confidently and effectively in research	1.781	Low extent	1.831	Low extent
Level of Utilization of AI Tools in the Following Research Areas					
5	Abstract	1.188	Very Low extent	1.154	Very Low extent
6	Research objectives, questions and Hypotheses	1.234	Very Low extent	1.185	Very Low extent
7	Accessing research papers.	1.875	Low extent	1.846	Low extent
8	Summarizing research papers	1.266	Very Low extent	1.185	Very Low extent
9	Providing connected papers.	1.172	Very Low extent	1.169	Very Low extent
10	Using chat bots eg ChatGPT, gemini and copilot.	1.875	Low extent	1.800	Low extent
11	Methodology of a research paper.	1.266	Very Low extent	1.246	Very Low extent

12	Construction of instrument for data collection.	1.266	Very Low extent	1.215	Very Low extent
13	Data analyses	1.547	Low extent	1.338	Very low level
14	Interpretation of result	1.172	Very Low extent	1.169	Very Low extent
15	Paraphrasing / Grammar checking	2.688	High extent	2.815	High extent
16	Plagiarism checks	2.875	High extent	2.892	High extent
17	Reference management	1.234	Very Low extent	1.246	Very Low extent
	Mean of Means	1.654	Low extent	1.478	Very low extent

VHE=Very high extent; HE= High extent; LE=Low extent; VLE=Very low extent
 Decision: 3.5 – 4.00 VHE, 2.50 – 3.49 HE, 1.50 – 2.49 LE, 1.00 – 1.49 VLE

Comparative analyses of the means of the lecturers' extent of utilization of AI tools for research writing by gender showed slight difference only in item 13. The grand mean for males (1.654) is greater than that of females (1.478). Hence, gender seems to influence lecturers' extent of utilization AI tools for data analyses.

Hypothesis 2: There is no significant difference in lecturers' level of utilization of AI tools for research writing due to gender.

Table 6: t- test summary showing the difference in utilization of AI tools for research by gender

	Gender	N	Mean	Std Dev	Df	t	Sig	Decision
Knowledge of AI Tools for Research	Male	17	1.65359	.661938	32	.219	.828	Do not reject Ho (.828 > .05)
	Female	17	1.47782	.554925				

From table 6, the t-test analysis of the difference in the means of male and female lecturers' extent of utilization of AI tools for research has $t = .219$, $\text{sig} = .828$. Hence, the null hypothesis is upheld. Therefore, the difference in the mean rating of male and female lecturers' extent of utilization of AI tools for research writing is not significant

Discussion of Finding

The results of this study indicated that lecturers' level of awareness and knowledge of AI tools that could be used to facilitate research writing is low. Hence their utilization of such tools is also very low. This is evident in their responses to the items presented to show their level of knowledge of different areas of research writing where AI tools could be used. Out of 17 items presented, lecturers ranking on 9 of the items is very low level/very low extent, 6 items low level/low extent and only 2 items as high level/high extent. The grand mean for their knowledge of the tools (1.685) and extent of utilization (1.627) indicate low level of knowledge of AI tools for research writing. Consequently, the lecturers' extent of utilization of these tools is also low. The only areas where most of the lecturers seem to use AI tools in their research activities are in paraphrasing/grammar checking and plagiarism tests. Furthermore, the study showed no significant difference in the knowledge level and extent of utilization of AI tools for research for male and female lecturers. Interaction of the researcher with some of the respondents revealed that most of the lecturers are aware that AI could be used in teaching and learning of various subjects/courses. These findings have important implications for educational institutions aiming to foster a more technologically adept faculty, ultimately enhancing research productivity and innovation. This highlights the need for targeted training and support to enhance AI tool integration in academic research.

The findings of this study relates to the results of previous studies on AI use in various facets of education and research. For instance, Thomas et al (2023) assessed lecturers' utilization of AI for education in a Nigerian University. The study reported that lecturers rarely used AI for education. Smith and Garcia (2023) noted AI's potential to enhance personalized learning and provide support for diverse educational requirements. Ezekiel and Akinnyemi (2022) investigated the perception of university of Ibadan lecturers on utilization of AI in education and

reported that lecturers' perception of AI in education is highly positive. Similarly, Johnson and Okonkwo (2021) assessed lecturers' awareness, readiness and utilization of AI for education. The study reveals that lecturers showed awareness and readiness to use AI, but its actual utilization was low. The study also reported no significant difference in awareness and readiness between male and female lecturers. Wardat et al (2024) also reported no statistically significant differences in Mathematics teachers' perspectives regarding the importance of using systems and applications of AI in teaching due to gender.

Conclusion

The study concludes that lecturers lack adequate exposure on robustness of AI tools in their research activities, and hence do not sufficiently utilize these tools.

Recommendations

1. In light of the findings, it was recommended among others that University management should regularly organize hands-on and professional training programmes for lecturers to create awareness of the many artificial intelligence tools that could enhance the efficiency of their research process and outcome.
2. University administration at all levels should canvass for mentorship groups (involving junior and senior academics) for effective collaboration in research activities. Use of different research tools can be demonstrated among group members.
3. University management and lecturers should collaborate with experts in ICT and education to expose students early to these research tools to assist them in their project works.
4. Both male and female lecturers in the University should be properly exposed to the use of AI in research writing.

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FACTORIAL VALIDATION OF A SCALE TO MEASURE TEST ANXIETY OF UNDERGRADUATE STUDENTS OF MEASUREMENT AND EVALUATION IN TERTIARY INSTITUTIONS IN ENUGU STATE

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Abstract

Measurement instruments play important roles in assessment of teaching and learning. Tests are used as instruments for assessment. The purpose of this study was to factorially validate a scale for measuring test-anxiety of undergraduate students of Measurement and Evaluation (M & E) in tertiary institutions in Enugu State. The study was guided by three specific purposes and three research questions. Descriptive research design was employed. The population comprised 673 undergraduate students of measurement and evaluation in public tertiary institutions in Enugu State. Simple random sampling and accidental sampling techniques were used in drawing a sample of 321 undergraduate Measurement and Evaluation public university students. The instrument known as Test-Anxiety Scale for Undergraduate Measurement and Evaluation Students (TASUMES) was adapted from Vigil-Colet, Seva and Psicotherma (2008) test anxiety scale which was developed and used in Spain. The TASUMES is made up of 29 items. The adapted instrument was face validated by three experts while construct validation was done using factor analysis. Internal consistency reliability estimate was determined using Cronbach alpha method and it yielded an estimate of 0.87. The fit index (the data model fit) was checked using root mean square error at approximation (RMSEA) and confirmatory factor index (CFI). The result showed that the scale was valid and reliable. Few items showed a good fit index while a greater percentage of the items did not because their probability values showed a significant deviation from the model. It was recommended that various tertiary institutions should adopt, adapt or develop test anxiety scale for measuring the test anxiety of M & E students and develop intervention strategies to deal with the issue of test anxiety. The study has implication for teacher education training institutions since the scale can be used in checking student teachers level of test-anxiety in M & E.

Keywords: Factorial validation, test, anxiety, test-anxiety and Measurement and Evaluation

Introduction

Tests and examinations are important parts of the teaching and learning process. They play both positive and negative roles in the lives of students by either providing academic recognition at the end of the learning process or may present a threatening situation and a significant source of worry. It is believed that classroom assessment can also provide diagnostic information for all students. There is need therefore, to improve assessment so that objectives of the curriculum which have clearly defined the important constraints that reflect what all students should know and should be able to do, can be achieved. Quality instruction requires continuous interaction among instruction, curriculum and assessment. One of the important means of achieving this interaction is through the use of tests.

Tests are instruments used for measurement in education. They are given for many reasons in the educational system. Ene (2014) defined test as a measurement tool designed to measure the outcome of learning while Murphy, Little and Bjork (2023) said that tests are opportunities to practice retrieving to-be-learned information and can function as one of the most powerful learning tools. Uluman (2023) also said that tests consist of a series of questions aimed at evaluating an individual's learning outcomes after exposure to educational outcomes. They are designed to give better information about the performance of students. They are used to assign grades to students as requirements for graduation from school, scholarships or eligibility to secure jobs. They play vital roles in making teaching and learning effective. To support this, Sireci (2007) opined that educational tests, if developed carefully, used properly and interpreted appropriately have enormous utility such as improving students learning. A good instrument must offer accurate, valid and interpretable data for accurate information on outcome of learning so that erroneous decisions will not be made on outcome of learning.

Therefore, a good instrument must be reliable and valid. Nworgu (2015) defined reliability as the degree of consistency or stability which a test exhibits. According to Ene, et al (2021), reliability is the degree of consistency of an instrument in producing reproducible results over time.

Validity, on the other hand, is the ability of the instrument to measure what it purports to measure.

Types of validity include, face, content, criterion-related and construct validity. Nworgu (2015) said that construct validity measures the extent to which a test measures a psychological construct which it is meant to measure. Souza, Alexandre and Guirardello (2017) stated that measurement instrument that assesses psychological constructs are available but many of them have not been properly validated. The present study adapted and validated an instrument developed by VigilColet, Seva and Psicothema in 2008 in Spain. The instrument was validated for measuring the test anxiety of Measurement and Evaluation students in tertiary institutions in Enugu State.

It is necessary that instruments should be subjected to validation. Zaki (2017) pointed out that information provided by any clinical instrument should be subjected to validation based on the judgement and decision-making process. Accurate decisions are more likely to be made when they are based on accurate information concerning the teaching and learning process (Ene, 2014).

This raises the question of whether the test in question, like a test-anxiety scale provides satisfactory properties of accuracy, reliability and validity and therefore, whether the quality of the result is high.

This paper was anchored on factorial validation of a test anxiety scale to measure the test anxiety of undergraduate measurement and evaluation students of public universities in Enugu State. Factorial validation determines, the structural construct validity of instruments by assessing the correlation in a big number of variables defining factors (Ene, et al 2021). In factorial validation, the validity of an instrument like the test anxiety scale is determined by its correlation with factors determined by factor analysis. It helped to determine the extent to which the underlying structure of the test-anxiety scale is recoverable in a set of test scores. Measurement and Evaluation is one of the courses offered mostly at the final year of the undergraduate programme. It focuses on the skills of planning, construction, scoring of tests, analysing, interpreting and reporting results of different assessments. Measurement and Evaluation being one of the courses offered towards the end of the undergraduate programme and based on its nature is associated with its own anxiety.

Anxiety is a feeling of intense, excessive and persistent worry and fear about a situation. It may be accompanied with fast heart rate, rapid breathing, sweating and feeling of tiredness. Pagaria (2020) said that when one experiences stress for a long time and the body doesn't adapt to it, it causes anxiety. The author further noted that physical symptoms of anxiety are sweating, trembling, agitation, nausea, dizziness, tense muscles, racing heart, dry mouth and shaky hands.

Test anxiety is a nervous feeling of worry or pressure one may get when one is about to write a test or an examination. Pagaria further defined test anxiety as a psychological condition in which people experience outrageous distress and anxiety in testing circumstances while Razazadeh and Tavakoli (2009) said that it is an apprehension over academic evaluation. No wonder why Razazadeh and Tavakoli said that it is usually common among students.

Researchers have found out that an average level of anxiety can be beneficial to students because it could serve as a drive in keeping them at alert in order to achieve better while on the other hand, an extreme level of anxiety can be detrimental and could lead to reduced achievement.

Supporting this idea, Pagaria (2020) stated that a little apprehension can really assist you with playing out your best while when the distress turns out to be unnecessary to such an extent that it really interferes with performance on a test, it is termed test-anxiety.

Fear of examination may influence the academic performance of such student in the examination and this can lead to the avoidance of the situation. Hussain, Ahmed, Ali, Khan, Sarwar, Treeza and Timmer (2023) described test anxiety as a physical, mental and emotional reaction to risk of failure in examinations and consists of worry and perception as components.

Razazadeh and Tavakoli (2009) said that millions of students under-perform in school because of heightened test-anxiety. Test-anxiety is a multi-dimensional construct which consists of a cognitive component and an affective physiological component (Danthony, Mascaret & Cury, 2019). The researchers called the cognitive component, worry and the affective physiological component, emotionality. It was also noted that worry is related to negative thoughts especially about failure while emotionality is related to the perception of physiological responses. According to Bados and Sanz (2005), there are two factors each, of the

cognitive and the emotionality components of test-anxiety. The cognitive component is made up of worry and test unrelated thoughts while the emotionality component is made up of tension and bodily symptoms.

Hussain, Ahmed, Ali, Khan, Sarwar, Treeza & Timmer (2023) conducted a research on assessment of test anxiety and its correlation with academic performance among undergraduate students and discovered that majority of the respondents (70.5%) were suffering from high to extremely (high) test anxiety whereas 17.5% participants have mild to moderate level of anxiety.

A significant association was found between test anxiety and study program. A weak reciprocal correlation coefficient was found between academic performance and test anxiety. There was a significant link between the study programme and level of anxiety, and a significant correlation was also found between academic performance and test anxiety.

Examination anxiety influences students' academic achievement and their mental and physical well-being thus resulting in a low quality of life. Brooks, Alshafei and Taylor (2015) noted that there is a disagreement about whether test anxiety affects test performance. However, they discovered that the test and examination anxiety measure (TEAM) had significant positive correlations with the state trait anxiety inventory as well as a negative correlation with grade point average. Vigil-Cole, Seva and Psicotherma (2008) observed that the specific measures of anxiety about statistics has a specific relationship with academic performance in statistics whereas broader measures of anxiety or neuroticism do not. Also, a statistically significant negative correlation was observed between test anxiety and academic achievement. Danthony, Mascaret and Cury (2019) discovered that worry, self-focus bodily symptoms and somatic tension were higher for girls than for boys whereas perceived control was also high. Razazadeh and Tavakoli (2005) in a separate study discovered that students have a high level of test-anxiety. The average of test anxiety score among female students was very higher. The current study adapted and factorially validated the Vigil-Colet, Seva and Psicotherma (2008) statistical anxiety scale. This was to determine if the scale could be applied in measurement of test anxiety in undergraduate measurement and evaluation students in universities in Enugu State. The scale was a set of 24 positive sentences that measure three scales: exam

anxiety, asking for help anxiety and interpretation anxiety. Results show that these specific measures of anxiety about statistics have a significant relationship with academic performance in statistics. The scale was developed using 159 undergraduate students enrolled in a statistics course in Spain. They consisted 139 women and 20 men.

It is common for undergraduate students to experience anxiety in measurement and evaluation course because of the nature of the course. It involves calculation and it cuts across all the departments in Faculty of Education. Literature has also noted that measurement instruments that assess psychological constructs are available but many of them have not been properly validated. Therefore, the researcher factorially validated a test anxiety scale called Test Anxiety Scale for Undergraduate Measurement and Evaluation Students (TASUMES) in public universities in Enugu State.

The purpose of the study was to factorially validate a test anxiety scale to measure test anxiety of undergraduate students of measurement and evaluation in public tertiary institutions in Enugu State. The following research questions guided the study:

1. What is the reliability index of the adapted test-anxiety instrument?
2. What is the construct validity/most appropriate items for assessing test anxiety of undergraduate measurement and evaluation students?
3. What is the fit index for the test anxiety scale?

Method

Descriptive research design was adopted for the study. The population comprised 673 undergraduate measurement and evaluation students in public universities in Enugu State. These universities are University of Nigeria, Nsukka and Enugu State University of Science and Technology (ESUT), Enugu. The sample comprised 321 undergraduate Measurement and Evaluation students. The sampling procedure comprised two stages. The first stage comprised using simple random sampling technique specifically balloting with replacement to draw four departments from each of the Faculties of Education in the two public universities in Enugu State.

The second stage comprised using accidental sampling technique to draw all the final year students found in the class during one of their

year lectures. This gave a total of 321 undergraduate measurement and evaluation public university students.

The instrument known as Test Anxiety scale for Undergraduate Measurement and Evaluation Students (TASUMES) was adapted from Vigil-Colet, Seva and Psicotherma (2008) test anxiety scale and validated for the study. This scale was a 5-point scale ranging from no anxiety (1) to considerable anxiety (5). Each item in the scale is a positive statement that described a typical situation that can be experienced by a student enrolled in a statistics course. The scale measured three subscales namely: examination anxiety, asking for help anxiety and interpretation anxiety. The scale consisted of 24 items. However, the researcher adapted the 24 items but was able to spilt some of the items based on the specific nature of measurement and evaluation. The TASUMES contains a total of 29 items with 4-point response options of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). The instrument contained 29 items on undergraduate measurement and evaluation students test anxiety. Three experts in measurement and evaluation face validated the instrument while construct validation was done using factor analysis. Internal reliability consistency index of the instrument was determined using Cronbach alpha method and this yielded an internal consistency reliability estimate of .87 which shows that the instrument was reliable. Method of data collection was face to face administration of the instrument to undergraduate measurement and evaluation students and this allowed for easy retrieval of the instrument.

Results

Research Question One

What are the reliability indices of the items in the adapted instrument?

Table 1: reliability indices of a scale to measure test anxiety of undergraduate students of measurement and evaluation in tertiary institutions in Enugu State

Items	Alpha	Items	Alpha	Items	Alpha
Item1	0.8781	Item11	0.8655	Item21	0.8685
Item2	0.8743	Item12	0.8740	Item22	0.8697
Item3	0.8722	Item13	0.8712	Item23	0.8707
Item4	0.8731	Item14	0.8718	Item24	0.8686

Item5	0.8707	Item15	0.8689	Item25	0.8735
Item6	0.8821	Item16	0.8704	Item26	0.8691
Item7	0.8839	Item17	0.8718	Item27	0.8706
Item8	0.8737	Item18	0.8668	Item28	0.8709
Item9	0.8693	Item19	0.8701	Item29	0.8695
Item10	0.8743	Item20	0.8684		

Table 1 shows the reliability indices of a scale to measure test anxiety of undergraduate students of measurement and evaluation in tertiary institutions in Enugu State. The result further shows that all the items of the scale to measure test anxiety of undergraduate students of measurement and evaluation in tertiary institutions in Enugu State is very reliable because the reliability indices of the items range from 0.8655 to 0.8839 and the mean reliability index was 0.87.

Research Question Two

What are the most appropriate items for assessing test anxiety of undergraduate measurement and evaluation students?

Table 2: most appropriate items for assessing test anxiety of undergraduate measurement and evaluation students arranged in order of most appropriateness

Items	Alpha	Items	Alpha	Items	Alpha
Item7	0.8839	Item14	0.8718	Item29	0.8695
Item6	0.8821	Item17	0.8718	Item9	0.8693
Item1	0.8781	Item13	0.8712	Item26	0.8691
Item2	0.8743	Item28	0.8709	Item15	0.8689
Item10	0.8743	Item5	0.8707	Item24	0.8686
Item12	0.8740	Item23	0.8707	Item21	0.8685
Item8	0.8737	Item27	0.8706	Item20	0.8684
Item25	0.8735	Item16	0.8704	Item18	0.8668
Item4	0.8731	Item19	0.8701	Item11	0.8655
Item3	0.8722	Item22	0.8697		

Table 2 shows the most appropriate items for assessing test anxiety of undergraduate measurement and evaluation students. The result further revealed that the most appropriate and reliable item for assessing test

anxiety of undergraduate measurement and evaluation students is item 7 because it has the highest reliability index while the least most appropriate is item 11 with a reliability index of 0.8655. However, all the items were reliable.

Research Question Three

What is the fit index for the test anxiety scale?

Table 3: Item fit index of a scale to measure test anxiety of undergraduate students of measurement and evaluation in tertiary institutions in Enugu State

Item	S-X2	Df	p-value	Item	S-X2	df	p-value
Item1	78.5057	49.0000	0.0047	Item16	89.4004	49.0000	0.0004
Item2	65.1401	50.0000	0.0737	Item17	99.9798	49.0000	0.0000
Item3	125.8216	49.0000	0.0000	Item18	63.9696	49.0000	0.0740
Item4	90.2649	50.0000	0.0004	Item19	218.6151	49.0000	0.0000
Item5	98.0161	49.0000	0.0000	Item20	108.8155	49.0000	0.0000
Item6	92.4535	50.0000	0.0002	Item21	91.6310	49.0000	0.0002
Item7	80.0179	49.0000	0.0034	Item22	184.0169	49.0000	0.0000
Item8	65.3106	50.0000	0.0717	Item23	155.2352	50.0000	0.0000
Item9	152.0437	49.0000	0.0000	Item24	88.4726	50.0000	0.0007
Item10	73.0063	49.0000	0.0147	Item25	90.5402	49.0000	0.0003
Item11	75.0432	50.0000	0.0125	Item26	145.9463	49.0000	0.0000
Item12	121.0597	49.0000	0.0000	Item27	63.6537	49.0000	0.0778
Item13	84.1317	50.0000	0.00018	Item28	80.0343	51.0000	0.0058
Item14	87.3163	49.0000	0.0006	Item29	93.5482	51.000	0.0005
Item15	86.6425	49.0000	0.0007				

Table 3 shows the item fit index of a scale to measure test anxiety of undergraduate students of measurement and evaluation in tertiary institutions in Enugu State. The result further shows that items 2, 8, 18, and 27 have good fit index because the associated probability values were above 0.05 showing that there is no significant deviation of those items from the hypothesized model, whereas other items do not because their associated probability values show a significant deviation from the hypothesized model.

Discussion

This study adapted and factorially validated the test anxiety scale which was developed by Vigil-Colet, Seva and Psicotherma in 2008. The finding revealed that the 29-item test-anxiety scale is reliable for measuring test anxiety of undergraduate students of Measurement and Evaluation in tertiary institutions. Fear of examination may influence academic achievement of students. Test anxiety is a dimensional construct which includes worry and emotionality. Razazadeh and Tavakoli (2009) noted that millions of students under-perform in school because of heightened test anxiety. Pagaria (2020) said that a little apprehension can really assist one in playing out one's best while when the distress turns out to be unnecessary to such an extent that it really interferes with performance on a test, it turns out to be anxiety which is not encouraged. Hussain, et al (2023) discovered a significant association between test anxiety and study programme and that 88% of the undergraduates have high to extremely high test anxiety.

The finding also revealed that all the items are appropriate for assessing test anxiety of undergraduate Measurement and Evaluation students with item 7 being the most appropriate. This item shows that students agreed that they feel anxious most times during Measurement and Evaluation test and examination. Hussain, et al (2023) recommended that causes and contributing elements of anxiety must be addressed because test anxiety puts the undergraduate on high risk for learning deficits and unhealthy consequences. This is why valid and reliable instruments must be developed to tackle the issue of test-anxiety among University Measurement and Evaluation undergraduates. Vigil-Cole, Seva and Psicotherma noted that the specific measures of anxiety about statistics has a specific relationship with academic performance in statistics. The finding also revealed that four items have good fit showing that there was no significant deviation of those items from the hypothesized model, whereas all the other items do not, because their associated probability values show a significant deviation from hypothesized model. Ene et al (2020) discovered that the teachers' self-efficacy scale for measuring pre-service teacher's self-efficacy demonstrated a good model fit.

