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Assessment of Senior Secondary School students' preparedness and challenges for Mathematics E-examination in Ebonyi State

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Abstract
The study assessed Senior Secondary School Students' Preparedness and Challenges for Mathematics E-examination Ebonyi State. Two (2) research questions and two (2) null hypotheses guided the study. The population of the study was the entire SS III Students (2025 set) from all the two hundred and thirty-three (233) public secondary schools in Ebonyi state, comprising twelve thousand one hundred and sixty-three (12,163) students. A total of three hundred and fifty-two (352) students, comprising one hundred and eighty-one (181) males and one hundred and seventy-one (171) females were used as sample for this study. The instruments for data collection were the Ebonyi State unified Mock Examination (EB-UME) on mathematics. The EB-UME and a questionnaire on the challenges facing students' preparedness for mathematics e-examination. The internal consistency of the questionnaire was ensured using Cronbach Alpha estimate and it yielded a reliability coefficient of 0.83. The data collected were analyzed using mean, and standard deviation for the research questions and t-test for the hypotheses at an alpha level of 0.05. The findings of the study showed that there was significant difference in the mean preparedness of science and non-science students for mathematics E-examination. In addition, some of the challenges constraining students in public secondary schools in Ebonyi State from preparing well for e-examination include, inadequate number of computers, lack or no power supply, among others. It was recommended among others that local, state and federal government should encourage and sponsor in-service training workshops and seminars for teachers so as to assist them update their knowledge, skills, attitude and new ideas on newly developed software on E-examination.

Keywords: Students, mathematics, e-examination, preparedness

Introduction

Mathematics is a subject that occupies an exceptional place in the curriculum of senior secondary school education because of its importance in sciences and life generally. Mathematics stands as a foundation upon which many science-related professions are based. Knowledge of mathematics, thus, promotes the habit of accuracy, logical, systematic and orderly arrangements of