Conclusion

Measurement instruments play an important role in the teaching and

learning process. They are supposed to be valid and reliable. Test-anxiety among students (including M & E students) when they are about writing tests or examinations is a well-known phenomenon. It is common for M & E students to experience test anxiety because of the calculations involved in the course. It is worthy of note that an average level of anxiety can be beneficial to students because it can serve as a drive to keep them at alert in order to achieve better. On the other hand, an extreme level of anxiety can be detrimental and could lead to reduced achievement. Therefore, it is important that valid and reliable instruments should be available to measure undergraduate M & E students test anxiety in order to see how intervention could be applied to reduce extreme test-anxiety.

Recommendations

1. Teacher training institutions should adopt the use of the TASUMES or any other valid test anxiety scale in checking students' test-anxiety.
2. Intervention strategies for student teachers who are faced with high test anxiety should be developed to help students overcome test-anxiety.

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EFFECT OF MIND-MAPPING METACOGNITIVE TEACHING STRATEGY ON BIOLOGY STUDENTS' ACHIEVEMENT IN SECONDARY SCHOOLS IN IMO STATE

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Abstract

The study investigated the effect of mind-mapping metacognitive teaching strategy on Biology students' achievement in secondary schools in Imo state. Two research questions were developed and answered and two null hypotheses formulated and tested for the study. The design of the study was a Quasi-experimental research design. The population of the study consists of 3825 SSII Biology students from the 296 state owned public secondary schools in Imo State. A sample size of one hundred and forty five (145) SS11 Biology students were drawn from two secondary schools using purposive sampling technique. Two intact classes of the selected secondary schools were used. The instrument used for this study was Biology Achievement Test (BAT) which consisted of 50 multiple choice objective questions. The instrument was face and content validated by three experts, one from Biology Education unit and two from Measurement and Evaluation, Department of Science Education all in College of Education, Michael Okpara

University of Agriculture, Umudike. The reliability of BAT was determined using trial testing. The data obtained was analysed using Kuder-Richardson 20 which yielded a correlation coefficient of 0.78. The data collected through the administration of the instruments were analyzed using mean and standard deviation to answer research questions and Analysis of Covariance (ANCOVA) was used to test the null hypotheses at .05 level of significance. The study revealed that mind mapping metacognitive strategy had higher effect on the students' academic achievement in Biology, than lecture method and that there was a significance difference between the mean achievement scores of students taught Biology using mind mapping metacognitive strategy, and lecture method. Based on the finding, it was recommended that mind mapping meta cognitive teaching strategies should be used by teachers in teaching Biology lessons in the classroom.

Keywords: Mind-mapping Metacognitive Teaching Strategy, Biology, Achievement

Introduction

Biology appears to be the most popular science subject at Secondary School level. This is partly because most art students consider Biology easier when compared to Physics and Chemistry. Biology is the science which deals with the study of the life of animals and plants alongside their interactions with their environment (Opera, 2014). Biology plays an important role in all aspects of human life. It is a prerequisite subject in the fields of medicine, agriculture, biochemistry and even extends to the field of geology and mining. Due to its indispensability, much emphasis has been placed on its instruction especially at the secondary school level (Umuoke & Nwafor, 2014). This is to ensure full realization of the objectives of the Biology syllabus as stated in the National Policy on Education (Federal Republic of Nigeria, FRN, 2013).

Due to the importance of Biology, a lot have been done to improve Biology teaching in secondary schools in Nigeria. Some of which are equipment of the Biology laboratories, sharing of mock ups and models, biological exhibitions, among others. In spite of these, students continue to perform poorly in Biology (Nwagbo, 2019). The analysis of students' achievement in Biology in the May/June West African Senior School Certificate (WASSCE) revealed 38.50%, 35.66%, 51.73%, 56.17%, 47.39%, 46.87, 44.93 and 50.52 in 2016, 2017, 2018, 2019, 2020, 2021,

2022 and 2023 respectively. Thus, Biology pass rate remains as low as 46.47% in the last decade (WAEC Chief examiner report, 2016-2023). This decline in students' performance over the years has been the outcry of many stakeholder.

Many factors have been attributed to as the cause of students' poor achievement and invariably leading to poor retention in Biology. Ibe (2015) opined teaching methodology, difficult nature of the topics/concepts, lack of equipment and instructional materials as prevailing factors. Many Biology concepts in the senior secondary school curriculum are perceived to be broad, abstract and difficult to understand by the learners (Okarter, 2018). West African Examination Council (WAEC) Chief Examiner's reports have consistently enumerated some of the weaknesses of the candidates to be poor answers to questions bordering on descriptions, inability to adhere to instructions, poor interpretation of questions, poor definitions, among others. Nutrition in animal/food tests always pose problem to students arising from inability to interpret the instructions and describe the procedures, among others. Okarter (2018) also attributed students' poor achievement in science subjects to poor instructional and learning methods, involving rote- learning, excessive copying of notes as encouraged by expository/lecture method of teaching. Okoli (2019) indicated that many science teachers prefer the expository/lecture method of teaching; that is, a teaching technique in which one person, the teacher, presents a spoken discourse on a particular subject matter and shy away from activity-oriented teaching methods which are student-centered (such as inquiry method, discovery method, investigative laboratory approach). Nwagbo (2019) observed that such teacher-centered approach which places the teacher as the sole possessor of knowledge and the students as passive recipients of knowledge may not enhance achievement and retention in Biology.

Many instructional strategies have been reported by many researchers to enhance Biology students achievement. They include: use of analogy, concept mapping, computer assisted instruction, among others (Anidu, 2015). However, there is seemingly no clear-cut evidence on the effects of mind mapping meta cognitive instructional strategy on the Biology students achievement. Mind map presents the connections in a radial, non-linear graphical manner. Hence it encourages brainstorming

approach to any given intrinsically appropriate role for theoretical or conceptual frame work to work with. To create your first mind map you will need a large white plane sheet of paper and some coloured pens. A mind mapping meta cognitive uses four key characteristics to form firstly; central image of the subjects' topic is formed. Secondly, main themes radiate from the central image. Thirdly, branches hold the key words on the central image. Fourthly, similar branches form a connected structure from main branches. Constant practice with other topics will make it more familiar and interesting. A mind map is based on radial or star structures. People have been using image centred radial graphic organisation techniques referred to as mental or generic mind maps for centuries in areas such as engineering, psychology and education, although the claim of the origin of mind map has been made by a British popular psychologist and author (Okoro, 2011). The mind mapping metacognitive continues to be used in various forms and various forms and for various applications including learning in education (where it is often taught as webbing), planning and engineering is taught as diagramming. Busan (2001) suggested that mind mapping meta cognitive have many applications in personal family, educational business situations, including note taking, brain storming where ideas are inserted into the map radial around the central node, without the implication or sequential arrangement, and where in group and organizing is reserved for later stages, summarizing, revising and general clarifying of thought. Mind mapping meta cognitive is one the best brainstorming techniques using mindmaps for brainstorming helps you easily retrieve information from your memory, get your thought flowing freely so you can come up with new idea, lets you identity connection between individuals ideas. Busan and Vander (2005) stated that one of the main reasons why mind mapping maybe effective is how it enhances the acquisition of scientific skills and even entrepreneurial skills within our brain. One can also use mind maps as mnemonic technique or to sort out a complicated idea.

Another factor that affects achievement in learning process is gender. Gender is the act of being male or female; Gender has been defined as the cultural difference between male and female. According to Okeke (2008), gender refers to the social or cultural construct, characteristics, behaviour and role which the society ascribes to males and females. Gender is a social cultural determinate that varies from place to

place or culture to culture, however some studies reported that there is no genetical difference between the male and females in academic achievement (Ezeliora, 2004). Anaekwe (2007) found out that there was significant difference in the mean achievement scores of boys and girls in chemistry in favour of boys; similarly Ifeakor (2003) found out that there are significant differences in the mean achievement scores of male and females in favour of the males. Nwogu (2005), found out that gender sensitization instructional approach is more effective in the achievement and interest of students in basic science than the conventional instructional approach. Nwachukwu (2008) reports exposing female students to small group cooperative interaction learning style makes them attain high cognitive achievement in chemistry. Therefore research findings have shown contradictory evidence in achievement of students in gender groups in Biology. This is suggestive of the fact that with learning methods and strategies such as mind mapping teaching strategy differently gender could equally have effects on students' academic achievement. Achievement is a term used to indicate the degree of success attained in some general or specific area. Ogbonna (2014) stated that achievement is the extent or degree of attainment of students in tasks, courses, or programmes to which they were sufficiently exposed. Other researchers (Ifeakor, 2003) and (Ifeakor, 2005) attributed the low achievement in secondary school Biology to teachers' non-utilization of appropriate teacher strategies instead most Biology teachers use conventional teaching methods like lecture teaching method (LTM). Conventional teaching method which also involve rote learning and text-book reading do not encourage student's activities such as group discussion, manipulating of objects, experimentation and creative thinking which are necessary for real science learning. Hence the need for exploration of other novel teaching strategies like mind mapping teaching strategy (Dike & Chinda, 2007). This study is therefore, designed to determine the effect of mind mapping metacognitive teaching strategy on students' achievement in Biology in senior secondary schools in Imo State.

Research Questions

The following research questions guided the study:

1. What are the mean achievement scores of students taught Biology using mind mapping metacognitive teaching strategy, and lecture method?
2. What are the difference mean achievement scores of male and female students taught Biology using mind mapping metacognitive teaching strategy?

Hypotheses

The following null hypotheses at a level of significance of 0.05 guided the study:

1. There is no significance difference between the mean achievement scores of students taught Biology using Mind mapping metacognitive strategy, and lecture method.
2. There is no significant difference between the difference mean achievement scores of male and female students taught Biology using mind mapping meta cognitive teaching strategy.

Method

The research design adopted for this study was the quasi-experimental non-randomized control group design. Quasi-experimental design can be used when it is not possible for the researcher to randomly sample the subject and assign them to treatment groups without disrupting the academic programmes of the schools involved in the study (Ihechu, 2019). The type of quasi experimental design used was the non-equivalent control group which involved two groups.

The population of the study consists of 3825 SSII chemistry students from the 296 state owned public secondary schools in Imo State in 2022/2023 academic session. A sample size of one hundred and forty five (145) SSII Biology students were drawn from two secondary schools used as the sample size for the study. The two schools were drawn out from the population of study using purposive sampling technique. Purposive sampling was employed in this study to deliberately select participants who possess specific characteristics or knowledge relevant to the research objectives. Two intact classes of the selected secondary schools were used.

The instrument used for this study was Biology Achievement Test (BAT) which consisted of 50 multiple choice objective questions adapted from West African Examination Council (WAEC) with a response format of options A to D. The instrument was face and content validated by three experts, one from Biology Education unit and two from Measurement and Evaluation, Department of Science Education all in College of Education, Michael Okpara University of Agriculture, Umudike. The reliability of BAT was determined by administering the instrument to 30 SS II Biology students in two different schools in Umuahia Education zone, which were not part of the study. The data obtained was analysed using Kuder-Richardson 20 which yielded a correlation coefficient of 0.78. The researcher and Biology teachers (research assistants) administered the pre-test and post test to the students. The data collected through the administration of the instruments were analyzed using mean and standard deviation to answer research questions and Analysis of Covariance (ANCOVA) was used to test the null hypotheses at .05 level of significance. Since the research involved pre-test and post-test of intact classes, the statistical technique adopted for testing the hypotheses (ANCOVA) enable the researcher to adjust initial group differences (Non-equivalence).

Results

Research Question 1

What are the mean achievement scores of students taught Biology using mind mapping metacognitive teaching strategy, and lecture method?

Table 1 Mean Achievement Scores of Students Taught Biology using Mind Mapping Metacognitive Teaching Strategy and Lecture Method

Groups	N	\bar{X}	Pretest	Post test		Mean gain scores
			SD	\bar{X}	SD	
Mind mapping metacognitive	70	28.282	4.318	67.314	7.205	39.032
Lecture method	75	27.762	4.269	51.423	6.171	23.661

Data in Table 4.1 showed that the students in mind mapping metacognitive strategy group had a mean gain of 39.032 while those in lecture method teaching group had a mean gain of 23.661. This showed that Mind mapping metacognitive strategy had higher effect on the students' academic achievement in Biology, than lecture method.

Hypothesis 1

There is no significance difference between the mean achievement scores of students taught Biology using Mind mapping metacognitive strategy, and lecture method.

Table 2: Analysis of Covariance (ANCOVA) of Significant between the Mean Achievement Scores of Students taught Biology using Mind Mapping Metacognitive Teaching Strategy and Lecture Method

Source	Type III Sum of Squares	Df	Mean Square	F	P. value
Corrected Model	12237.1004	2	6118.550	332.440	.000
Intercept	1214.119	1	1214.119	65.967	.000
Pretest	7669.431	1	7669.431	416.704	.000
Group	221.322	1	221.322	12.025	.004
Error	2613.510	142	18.405		
Total	227408.213	145			
Corrected Total	14268.721	144			

Table 4.2 showed that the Probability (P)-value associated with F calculated value of 12.025 is 0.004. Since the Probability-value of 0.004 is less than 0.05 alpha level, the null hypothesis which stated that there is no significant difference between the mean achievement scores of students taught Biology using Mind mapping metacognitive strategy, and lecture method is thereby rejected. It implies that there was a significance difference between the mean achievement scores of students taught Biology using Mind mapping metacognitive strategy, and lecture method.

Research Question 2

What are the difference mean achievement scores of male and female students taught Biology using mind mapping metacognitive teaching strategy?

Table 3 Difference in Mean Achievement Scores of Male and Female Students Taught Biology Using Mind Mapping Metacognitive Teaching Strategy

Location	Pretest		Post test		Mean gain	
	\bar{X}	SD	\bar{X}	SD		
	N					
MALE	37	29.316	4.414	60.162	6.756	30.846
FEMAL	38	29.014	4.386	59.938	6.742	30.924
		0.302		0.224		-0.078
Differences						

Data in the Table 3 showed that male students in the mind mapping metacognitive teaching strategy group obtained a pretest mean score of 29.316 with a standard deviation of 4.414 and a post test mean scores of 60.162 with standard deviation of 6.756 while the female students in the mind mapping metacognitive teaching strategy group had a pretest mean score of 29.014 with a standard deviation of 4.386. The difference between male and female students mean scores at pretest are 0.302 and 0.224 at post test respectively. The mean achievement gain score for male and female students stood at 30.846 and 30.926 respectively. This indicated that the treatment had the same effects on male and females students.

Hypothesis 2

There is no significant difference between the difference mean achievement scores of male and female students taught Biology using mind mapping meta cognitive teaching strategy.

Table 4: Analysis of Covariance (ANCOVA) of Mean Achievement Scores of male and female students taught Biology using mind mapping meta cognitive teaching strategy

Source	Type III Sum of Squares	Df	Mean Square	F	P. value
Corrected Model	2311.501	1	2311.501	101.040	.000
Intercept	1214.144	1	1214.144	53.073	.000

Pretest	6211.312	1	6211.312	271.509	.000
Gender	61.245	1	61.245	2.677	.132
Error	1670.021	73	22.877		
Total	11468.223	75			
Corrected Total	22936.446	74			

Table 4 showed that the Probability (P)-value associated with F calculated value of 2.677 is 0.132. Since the Probability-value of 0.132 is greater than 0.05 alpha level, the null hypothesis which stated that there is no significant difference between the difference mean achievement scores of male and female students taught chemistry using mind mapping meta cognitive teaching strategy is thereby upheld. It implies that there is no significant difference between the difference mean achievement scores of male and female students taught chemistry using mind mapping meta cognitive teaching strategy.

Discussion of the findings

The findings in research question 1 showed that the students in mind mapping metacognitive strategy group had a mean gain of 39.032 while those in lecture method teaching group had a mean gain of 23.661. This showed that mind mapping metacognitive strategy had higher effect on the students' academic achievement in Biology, than lecture method. The corresponding hypothesis showed that there was a significance difference between the mean achievement scores of students taught Biology using Mind mapping metacognitive strategy, and lecture method. The finding is in agreement with the finding of Bitrus (2014) who showed that mean achievement scores of students taught ecology under cooperative learning modes using concept mapping was higher than their counterpart.

The finding from research question 2 showed that the difference between male and female students mean scores at pretest are 0.302 and 0.224 at posttest respectively. The mean achievement gain score for male and female students stood at 30.846 and 30.926 respectively.. The corresponding hypothesis showed that there is no significant difference between the difference mean achievement scores of male and female students taught chemistry using mind mapping meta cognitive teaching

strategy. The finding is similar with the finding of Dahiru (2006) who finds out that the influence of gender on Mathematics achievement of learning disabled children was not significant when they are exposed to peer teaching. The finding is in contradiction with the finding of Bitrus (2014) who revealed that there was a significant difference in the mean achievement scores of male and female students taught ecology under cooperative and mind mapping modes using concept mapping as a teaching technique

Conclusion

The study examined the effect of mind-mapping metacognitive teaching strategy on Biology students' achievement in secondary schools in Imo state. Based on the findings of the study, the researchers concluded that mind mapping metacognitive strategy had higher effect on the students' academic achievement in Biology, than lecture method and that there was a significance difference between the mean achievement scores of students taught Biology using Mind mapping metacognitive strategy, and lecture method.

Finally, the researchers concluded that mind mapping meta cognitive teaching strategy promote both male and female Biology students' academic achievement and that there is no significant difference between the difference mean achievement scores of male and female students taught chemistry using mind mapping meta cognitive teaching strategy.

Recommendations

Based on the findings and conclusions of the study, the following recommendations were made.

1. Mind mapping meta cognitive teaching strategy should be used in teaching Biology lessons in the classroom. The use of mind mapping meta cognitive teaching strategy in teaching and learning of Biology will enable the students to develop critical skills needed for concept and knowledge construction which will help them to appreciate Biology better and improve on their achievements.
2. Biology teachers should be trained and retrained on the job to adopt the use of mind mapping metacognitive teaching strategy in the teaching and learning of Biology in the classroom. While the use of

mind mapping metacognitive teaching strategy on the other hand will help teachers to accommodate the individual differences that may exist between male and female students in the classroom.

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DEVELOPMENT AND VALIDATION OF MATHEMATICS ACHIEVEMENT TEST ITEMS FOR ITEMS BANKING IN BENUE STATE, NIGERIA

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Abstract

Education is aimed at bringing out desirable behavioural changes which may be overt or covert. These behavioural changes are the objectives of teaching/learning. To achieve this aim, a standard instrument is required. The study developed quality Achievement Test items in Mathematics for use in secondary schools in Benue state, Nigeria. The study established the item difficulty and validity of the instrument. Two (2) research questions guided the study. The study adopted the instrumentation research design where 19,340 Senior Secondary school Students made up the population. 525 SSII students were sampled for the study through multi-stage sampling procedure. 150 items were drafted initially which were subjected to face and content validity. 100 items emerged from the 150 initial items for validation and after items analysis, 51 valid items were retained for this instrument. Content validity Index (CVI) was 0.70. The items difficulty analysis of the developed instrument using Normal Ogave Harmonic Analysis Rebut Method (NOHARM) revealed that the items difficulty parameter ranged from -0.30 to 2.36. Based on the results of this study, it was

found that MAT was valid instrument. Therefore the instrument was recommended for use in secondary schools.

Keywords: Achievement test, Difficulty index and validity.

Introduction

The study of Mathematics in Nigeria has continued to generate a great deal of interest. The fact that the average Nigerian child seems to be poorly achieved in Mathematics is a source of serious concern to educationists, parents and the general public (Sidhu, 2016). Mathematics is the science that deals with the logic of shape, quantity, arrangement of numbers, calculation and evaluation of one's achievement. Mathematics is all around us, in everything we do. The importance of Mathematics to nation building has led the Federal Government of Nigeria to make Mathematics a core subject to be offered by students at Primary and Secondary Education levels in Nigeria (NPE, 2014).

Despite the importance attached to Mathematics as a key subject in realizing any nation's scientific and technological aspiration, it has experienced a flood of persistent failure (Kurumeh, 2012). This may be due to the improper assessment of students that will enable teachers meet the challenges of teaching of the subject especially in this era of continuous assessment. The quality of any test is always achieved through item analysis of examinees' response.

Kelvin and Charles as cited in Abdullahi and Darazo (2020) define item analysis as a loosely structured group of statistics that can be computed for each item in a text. This is mainly carried out on already administered test with the hope that the test will be corrected for further use. But in teacher made test commonly used for internal assessment do not go through this process due to a reasons left known to the teachers. This could be a contributing factor. This may be possible because these students were not exposed to the standardized test during the School Based Assessment (SBA). Teacher made test used for School Based Assessment always lack psychometric properties. Since test is the most important parameters with which society adjudges the product of the educational system. According to Aduloju (2020), this calls for high standard in development of the instrument so that the decision taken should be valid and reliable. If a test is not valid for the purpose it is used, it has no value and that is why Eliot, Krotowill, Cook and Travers as

cited in Aduloju (2020) state that of all the essential characteristics of a good test, none surpasses validity. This attest to the fact that a good test for testing of ability should have some psychometric properties in term of validity, reliability, difficulty index, discrimination and psycho guess index.

Psychometric properties of a test refer to certain attributes inherent in the tests upon which assessment of candidates is based. These characteristics are used as yardsticks to evaluate the quality of test items as been both valid, reliable and items analysis. This is mostly lacking in teacher made test which the students are mostly used to.

The analysis of items in education is based on two basic theories namely; Classical Test Theory (CTT) and Item Response Theory (IRT). IRT looks at the examinees' performance by using item distributions based on the examinees' probability of success on a latent variable. It focuses on the pattern of responses rather than on composite or total score variables and linear regression theory while CTT is test base theory. IRT is adopted for this study because of its applicability to nifty through item level statistic and item analysis. This study assessed the difficulty level of a developed Mathematics Achievement Test and its dimensions using IRT.

In general, assessment in the form of achievement test, serves the purposes of identifying the learners' extent of mastery of knowledge and skills, as well as contributes to effective teaching of a subject. This implies that achievement test should be used for guiding the teaching process to reveal effectiveness in learning. Achievement testing means a systematic and purposeful quantification of learning outcomes. It involves the determination of the degree of attainment of individuals on tasks, courses or programmes to which the individuals were sufficiently exposed (Ary, Cheser & Sorensen, 2010). To achieve this purpose, a test is used. Test can be classified based on interpretation as criterion-reference and non-reference test. This study focused on development of non-reference achievement test.

In norm-referenced achievement test, a number of properties are required to make such a test appropriate and acceptable. These properties are the test validity, reliability and item analysis such as item difficulty index, discriminative index and distractive index. Hence, standardized test are different from conventional school (teacher-made) tests because they have norms, better constructed by experts, accompanied by manuals and

have good psychometric properties, for that, this study work centered on standardize test procedure to make the instrument valid and reliable.

These qualities referred to as the psychometric properties of a test hinge on the validity, reliability and item analysis of the test (Ary, Cheser, Sorensen & Razavieh, 2010). Validity and reliability are important psychometric properties in the literature of educational measurement and evaluation. The relationship between validity and reliability is that, a test may be reliable but not valid. But a test may not be valid unless it is reliable. Hence, a test must possess both in order to be deemed satisfactory for testing purposes. This is one of the concerns of the study.

In test development, Chime (2012) viewed Validity as the degree of accuracy with which the test measures what it is intended to measure. Operationally, validity is the extent to which the results of an evaluation programme serve the particular uses for which they are intended. If the results are to be used to describe pupil's achievement, one would like them to represent the specific achievement, and to represent nothing else. The desires for valid achievement test in this regard are like that of the lawyer in the court room who wants the truth, the whole truth and nothing but the truth.

The difficulty index is important because it helps to know how well students have acquired the knowledge they are supposed to. The range of normal item difficulty index (P) is given by the following inequality expression $(0.4 \leq P \leq 0.7) = (40\% \leq P\% \leq 70\%)$ which implies that items with difficulty index below 0.4 and above 0.7 is said to be difficult, moderate and simple for the target population respectively. Sabri as cited in Abdullahi and Darazo (2020) also reports that based on recommendations by Instructional Assessment Resources (IAR), test items were classified into three categories in terms of level of difficulty as Easy (Above 0.90), Moderate (0.20-0.90) and Difficult (below 0.20). The moderate (0.2-0.90) of difficulty index will be appropriate for this study, this because items that are too difficult and too easy are considered to discarded.

Literature shows that content validity index by subject's specialist (Jayanthi, 2014) revealed CVI of 0.942. Also, Chime (2012) and Osadebe (2014) revealed items difficulty index of 0.47 to 0.9857 and 0.30 to 0.70 in their studied. Also Chime (2012), who developed and validated Economics Achievement Test. In the study, 50 items tests were

developed in Economics Achievement Test. The difficulty index of range 0.47 to 0.9857 were determined. The study result of Odo and Ugwoji (2016) on the Development and Validation of Biology Achievement Test for assessment of students in Enugu state. The study shows the value of difficulty index lies between 0.29 and 0.70.

In most schools in the state, students normally do well in continuous assessment/school base assessment (SBA) but the same set of students while sitting for external/standardize examinations they failed the subject. At the school base level, students usually passed mathematics at credits level, but find it difficult to pass the external examinations. This raised questions on what could have been the problems; is it that the teachers do not know how to score the students correctly? Is it due to the kind of instrument used by these teachers? Also it has been discovered that there is no uniformity in the types of instrument used by teachers in different schools and this is one of the problem of continuous assessment. Most of the instruments developed and used by the teachers are teacher made test which do not pass through item analysis and psychometric properties and this may be the reason why there is a consistent failing in this subject. Based on this observation, the researchers developed and validated a Mathematics achievement test to measure Senior Secondary School Student's achievement in Mathematics.

Purpose of the Study

The study developed and validated Mathematics Achievement Test (MAT) for Senior Secondary Schools in Benue State. Specifically, the study:

1. Established the content validity of the developed Mathematics Achievement Test (MAT) instrument.
2. Determined the item difficulty index of the developed Mathematics Achievement Test (MAT) instrument.

Research Questions

The study was guided by the following research questions:

1. What is the content validity of the developed MAT instrument?
2. What is the item difficulty index of the developed MAT instrument?

Method

The study adopted instrumentation research design because it developed and validated Mathematics Achievement Test Items. The population of the study was 19340 Senior Secondary two (SS2) Students of all government approved and grant aided schools in Benue State. The sample size of 525 students was used. To arrive at the sample size, multi-stage sampling procedure was adopted. At the first stage, purposive sampling technique was used to select the sample that satisfy some predetermined criteria such as the respondents must be Senior Secondary two (SS2) students and the school management should allow their mathematics teachers to assist the researcher in data collection process. In the second stage, the proportionate stratified sampling technique adopted in selecting sample. By this method, 10 schools were selected from zone 'A' educational district, 8 from zone 'B' educational district and 7 school from zone 'C' educational district, thus making 25 schools. This was done to ensure that, relative proportion of schools and students involved in the study was exactly represented the proportion of the sample. The last stage; the researcher used simple random sampling technique to select schools from which sample size was composed. In using simple random sampling technique, the researcher wrote the name of government approved and grants aided schools each in zone 'B' educational district on pieces of papers, squeezed it and placed them in a container. The researcher drew the sample size by picking up a piece of paper one after another without replacement and the names that were found on the pieces of paper picked formed the sample. This was done until the required 8 schools needed were gotten in zone 'B' and same method was replicated in all the educational zones in the Benue state. Thus, students from intact classes from sample schools formed the respondents of the study. Intact classes were used because it reduces students' suspicion that could have arisen if new teachers and some selected students were involved in the exercise.

A self-developed instrument called Mathematics Achievement Test (MAT) as used for data collection. The first step to develop the MAT was to identify the instructional contents, objectives and learning activities as contained in the Senior Secondary two (SS2) Mathematics' Curriculum. The second step to develop the MAT was to identify the content. SSII

Mathematics Curriculum content was used in developing the test items. The curriculum contents are: logarithms, approximation, sequences and series, quadratic equations, simultaneous linear and quadratic equations, gradient of a curve, logical reasoning, linear inequalities, algebraic fractions, chord properties of a circle, circle theorems, Trigonometric ratios, bearings, measures of central tendency and dispersion, histograms of grouped data, cumulative frequency graph, grouped data and probability. The third step was to develop table of specification. To determine the number of test items to be generated from each topic, a table of specifications was constructed and used. The relative weights of each topic in terms of difficulty level, coverage, time spent in teaching such a topic was estimated in percentages. Also the relative weightings of the cognitive levels in terms of number of questions were considered in the table of specifications and represented in percentages. The researcher began with an initial collection of hundred and fifty (150) items covering all the topics in the SSII Mathematics Curriculum. Items in each topic were developed based on level of cognitive ability measured by the test. The number of questions outlined were relative to the size of the content (considering the duration involved in teaching the content), as well as the number of tasks implied in the objectives. The Fourth step was to decide the type of test used. The researcher used multiple choice tests of A-D options. The fifth step was to generate test items. The researcher began with an initial collection of hundred and fifty (150) items covering all the topics in the SSII Mathematics Curriculum and according to the numbers of items on each topic. The Sixth step was face and content validity. The initial start of one hundred and fifty (150) items was given to experts for face and content validity. From the comments of validators, fifty items were discarded while one hundred (100) test items were modernized and retained for trial-testing and items analysis for MAT. The seventh step was selection of items after items analysis. 40 items were finally retained for the instrument.

Cronbach coefficient Alpha method to determine the internal consistency of the MAT and the reliability coefficient obtained was 0.918. Research Question one was answered using Lawshe Validity Ratio and The research question 2 answered using Normal Ogave Harmonic Analysis Robust Method (NOHARM).

RESULT

Table 1.0:Joint ratings of the relevance of MAT items, by two content specialists. Rating on 150 items relevance of MAT.

CVI of Specialists 1			
Items not essential	items essential		Total
Items not essential	(a) 11	(b) 15	26
CVI of Specialists 2			
Items essential	(c) 39	(d) 85	124
Total	50	100	150

CVI= 0.70

CVI=Content Validity Index (source: field survey 2019)

Table 2.0 : Analysis of the Difficulty index of MAT

Items	a1	a2	a3	a4	a5	b
1.	0.35	0.00	0.00	0.00	0.00	0.95
2.	0.10	0.23	0.00	0.00	0.00	-0.25
3.	0.32	0.00	0.18	0.00	0.00	0.48
4.	0.20	0.15	-0.07	0.12	0.00	0.66
5.	0.30	-0.09	0.02	0.05	-0.02	0.27
6.	0.25	0.11	0.01	0.23	0.05	0.54
7.	0.36	0.02	0.05	-0.10	0.12	0.27
8.	0.20	0.08	0.13	-0.04	0.04	0.52
9.	0.44	-0.13	0.11	0.13	0.09	0.97
10.	0.29	-0.02	0.06	0.11	0.23	0.79
11.	0.45	0.05	-0.02	0.02	0.10	0.90
12.	0.53	-0.07	-0.13	0.03	0.21	0.99
13.	0.36	-0.13	0.09	-0.01	0.17	0.40
14.	0.27	0.07	0.13	0.08	0.19	0.50
15.	0.30	0.07	0.19	0.20	0.10	0.70
16.	0.43	-0.11	0.05	0.07	0.08	-0.16
17.	0.54	-0.14	0.15	0.19	0.04	0.24
18.	0.63	-0.14	0.29	-0.02	0.07	0.16
19.	0.66	-0.19	0.04	0.00	0.08	0.86

20.	0.57	-0.14	-0.14	0.18	0.22	-0.30
21.	0.57	-0.20	-0.07	0.10	0.10	-0.03
22.	0.64	-0.13	-0.10	0.11	0.28	-0.12
23.	0.49	-0.19	-0.04	0.14	0.21	0.49
24.	0.59	-0.17	-0.08	-0.03	0.34	0.20
25.	0.51	-0.21	-0.20	0.00	0.40	0.23
26.	0.59	-0.19	-0.20	0.15	0.31	0.29
27.	0.77	-0.15	-0.19	0.10	0.44	0.53
28.	0.91	-0.06	-0.06	0.01	0.43	1.59
29.	48.11	0.83	-4.72	8.76	31.26	1.48
30.	0.72	0.04	-0.02	0.00	0.33	0.29
31.	0.80	0.20	-0.08	-0.05	0.37	0.38
32.	1.08	0.11	0.03	-0.19	0.48	0.48
33.	0.95	0.08	-0.01	-0.16	0.44	0.01
34.	1.06	0.16	-0.03	-0.17	0.42	-0.08
35.	1.26	0.15	-0.08	-0.24	0.80	0.33
36.	1.22	-0.15	-0.26	-0.04	0.92	-0.08
37.	1.29	-0.04	-0.13	-0.02	0.93	-0.02
38.	1.25	0.04	-0.24	0.04	1.04	-0.12
39.	1.44	0.01	-0.55	0.00	1.47	0.35
40.	1.35	-0.24	-0.89	0.46	1.47	0.30
41.	0.76	-0.37	-0.44	0.37	1.38	0.22
42.	0.60	-0.18	-0.47	0.46	1.39	0.01
43.	0.47	-0.51	-0.27	0.60	1.28	-0.21
44.	0.37	-0.82	-0.11	0.81	1.81	0.00
45.	0.13	-0.82	-0.11	0.94	1.34	-0.01
46.	0.18	-1.37	-0.17	1.23	1.85	0.02
47.	0.11	-0.97	0.34	1.22	1.73	-0.03
48.	-0.20	-1.80	0.91	1.73	2.79	-0.02
49.	-0.17	-0.81	0.52	0.83	1.68	-0.01
50.	-0.54	-1.30	1.23	1.21	2.62	-0.02
51.	-1.33	-8.06	13.05	6.68	20.99	0.23
52.	-0.30	-0.93	2.09	0.27	2.62	0.08
53.	-0.09	-0.67	2.10	-0.57	2.31	0.01
54.	6.99	-7.15	36.64	-11.04	31.76	0.16
55.	5.51	-3.25	23.82	-8.18	20.94	-0.09
56.	7.52	-4.91	23.78	-10.71	17.03	-0.09
57.	1.80	-2.02	6.79	-2.63	4.44	-0.22

58.	0.57	-0.44	1.63	-0.71	0.85	-0.10
59.	0.68	-0.80	2.09	-0.70	1.01	-0.04
60.	0.85	-0.86	2.23	-0.68	0.73	0.07
61.	0.68	-0.78	1.58	-0.45	0.51	0.01
62.	18.34	-17.78	38.63	-3.77	8.23	0.10
63.	1.88	-1.56	2.87	-0.18	0.37	0.00
64.	1.04	-0.64	1.24	0.02	0.12	0.05
65.	1.00	-0.73	1.19	0.23	0.21	0.00
66.	1.18	-0.68	1.31	0.48	0.03	0.08
67.	0.95	-0.80	1.12	0.69	0.07	0.00
68.	1.60	-1.92	2.21	1.66	-0.43	0.07
69.	1.66	-1.69	1.90	1.64	-0.41	-0.04
70.	20.06	-21.71	20.26	19.48	-8.39	-0.06
71.	1.08	-0.98	1.10	1.06	-0.46	-0.03
72.	1.34	-0.77	1.50	1.40	-0.50	0.17
73.	1.03	-0.31	1.20	1.01	-0.30	0.29
74.	0.57	-0.05	0.87	0.87	-0.02	0.03
75.	0.57	0.08	0.84	0.69	0.13	-0.19
76.	0.53	0.41	1.06	1.02	0.16	-0.07
77.	0.56	0.33	0.83	0.97	0.20	0.02
78.	0.48	0.64	1.24	1.34	0.34	0.09
79.	0.42	0.58	1.04	0.86	0.24	0.00
80.	0.71	0.97	1.54	1.58	0.58	-0.08
81.	0.47	1.25	1.26	1.28	0.70	-0.16
82.	0.53	1.12	1.25	0.79	0.64	0.04
83.	0.45	0.66	0.78	0.53	0.45	-0.11
84.	0.57	0.75	0.79	0.78	0.41	0.36
85.	0.42	0.72	0.46	0.73	0.40	-0.30
86.	0.26	0.41	0.21	0.48	0.48	0.22
87.	0.35	0.66	0.44	0.68	0.24	0.73
88.	0.31	0.34	0.21	0.48	0.48	0.15
89.	0.50	0.37	0.38	0.26	0.16	0.26
90.	0.35	0.32	0.17	0.09	0.23	-0.11
91.	0.24	0.23	0.48	0.09	0.22	0.83
92.	0.32	0.25	0.28	0.22	0.13	0.37
93.	0.28	0.26	0.33	0.19	0.12	0.05
94.	0.02	0.06	0.17	0.13	0.07	0.80
95.	0.13	0.18	0.03	0.07	-0.03	2.06

96.	-0.04	0.03	0.09	-0.04	0.00	2.03
97.	0.03	0.07	0.15	-0.19	0.03	1.18
98.	0.02	0.02	0.00	0.02	0.06	2.36
99.	0.10	0.02	0.16	0.00	0.09	0.75
100	0.25	0.08	-0.04	-0.09	0.03	0.25

a₁=dimension 1, a₂=dimension 2, a₃=dimension 3, a₄=dimension 4, a₅=dimension 5 and b=difficulty index.
(source: field survey 2019)

Discussion

The findings of the study revealed that the Content Validity Index (CVI) was 0.70 (70%). This in line with Ijeoma & Magnu (2017), who's Content Validity Index (CVI), was also computed using joint ratings of the relevance of Mathematics test items by subject specialists based on their ratings, the value of 0.80 was obtained. Also Jayanthni (2014) researched on development and validation of achievement test in Mathematics, which had validity coefficient of 0.942. This shows that the instrument is valid in terms of content validity.

The findings of the study revealed that all the items of the Mathematics Achievement Test instrument have item difficulty index between -0.30 to 2.36. This finding is similar to the findings of Osadebe (2014) who constructed and validated an achievement test on upper primary science. The 102 items had a difficulty index which ranged from 0.30 to 0.70. Also the finding is similar to the study result of Chime (2012), who developed and validated Economics Achievement Test. In the study, the difficulty index of ranges from 0.47 to 0.9857. The finding is similar to the study result of Odo and Ugwoji (2016), who developed and Validated Biology Achievement Test for assessment of students in Enugu state. The study shows the value of difficulty index lies between 0.29 and 0.70.

Conclusion

Based on the research findings, the study concluded that Mathematics Achievement Test items were found valid and 51 items were appropriate in terms of difficulty index and were retained for items banking.

Recommendations

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

Teachers, researchers and relevant educational agencies should always establish the content validity index of a test before used.

Test developers should always establish the items difficulty index of an instrument before used.

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**TEACHERS COMPETENCY IN TEST
ADMINISTRATION IN SECONDARY SCHOOLS IN
OVIA NORTH-EAST LOCAL GOVERNMENT AREA,
EDO STATE.**

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Abstract

The study investigated teachers' competency in test administration in senior secondary schools in Ovia north- east local government area of Edo state. To give direction to the study, four (4) research questions were raised, out of which three (3) were hypothesized. The descriptive survey design was adopted for the study. The study population comprised 162 teachers in the 23 senior secondary schools in Ovia North-East local government area of Edo state. The sample of study consists of all the 162 teachers in the senior secondary schools. Census method was used considering the fact that the entire population of the study was used. The research instrument used for data collection were the teachers competency in test administration questionnaire (TCTAQ). The instrument was validated by three experts in Educational Measurement and Evaluation. Reliability of the instrument was done using Cronbach alpha statistics, the coefficients of 0.61 was obtained. The research instruments were administered personally by the researchers in most of the schools while field assistants (teachers in some schools) were used to administer the instruments in their own schools. Research question was answered using descriptive statistics such as mean and standard deviation while hypotheses were tested using the independent t- test and analysis of variance (ANOVA). The results revealed that the teachers in Ovia North-East Local Government area of Edo state, have high competency

in test administration. It was also found that a significant difference exists among the teachers in the area of competency in test administration based on sex. However, no significant differences were found among the teachers with respect to competency in test construction on the bases of qualification and years of experience of teachers. Based on the findings of the results, it was concluded that teachers in secondary schools in Ovia North- East Local Government Area of Edo state possess high competency level in test administration. The researchers recommend periodic workshop for teachers to keep them abreast of new developments in the area of test administration in order to sustain this level of competency.

Keywords: Competency, teachers , test administration, assessment.

Introduction

Assessment of students learning is an integral part of the Nigeria educational system. At all levels of learning, students are assessed periodically after a teaching and learning experience to ascertain whether expected change has occurred in the learner and also determine the effectiveness of instructional methods. It is stipulated in the Professional Standards for Nigeria Teachers Document cited in Adeosun & Mokogwu (2024), that teachers are to administer assessments that are reliable and valid, and directly related to the subject content to ascertain periodically the progress of students. Adeosun and Mokogwu (2024) posits that assessment of students is very vital in the teaching and learning process because it is an effective way of determining the aspect of the content taught that students have learned and mastered, as well as the effectiveness of instructional methods and materials, providing a means of evaluating students progress and achievements. There are many instruments of assessment, however, tests are commonly employed or adopted in our school system for measuring learning outcomes. According to Mehren in Ahmed and Bashir (2022), a test is any method (written, observational, or oral) utilized to collect data for assessment and evaluation purposes. In the view of Brown also in Ahmed and Bashir (2022), a test is a method of assessing a person's capability, knowledge or performance in a given area. In other words, a test is a device or set of items that are presented to the respondents which requires performance from them. According to Omoroguiwa (2019), a test is an item or set of items presented to an individual or set of individuals to which they are expected to respond

under specific conditions with the intent to determine the extent to which a trait of interest is present or absent in the respondent. Adeosun and Mokogwu (2024) defines test as a set of items (questions) presented to students (testees/examinees) by the teacher to determine what students have learned or not learned and whether the behavioral objectives or the expected change(s) in behavior is/are being achieved. This form of test that focuses on the achievement of the individual\ learners is termed achievement test.

An achievement test could be a standardized test or a teacher-made test, otherwise known as classroom test. Standardized tests are tests prepared by someone else apart from the teacher, usually, experts in the field of measurement and evaluation. Teacher- made tests or classroom tests on the other hand, are tests prepared and administered by class teachers or subject teachers as the case maybe. The administration of teacher-made or classroom test is the focus of this paper. How effective are teachers in secondary schools in administering classroom tests? Hugh in Roshan (2016), defines test administration as a variety of procedures for giving a test to an individual or a group of individuals and also gathering empirical information in order to assess the qualities of test usefulness and make reference about test takers abilities. Test administration involves the whole process of presenting a test to students in order to obtain their responses. According to Roshan (2016), test administration involves two issues:(i) replicating the meticulous conditions that the test designers set out in the delivery specification that is the conditions under which the test was originally piloted and field tested and(ii) ensuring that these conditions are replicated for all test takers so no one experiences taking the test in a condition that provides either an advantage or a disadvantage. Tests in essence are to be conducted under right/stipulated conditions and all test takers should write under same conditions to avoid placing any test taker at a disadvantaged position or giving undue advantage to any group of testees. Fulcher in Roshan(2016) also submits that for administering better tests, controlling for extraneous irrelevant variables is necessary.

Three prominent tenets for administering classroom test are identified in literature. First, all testees must be given equal opportunity to show their attainment of the learning objectives intended, indicating that the physical and psychological environment in which the testing is occurring must be helpful to the testees. Second, learners and testees

should have positive attitude towards examinations. A positive attitude will help students to carry out better. Third, administrators of tests should be qualified and trusted persons. This will ensure that tests are properly managed to obtain valid and reliable results. By implication, the classroom teacher in administering classroom tests must ensure that the physical and psychological environment are conducive for all students, help students develop positive attitude towards test taking by preparing adequately, and very importantly, the classroom teacher who is administering a test must possess the requisite knowledge required for effective test administration. The United state Department of labour in (Rukundo & Magambo(2010), states that test administrators need to have the opportunity to learn their responsibilities as a prerequisite to accurate results. In the same vein, Lazarus, Mari and Thurlow(2021) citing Lazarus et al(2021), Olson, et al,(2021) and Thurlow(2020), stated that individuals who administer or proctor assessments as well as those who provide accommodations (for example, scribes, test readers, sign language interpreters, translators) should be qualified and knowledgeable about how to appropriately administer assessments and provide accommodation. Obiagah(2012), equally opined that to become a committed examination officer, some level of education is needed for all teachers. Consequently, those who administer tests must be well grounded in test administration procedures and be able to adopt same in testing situations. Effective classroom test administration requires that teachers be knowledgeable about test administration procedures and apply same classroom testing in order to ensure the reliability and validity of the test results. In other words, teachers need to have and demonstrate some degree of competency in administering classroom tests. These competencies are competencies based on standard procedures for test administration. Test administration procedures are developed to help minimize measurement errors and to increase the likelihood of fair, reliable and valid assessment. How knowledgeable are teachers in our secondary schools about test administration procedures? Do teachers adhere to these procedures in administering classroom tests? In other words, do they possess the competency or competencies needed for effective classroom testing?

Competency, as defined in the Cambridge dictionary is an important skill that is needed to do a job. According to Kolibacova (2014), the concept of competency is usually applied to define the whole of

individuals' abilities, skills, behaviors and knowledge, oriented to effective performance. Gupta in Selvi (2010) in his definition of competencies, added to knowledge and skills, attitudes, values, motivations and beliefs people need in order to be successful in their jobs. Wong (2020) posited that competencies in general can be described as a set of observable and measurable attributes or success factors required for individuals for effective work performance. These attributes or factors may include knowledge, skills, self-concepts and values, personal traits and motives. Competencies are observable, measurable and encompass all that is needed for effective job performance. Teachers as test administrators in their subject areas and in their classrooms should possess some degree of competency in test administration.

Teachers, given their educational background should exhibit some degree of skillfulness in administering tests to their students. Unfortunately, the conducts of teachers in the testing process leave very little to be desired. Personal observation and literature have shown that most teachers do not adhere to the basic principles of test administration in the course of administering classroom tests, that teachers do not take into cognizance the physical environment in which test is taken and very importantly, the psychological environment (speaking about the state of mind of the students) when administering classroom tests. Teachers, again, are seen not to observe simple rules such as the use of the 'do not disturb, examination in progress sign to ensure that the testing environment is as quiet as possible and free from any form of distraction. Needless to say, that these teachers become sources of distraction even in the administration of their own tests ranging from call answering, shouting at students, chatting with free colleagues or on the phone etc. This observed pattern of behaviour calls to question the competency of teachers in test administration.

Teachers' lack of competency in test administration could jeopardize the entire testing process. When teachers fail to adhere to test administration procedures in administering class room test, results from such tests cannot be reliable Roshan (2016) posits that Test administration procedures are developed to minimize measurement error and to increase the likelihood of a fair, valid, and reliable assessment. A disregard of these procedures will amount to an unfair, invalid and unreliable assessment, no credible information can be obtained and any decision made on basis

result obtained will be to say the least, faulty and misleading. Therefore, it is pertinent that teachers in secondary schools' take a critical look at their competency in the administration of classroom test. It is on this note that this paper investigates the competency of teachers in secondary schools in Ovia local government area of Edo State, in test administration.

The following research question guided the study:

What is the level of competency in test administration among teachers in secondary schools in Ovia LGA?

The following hypotheses were tested at 0.05 alpha level:

1. There is no significant difference in the male and female teachers' competency in test administration among teachers in the secondary schools in Ovia local government area.
2. There is no significant difference in the teachers' competency in test administration among teachers in secondary schools in Ovia local government area by qualification.
3. There is no significant difference in teachers' competency in test administration among teachers in secondary schools in Ovia local government area by experience.

Methods

The research design adopted for this study is the descriptive survey design. The descriptive survey design enables the researcher to collect data and describe the competencies of teachers in test construction. The population of the study consists of the 162 teachers in the twenty three (23) public senior secondary schools in Ovia north east local government area of Edo State. (Data from Edo State Ministry of Education). The sample consists of all the 162 teachers in the 23 schools. Census method was used for this study considering the fact that all the population were used. Therefore, the entire population of study was used as the sample for the study. This helped to eliminate sampling error and provide data on the entire population.

The instrument for the study was titled, Teachers' Competency in Test Administration Questionnaire (TCTAQ). It was adapted from Armah, (2018). The questionnaire was patterned in the form of Modified Likert Scale: SA- Strongly agreed, A -agreed, D - Disagreed and SD -Strongly Disagreed. It is made up of two parts. The first part, Section A, consists of

demographic data of the respondents as follows, sex, teaching experience and educational qualification. While Section B consists of 17 items on teachers application of test administration procedures. The instrument was validated by three experts in the field of educational measurement and evaluation. The corrections and suggestions made were duly effected by the researcher. To determine the reliability index of the items on the teachers' competencies in test construction Questionnaire (TCTAQ), the instrument was administered to 30 teachers who were not part of the population of study. The data was collated and subjected to Cronbach alpha statistics. The coefficient of 0.61 was obtained. This was considered good and indicated that the items were internally consistent. The data obtained for this study was analyzed using both descriptive and inferential statistics. Research questions one was answered using descriptive statistics such as mean and standard deviation while the hypotheses were tested using the independent t-test for hypotheses 1, and analysis of variance (ANOVA) for hypotheses 2 and 3.

Presentation of Results

Research Question 1: What is the level of teachers' competency in test administration among teachers in secondary schools in Ovia Local Government Area?

Table 1: Descriptive of Teachers' Competency in Test Administration

Variable	N	Mean	Std Dev
Teachers' Competency in Test Administration	163	52.45	17.18

Table 1 shows the mean value of 52.45 and a standard deviation of 7.18. Since the calculated mean is greater than the normative mean of 42.50, this indicates that the level of competency in test administration among teachers' in secondary schools in Ovia Local Government Area is high.

Hypothesis One: There's no difference in male and female teachers' competency in test administration among teachers in secondary schools in Ovia local government area by sex.

Table 2:t-test of Independent Samples of Male and Female Teachers' Competency in Test Administration Based on Sex.

Sex	N	Mean	Std Dev	t	df
Sig (2-tailed)					
Male	54	54.31	7.65		161
				2.359	
Female	109	51.33	6.79		

Table 2 shows a calculated t of 2.359 and a p-value of .020, testing at an alpha level of 0.05. Since the p-value is less than the alpha level, the null hypotheses which states that there is no significant difference in the teachers' competency in test administration among male and female teachers in secondary Ovia Local Government Area by sex is rejected. Consequently, there is a significant difference in teachers' competency in test administration in Secondary Schools in Ovia Local Government Area based on Sex.

Hypothesis Two: There is no significant difference in the teachers' Competency in test administration among teachers in Secondary schools in Ovia Local Government Area by qualifications

Table 3: ANOVA of Teachers Competency in Test Administration among Teachers' in Ovia Local Government Area based on Qualifications

	Sum of	df	Mean	F
Sig(2-tailed)	Square		Square	
Between Groups	290.863		6	48.77
				.936
Within Groups	8079.541	156	51.791	
Total	8370.405	162		

Table 3 shows a value of .936 and a p-value of .471, testing at an alpha level of 0.05. Since the p-value is greater than the alpha level, the null hypothesis which state that there is no significant difference in teachers' competency in test administration based on qualification among teachers in secondary school in Ovia local government is retained.

Consequently, there is no significant difference in teachers' competency in test administration among teachers in secondary schools in Ovia Local Government based on qualification.

Hypotheses Three: There is no significant difference in teachers' competency in test administration among teachers in Ovia Local Government Area by experience.

Table 4:ANOVA of Teachers' Competency in Test Administration among Teachers' in Ovia Local Government area Based on Experience.

Sig (2-tailed)	Sum of Square	df	Mean Squares	F
Between Groups	1.569	2	.784	.985
Within Groups	8368.836	160	52.305	.015
Total	8370.405	162		

Table 4 shows F-value of .015 and p-value of .985 testing at an alpha level of 0.05. Since the p-value is greater than the alpha level the null hypothesis which states that there is no significant difference in teachers' competency in test administration among teachers in secondary schools in Ovia Local Government area by experience is retained. There is no significant difference in teachers' competency in test administration among teachers in secondary schools in Ovia Local Government area based on experience.

Discussion of Findings

The finding of this study showed that teachers' in secondary schools in Ovia local government area have high level of competency in test administration. This may be attributed to the background of the teachers in the field of education and the various training that have been organized for teachers in the state by the government to equip them with best educational practices in order to enhance their effectiveness in the state and provide quality education to students in Edo state both at the basic level and senior secondary school level. The finding contrasts the claim of Adikwu, Obinne and Amali(2014) that teachers are guilty of

giving hints to individual students who ask about individual items and also warning students to do their best because of the importance of the examination, indicating their incompetency in administering classroom tests.

The result also revealed a significant difference in test administration competency among teachers in Ovia local government area based on sex. The sex of teachers' is significant in explaining the competency of teachers in test administration. In this case, the males tend to have more competency in test administration than the female teachers. This could be attributed to the fact that the male teachers appeared to be stricter when it comes to applying rules than the female teachers who may be carried away with their love for the students and tend to be more lenient. The finding supports the positions of numerous studies that have looked at gender and its role in teachers' effectiveness. Such studies include Amalu(2021), Ahiatoga(2017), Akiri Ugbrugbo in Dien, Abang and Ngban (2022) all of which indicated that gender influences teachers' effectiveness. It particularly collaborates the findings of literature on gender and its effects on performance in a test such as Samuel(in Ortner and Vormittag,2011), Ortner and Vormittag (2011) and Rumnik, Capasso and Hendrick in Vormittag and Ortner(2011). These studies clearly revealed that the gender of the test administrator has effect on the performance of students in a test. They however differ on which gender effects the students more. While Samuel(in Ortner and Vormittag, 2011), and Ortner and Vormittag (2011) found male and female students to perform better with female test administrator, Rumnik, Capasso and Hendrick (in Vormittag and Ortner, 2011), submitted in their review that male examiners elicit better performances from adult male and female test takers.

The result presented in table 2 above shows that teachers in secondary schools in Ovia north east are not significantly different in their competency in test administration based on their qualification. This indicates that qualification does not explain teachers competency in test administration. This may be due to the fact that the teachers have been administering test to students for a long time which made them to be familiar to the process of test administration. The level of education at which a teacher received his / her training in education does not explain his /her competency in test administration. What is of importance is the

requisite knowledge in the principles of test administration and one could also add to this, the discipline to apply these principles. The finding is contrary to the stance of Rukundo and Mugambo (2010) who posited that test administrators should be qualified and trusted persons in order to ensure that tests are properly managed to obtain valid and reliable results.

Again the result showed that teachers' competency in test administration is not based on experience. No significant difference was found among the teachers in this study on their level of competency in test administration based on experience as revealed in the result presented in table 3 above. By implication, Teachers' competency in test administration is not explained by the experience of teachers. This again contrasts studies that have linked experience of teachers to their effectiveness, as well as the achievements of students such as Ewetan (2016) which emphasized that time and experience play similar roles in the development of pedagogical expertise as well as the study of Kosgie, Mise, Odera and Ayugi (2013). This could be due to laxity or what might be termed "I have paid my dues syndrome" or mentality, an attitude commonly found in public servants (teachers inclusive) which makes it difficult for them to become more functional in their line of job as they advance in the job or up skill themselves, particularly when there is no motivation to do so.

Conclusion

Based on the findings of this study, it is concluded that the level of teachers' competency in test administration is high among teachers in senior secondary schools in Ovia local government area, Edo state. More so, teachers' characteristics such as qualification and experience of teachers do not account for the level of competency in test administration among the teachers in Ovia north east. However, the sex of the teachers does explain the level of their competency in test administration.

Recommendations

The researchers therefore, recommended that:

1. Periodic workshop for teachers to keep them abreast of new developments in test administration is needed to sustain their high level of competency.

2. Beyond qualifications, the passion and personal values of prospective teachers should be of paramount interest to school administrators.
3. Teachers should avail themselves of every opportunity to up their skills and exercise discipline in the discharge of their duties.

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ENHANCING SECONDARY EDUCATION ASSESSMENT POLICY AND PRACTICE IN ENUGU URBAN USING DIGITAL ASSESSMENT

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Abstract

In the context of secondary education in Enugu Urban, the integration of digital assessment methods holds significant promise for enhancing both assessment policy and practices. The purpose of the study was to find out how secondary education assessment policy and practice can be enhanced in Enugu Urban using digital assessment. The research utilized a non-experimental design of descriptive research type. The population for the study consisted of 1,797 teachers of 31 secondary schools in Enugu Urban. Eleven schools were randomly drawn from 31 secondary schools using simple random sampling. Taro Yamene's formula was used to determine the sample size of 327 teachers. From these drawn schools, the sample of the 327 teachers was drawn using stratified random sampling. Three research questions aligned with the study's objectives, guiding the investigation. Instrument for data collection was a well-structured questionnaire. Two specialists in Educational Research, Measurement and Evaluation validated the structured questionnaire. The questionnaire was also tested for reliability using Cronbach Alpha and the reliability coefficient was 0.83. The data collected were analyzed using arithmetic mean. The findings from the study indicated that digital assessment enhances secondary education assessment policy and practice in Enugu Urban. It was recommended that the study findings be made available to the Enugu State Ministry of Education. It was also recommended among others that digital assessment should be introduced in secondary schools in Enugu Urban and teachers be trained on how to integrate digital assessment into assessment processes.

Keywords: Assessment Policy, Assessment Practice and Digital Assessment

Introduction

Education plays a pivotal role in the socio-economic development of any nation. In Nigeria, as in many other countries, the quality of education directly impacts individual growth, societal progress, and national development. To enhance the quality of secondary education, it is crucial to focus on assessment policies and practices that promote effective teaching and learning.

Enugu State, located in southeastern Nigeria, grapples with challenges in its secondary education system. These challenges include inadequate infrastructure, teacher quality disparities, curriculum implementation gaps, and management issues. Educators and policymakers are increasingly turning to digital assessment. Assessment policies shape how student learning is evaluated. These policies influence the design of examinations, grading criteria, and the overall assessment framework. Hence, in Enugu State its assessment policies and practices align with the curriculum, ensuring that what is taught is what is assessed. This approach includes both objective assessments (focusing on students' knowledge, skills, and understanding of the subject matter) and continuous assessment (incorporating ongoing assessments beyond final exams). (Enugu State Ministry of Education, 2024).

Assessment practices are the overall approaches used for evaluating students' learning, which include a broad range of activities and procedures, both formal and informal ways of assessing students' performance. The Enugu State Ministry of Education employs a variety of assessment methods including written examination, practical assessments, projects, and oral exams. These methods cater to diverse learning styles and aim to balance assessing essential knowledge with encouraging critical thinking and problem-solving skills (Enugu State Ministry of Education, 2024). These assessment methods are specific techniques which are used by secondary schools in the Enugu Urban to measure students' achievement. Assessment is not just about grading; the goal is to provide constructive feedback to aid students' growth and improvement. Quality assurance is an integral part of assessment practices in Enugu State's secondary education system. A study assessed quality assurance practice in Enugu state secondary schools and the key practices identified include provision of infrastructural facilities, recruitment of qualified teachers, secondary school curriculum implementation, and effective

leadership management (Nwite & Okpalanze, 2017). These practices collectively contribute to the assessment process by creating a conducive environment for student learning and growth. These practices ensure schools maintain high standards and provide effective learning experiences for students. Ogwuike and Iheonu (2021) in a study noted that there are challenges which impact assessment practices in Enugu State secondary education, such as lack of effective supervision which affects curriculum implementation, teacher performance, infrastructure maintenance, inadequate governmental supervision, misaligned curricula, teacher remuneration issues, and poor learning environments (Ogwuike and Iheonu 2021).

Digital assessment, also known as e-assessment or electronic assessment refers to the use of technology in evaluating student learning outcomes. Digital assessment involves delivering assessments, tests, surveys, and other measures through digital devices such as computers, tablets, and mobile phones (Issayeva, 2024). While digital technologies offer opportunities for effective assessment, they also pose challenges. According to the Organization for Economic Cooperation and Development (OECD, 2024), using digital technology poses challenges to teachers when they try to design pedagogically sound and responsible digital assessment, and ensuring fairness, security and accessibility in online assessment. Ethical questions may also emerge with regards to inequalities because not all teachers and students have the necessary technological devices or software (Vidal, 2023). However, most teachers and students use Android phones. Digital assessment can be effectively done with their android phones.

The implementation of assessment practices directly impacts student outcomes. Traditional pen-and-paper assessments are prevalent in the Enugu Urban secondary education system. This is done through continuous assessment whereby a test is administered to the students either weekly or monthly. The continuous assessment test is designed to measure the cognitive abilities of students, and most often the affective and psychomotor domains are not considered. The continuous assessment practice which is done through the pen-and-paper test may not fully capture students' abilities or provide timely feedback. Traditional paper-based assessment is time-consuming to administer and grade and sometimes lacks efficiency and accuracy. Integrating technology can help

teachers create more engaging and personalized assessments leading to better learning outcomes for students. Digital assessment involves leveraging technology to evaluate students' performance, provide timely feedback, and enhance the overall assessment process. By integrating digital assessment methods, Enugu Urban secondary education can enhance the accuracy, efficiency, and fairness of evaluating students' performance. This shift aligns with global trends and recognizes the potential of technology to transform education. Digital tools will allow for automated grading, reducing teacher workload and minimizing errors. When teachers use only traditional paper-based assessments, students are devoid of the knowledge of digital tools. familiarity with digital tools during secondary education prepares students for real-world scenarios. It is based on this framework that the researcher seeks to study the intersection of assessment policy, practice, and digital innovation within Enugu State's secondary education system, using Enugu Urban as the area of study.

The purpose of the study was to find out how the secondary education assessment policy and practice in Enugu Urban can be enhanced using digital assessment.

The study was guided by the following research questions:

1. What are the assessment policies of secondary education in Enugu Urban?
2. What are the assessment practices of secondary education in Enugu urban?
3. What are the digital assessment methods that can enhance the assessment policy and practices of secondary education in Enugu Urban?

Method

The population for the study comprised 1,797 teachers of 31 secondary schools in Enugu Urban (Source: Planning Research and Statistics, PPSMB 2024). A sample of 327 teachers was used. Taro Yamene Formula was used to determine the sample size, while the multistage sampling method was used to select the schools and the teachers. Initially, simple random sampling was used to draw 11 schools from a total of 31. Subsequently, stratified random sampling was employed to draw 327 teachers from the 11 schools. This approach ensured a representative and

unbiased sample of schools and teachers for this study. In alignment with the purpose of the study, three research questions were formulated and answered. The study was conducted using a descriptive research design, which is non-experimental. Data were gathered through a questionnaire titled “Assessing Policy, Practice, and Digital Assessment in Enugu urban Secondary Education” (APPADEUSE), specifically formulated for this research. The researcher employed the help of five research assistants in the distribution of the questionnaire to the target sample. The instrument was validated by two specialists in Educational research, Measurement and Evaluation, Godfrey Okoye University, Enugu. The instrument was subjected to a reliability test through the Cronbach Alpha procedure to determine its internal consistency with a reliability coefficient of 0.83. All the questionnaires were retrieved and used for data analysis. Arithmetic mean was used to analyze the data collected. Items with ratings 2.50 and above were accepted, while the items below 2.50 were rejected.

Results

Table 1: Responses on Assessment Policies of Secondary Education in Enugu Urban.

S/N With the current assessment policies of						
Enugu State Ministry of Education	SA	A	D	SD	\bar{X}	Remark
1. Students are assessed objectively, focusing on their knowledge, skills, and understanding of the subject matter.	83	201	27	16	3.07	Agreed
2. teachers do not focus on their knowledge, skills and understanding of the subject matter.	12	44	79	192	1.62	Disagreed
3. students are assessed with formative assessment during the learning process in Enugu Urban.	40	57	156	74	2.66	Agreed
4. students are assessed only with summative assessment in Enugu Urban.	26	97	115	89	2.18	Disagreed
5. teachers incorporate continuous assessment in evaluating students' performance in Enugu Urban.	213	101	8	5	3.59	Agreed

Table 1 shows that in the assessment policies of secondary education in Enugu urban, students are assessed objectively (3.07), with formative

assessment during the learning process (2.66), and teachers incorporate continuous assessment in evaluating students' performance (3.59). The respondents disagree that teachers do not focus on their knowledge, skills and understanding of subject matter (1.62), and that students are assessed only with summative assessment (2.18).

Table 2: Responses on the Assessment Practices of Secondary Education in Enugu Urban

S/N	In the assessment practices of Enugu Urban secondary schools,	SA	A	D	SD	\bar{X}	Remarks
6.	students are assessed primarily with written exams.	67	129	106	25	2.72	Agreed
7.	students are assessed solely continuous assessment tests.	35	49	187	562	1.19	Disagreed
8.	teachers use practical assessment to assess students.	5	98	173	51	2.70	Agreed
9.	teachers do not use projects to assess students.	104	122	31	70	2.79	Agreed
10.	assessment practices do not align with the curriculum.	37	72	103	115	2.09	Disagreed
11.	assessment process is not transparent with information about assessment dates and formats.	85	166	44	32	2.92	Agreed
12.	continuous assessment practice is paper based.	119	127	70	11	3.08	Agreed

Table 2 shows that in the assessment practices of Enugu Urban secondary education, students are assessed primarily with written exams (2.72), teachers use practical assessments (2.70), but do not incorporate projects (2.79). The assessment process lacks transparency regarding assessment dates and formats (2.92), and continuous assessment practices is paper based (3.08). The respondents disagree that students are assessed solely with continuous assessment tests (2.19) and that assessment practices do not align with the curriculum (2.09).

Table 3: Responses on Digital Assessment Methods that can Enhance the Assessment Policies and Practices of Secondary Education in Enugu Urban

S/N	Digital assessment methods can enhance policies and assessment practices of students	SA	A	D	SD	\bar{X}	Remark
13.	Short online quizzes that measure learners' comprehension.	102	194	29	2	3.46	Agreed
14.	Digital assignment that can help assess specific skills.	197	118	9	3	3.56	Agreed
15.	WhatsApp are used for students' feedback and reflection.	199	121	7	-3.58		Agreed
16.	WhatsApp use of assessment enhance accessibility and low cost.	100	201	24	5	3.24	Agreed
17.	teachers create exit tickets using Google Forms to access students' answers from any location and at any time.	68	235	24	-	3.13	Agreed
18.	Teachers use video discussions for assessment.	57	93	164	13	2.59	Agreed
19.	Reading comprehension are assessed by Common Lit that has built-in quizzes.	26	77	151	73	2.17	Disagreed
20.	Kahoot which is a free online quiz game generator is used for assessment.	64	172	51	40	2.79	Agreed

Table 3 shows that all the items except item 19 (2.17) have mean scores above the cut-off mean. This indicates that the respondents agreed on the items but disagreed on the reading comprehension that has built-in quizzes. The mean of the rest of the items indicate that digital assessment methods can enhance the assessment policies and practices of secondary education in Enugu Urban.

Discussion

The findings of the study as shown in the tables were based on the study research purpose and questions. The results in table 1 of the study reveal that secondary education in Enugu Urban uses the assessment policies of Enugu State Ministry of Education. Lynch (2023) sustains that assessment

policies guide teachers in enhancing classroom practices, help teachers analyze students' performance, and tailor their instruction to address learning gaps.

The results in Table 2 reveal that secondary education in Enugu Urban engage in assessment practices that go beyond continuous assessment tests and are aligned with the curriculum. The findings agree with Sastry(2023) who noted that assessment practices are good checkpoints on the educational journey. It helps the teacher to track students' progress and find out areas for improvement.

The result of Table 3 showed a positive endorsement of digital assessment methods in secondary education in Enugu Urban. Digital assessments make assessment processes efficient and manageable for teachers, help them tailor teaching methods to individual needs, and enhance learning (Education Brief, 2017). Embracing digital assessments is essential for maintaining educational relevance and enhancing learning.

Conclusions

Based on the study's findings, it was concluded that digital assessments are required for the enhancement of assessment policies and practices of secondary education in Enugu Urban. Digital assessment is required by the teacher to enhance teaching and by the student to improve learning outcomes.

Recommendations

The following recommendations were provided based on the study's findings:

1. Digital assessment should be used by secondary schools in Enugu Urban, to complement paper-based assessment practices.
2. Enugu State Ministry of Education should adopt digital assessment methods in secondary schools to enhance assessment policies and practices.

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DETERMINANTS OF CONTINUOUS ASSESSMENT IMPLEMENTATION IN UPPER BASIC EDUCATION IN OWERRI EDUCATION ZONE I, IMO STATE

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Abstract

The transition from summative to continuous assessment (CA) in Nigeria's educational system aimed at addressing the inefficiencies of traditional assessment methods by providing a comprehensive evaluation of students' learning outcomes. This study investigates the determinants of CA implementation in upper basic education within Owerri Education Zone I, Imo State, Nigeria. Employing a correlational research design, the study focuses on three primary factors: teachers' qualifications, class size, and teachers' teaching skills. Data were collected from 351 teachers across 39 secondary schools using validated instruments, including the Continuous Assessment Implementation Rating Scale (CAIRS), Indices of Continuous Assessment Implementation Checklist (ICAIC), and Teachers' Teaching Skills Rating Scale (TTSRS). Analysis using Cramer's V Coefficient, Pearson Product Moment Correlation (PPMC), Chi-square tests, and t-tests revealed significant relationships between the examined factors and CA implementation. Findings indicate that higher teacher qualifications, manageable class sizes, and strong teaching skills are critical for effective CA implementation. Based on the findings the researcher

recommends that the Ministry of Education through the Imo State Universal Basic Education Board (IMSUBEB) should ensure the employment of qualified teachers and guidance counsellors who directly implement the continuous assessments in schools, reduction of class sizes and enhancing teaching skills in the upper Basic Education level to guarantee the effective implementation of continuous assessment.

Keywords: Continuous Assessment, Teachers' Qualifications, Class Size, Teaching Skills, Upper Basic Education, Nigeria

Introduction

At the onset of formal education in Nigeria, assessment methods primarily relied on summative evaluations, wherein students were assessed through a single examination administered at the end of the school year. This traditional method proved grossly inefficient as it did not account for continuous learning and improvement, and it failed to provide a holistic measure of students' abilities across different schools and regions (Bassey & Idaka, 2017). This approach often led to significant disparities in student performance due to factors such as sudden illness, psychological issues, and other intervening variables during the exam period.

In response to these challenges, the Nigerian education system adopted the 6-3-3-4 system, which later evolved into the 9-3-4 system under the Universal Basic Education program. A key component of this educational reform was the introduction of continuous assessment (CA) to provide a more comprehensive evaluation of students' learning outcomes. Continuous assessment is defined as a systematic approach to evaluating students' performance in cognitive, affective, and psychomotor domains over a period of time, utilizing various assessment techniques such as tests, projects, assignments, and observations (Federal Ministry of Education, 2007; Ekpo, 2015).

It is defined as the mechanism whereby the final grading of learners in cognitive, affective and psychomotor domains of learning systematically takes account of their performance during a given period of schooling (SESAC, cited in Ekpo, 2015). It is often regarded as an assessment for learning because the purpose of assessing the child is to help him learn and find out if he has satisfied the objectives of learning. In continuous assessment, the pupils are assessed in the cognitive, affective

and psychomotor domains, several times and at certain intervals using a variety of assessment techniques such as tests, projects, assignments, observations, questionnaires, interviews, portfolios, checklists, sociometry etc. results of these assessments are recorded and kept continuously for future use in decision making on the pupils and guidance purposes. Continuous assessment is therefore different from the former system of assessing pupils at the end of teaching. It is a formative mode of assessment. This new mode of assessment was therefore believed to take care of all aspects of pupils learning and thus a better alternative to the former method because it will involve the teacher meaningfully in the assessment of his pupils and also create an opportunity for the teacher to be more innovative, more creative and exploratory in his learning (Abejehu, 2016).

Continuous assessment aims to address the shortcomings of summative assessments by offering multiple opportunities for students to demonstrate their knowledge and skills. This method involves frequent and varied assessments that provide a more accurate representation of a student's abilities and learning progress (Ahukama, 2013). Despite its potential benefits, the implementation of CA in Nigerian schools has faced numerous challenges, prompting this study to examine the determinants of its effective implementation.

While continuous assessment was introduced to enhance the accuracy and fairness of student evaluations, there appears to be a gap between the policy and its actual implementation in schools. Observations indicate that many teachers misinterpret CA as continuous testing, using it primarily for disciplinary purposes rather than as a tool to aid learning. This misuse undermines the objectives of CA and can negatively impact student learning and development (Kapambwe, 2010; Kidane, 2013). Time is also of essence if CA is to be properly implemented.

The word Time means the point or period when something occurs. It could also be seen as an appointed, fixed or customary moment or hour for something to happen, began or end. This is a very important factor in teaching and learning process as well as in the effective implementation of C/A. If enough time is given to teach each subject, the class teacher will have time enough to teach, observe the pupils, give class work as well monitor progress while teaching and this will enhance the effective implementation of continuous assessment especially at the upper basic

level. According to the time on-task hypothesis, the amount of time an individual devotes to an instructional task determines the extent to which learning occurs. Differences in the ways in which time has been operationalized may be one factor contributing to implementation of C/A. (Lillie, 2023). Time plays a very important role in every field of life, especially in teaching learning process. Obviously, if no time is spent teaching a subject, students will not learn, and teachers will as well find it hard to effectively implement C/A. (Shabbir, 2017).

As more assessments are added to the current education and landscape, there may be a correlative effect on student's allocated instructional time. Increased levels of allocated instructional time have been demonstrated to relate to increased levels of students' achievement (Bell & Davidson 2016). Allocation of instructional time may be affected by the introduction of new assessment (C/A) aligned with current educational reform.

Given these challenges, it is essential to identify and understand the factors that influence the effective implementation of continuous assessment. This study focuses on three key variables: teachers' qualifications, class size, and teachers' teaching skills. These factors are critical in determining how well CA is implemented and its overall impact on student learning outcomes.

Merriam- Webster Dictionary defines ‘‘qualification’’ as a specialised skill or type of experience or knowledge that makes someone suitable to do a particular job or activity. Therefore, teachers' qualification is a particular skill or type of experience or knowledge someone possesses to make him or her suitable to teach. Teachers' qualifications could, therefore, mean all skills a teacher is required to teach effectively. Such skills include formal education, experience, subject matter knowledge, pedagogy studies, duration of training, certificate/licensing and professional development (Zuzovsky, 2009). Someone might have a teaching certificate at hand but without adequate knowledge of subject matter, this individual has no teaching qualifications yet. Similarly, someone without proper knowledge of pedagogy or someone who spent few years in training without completing the required years does not possess teacher qualifications. (Darling –Hammond et al, 2020).

Professional development and experience also count for teacher's qualification because several studies have revealed this (Helk, 2007).

Qualification is one of the critical factors that drive students' academic performance. It was also observed that one of the most important factors in the teaching process is qualification of the teacher. The perspective was that teachers' qualifications can go a long way to bring about students' higher academic achievement. M.O.K (2015). The level of education and professional training that teachers have received is likely to influence their understanding and implementation of CA. Qualified teachers are more likely to be familiar with modern assessment techniques and the importance of evaluating students continuously. Research suggests that teachers with higher qualifications are better equipped to implement CA effectively, thereby enhancing student learning (Muse, Ndirangu, &Imonje, 2018; Osadebe, 2015).A teacher who does not have both academic and professional qualification would have a negative influence on teaching and learning of his/her subject which subsequently affects the performance of students (Bahar, 2016). In this study, academic qualification referred to the level of education achieved.

The number of students in a class can significantly affect the implementation of CA. Smaller class sizes allow teachers to give more personalized attention to each student, facilitating frequent and detailed assessments. Conversely, larger class sizes can overwhelm teachers, making it challenging to conduct continuous assessments effectively. Studies have shown that smaller class sizes are associated with better student performance and more effective teaching practices, including CA (Achimugu, 2016).

Continuous assessment involves individual attention by the teacher to each pupil which allows the teacher to teach only a few pupils in a class at a time. The teacher is supposed to teach and assess not more than 40 pupils, the Federal Republic of Nigeria, FRN (2013). But most of our classrooms contain very large number of students much more than the stipulated number of pupils per class. This affects the teacher's ability to comprehensively and thoroughly assess and keep records of each pupil in the class. The discussion about the importance of class size has been ongoing for decades. While some still argue that class size doesn't make a noticeable difference in the quality of education, research has shown that is not the case. Understanding the connection between class size and student achievement, as well as teacher retentions, is critical to the future of our educational system.

Teachers influence the lives of students much more significantly than we imagine. A teacher with the right skills inspires and influences entire student lives. They are instruments who can ignite powerful thoughts in students, helping them unleash their true potential. The interaction carried out at school needs to be done by several parties including between teacher and students so that the interaction process goes two directions. The teacher has an important role in the interaction process because the teacher will transfer knowledge to students. The teacher is a professional, which means a position that requires special skills as a teacher and cannot be carried out by just anyone outside the field of education. For a teacher to know and be able to apply several teaching principles in order to carry out their duties in a professional manner, they must be skilful. To be skilful: (1) the teacher must be able to arouse the attention of students on the subject matter provided and can use a variety of media and varied learning resources. (2) the teacher must be able to arouse the interest of students to be active in thinking and searching and finding their own knowledge. (3) the teacher must develop students' attitudes in fostering social relations, both in the classroom and outside the classroom. (4) the teacher must investigate and explore the differences in the participants individually in order to serve students in accordance with these differences (Arifudin, 2015).

The ability of teachers to engage students, use varied instructional strategies, and manage the classroom environment plays a crucial role in the successful implementation of CA. Teachers with strong teaching skills are more likely to integrate continuous assessment into their teaching practices, thereby providing a more comprehensive evaluation of student learning. Effective teaching skills include the ability to communicate clearly, use appropriate teaching aids, and adapt teaching methods to meet students' needs (Okwarajiaku, 2021; Akiri & Ugborugbo, 2017).

The following research questions and hypotheses guided the study:

1. What is the coefficient of determination between teachers' qualifications and the implementation of continuous assessment?
2. What is the relationship between class size and the implementation of continuous assessment?
3. How do teachers' teaching skills impact the implementation of continuous assessment?

Ho₁.There is no significant coefficient of determination between teachers' qualifications and CA implementation.

Ho₂.Class size does not significantly relate to CA implementation.

Ho₃.Teachers' teaching skills do not significantly determine CA implementation.

Methods

This study employed a correlational research design to investigate the determinants of continuous assessment (CA) implementation in upper basic education in Owerri Education Zone I, Imo State, Nigeria. The focus is on the relationships between teachers' qualifications, class size, and teachers' teaching skills, and their impact on CA effectiveness. The research is conducted in Owerri Education Zone I, comprising five Local Government Areas (LGAs): Ikeduru, Mbaitoli, Owerri Municipal, Owerri North, and Owerri West. This diverse region offers a comprehensive setting for the study. The target population includes all teachers and students in upper basic education classes in 79 public secondary schools, totaling 28,502 students and 1,851 teachers. A sample of 351 teachers from 39 secondary schools is selected using proportionate cluster and stratified random sampling techniques, ensuring representativeness. Three instruments are used: 1) Continuous Assessment Implementation Rating Scale (CAIRS): Measures the extent of CA implementation using an eight-item, four-point Likert scale; Indices of Continuous Assessment Implementation Checklist (ICAIC): Collects data on teachers' qualifications, class sizes, and teaching time; and Teachers' Teaching Skills Rating Scale (TTSRS): Assesses teaching skills and content mastery with two ten-item clusters on a four-point Likert scale. The instruments underwent face validation by experts in measurement, evaluation, and curriculum studies. Reliability was ascertained through a pilot study with 30 teachers, yielding satisfactory Cronbach's alpha coefficients: 0.752 for CAIRS, and 0.842 and 0.821 for TTSRS clusters. Data collection was conducted by the researcher and assistants, with instruments administered and collected in two days. Data analysis employed Cramer's V Coefficient, Pearson Product Moment Correlation (PPMC), Pearson Coefficient of Determination, Chi-square tests, and t-tests for significance, using SPSS version 25. Research question 1 and 2 were answered using

Cramer's V Coefficient while Pearson Product Moment Correlation was used to answer research question 3.

Hypotheses 1 and 2 were tested with Chi-Square statistics, while hypothesis 3 was tested with t-test statistics at 0.05 level of significant

Results

The results of the data analysis are presented in this section according to the research questions and hypotheses. Each research question is answered with the corresponding data analysis, and the hypotheses are tested to determine the significance of the relationships between the variables.

Research Question One: What is the coefficient of determination between teachers' qualifications and the implementation of continuous assessment?

Table 1: Coefficient of Determination between Teachers' Qualifications and CA Implementation

<i>NϕRemark</i>		
351	0.361	Strong Coefficient of Determination

The Phi coefficient (ϕ) for the association between teachers' qualifications and the implementation of continuous assessment is 0.361. This value indicates a strong coefficient of determination, suggesting that teachers' qualifications are a significant factor in the effective implementation of continuous assessment.

Hypothesis One: The coefficient of determination between teachers' qualifications and the implementation of continuous assessment is not significant.

Table 2: Chi-Square Test for Teachers' Qualifications and CA Implementation

<i>Nχ^2_{cal}pdfχ^2_{crit}Decision</i>				
351	45.805	0.000	2	5.991
reject H ₀₁				

The Chi-square test results show a calculated value (χ^2) of 45.805, which is significantly higher than the critical value (χ^2) of 5.991, with a p-value

of 0.000. Since the calculated χ^2 is greater than the critical χ^2 and the p-value is less than 0.05, the null hypothesis is rejected. This indicates that the coefficient of determination between teachers' qualifications and CA implementation is significant.

Research Question Two: What is the relationship between class size and the implementation of continuous assessment?

Table 3: Coefficient of Determination between Class Size and CA Implementation

<i>NφRemark</i>		
351	0.388	Strong Coefficient of Determination

The Phi coefficient (ϕ) for the association between class size and the implementation of continuous assessment is 0.388, indicating a strong coefficient of determination. This suggests that class size is an important factor in the effective implementation of continuous assessment.

Hypothesis Two: The coefficient of determination between class size and the implementation of continuous assessment is not significant.

Table 4: Chi-Square Test for Class Size and CA Implementation

<i>Nχ²_{cal}pdfχ²_{crit}Decision</i>				
351	52.900	0.000	4	9.488
reject H ₀₂				

The Chi-square test results show a calculated value (χ^2) of 52.900, which is significantly higher than the critical value (χ^2) of 9.488, with a p-value of 0.000. Since the calculated χ^2 is greater than the critical χ^2 and the p-value is less than 0.05, the null hypothesis is rejected. This indicates that the coefficient of determination between class size and CA implementation is significant.

Research Question Three: How do teachers' teaching skills impact the implementation of continuous assessment?

Table 5: Coefficient of Determination between Teachers' Teaching Skills and CA Implementation

<i>nt_rr² Remark</i>			
351	0.750	0.563	High Extent of Determination

The Pearson correlation coefficient (r) between teachers' teaching skills and the implementation of continuous assessment is 0.750, with an r^2 value of 0.563. This indicates a high extent of determination, meaning that 56.3% of the variation in CA implementation can be explained by teachers' teaching skills.

Hypothesis Three: The coefficient of determination between teachers' teaching skills and the implementation of continuous assessment is not significant.

Table 6: t-test for Teachers' Teaching Skills and CA Implementation

<i>nt_{cal}pdft_{crit} Decision</i>					
351	21.183	0.000	349	1.960	H ₀₃ is rejected

The t-test results show a calculated t-value (t) of 21.183, which is significantly higher than the critical t-value (t) of 1.960, with a p-value of 0.000. Since the calculated t-value is greater than the critical t-value and the p-value is less than 0.05, the null hypothesis is rejected. This indicates that the coefficient of determination between teachers' teaching skills and CA implementation is significant.

Discussion

The results of this study reveal significant insights into the determinants of continuous assessment (CA) implementation in upper basic education in Owerri Education Zone I, Imo State, Nigeria. The study focused on three primary factors: teachers' qualifications, class size, and teachers' teaching skills. Each of these factors showed a strong and

significant relationship with the effective implementation of continuous assessment.

The findings indicate that teachers' qualifications are a strong determinant of continuous assessment implementation. The Phi coefficient (ϕ) of 0.361 signifies a robust association between higher qualifications and better CA practices. This result aligns with the hypothesis that qualified teachers are more adept at integrating CA into their teaching processes. Qualified teachers possess advanced knowledge and understanding of educational theories and practices, which equip them to implement diverse assessment techniques effectively. They are likely to be familiar with the pedagogical principles underlying continuous assessment and possess the skills necessary to employ these methods systematically. Furthermore, professional training often includes exposure to innovative assessment strategies, enabling qualified teachers to assess students' cognitive, affective, and psychomotor domains comprehensively. This finding is consistent with previous studies (Muse, Ndirangu, & Imonje, 2018) which suggest that teachers with higher qualifications are more likely to engage in effective assessment practices. Consequently, this highlights the importance of ensuring that teachers in upper basic education possess the requisite qualifications to foster effective CA implementation.

Therefore, there is a clear need to ensure that teachers possess appropriate qualifications. Recruitment policies should prioritize hiring teachers with relevant academic and professional credentials. Additionally, existing teachers should be encouraged to pursue further education and professional development to enhance their qualifications. The study found a significant relationship between class size and the implementation of continuous assessment, with a Phi coefficient (ϕ) of 0.388. This strong association indicates that smaller class sizes facilitate better CA practices compared to larger class sizes. Smaller class sizes allow teachers to provide more individualized attention to students, which is critical for continuous assessment. In a smaller class, teachers can monitor each student's progress more closely, provide timely feedback, and tailor their teaching strategies to meet individual needs. This personalized approach is challenging to achieve in larger classes, where the sheer number of students can overwhelm teachers, leading to superficial assessments or reliance on summative evaluations. This finding

underscores the necessity of maintaining manageable class sizes to ensure effective continuous assessment. It aligns with the research by Achimugu (2016), which found that smaller class sizes are conducive to better teaching and learning outcomes. Educational policymakers should consider strategies to reduce class sizes, such as hiring more teachers and building additional classrooms, to enhance the implementation of continuous assessment.

Policymakers must, therefore, address the issue of large class sizes, which hinder effective continuous assessment. Investment in educational infrastructure, such as building additional classrooms and hiring more teachers, is essential to reduce class sizes and facilitate better teaching and assessment practices.

The Pearson correlation coefficient (r) of 0.750, with an r^2 value of 0.563, indicates a high extent of determination between teachers' teaching skills and the implementation of continuous assessment. This finding suggests that teachers' teaching skills significantly influence the effectiveness of CA practices. Effective teaching skills encompass a range of competencies, including the ability to engage students, employ diverse instructional methods, manage classroom dynamics, and provide constructive feedback. Teachers who possess these skills can seamlessly integrate continuous assessment into their daily teaching routines, ensuring that assessments are meaningful and aligned with learning objectives. Teachers with strong teaching skills are also more adept at using assessment data to inform instruction. They can identify students' strengths and weaknesses, adjust their teaching strategies accordingly, and provide targeted support to help students achieve learning goals. This proactive approach is vital for continuous assessment, which aims to foster ongoing student development rather than merely evaluating performance at the end of a term. The significant relationship between teaching skills and CA implementation highlights the need for ongoing professional development for teachers. Training programs should focus on enhancing teachers' instructional strategies, classroom management techniques, and assessment literacy. This finding is in line with the research by Okwarajiaku (2021), which emphasized the importance of teaching skills in effective educational practices.

Continuous professional development programs should be implemented to enhance teachers' teaching skills. These programs should

focus on effective instructional strategies, classroom management, and assessment techniques. By equipping teachers with the necessary skills, schools can ensure the successful implementation of continuous assessment.

Recommendations

Based on the findings, the following recommendations are made:

1. The Ministry of Education should implement policies to ensure that only qualified teachers are employed. Continuous professional development opportunities should be provided to help teachers and guidance counselors to upgrade their qualifications and stay abreast of current educational practices.
2. Educational authorities should work towards reducing class sizes by building more classrooms and hiring additional teachers. This will enable more effective implementation of continuous assessment.
3. Regular workshops and training sessions should be organized to improve teachers' teaching skills. These programs should cover various aspects of effective teaching and assessment practices, ensuring that teachers are well-equipped to implement continuous assessment.

Conclusion

In conclusion, this study has demonstrated that teachers' qualifications, class size, and teaching skills are significant determinants of continuous assessment implementation in upper basic education. By addressing these factors, educational stakeholders can enhance the effectiveness of continuous assessment, leading to improved student learning outcomes. The findings underscore the importance of investing in teacher qualifications, managing class sizes, and providing ongoing professional development to ensure the successful implementation of continuous assessment in Nigerian schools.

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SOCIAL MEDIA TOOLS UTILIZATION AS CORRELATES OF STUDY HABITS AND ACADEMIC ACHIEVEMENT IN MATHEMATICS AMONG EARLY CHILD HOOD CARE EDUCATION PRE-SERVICE TEACHERS

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Abstract

The study assessed the relationship between social media tools utilization, study habits and academic achievement in mathematics among early child hood care education pre-service teachers. This study was carried out in Alvan Ikoku federal University of Education Owerri in Imo State. Based on the purpose of the study one research question and six hypotheses guided the study. The study adopted correlational research design. The population of the study comprised 1,865 pre service teachers in school of early childhood care and Primary Education. A sample size of 381 pre-service teachers was used for the study. The instruments used for data collection are Utilization of Social Media Questionnaire” (USMQ), Study Habits Questionnaire” (SHQ) and Mathematics Achievement Test (MAT). The reliability co-efficient(r) of 0.78, 0.81 and 0.86, were obtained using Cronbach alpha method respectively.

Data collected were analyzed using mean, standard deviation for the research question while correlational were used to test the hypotheses at 0.05 level of significance. The results showed that Facebook and WhatsApp are the most utilized social media tools among early childhood care education pre-service teachers in mathematics. Social media tools have significant positive relationship with study habits and academic achievement in mathematics among early childhood care education pre-service teachers.

Keywords: Assessment, Social Media Tools, Study Habits, Academic Achievement And Mathematics.

Introduction

Assessment plays a crucial role in the school system especially in teaching and learning process. Without assessment teachers cannot discover the areas of strengths and weaknesses of their students and the extent of which teaching objectives have been achieved. Assessment involves the collection of information about an individual's knowledge, skills, attitudes, judgement, interpretation and using the data for taking relevant decisions about the individual instructional process, curriculum or programme (Ugodulunwa, 2008). Assessment can be formative or summative in nature. The teachers or researchers can use any type of assessment suitable for their study or programme. Assessment can be used to determine programme progress level of any course

Mathematics is a science of magnitude and number as well as the science that sustains the daily practices of man. It is the only core science subject that acts as pivot on which national development and wealth of any nation is created. Competency in mathematics learning is vital and sustainable to every individual's meaningful and productive life. Mathematics learning is very important in enhancement and sustainability of human existence because mathematics is all about finding solutions to human problems and physical challenges. All these are indications that mathematics is useful in domestic and business deals, scientific discoveries, technological breakthrough, problem-solving and decision making in different situations in life (Usman and Nwoye, 2010; Unodiaku, 2011; and National Council of Teachers of Mathematics, (NCTM, 2013). It may be due to this vital usefulness of mathematics that Nigeria government made the study of mathematics compulsory at all the levels of

education in Nigeria by National Policy on Education (2013) provision. The problem of learning mathematics in Nigeria primary and post primary school levels has continued to be topical and attracts the attention of researchers in the field. The incessant low level of performance in mathematics among Nigeria pupils and students is a clear manifestation of this perceived problem. This trend in low academic performance has been attributed to certain factors including social, economic, regional and psychological factors in which self-concept plays a role (Largea, Sanni and Brew, 2014). Bandura's studies of self-concept among students in the United States established self-concept as a major factor contributing to students' academic performance (Bandura, 1997). Other researchers established a link between high school students' level of engagement in school, self-efficacy and goal orientation (Caraway, Trucker, Renike & Hall, 2003). Also, students' fears of failure in a variety of academic situations contributed to low effort while social supports, such as parents and teachers, could provide positive reinforcement for students' success and increase overall involvement in student learning activities to reduce negative feelings towards school (Caraway, Trucker, Renike & Hall, 2003). Another major factor that contributes to low performance of student learning is study habit.

Study habits are defined as those techniques, such as summarizing, note taking, outlining or locating material which learners employ to assist themselves in the efficient learning of the material at hand. The term study habit implies a sort of more or less permanent method of studying. Study habits are those learning tendencies that enable students to work privately. Azikiwe (2014) describe study habit as the adopted way and manner a learner plans his private studies or reading, after classroom learning so as to attain mastery of the subject. Azikiwe further stated that "good study habit is good asset to learners because the habit assists students to attain mastery in areas of specialization and consequent excellent performance, while the opposite bad study habits, constitute constraints to learning and achievement leading to failure. Good (2020) define the term study habit as the student's way of study whether systematic, efficient or inefficient etc. Going by this definition it literally means that good study habit produces positive academic achievement while inefficient study habit leads to academic failure. Study habit plays an important role in the academic achievement of students. Good study habits lead to good academic record

and bad study habit lead to poor academic record as there is direct relationship between study habits and academic achievement. (Verma, 2019; Verma and Kumar 2019, Satapathy and Singhal, 2000; Vyas 2002). Ramamurti (2023) rightly emphasized that despite possessing good intelligence and personality, the absence of good study habits hampers academic achievement. Hence study habits of students play important role in learning and fundamental to school success. Good study habit skills like note taking, having regular time to study, and organizing for a test, while removing the distraction that comes from television or phone call at home can lead to good academic performance (Tschumper, 2006). Effective study habits help students to achieve good results (Sadia, 2005). The researchers' interest is to assess students study habit in mathematics through social media tools in this study.

Social media is a 21st century term used to broadly define a variety of networked tools or technologies that emphasize the social aspects of the Internet as a channel for communication, collaboration, and creative expression (Dabbagh & Reo, 2011). Kaplan and Haenlin (2010) defined social media as a group of Internet-based applications that build on the ideological and technological foundations of web 2.0. However, the differences between web 2.0, social media and social networking have not been clearly distinguished. Lenartz (2013) argued that the term social media can be used to categorize web 2.0 applications, including social networking. Social media reflects the definition of web 2.0 as the creation of user-generated content, often with a specific agenda or message that the creator is intending to promote. Social media is a medium or website that facilitate the learners to share and search the content quickly.

Researchers have categorized social media in a variety of ways (e.g., Boulos & Wheeler, 2007; Bower, 2016; Koehler & Ertmer, 2016; Mao, 2014; McCay-Peet & Quan-Haase, 2016; Orehovački, Bubaš, & Kovačić, 2012; Scott, Sorokti, & Merrell, 2016). Categories include social networking sites (e.g., Facebook and LinkedIn), blogs (e.g., WordPress and Blogger), wikis (e.g., PBworks and Notion), microblogging (e.g., Twitter and Tumblr), collaborative authoring or editing (e.g., Google Docs), instant messaging (e.g., WhatsApp and Telegram), idea mapping (e.g., Miro and Mindomo), social bookmarking (e.g., Pinterest and StumbleUpon), podcasting (e.g., Apple Podcasts), social news (e.g., Reddit), and media sharing (e.g., YouTube and Vine). With several

diverse social media platforms, educators have numerous opportunities to facilitate communication and collaboration, and with the widespread access to social media and popularity, these tools have great potential to support educational programs for all ages.

Facebook is a social networking site founded by a group of Harvard University students in their dorm room (Nicole, 2007). At the beginning, the website was only accessible to college and university students requiring an “.edu” email address to register, according to Kirkpatrick (2010). After that, Facebook expanded to colleges across the country and became an integral part of the lives of modern students (Lenartz, 2013). Facebook enables its users to connect by creating personal information profiles, inviting friends and colleagues to have access to those profiles, and sending e-mails and instant messages between each other. These personal profiles can include any type of information, including photos, video, audio files, and blogs (Karpinsk and Duber-stenin, 2009). Facebook allows users to create a profile where they can post information about themselves ranging from their occupation, to their religious and political views, to their favorite movies and musicians. On this profile, both the user and their ‘friends’ can post web links, pictures and videos of interests. Furthermore, Facebook also offers the facility to send private and public messages to other users and even engage in real-time instant messaging. All of these features coupled with the creation of applications, groups and fan pages make Facebook broadly popular for online socializing (Hughes et al. 2012). The use of Facebook is popular at colleges and universities, with an estimated 85% of students using Facebook and this number continues to increase.

Additional application of social media used in the current study is Twitter, created 2006, which is considered microblogging. Microblogs allow people to post short messages that are displayed on their personal pages in real time via the web, SMS, instant messaging clients, among other methods. The postings can then be viewed by others (i.e. followers). Most microblogging service providers limit the number of characters of users' postings to 140. This short post feature is a distinguishing factor that makes microblog a unique, asynchronous, fast mode of communication (Yanru Guo et al., 2012).

YouTube is another example of social media technology that allows content sharing. It is an online storehouse, and free video sharing

website from which users can watch video clips as well as upload self-made, self-edited, or imported clips for free. YouTube is considered one of the content communities. YouTube allows users to freely access any videos that are set to public, including videos that contain educational content. Whether a video is created by an accredited university, or by a random video blogger, users can decide what best suits their needs. Users begin with an opening video which enables them to create sequences of video having many responses from participants and fans.

Wikipedia, which is considered a collaborative project tool (Wikis,2010).It is a collaborative tool because it allow users to add, remove, and change text-based content. Exemplary applications within this category include the online encyclopedia Wikipedia, a wiki currently available in more than 230 different languages, and the social bookmarking web service Delicious, which allows the storage and sharing of web bookmarks (Kaplan and Haenlin, 2010). Shen et al. (2013) defined Wikipedia as, “the world’s largest web-based free content encyclopedia project.

WhatsAppis across-platform chat application was founded in 2009 by two ex-Yahoo employees Brian Acton and Jan Koum. It is an Internet based- communication tool that allows users who also have WhatsApp installed to send text messages for free to each other. WhatsApp replicates the text experience through push notifications (Cotton, 2013). WhatsApp also supports many different message types, from simple text to pictures to audio files. Riyanto (2013) argued that WhatsApp allows its users to use their Internet connection to send messages to each other. WhatsApp is like a chat program for mobile phones. Smart phones are becoming increasingly popular and WhatsApp is available for almost all Smartphones. WhatsApp involves not only sending text message but also message broadcasting, files, videos, audio media messages as well as their location using integrated mapping features.

The final tool of social media used in this study is Skype, considered a software application that allows users to make voice and video calls through the Internet. Skype is Internet-based communication software released in 2003, which includes voice, instant messages capabilities, and video. It was founded by Niklas Zennstrom of Sweden and Janus Friis of Denmark. One of its features is chatting. According to Siobhan (2008) with a headset and microphone, telephone calls can be

made to up to five Skype users at one time at no cost, though the quality of the call diminishes with each additional caller. Librarians who have a question to talk over with a colleague can look at their list of online contacts and make a quick Skype call to work out the solution to the question. An additional feature of Skype is the webcam.

There are different studies and articles discussing the effects of Instagram at academic performance. The author (Phillips, 2013) mentioned some ways the results benefit for students to improve their study. Some of these ways are: Spatial Intelligence: The user at Instagram used his spatial intelligence to analyzing the images or videos to obtain an important data that construct a clear meaning about the goal of this post (picture/video).

Educators and researchers have recognized the potential for using social media to enhance teaching and learning experiences (Kimmons, 2014; Risser et al., 2019). By using social media platforms, students and teachers gain access to and participate in global digital communities, which provide opportunities for extending learning beyond the boundaries of a classroom. The possibility of students creating their own personal learning environment (PLE) can enrich learning and create a student-centered approach (Lim & Newby, 2020). According to the authors, when allowing students to select social media that best help them achieve their goals and meet their interests, teachers must equip and support students to make these decisions. Research considering how social media enhance teaching and learning experiences has focused on writing skills (e.g., Lee & Kim, 2016); language acquisition (, Altanopoulou, Tselios, Katsanos, Georgoutsou, & Panagiotaki, 2015); technology literacy (Gachago, Livingston, & Ivala, 2016); collaborative learning (Sun, Lin, Wu, Zhou, & Luo, 2018); learning within a community (e.g., Lee & Bonk, 2016); problem-based learning (Lau, Lui, & Chu, 2017); and self-regulation (Yeo & Lee, 2014), among other areas of learning.

Shoshani and Braun (2007) claim that collaborative learning supports social media and eventually, creative learning. Collaborative learning comprises the interactions and connections of the student with the curricula. In this scenario, social media enables the extension of the learning environment because only a part of learning takes place in classes (Chen & Bryer, 2012; Friesen & Lowe, 2012; Wodzicki, Schwämmlein, & Moskaliuk, 2012; Al-rahmi, Othman, Yusof, L. & Musa 2015a).

Therefore, it is crucial for educators to determine the effective methods that can assist in integrating social media into classes (Fewkes & McCabe, 2012). They can make use of social media to boost students' creativity and exploration of curricula content (Frye et al., 2010; Lamb & Johnson, 2010). Social media provides various alternatives to the development of actual products via blogs, YouTube and even podcasts and it also enables the exploration of content material in new knowledge generation (Frye et al., 2010; Lamb & Johnson, 2010; Al-Rahmi, & Othman, 2013a; and Al-Rahmi et al., 2014; 2015). By satisfying the creative learners' need with cooperative learning, they will be more able to balance their individualism and peer connection, and this ultimately results in ideas creation (Garrett, 2011; Shoshani & Braun, 2007).

Social Media Use and Satisfaction of Students and Researchers

Using social networking in higher education guarantees sufficient understanding transfer and contributes to student learning performance improvement (Vie, 2008). Evaluative periods were articulated as a way of feedback process between instructor-student in literature (i.e. Foroughi, 2011; Al-Rahmi & Othman, 2013c) to determine the level of students' understanding, satisfaction, and students' academic performance outcome. Additionally, records showed that the adoption of social networking triggers positive association between students' academic performance and their satisfaction (Cao & Hong, 2011; Al-rahmi et al., 2015a; Al-rahmi et al., 2015b). Based on Ajjan and Hartshorne (2008) and Al-Rahmi et al. (2014) reported findings, there is a significant association between student learning performance and student satisfaction with learning through the usage of social networking as a platform for collaborative learning process. Some faculty officials believe that certain social networking tools could improve students' learning, their interaction with faculty and other peers, their writing capabilities, as well as their satisfaction and learning performance.

Social Media Use and Academic Performance of Students and Researchers Students taking advantage of social media incorporated in class, display higher relationship with their peers in comparison to their counterparts who are not (Annetta, Minogue, Holmes & Cheng, 2009; Jackson, 2011; Tomai, Rosa, Mebane, D'Acunti, Benedetti, & Francescato, 2010). According to studies (Jackson, 2011; Mazman & Usluel, 2010; Wodzicki, Schwämmlein, & Moskaliuk, 2012), students are enabled by

social media to categorize themselves with similar peers and to enhance and connect with them. Moreover, it also decreases the diversity in the classroom via a neutral zone wherein students can interact with their peers (Junco et al., 2011; Pike, Kuh, & McCormick 2011; Al-rahmi, Othman, & Musa, 2014). More importantly, students leveraging social media feel emotional connection with their peers as they feel that they may take help from them in case they need to. These peer linkages encourage the participation of all students, specifically those who are hesitant to discuss matters face-to-face (Arnold & Paulus, 2010; Junco et al., 2011; Rambe, 2008). Raut & Patil (2016) highlights how social media influenced education sector the study revealed various positive and negative impacts of social media on education or students. It also highlighted measure to minimize the negative impact of social media on students' academic performances such as; moderating their access to social media sites, reducing the amount of time spent on social network. Zahid, et al (2016) did a study to determine the effect of growing use of social media sites on the academic performance of the students of universities and colleges. On the basis of random sampling, 300 students were selected. Questionnaire was used as the instrument for data collection. The questionnaire received from respondents were analyzed with descriptive statistic. Results indicate that the effect of social media can be positive.

It is therefore worthwhile to investigate the relationship between social media tools utilization, study habit and academic achievement among students of tertiary institutions.. Specifically, the study aimed at finding the level of utilization of social media among students of tertiary institutions in Katsina State. Influence of students' level of utilization of social media on their study habit was also investigated by the researchers.

Research Questions

The following research questions were addressed by the study:

1. What is the level of utilization of social media tools among early childhood care education pre-service teachers in mathematics.
2. What is the relationship between social media tools and study habits exhibited among early childhood care education pre-service teachers in mathematics

3. What is the relationship between social media tools and academic performance among early childhood care education pre-service teachers in mathematics

Hypotheses

The following hypotheses were formulated to guide the study:

- Ho1:** There is no significant relationship between social media tools and study habit patterns among early childhood care education pre-service teachers in Mathematics.
- Ho2:** Social media tools have no significant joint effect on study habit patterns among early childhood care education pre-service teachers in Mathematics.
- Ho3:** Social media tools have no significant relative contribution to study habit patterns among early childhood care education pre-service teachers in Mathematics.
- Ho4:** There is no significant relationship between social media tools and academic performance among early childhood care education pre-service teachers in mathematics
- Ho5:** Social media tools have no significant joint effect on the academic performance among early childhood care education pre-service teachers in mathematics
- Ho6:** Social media tools have no significant relative contribution to academic performance among early childhood care education pre-service teachers in mathematics.

Method

The study adopted a correlational survey research design. The population of the study comprise all the 1345 Pre service teachers in school of early childhood care education. A total of three hundred and eighty-one (381) students participated in the study selected using simple random sampling technique in this study, researchers-designed questionnaire titled “Utilization of Social Media Questionnaire” (USMQ), Study Habits Questionnaire (SHQ) and Mathematics Achievement Test (MAT) were used to collect data from the respondents. USMQ contained twenty-five items with a four-point Likert-type scale of Very Frequently, Frequently, Sometimes and Rarely. SHQ contained twelve items with a four-point Likert-type scale of Strongly Agree, Agree, Disagree and Strongly

Disagree. Section 'A' of these questionnaires contained the personal information of the respondents such as name of school, level, gender and age. Two experts from measurement and Evaluation and one expert from early childhood were used in validating the instruments. The Cronbach's Alpha reliability coefficients of 0.78, 0.81 and 0.86 were obtained for USMQ, SHQ and MAT respectively. Analysis of data was carried out using mean standard deviation for the research question and Correlation statistics at 0.05 alpha level to test the hypotheses.

Results

Research Question one: What is the level of utilization of social media tools among early childhood care education pre-service teachers in mathematics.

Table 1: Mean and Standard Deviation level of utilization of social media tools among early childhood care education pre-service teachers in mathematics.

S/ N	Social media	Mean	S D	Decision
1	Facebook	78.89		High level
2	Twitter	30.00		Low level
3	YouTube	18.89		Low level
4	Wikipedia	10.13		Low level
5	WhatsApp	89.93		High level
6	Skype	9.34		Low level
7	Instagram	23.14		Low level
8	Edmodo	14.00		Low level
9	imo	8.89		Low level

Results in table indicated that Facebook and WhatsApp are the most utilized social media tools among early childhood care education pre-service teachers in mathematics.

Hypotheses

Ho1 There is no significant relationship between social media tools and study habit patterns among early childhood care education pre-service teachers in Mathematics.

Table2: Pattern of Relationship Between Study habit (dependent Variables) and social media tools (independent variables) among Early Childhood care Education Pre-service teachers in Mathematics.

Dependent variable	Independent variable	Correlation (r)	Significant level	Remarks
Students – teacher consultation	Social Media tools	.480	.000	Significant
Time allocation of study		.639	.000	Significant
Reading and note taking		.646	.000	Significant
Use of library		.384	.000	Significant

From the above table 2, it is indicated that correlation between dependent and independent variables was strongly positive. Students -teachers consultation, time allocation of study, reading and note taking and use of library highly correlated with using of social media tools. Social media toolshaveimpactonStudents -teachers consultation, time allocation of study, reading and note taking and use of library. So, this implies social media tools have significant positive relationship with study habits among early childhood care education pre-service teachers in Mathematics.

Ho3: Social media tools have no significant relative contribution to study habit patterns among early childhood care education pre-service teachers in Mathematics.

Table 3: Composite Effect of Independent Variables on dependent variables

Multiple R = .191	R Square = .037		
Adjusted R Square =	Standard Error = 50.52		

Analysis of variance					
Source of Variation	SS	DF	MS	F	P
Regression	30743.461	4	4527.051		
Residual	1301237	320	2552.409	1.774	.071
Total	1002055	329			

From table 3 coefficient of determination ($\text{Adjusted } R^2$) = 0.016 and this gives proportion of variance ($\text{Adjusted } R^2 \times 100$) = 1.6%. This implies that the independent variables accounted for 1.6% of the variance in the dependent variable. The joint effect of social media is significant on study habit patterns among early childhood care education pre-service teachers in mathematics.

Ho4 There is no significant relationship between social media tools and academic Performance among early childhood care education Pre-service teachers in mathematics.

Independent Variables	Academic Performance in Mathematics		Remarks
	R	Sig	
Facebook	0.024	0.608	Significant
Twitter	0.067	0.081	Not Significant
YouTube	0.005	0.462	Not Significant
Wikipedia	0.060	0.105	Not Significant
WhatsApp	0.061	0.620	Significant
Skype	0.064	0.005	Not Significant
Instagram	0.107	0.013	Not Significant
Edmodo	0.116	0.008	Not Significant
imo	0.032	0.225	Not Significant

Results in table 4 shows the pattern of relationship between social media tools and pre-service teacher's academic achievement in Mathematics. Out of the nine independent variables only two have significant positive relationship with pre-service teachers' academic achievement in Mathematics. These are Facebook ($r = .024$; $P < 0.05$) and WhatsApp ($r = .061$; $P < 0.05$).

Ho5 Social media tools have no significant joint effect on the academic performance among early childhood care education pre-service teachers in mathematics

Multiple R = Adjusted R Square =	R Square = .037 .016 Standard Error = 50.52				
Analysis of variance					
Source of Variation	SS	DF	MS	F	P
Regression	40743.	9	4527.05		
Residual	10720	420	2552.40	1.774	0.071
Total	11127	429			

From table 5 coefficient of determination (Adjusted R^2) = 0.016 and this gives proportion of variance (Adjusted $R^2 \times 100$) = 1.6%. This implies that the independent variables accounted for 1.6% of the variance in the dependent variable. The joint effect of school-based quality improvement factors is not significant on the students' achievement in Mathematics in Nigeria ($F=1.774$; $df(9,420)$; $P>0.05$)

Ho6 Social media tools have no significant relative contribution to academic performance among early childhood care education pre-service teachers in mathematics

Table 6: Relative contribution of social media tools on students' achievement in mathematics

Model	Unstandardized Coefficient		Standard Coefficient	T	Sig
	B	Std Error	Beta B		
Constant	-26.444	21.502		- 1.230	.219
Instagram	-.757	.692	.103	1.804	.275
Twitter	1.226	.680	-.065	-1.094	.072
YouTube	-9.76E	.598	.010	-.163	.870
Wikipedia	2.425	2.693	.062	.900	.368
Skype	0.831	1.591	.134	2.470	.602
WhatsApp	6.630	2.869	.130	2.381	.018
Facebook	5.696	2.306	.134	-.522	.014
Edmodo	-2.729	2.662	-.079	-1.025	.306
imo	-1.213	1.740	-.045	-.697	.486

Table 3 shows the relative contribution of independent variables on dependent variable. Out of the nine variables, the two variables that contributed significantly to student's achievement in Mathematics are Facebook and WhatsApp ($\beta = 0.130$, $t = 2.381$, $P < 0.05$), ($\beta = 0.134$, $t = 2.470$; $P < 0.05$) respectively.

Discussion

Based on the data collected, the findings of this study revealed that Facebook and WhatsApp are the most utilized social media tools among early childhood care education pre-service teachers in mathematics. Social media tools have significant positive relationship with study habits among early childhood care education pre-service teachers in Mathematics. This study is contrary to the study of Adomi and Ejirefe (2012) which stated that majority of students use Facebook for connecting with friends or relatives and others, also as a platform for keeping in touch with close acquaintance, which discourages reading habits among the students.

Also, Social media tools have significant positive relationship with academic achievement in mathematics among early childhood care education pre-service teachers. These results are in accord with findings of Arnold & Paulus, 2010; Dawson, 2008; Hurt et al., 2012; Al-Rahmi et al., 2014; Top, 2012 opined that social media opens the doors to developing a higher sense of student community via collaboration among peers on certain topics. Moreover, social networking sites (SNSs), social capital, and psychological well-being offer an additional link to student learning through the mechanism of academic engagement and increase engagement with school and academics (June, 2011).

Conclusion

The study concludes that social media tools have significant positive relationship with study habits and academic performance among early childhood care education pre-service teachers in Mathematics.

Recommendations

The following recommendations were made based on the results of this study:

1. Management of tertiary institutions must disallow students for using hand-set in classroom

2. Regular orientation should be given to students on how to and when to use social media to enhance their study habit and achievement
3. Tertiary institution students should be encouraged to improve upon their study habit for better performance in their academic endeavor
4. Lecturers and tertiary institutions counsellors should help the tertiary institution students to imbibe efficient and effective study habits.

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IMPROVING PUPILS' ACHIEVEMENT AND REDUCING AGGRESSIVE BEHAVIOUR IN MATHEMATICS USING MANIPULATIVE MATERIALS AND PLAY METHOD

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Abstract

The study assessed manipulatives materials and Play Method as Instructional Strategy to Reduce Aggressive Behaviour and Improve Academic Achievement of Pupils in mathematics. Based on the purpose of the study four research questions and four hypotheses guided the study. The study adopted quasi experimental pretest-posttest research design. The population of the study comprised 139 Pupils. A sample size of 102 pupils was used for the study. The instruments used for data collection was Buss-Perry Scale for Aggressive Behaviour (BSAB) and Mathematics Achievement Test (MAT). The reliability coefficient (r) of 0.83 and 0.93 were obtained using Cronbach alpha method. Data collected were analyzed using Mean, standard deviation for the research questions while t-test were used to test the hypotheses at 0.05 level of significance. The results showed that play method had more significant influence in reducing aggressive behaviour than manipulative materials among primary school pupils and also improve their academic achievement. It was recommended that teachers should adopt play method and use of manipulative materials as instructional

approach in reducing aggressive behaviour and as a strategy to improve achievement of pupils in mathematics.

Keywords: Manipulatives, Play Method, Aggressive Behaviour and Academic Achievement

Introduction

The broad aim of primary education within the overall national objectives is: Preparation for useful living within the society and preparation for secondary education. Specifically, the primary education should: Provide an increasing number of primary school pupils with the opportunity for education of a higher quality irrespective of sex, or social, religious, and ethnic background; diversify its curriculum to cater for the differences in talents, opportunities and roles possessed by or open to learners after their primary school course; equip students to live effectively in our modern age of science and technology; develop and project Nigerian culture, art and language as well as the world's cultural heritage; raise a generation of people who can think for themselves, respect the views and feelings of others, respect the dignity of labour, and appreciate those values specified under our broad national aims, and live as good citizens; foster Nigerian unity with an emphasis on the common ties that unite us in our diversity; inspire its learners with a desire for achievement and self-improvement both at school and in later life (NPE, 2004). In the primary school one compulsory subject for learners is mathematics.

Mathematics according to Butler and Wren, (2015) can contribute to the realization of the general aims of education and mathematics education in particular by; developing habits of effective critical thinking. This means developing logical reasoning both inductively and deductively, Providing competence in the basic skills and understanding for dealing with number and form, Fostering the ability to communicate thought through symbolic expressions, Developing the ability to differentiate between relevant and irrelevant data and to make relevant judgment through the discrimination of values, developing intellectual independence and aesthetic appreciation and expression, advancing the cultural heritage through its own total physical and social structure. The role of mathematics in the society has been variously recognized and acknowledged as the key to the science and technology-based courses, and as useful to man in his daily living (Unamba 2020). In support of this Ale,

(2021) stated that mathematics is the backbone of knowledge. Eguavon, (2002) also remarked that mathematics is the pivot of all civilization and technology development. According to Dedron and Itard, (2020) mathematics arose from the need for areas and volumes. Furthermore, Adegboye, (2018) described mathematics as universal language of communication. It is proved to be the sharpest tool through its application in different subjects and in everyday life. Mathematics helps to enumerate, calculate, measure, collate, group, analyze and relate knowledge (Unamba, 2018). All these were signals given to mathematics as a descriptions tool for sustainable development. Odo, (1990) pointed out that mathematics is a model for thinking, developing scientific structure, drawing conclusion as well as for solving problems. Perhaps it is because of the importance of mathematics that the study has been made compulsory in primary schools. In spite of the social, cultural and disciplinary values of mathematics worldwide, the annual unity examination results indicate poor performance of children in mathematics examinations as many of the candidates scored zero or marks within zero range (Unity Schools Examiner's Report, 2019).

Factors identified by the Examiner's Report as being responsible for the poor performance include poor preparation of students for the examination and failure to observe the rubrics. Furthermore, Chief Examiners' Report (2000) stated that many of the questions demanded fundamental understanding of the subject. Also, Kibriya and Zhang (2015) opined that aggressive behaviour has negative impact on mathematics scores. Uche (2018) opined aggressive behaviour influence pupil's academic performance especially in mathematics.

Aggressive behaviour is a form of social behavior. It is widespread in our schools and nations. Aggression in schools is one of the most pressing issues in the current generation and in schools. Aggressive behaviour is defined as any behaviour intends to harm self or others or destroys property of others. Bernstein, Penner, Clarke-Stewart and Roy (2006) defined aggression as "an act that is intended to cause harm to another person. In his own definition, Colman (2003) defined aggression as a behaviour whose primary or sole purpose or function is to injure physically or psychologically. Myers (2005) in his own submission defined aggression as physical or verbal behaviour intended to hurt someone. Also, Brehm, Kassin and Fein (2005) saw aggression as

behaviour that is intended to harm another individual. Aggressive behaviour among students is considered a behavioural disorder; such behaviour involves physical violence against students and teachers. It includes the use of abusive language, bossiness, tantrums and emotional outbursts. Aggressive behaviour does not only disrupt classroom instructions, but also affects the physical and professional well-being of the teacher. Based on the above definitions, aggression refers to any act that hurts, harms or destroys which must be intended or deliberate. Kuppaswamy (2006) categorized aggression into two forms namely sadistic and masochistic aggressions; Sadistic Aggression is also called externalized form of aggression. It is an aggression that is expressed on things, objects or people in the external world by doing some harm or damage to them. The individual that is afflicted is usually harmed and if it is an object, is damaged and in most cases destroyed while Masochistic Aggression is also referred to internalized form of aggression. This is where the individual does not express his anger on others. His/her aggression turns on his/herself. Shaffer (2013) categorize aggression into two. Hostile aggression and instrumental aggression. Hostile Aggression implies if a person's ultimate goal is to harm a victim, his or her behaviour qualifies as hostile aggression. -Instrumental Aggression: describes those situations in which one-person harms another as a means to some other end. Despite the efforts made by school counsellors through rendering guidance and counselling services, educational administrators and researchers in recommending effective ways for reducing aggression among learners do not appear to be highly effective. Therefore, if aggressive behaviour must be reduced among primary schools is through manipulative materials and play method.

Learning through play is a term that is often used in education and psychology to describe how children can learn to make sense out of the world around them. Children usually develop social and cognitive skills through play. They also mature emotionally and gain self-confidence which is a pre-condition to engage in new experiences. It is a general belief that plays enable children to make sense of their world. It has been observed that utmost learning achievements occur while playing games because the environment is usually relaxed and learning becomes interesting and fun. Play is regarded as the major characteristics that mode the behaviour of the child. There is no universally acclaimed definition to

the concept of play and as a result, it means several things to different learners depending on the angle from which it is viewed. The psychologists, philosophers and educators such as Froebel and Rousseau see play as the highest expression of human development in childhood. Froebel, as cited in Torkilden (2017) stated that play is the purest, most spiritual activity of man at this stage...a child that plays thoroughly with self-active determination, perseveringly until physical fatigue forbids, will surely be a thorough, determined man, capable of self-sacrifice for the promotion of the welfare of himself and others. In his view, play of the child is an all-encompassing activity which not only promotes the total wellbeing of the child but also allows for integration and interpersonal relationship with significant others around him play gives the child room to express self without bias or prejudice. It promotes sincerity and tolerance. Ireland National Play Policy (2004) captures play to be a freely chosen personally directed behaviour, motivated from within by needs, wants and desires. Play can be fun or serious. Through play children explore social, material and imaginary worlds and their relationship with them, elaborating all the while a flexible range of responses to the challenges they encounter. By playing children learn and develop as individuals and as members of the community. This affirms that play is freely entered into by the child without compulsion or force. When children are at play, they are in control, they take charge of their environment and situations around them to suite their pressing needs. They also manipulate their immediate environment to unleash their creative potentialities. Play is an activity of the child which he willingly and spontaneously goes into. It transcends human culture and race. The play of the child is enculturative. It helps the child to learn the norms and values of the society. It also promotes his social wellbeing (Hyun 1998). Play of the child enhances the cognitive, social, physical and emotional development of the child, (Ginsburg 2007, UNESCO 2007) involvement of children in play improves their competencies of several skills and also allows them to overcome several challenges. It is a free choice activity which is rewarding in itself. It is self-motivated and gives the pupils ample opportunities to create and re-create meanings out of their environment. The play of the child is open-ended. In view of the fact that there are no definitive meanings ascribed to play, several attempts have been made to define play with respect to its characteristic, which include but not limited to

- Play is voluntary in nature: children engage in play willingly and they change the direction of play to please themselves.
- Play is meaningful to the players: when children play, it usually reflects what they already know and it creates a platform upon which further knowledge can be built.

Maheshwari, (2013) found that, play offers informal and free atmosphere which gives the kids a chance to learn concepts, Mathematics and Language. He said visual materials can be used to teach the young ones about Mathematics, art and nature. Play enhances motor expression which is learning by doing as against learning by rote, Onukaogu, Oyinloye and Iroegbu, (2010) found that play can help children to learn Mathematics in the following ways: .learn about equal lengths, open and close spaces, topography, solid geometric shapes as they play with blocks of different colours and shapes, Learn about set theory as they group, sort and classify objects like abacus, counters, and mathematical shapes, Learn to compare sets develop one by one correspondence, and solve problems using Mathematics(such as counting the pieces needed for each to play a game), Learn to recognize, duplicate and extend simple patterns using a variety of materials, Increase abilities to match, sort and put in a series, and regroup objects according to one or two attributes such as shapes or sizes, Begin to recognize, describe, compare and name common shape, their parts and attributes, Progress in the ability to put together and take apart shapes, Develop increasing ability to count in sequence to and beyond.Unamba, Onyekpandu&Nwaebo (2015). Effect of Game and Poem enhanced Instruction on Pupils Achievement in Mathematics.

Another strategy that can reduce aggressive behaviour among children is manipulatives. There have been numerous definitions of manipulatives by several authors. Kennedy (2020) defines manipulative as “objects that appeal to several senses and that can be touched, moved about, rearranged, and otherwise handled by learners. Smith (2009) defines manipulatives as physical objects that are used as teaching tool to engage students in hand-on learning of mathematics. Thus, manipulatives are materials from our own environment that learners can use to learn or form mathematical concepts. In other word, any material or object that helps learner to understand mathematics. Such materials help to reduce the abstract nature of mathematics as perceived my many students. Manipulatives can come in a variety of forms and they are often defined as physical objects that are

used as teaching tools to engage students in the hands-on learning of mathematics (manipulatives, 2009). Manipulatives can be purchased at a store, brought from home, or teacher and student made. The manipulatives can range from dried beans and bottle caps to Unifix cubes and base-ten blocks. They are used to introduce, practice, or remediate a mathematical concept. A good manipulative bridges the gap between informal mathematics and formal mathematics. Manipulatives can be used in teaching a wide variety of topics in mathematics, including the objectives from the five NCTM standards: problem solving, communicating, reasoning, connections, and estimation. The materials should foster learner's concepts of numbers and operations, patterns, geometry, measurement, data analysis, problem solving, reasoning, connections, and representations (Seefeldt & Wasik, 2006). Teachers could use counters, place-value mats, base-ten blocks, and fraction strips while teaching from the numbers and operations standard. The counters could be used to teach one-on-one correspondence, ordinal numbers, and basic addition and subtraction. The fraction strips could be used to add and subtract fractions or to show equivalent fractions. Pattern blocks, attribute blocks and scales could be used to assist students in the learning basic algebra. Student could use geoboards when trying to identify simple geometric shapes. They could also use geometric solid models when learning about spatial reasoning. Teachers could use standard and non-standard rulers and measuring cups to represent length or volume in measurement lessons. The students could also use tiles when trying to find the area or perimeter of an object. When it comes to data analysis and probability, students could use spinners to find the probability of landing on a designated area. They could also use number cases or dice to find the probability of rolling a certain number or combination of numbers (manipulatives, 2009). Manipulatives can be extremely helpful to students, but they must be used correctly. Learners must understand the mathematical concept being taught rather than simply moving the manipulatives around. Smith (2009) stated that there are probably as many wrong ways to teach with manipulatives as there are to teach without them. The mathematical manipulatives should be appropriate for the students and chosen to meet the specific goals and objectives of the mathematical program. The complexity of the materials provided will increase as children's thinking and understanding of mathematical concepts increase (Seefeldt & Wasik,

2006). It is also important for teachers to allow their students to have free time to play with the manipulatives.

After the students have explored the manipulatives, the materials cease to be toys and assume their rightful place in the curriculum (Smith, 2009). He further explains that teachers should provide learners with opportunities to work with materials with open-ended objectives that have no specific preset goals. These opportunities allow the students the chance to explore their own questions and generate a variety of answers. These experiences help students think about their world in alternative ways and help them understand that there are multiple ways to solve problems. Generating multiple solutions to problems is an essential strategy in mathematics (Seefeldt & Wasik, 2006). The use of manipulatives is recommended by the NCTM because it is supported by both learning theory and educational research in the classroom. Manipulatives help students learn by allowing them to move from concrete experiences to abstract reasoning (Research on the n.d.). When students manipulate objects, they are taking the first steps toward understanding mathematical processes and procedures. The effective use of manipulatives can help students connect ideas and integrate their knowledge so that they gain a deep understanding of mathematical concepts (Research on the, n.d.). Over the past few decades, researchers have studied the use of manipulatives in several different grade levels and in several different countries. The majority of the studies indicate that mathematics achievement increases when manipulatives are put to good use. Many studies also suggest that manipulatives improve children's long-term and short-term retention of mathematics. Ukaegbu, Anulobi & Unamba (2018) research indicates that using manipulatives helps improve the environment in mathematical classrooms. When students work with manipulatives and then are given a chance to reflect on their experiences, not only is mathematical learning enhanced, but mathematics anxiety is also greatly reduced. Kenneth-Chang (2008) examined the work of research scientist Jennifer Kaminski and he found that children better understand mathematics when they use concrete examples. Catherine Kelly, a member of the Montana Council of Teachers of Mathematics, stated that teachers need to know when, why, and how to use manipulatives effectively in the classroom as well as opportunities to observe, first-hand, the impact of allowing learning through exploration with concrete objects

(Kelly, 2006). Additional studies have shown that students who use manipulatives in specific mathematical subjects are more likely to achieve success than students who don't have the opportunity to work with manipulatives ("Research on the, n.d.). Some learners need to use manipulatives to learn to count, while other students' understanding of place value increases with the use of manipulatives. Research also indicates that using manipulatives is especially useful for teaching low-achievers, students with learning disabilities and learners are motivated.

Brottmiller (1999) in his study of early childhood education found that early childhood educator must provide good environment that will involve the pupils in play activities such as classification, seriation, numbers, time and space all which contribute to the gradual acquisition of mathematics concept. The early childhood classroom should therefore contain many materials that lend themselves to acquiring mathematics concepts. These include, blocks, sand and water implement. Oyinloye and Popoola (2013) in a study of activation of prior knowledge of pupils found that pupils' active participation in activities is essentials if pupils are to be actively involved in learning of math and English language. Oyedeki (1996) observed that pupil's feel more fulfilled when they are actively involved in the learning process. Abiodun (2008) investigated effect of play way method on the numeracy skills of early basic education school pupils in Ekiti State Nigeria. Results showed that hat there was significant difference in the performance of students in favour of those in guided play group. Also, gender has no influence on the pupils' achievement in each group. According to Farris (1993), storytelling can aid learners to voice their ideas and develop their self-confidence while speaking, thereby producing positive attitudes towards such influence. Storytelling therefore offers them a chance to practice and improve communication.

Johnson and Freedman (2001) assert that engaging students in talking into their lives could form a relationship among students. In that community, storytelling allows students to exercise their imagination, communicate effectively, and think critically. In Mello's (2001) meta-analysis of the use of storytelling as a pedagogical strategy, she indicated that participants' literacy was improved with regard to fluency, vocabulary learning, writing, and recall.

Samantaray (2014) used a similar line of reasoning for use of storytelling to develop technical students' spoken English skills. It was

found that storytelling could be an effective method that helps students develop concentration, imagination, participation, comprehension, and English skills. According to Massa (2016), storytelling as a strategy helps the second language learners increase oral language because storytelling is a perfect avenue to explore ways to develop the oral skills in class. Through stories, learners are given opportunities to interact with other peers regularly on a one-to-one basis and to talk, think, and explore their knowledge of the topic of interest. Storytelling is used in the English as a foreign language (EFL) classroom in order to promote speaking skills (Hwang et al., 2016). Hwang (20018) found that storytelling can help students improve critical thinking skills. In particular, students can remember new vocabulary better, practice speaking more frequently, become competent in speaking the target language, and thus improve learning performance. Although these above-mentioned studies reported positive aspects of storytelling, therefore provides insights into how manipulatives materials and play method as Instructional Strategy to Reduce Aggressive Behaviour and Improve Academic Achievement of Pupils in Mathematics. This study intends to investigate manipulatives materials and Play Method as Instructional strategy to reduce aggressive behaviour and improve academic achievement of Pupils in mathematics.

Research Questions

1. What is the mean scores of pupils on aggressive behaviour before and after implementing use of manipulatives materials as instructional approach?
2. What is the mean achievement scores of pupils in mathematics before and after implementing use of manipulatives materials as instructional approach?
3. What is the mean scores of pupils on aggressive behaviour before and after implementing play method instructional approach?
4. What is the mean achievement scores of pupils in mathematics before and after implementing play method instructional approach?

Hypotheses

- HO₁:** There is no significant difference in the mean scores of pupils on aggressive behaviour before and after implementing manipulatives materials as instructional approach?
- HO₂:** There is no significant difference in the mean achievement scores of pupils in mathematics before and after implementing manipulatives materials as instructional approach?
- HO₃:** There is no significant difference in the mean scores of pupils on aggressive behaviour before and after implementing play method instructional approach?
- HO₄:** There is no significant difference in the mean achievement scores of pupils' in mathematics before after and implementing play method instructional approach?

Method

The research design for this study was Quasi-experimental pre-test- post-test group design. The population of the study comprise of 708 Primary six pupils in public schools and 347 private school primary six pupils in Owerri Municipal Council. A sample of 104 pupils were identified with aggressive behaviour was used for study through purposive sampling technique . The schools were randomly assigned to have 62 pupils (public primary) using manipulatives materials instructional strategy (MM) and 42 pupils (private primary) using play method (ST). Two instruments were used for data collection one is;A standardized instrument tagged “Buss-Perry Scale for Aggressive Behaviour (BSAB) was used to select pupils with aggressive behaviours and Mathematics Achievement Test (MAT): It was constructed by the researchers with special attention on Fraction. MAT consists of 30 items objective with options from A to D. it was drawn through the guide of a table of specification the face and content validation on MAT were done by three experts in measurement and evaluation and two in mathematics education from Alvan Ikoku Federal College of Education. They were instructed to check for the language level, relevance, ambiguity, plausibility, vagueness and content coverage of the instruments for the study. Their comments, recommendations and suggestions were used to modify instrument. Test-retest method was used to obtain the reliability of the instruments and estimated at 0.92 and while k-21 were used for MAT 0.89 respectively. This was considered reliable

enough to be used for the study. The researchers trained four (4) mathematics teachers in each of the school used in the study for a period of two weeks. The training exercise was based on the purpose of the study. They were trained to assess the pupils during the experimental exercise. Before the commencement of the experimental process the participants were pre-tested to determine their cognitive backgrounds. Play method Group. The teacher of MM was trained by the researchers for 4 hours, prior to the beginning of the Manipulatives materials classes. During the MMclasses. Each child sat facing his or her assigned partner and use of different manipulatives were demonstrated by the teacher. Classes lasted for 50 minutes, weekly, always in the same day of the week. After the first class, every day, before the snack break, children were asked to practice the use of manipulatives materials with randomly determined pairs, for 10 minutes. Play method Group. The teacher of PM was trained by the researchers for 4 hours, before giving the play methodclasses. Different play method was selected, based on the age of participating pupils. The approached the themes family, reflecting about relationships, expressing feelings, respecting differences, working cooperatively, imagination and creativity, health, empathy, environment and culture. The weekly play method classes lasted for 50 minutes and were always scheduled on the same day of the week. Every week, children chose one book from three offered by the teacher. Children sat in circle, on cushions, and the teacher told the story. Children could ask questions and make comments during the class. Every day, before the snack break, children were asked to practice. They were allowed to pose problems and proffer solutions among themselves and compare solutions strategies within themselves. They interacted with the teachers when difficulties were encountered. Teacher gave participants room for questions in areas not clear and later responded. The treatment period lasted for 3 weeks. After which a post-test was administered to the participant using the re-arranged version of MAT and BSAB. The test instruments were marked over 100%. The data generated was analyzed using mean and standard deviation for answering the research questions while t-test statistical tool was used to test the hypotheses at 0.05 level of significant.

Results

Table 1: Mean and Standard deviation on aggressive behaviour before and after implementing use of manipulatives as instructional approach?

Play Method	N	Mean	SD	Reduced Mean Score
Before (Pre-test)	62	53.34	1.05	
After (post-test)	62	10.56	2.21	41.78

Results in table 1 shows that the mean score of pupils on aggressive behaviour before is 53.34 with a standard deviation of 1.05 while the after the implementation use of manipulatives materials as instructional approach the mean score was reduced to 10.56 with a standard deviation of 2.21 This implies that aggressive behaviour of pupils was reduced with mean score of 41.78 after implementation of use of Manipulatives Materials as instructional approach.

Table 3: Mean and Standard deviation on pupil's achievement scores in MAT

Academic Achievement	N	Mean	SD	Mean Gain
Before (Pre-test)	62	20.08	1.67	
After (post-test)	62	60.53	3.06	40.45

Results in 2 table shows that the mean score of pupils in MAT before 20.08 with a standard deviation of 1.68 while after the implementation the use of manipulatives materials instructional approach the mean score was 60.53 with a standard deviation of 3.06 This implies that MAT of pupils was improved with a high mean gain of 40.45 after implementation of manipulatives materials as instructional approach.

Table 3: Mean and standard deviation on aggressive behaviour before and after implementing play method instructional approach

Storytelling	N	MEAN	SD	Reduced mean Score
Before (Pre-test)	42	60.09	3.24	52.04
After (post-test)	42	8.05	1.30	

Results in table 3 shows that the mean score of pupils on aggressive behaviour before is 60.09 with a standard deviation of 3.24 while the after the implementation play method instructional approach the mean score was reduced to 8.05 with a standard deviation of 1.30. This implies that aggressive behaviour of pupils was reduced with a low mean score of 52.04 after implementation of play method instructional approach.

Table 4: Mean and Standard deviation on pupil's achievement scores in MAT and after implementing play way method instructional approach

Academic Achievement	N	Mean	SD	Mean Gain
Before (Pre-test)	52	18.08	1.67	47.45
After (post-test)	52	65.53	3.06	

Results in 4 table shows that the mean score of pupils in MAT before 18.08 with a standard deviation of 1.68 while after the implementation of play method instructional approach the mean score was 65.53 with a standard deviation of 3.06 This implies that MAT of pupils was improved with a high mean gain of 47.45 after implementation of play method instructional approach.

Table 5: t-test analysis on aggressive behaviour before and after implementing manipulatives instructional approach?

GROUP	N	MEAN	SD	t-cal	t-tab	Decision
Pre-Test	62	53.34	1.05	22.05	1.96	Reject
Post -Test	62	10.56	2.21			HO

The result of the t-test presented in table 1 shows the calculated t-value of 22.05 is significant at ($P < 0.05$) the null hypothesis is rejected and the researchers concludes that there is significant difference in the mean scores of pupilson aggressive behaviour before and after implementing manipulatives instructional approach.

Table 6: t-test on Achievement scores of pupils in mathematics before after implementing manipulatives instructional approach

Achievement	N	MEAN	SD	t-cal	t-tab	Decision
Pre-test	62	18.08	1.67	31.06	1.96	Accept
Post-test	62	65.53	3.06			HO

The result of the t-test presented in table 6 shows the calculated t-value of 31.06 is significant at ($P < 0.05$) the null hypothesis is rejected and the researchers concludes that there is significant difference in the mean scores of pupils in mathematics after implementing manipulatives instructional approach.

Tale 7: T-test analysis on aggressive behaviour before and after implementing play method instructional approach

Variables	N	MEAN	SD	t-Cal	t-tab	Decision
Pre-test	42	60.09	3.24	32.77	1.96	Reject
Post test	42	8.05	1.30			HO

The result of the t-test presented in table 7 shows the calculated t-value of 32.77 is significant at ($P < 0.05$) the null hypothesis is rejected and the researchers concludes that there is significant difference on aggressive behaviour before and after implementing play method instructional approach?

Tale 8: T-test analysis on Achievement in MAT

GENDER	N	MEAN	SD	df	t-Cal	t-tab	Decision
Pre-test	52	18.08	1.67	102	29.05	1.96	Accept
Post test	52	65.53	3.06				HO

The result of the t-test presented in table 8 shows the calculated t-value of 29.05 is significant at 1.96 ($P < 0.05$) the null hypothesis is accepted and the researchers concludes that there is significant difference in the mean achievement scores of pupils' in mathematics after implementing play method instructional approach?

Discussion

Efficacy of manipulatives materials in reducing of Aggression among primary school pupils

The results showed the pretest and posttest mean scores of the pupils treated with manipulatives instructional approach were 53.34 and 10.56 respectively. This is to show that the pupils scored higher in their pretest mean score than in their posttest mean score. This is an indication that their aggressive behaviour level was reduced after their treatment. When these mean differences were subjected to a paired t-test, it was found that manipulatives instructional approach had significant efficacy in reducing aggressive behaviour among primary school pupils. This finding did not appear as a surprise because; manipulatives consisting a combination of three different types of technique i.e. cognitive, behavioural and emotive. It is used to help an individual feel better physically, emotionally and to engage in healthier behaviours. and it is an active treatment for coping with life's difficulties. This result is in accord with the findings of Maheshwari, (2013) found that, play offers informal and free atmosphere which gives the kids a chance to learn concepts in Mathematics and Language. Also, Moore (1999) who found that REBT has the efficacy on the improvement of at-risk adolescents in relation to their irrational thinking, attitude to school, social competence and anti-social behaviour.

The results showed that the academic achievement in mathematics of pupils was improved with a high mean gain of 40.45 after implementation of manipulatives instructional approach. While the t-test showed there is significant difference in the mean scores of pupils in mathematics after implementing manipulatives instructional approach. This result is in accord with the finding of Unamba, Onyekpandu, & Nwaebo, (2015). Effect of Game and Poem enhanced Instruction on Pupils Achievement in Mathematics. Abiodun (2008) investigated Effect of Play Way Method on the Numeracy Skills of Early Basic Education School Pupils in Ekiti State Nigeria. Results showed that there was significant difference in the performance of students in favour of those in guided play group.

Efficacy of play method on Aggression reduction among school's pupils

The results revealed that the post-test mean scores of the pupils treated with play method was higher than their pre-test mean score on aggressive behaviour. The mean scores are 60.09 and 8.05 respectively for posttest and pretest scores. This implies that, play method was efficacious on the reduction of aggression among pupils. When this mean difference was subjected to paired t-test, a significant mean difference was obtained. The outcome of this finding was expected because; play method is a communicative that is aimed at helping learners to be aware of when they act, interpreted action, or behave in such a way that could distort their thinking. As a result, may help individuals to develop an alternative positive way of thinking and behaving which will in one way or the other help to reduce aggressive behaviour among the learners. The finding of this study is in agreement with the result of an earlier study by Mclead (2008) who explained that; cognitive behavior therapy is empirically supported and has been seen to effectively help patients overcome a wide variety of maladaptive behaviours which aggression is all-encompassing. The efficacy of play method promotes joy and confidence, as it instills virtues in children and makes them aware of their culture and other cultures. It enhances verbal proficiency and improves attention, concentration, creativity, imagination, and memory (Isbell, Sobol, Lindauer & Lowrance, 2004).

Also, the results showed that the academic achievement of pupils was improved with a high mean gain of 47.45 after implementation of play method instructional approach and the t-test analysis showed that there is significant difference in the mean achievement scores of pupils in mathematics after implementing play method instructional approach. This result is in accord with the findings of Oyinloye and Popoola (2013) in a study of activation of prior knowledge of pupils found that pupils' active participation in activities is essentials if pupils are to be actively involved in learning of math and English language. Oyedeji (1996) observed that pupil's feel more fulfilled when they are actively involved in the learning process.

Conclusion

The study aimed at determining the efficacy of manipulatives materials and play method in reducing aggressive behavior among primary school pupils. Based on the data analysis, the result found that, play method had significant influence in reducing aggressive behaviour more the story telling among pupils. A significant influence of play method on the reduction of aggression among pupils was found that the pupils treated with play method had reduced aggressive behaviour. From the foregoing therefore, it can be concluded that, aggressive pupils treated with play method had the lowest level of aggressive behaviours followed by those treated with storytelling.

Recommendations

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

1. Teachers should adopt play method and storytelling instructional approach in reducing aggressive behaviour and as a strategy to improve achievement of pupils in mathematics
2. Workshop and seminars should be organized for teachers as to be abreast with innovative approaches of reducing aggressive behaviour among pupils.
3. Teacher Educators should understand their pupils in the classroom so that they will know the appropriate strategy to be applied when treating aggressive behaviours.

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ASSESSMENT OF BUSINESS EDUCATION TEACHERS' UTILIZATION OF DIGITAL SKILLS AND COMPETENCY LEVEL IN TEACHING AMONG PRE- SERVICE TEACHERS IN TERTIARY INSTITUTIONS

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Abstract

The study examines business education Utilization of Digital Skills and Competency Level in Teaching among Pre-Service Teachers in Tertiary Institutions. This study was carried out in tertiary institutions in Imo State. Based on the purpose of the study two research questions and two hypotheses guided the study. The study adopted descriptive research design. The population of the study comprised 65 business education in two public tertiary Institutions in Imo State. A sample size of 65 business education was used for the study. The instrument used for data collection was a structured Questionnaire titled Assessment of business education utilization of Digital skills and competency level (ABEUDSCL). The reliability co-efficient(r) of 0.84 was obtained using Cronbach alpha method. Data collected were analyzed using mean, standard deviation for the research questions while t-test were used to test the hypotheses at 0.05 level of significance. The results showed that business education have high extent and confidence level in utilization of digital skills in teaching among pre-service teachers in tertiary Institutions. It is recommended that business education teachers should utilize digital skills in instructional delivery to make teaching more meaningful, motivating and interesting to pre-service teachers.

Keywords: Assessment, Business Education, Digital Skills, Competency and Teaching

Introduction

The global technological innovations in the world have brought about radical changes in the educational system and instructional delivery. Technology is now a new tool that sharpens the global economy and equips teachers and students with long life learning. Every facet of human endeavour be it in the areas of healthcare delivery, business practices, social interaction, politics, information system, knowledge dissemination, education and others are now revolutionized with digital technology. The traditional pedagogical practices of training in educational institutions are gradually paving way for new technological system of teaching. In line with the above view, Makinde et al. (2013) argued that the role of technology in teaching and learning is rapidly becoming one of the most important and widely discussed issues in contemporary education policy. According to authors, most experts in the field of education agreed that, when properly used, ICT holds great promise to improve education through teaching and learning in addition to shaping workforce opportunities. In the same vein, Sarah (2017), reiterated that digital world has penetrated the education and skills domain, where technology is employed to deliver education, knowledge and skills in new and innovative ways. This has led to changes to the mode and pattern of work, which are themselves affected by policies and economic uncertainty.

Digital skills entail knowledge of the use of digital technologies for communication, collaboration and professional development, to enhance learners' active engagement. Digital technologies in teaching and learning include sourcing, creating and sharing digital resources, enhancing assessment by enabling learners to use digital technologies creatively and responsibly for information, communication, content creation, well-being and problem solving. It is the ability of individuals and groups to grasp and utilize digital technology for meaningful activities in real-life situations. Kirikoi (2015) defined digital skills as the technologies that help us record, store, process, retrieve, transfer, and disseminate recorded information. Such device could be computer system, communication device, telecommunication, telephone, satellites, telex, facsimile, internet,

email, fax, video text and document delivery, electronic copiers, radio, television, among others.

According to Abubakar, (2016), the role of digital skill cannot be overemphasized. Digital skills enable learners and educators to have access to a multitude of additional online educational content as well as being able to create, provide knowledge of a range of digital tools and services which allow educators to offer a number of approaches to learning and learners can choose the approach that best suits them. Digital skills not only enable educators to offer learners the opportunity to collaborate online with others from across the world in addition to their peers within their school or early years setting. They also assist educators to deliver learning in a digital context using digital tools and services. This better aligns with learners' experience of today's digital world (Barun, 2014). Moreover, they enable educators to provide learners with access to a range of digital resources which allow 'anytime/anywhere learning' and build a level of digital skills which will be vital in today's digital world, reduce workload by using appropriate digital assessments that provide instant results and personalized feedback.

With digital skills, online digital networks educators can share resources and digital tools and services expedite lesson planning. Digital skills through learning tools and technology enable students to develop effective self-directed learning skills. In the opinion of Odu (2017), they are able to identify what they need to learn, find and use online resources, apply the information on the problem at hand, and even evaluate resultant feedback. This increases their efficiency and productivity. In addition to engaging students, digital learning tools and technology sharpen critical thinking skills, which are the basis for the development of analytic reasoning. Digital skills through digital learning tools create bond among educators and students. They do not only allow students to access more and more information but also ensure that the information in question is customizable and suited to their personal needs. The opportunity to help every student learn at the best pace and path for them is the most important benefit of digital learning (Harper, 2016). By embracing digital devices and connected learning, classrooms around the country and around the globe can not only coordinate with one another to share insights but also boost learning, experience, and communications skills (Ademola et

al., 2018). The use of digital learning tools and technology has enabled educators to rapidly share information with other educators in real-time.

In this era of digitalization, lecturers must brace up to be digitally competent in order to meet up with the global standard (Ubong, 2019). To accomplish this, a shift from traditional teaching, learning, and research methods to a more digital approach is necessary, which involves the use of technology and digital skills in teaching and learning. The importance of highlighting the use and significance of digital skills in every learning and teaching context cannot be overstated. In order for learning to take place, the instructor must use specific digital skills that will allow him to properly educate his students. Similarly, Ukwungwu & Oyedepo (2012) posit that students through the use of computers, internet, smart boards among others can acquire communication, creative, coordinating, calculating, commercial, concentration and cognitive skills. These skills once developed by students would lead to the improvement of their status in life, development of the nation's economy, creation of self-employment, and proper utilization of human and material resources. They also added that Internet enhances educational processes whereby teachers can handle large classes conveniently using computer-aided gadgets; aids skill acquisition and enhances problem-solving skills; makes the evaluation of students' works a lot easier; creates room for individualized instruction for different learning styles, and collaborations with peers and colleagues globally. It introduces easier ways of searching for research/study materials at anytime and anywhere. Barun (2014) also reported that having the internet in classrooms can also help teachers avoid communication mishaps. When messages and information are shared digitally, misplaced notes and lost assignment sheets become a thing of the past. The internet can also improve class community by facilitating communication outside of the classroom. Class websites or blogs can give students the ability to download assignments and materials, talk with other students, and share their work globally. Mobile phones on the other hand are efficient communication devices and make life easier. Udoh (2015) reiterated the role of mobile phones in education as follows: improving access to education; promoting new learning and alternative counselling processes, sustaining continuous learning and counselling.

It increases access for those who are mobile or cannot physically attend learning institutions. Mobile learning makes education more

accessible in that it enables learners to pursue their studies according to their own capacities in terms of chance (time), cost, mobility. Mobile Learning can also increase access in those situations where cost represents a significant barrier to learning. For those in rural or remote areas where environmental and infrastructure challenges hinder other learning modalities, it presents great opportunities. The ubiquity of mobile phones means that educational services can be delivered with learners' existing resources and know-how. Furthermore, Darko-Adjei (2019) said that the reliance of mobile phones is quite evident and the usage of mobile phones among students is rapidly growing. The physical boundaries on the classroom and time for learning no longer prevail because the content is ambitious, students can communicate with teachers, other students and anyone else to satisfy their needs for knowledge using the new generation of mobile devices-digital media players (including iPad and iPad touches), mobile phones (including iPhone, android phones, and windows phones), personal digital assistants (PDAs), and table computers (including iPads).

According to Ukwueze & Onyia (2014), a smart board is an interactive projection display that allows teachers to include a variety of learning resources, such as web pages, images, and videos, into a teaching lesson. The smart board has an electronic pencil and eraser for writing on the screen, making it ideal for classroom use, PowerPoint presentations, and games. In the same vein, Chan, Churchill and Chiu, (2017) stated that smart boards make differentiated learning much easier because teachers are able to accommodate different learning styles. Visual learners are able to observe the whiteboard, while tactile learners can learn by touching the board. The touch screen option allows teachers to run programs with the tap of their finger. This makes it not only easy to navigate for the teacher but for the students as well. In addition to that, a student's learning experience is enhanced by technology because of its ability for students to view diagrams, charts, videos, and more right on the huge screen in front of them. Their learning comes to life, and many students find it more fun to learn than ever before. Effective teaching and learning can take place in our schools when a student is properly guided by the teacher by way of employing various methods and means through which his teaching could be meaningful.

The use of online teaching environments and learning management systems during the pandemic has revealed the importance of teachers'

ability to use digital tools (OECD, 2022). It is asserted that teachers with a high level of digital competence will assist their students in learning more efficiently and enjoy their schoolwork more in the digital environment (Caena et al, 2017). Digital competency in teaching refers to a teacher ability to effectively integrate technology into their practice to enhance teaching, learning and assessment. it involves having the skills and knowledge. Digital competence has dimensions of knowledge, skills, and attitude to use information and communication technologies (ICT). Teachers with high digital competency can enhance students' engagement and motivation, personalized learning experiences, increase accessibility and inclusivity, improve assessment and feedback practices, develop innovative and effective teaching practices. Digital competency is essential for teachers to effectively integrate technology and enhance teaching and learning in the digital age. Therefore, there is need for teacher educators comprising of both male and female to employ the use of digital skills in teaching and learning activities. However, one of the reasons why students in our tertiary institutions sometimes find it difficult to comprehend immediately what is being taught by the lecturers is because of the complexity of the subject taught, and the inability of the instructor to employ suitable skills that can easily convey the message of the lesson to the learners. The study therefore, deems it necessary to determine the extent digital skills are utilized for effective teaching and learning in public tertiary institutions in Imo State.

Digital skills enhance educational processes by allowing teachers to manage large classes easily with the help of computer-assisted devices; aids skill acquisition and problem- solving skills; greatly simplifies grading students' work; and allow for individualized instruction for different learning styles, as well as global collaborations with peers and colleagues. One of the major concerns of educators in this digital age has been how to make teaching and learning more effective and efficient and with the rapid advancement of technology and its inclusion into education. Employing digital skills in teaching and learning has been a driver of change in the educational sector, changing the sector in developed nations from basic classroom teaching to virtual learning. However, in poor countries such as Nigeria, the use of digital skills in the teaching and learning process is still in its early stages, with teacher educators having little or no digital literacy skills (Abubakar, 2016). This is because

Nigeria's education system is mostly focused on traditional pedagogical learning, which places a larger premium on the physical learning environment. According to a report by the Data Centre of United Nations Educational, Scientific and Cultural Organization (UNESCO, 2018) Institute for Statistics, of all the 189 countries, Nigeria is among four nations with the highest number of overcrowded classrooms and the less with adequate ICT teaching/learning equipment in its tertiary institution. Furthermore, the COVID-19 outbreak has emphasized the need of appropriately adopting digital learning. Additionally, the declining educational condition, as well as the growing number of technologically inexperienced students graduating each year, have proven the detrimental impact of not completely integrating digital skills in teaching and learning on the university's overall educational progress.

The purpose of the study is to assess Business Education teachers Utilization of Digital Skills and Competency Level in Teaching among Pre-Service Teachers in Tertiary Institutions.

Research Questions.

The following research questions were formulated;

1. To what extent business education teachers utilize digital skills in teaching among pre-service teachers in tertiary institutions.
2. What is the competency level ability to effectively utilized digital skills for teaching among pre-service teachers in tertiary Institutions.

Hypotheses

The following hypotheses were formulated and will be tested at (0.05) level of significance.

Ho1: There is no significant difference in the mean ratings of male and female business Education teachers on the extent of utilization of digital skills in teaching among pre-service teachers in tertiary institutions.

Ho2: There is no significant difference in the mean ratings of male and female business education teacher's competency level ability to effectively use digital skills for teaching among pre-service teachers in tertiary institutions.

Method

The descriptive survey research was used for the study. According to Ogumaka (2021), a descriptive survey research seeks to collect detailed factual information that describes the nature of existing conditions. It assesses the characteristics of the whole population and usually study sample drawn from the population of the study. The population of the study was all 140 (52 male and 118 female) business Education teachers in all public tertiary Institutions in Imo state, Nigeria. No sample was used because the population is not large. A 25-item self-made instrument titled “Teachers’ Digital Skills and Competency Level Questionnaire” was used for data collection. The items were constructed based on literature reviewed on Assessment of business Education Teachers Utilization of Digital Skills and Competency Level in Teaching among Pre-Service Teachers in Tertiary Institutions. The TDSCLQ was measured on a 4-point likert-type format of Very High Extent (VHE), High Extent (HE) Low Extent (LE) Very Low Extent (D) was used for data collection. which were assigned numerical values, 4, 3, 2, and 1. Face and content validity of the instrument were established by two experts in measurement and Evaluation and one expert in business education. They scrutinized the contents of the questionnaire, offered useful corrections and suggestions, which led to some modifications. Based on such corrections and modifications, the instrument was considered adequate and the final draft of the questionnaire was produced. A reliability coefficient value of 0.84 was obtained using cronbach alpha coefficient. Data were collected by researchers with the help of five research assistants. Mean and standard deviation was used to answer the research questions while t-test were used test hypotheses at 0.05 level of significance.

Results

Table 1. Mean and Standard deviation on the business education teachers utilize digital skills in teaching among pre-service teachers in tertiary institutions.

S/N	Digital skills	Mean	SD	DECISION
1	Learning management system (Ability to use platforms, interactive white boards, mobile phones and Moodle to manage and deliver course content)	2.92	1.71	High Extent

2	Online Pedagogy (knowledge and ability for effective online teaching practices)	3.13	1.51	High Extent
3	Digital content creation (Ability to create and curate digital resources)	3.00	1.60	High Extent
4	Assessment and Feedback (skills in using digital tools to assess students learning and provide feedback)	3.13	1.77	High Extent
5	Digital Communication (ability to effectively communicate with students and colleagues through emails, messaging apps and video conferencing)	2.98	1.72	High Extent
6	Data Analysis (ability of using digital tools to track students' progress and analyze data to inform instruction)	2.51	1.64	High Extent
7	Digital Citizenship (Ability to teach these skills to students)	2.68	1.69	High Extent
8	Flipped Classroom (Ability to design and implement flipped classroom models)	2.78	1.62	High Extent
9	Gamification (skills in using digital tools to create engaging games)	2.52	1.50	High Extent

Table 1 shows that the mean scores of all the items are greater than 2.5 mean score. This applied that the respondents admitted that Learning management system (Ability to use platforms, interactive white boards, mobile phones and Moodle to manage and deliver course content) , Online Pedagogy (knowledge and ability for effective online teaching practices), Digital content creation (Ability to create and curate digital resources) , Assessment and Feedback (skills in using digital tools to assess students learning and provide feedback), Digital Communication (ability to effectively communicate with students and colleagues through emails, messaging apps and video conferencing), Data Analysis (ability of using digital tools to track students' progress and analyze data to inform instruction). Digital Citizenship (Ability to teach these skills to students). Flipped Classroom (Ability to design and implement flipped classroom

models) and Gamification (skills in using digital tools to create engaging games) to a high extent. The standard deviation scores for all the items are within the same range showing that the respondents are homogeneous in their respondents.

Table 2, Mean and Standard deviation on the competency level ability to effectively utilize digital skills for teaching among pre-service teachers in tertiary Institutions.

S/N	Digital skills	Mean	SD	DECISION
1	Learning management system	3.00	1.71	High Competent
2	Online Pedagogy	3.05	1.51	High Competent
3	Digital content creation	3.02	1.60	High Competent
4	Assessment and Feedback	3.13	1.77	High Competent
5	Digital Communication	3.10	1.72	High Competent
6	Data Analysis	3.00	1.64	High Competent
7	Digital Citizenship	3.00	1.69	High Competent
8	Flipped Classroom	3.00	1.62	High Competent
9	Gamification	3.05	1.50	High Competent

Results in table 2 shows that all the items scored above 2.50. this implies that Education Administration teachers have high competency level in learning management system, online Pedagogy, digital content creation, assessment and feedback, digital communication, data analysis, digital citizenship, flipped classroom and gamification.

Table 3: t-test analysis of the difference between the mean ratings of male and female business education on the extent of utilization of digital skills in teaching among pre-service teachers in tertiary institutions.

Groups	N	MEAN	SD	df	t-cal	t-tab	Level of Significant	Decision
Male	52	2.49	0.86	168	1.10	1.96	0.05	Not
Female	118	2.42	0.87					significant

The t-test analysis presented in Table 3 revealed that the t-calculated (t-cal) value of 1.10 is less than the t-table (t-tab) value of 1.96 at $P \leq 0.05$ levels of significance and at 168 degrees of freedom (df). This showed that, there is no significant difference between the mean ratings of male and female business education on the extent of utilization of digital skills in teaching among pre-service teachers in tertiary institutions.

Table 4: t-test analysis of the difference between the mean ratings of male and female on competency level ability to effectively digital skills for teaching among pre-service teachers in tertiary institutions.

Groups	N	MEAN	SD	df	t-cal	t-tab	Level of Significant	Decision
Male	52	2.63	0.71	168	1.41	1.96	0.05	Not
Female	118	2.73	0.82					significant

The t-test analysis presented in Table 4 revealed that the t-calculated (t-cal) value of 1.41 is less than the t-table (t-tab) value of 1.96 at $P \leq 0.05$ levels of significance and at 168 degrees of freedom (df). This showed that, there is no significant difference between the mean ratings of male and female business education on competency level ability to effectively digital skills for teaching among pre-service teachers in tertiary institutions. Therefore, the null hypothesis of no significant difference is accepted

Discussion

The findings showed that the respondents admitted that business education utilize digital skills in teaching among pre-service teachers in tertiary institutions is to a high extent. However, the hypothesis one test

result indicated that there is no significant difference in the mean ratings of male and female business education on the extent of utilization of digital skills in teaching among pre-service teachers in tertiary institutions. The finding of this study is in agreement to the study of Msunju (2012) who found that the high use of mobile phones for teaching and learning was because it enables you to carry your files around wherever you go, ensuring that you are always with important documents. Darko-Adjei (2019) also in his findings noted the positive usefulness of the use of smart phone in the students learning activities such as easy sharing and accessing of lecture materials online, easy communication among others. However, this finding disagrees with that of Amhag, (2016), Amhag, (2017), Anshari and Alas (2015), who found that use of mobile phone in teaching and learning is not conducive to recall and retention of material. Also, the results indicated that business education teachers have high competency level in learning management system, online Pedagogy, digital content creation, assessment and feedback, digital communication, data analysis, digital citizenship, flipped classroom and gamification. Also, that there is no significant difference in the mean ratings of male and female business education on competency level ability to effectively digital skills for teaching among pre-service teachers in tertiary institutions. This finding confirms the important role the internet plays in teaching and learning as it facilitates easy and quick access to needed information. This finding conforms with the work of Apuke and Iyendo (2018) who found that because the use of internet enables both teachers and students to perform research ahead of time, tackle multiple home-works, widen the scope of reading and learning its use in teaching and learning is at high extent.

Conclusion

The study concludes that business education has high extent and confidence level in utilization of digital skills in teaching among pre-service teachers in tertiary Institutions.

Recommendations

In view of the afore-mentioned result of this study, the following recommendations are made:

1. Business education teachers should utilize digital skills in instructional delivery to make teaching more meaningful, motivating and interesting to students.
2. Government and school administrators should train business education on the use of digital skills in teaching to create productive learning among students and supervise their conformity in usage.
3. Government and school administrators should provide internet facilities in public tertiary institutions to enable business education teachers and students use them to their full potential and advance in knowledge.

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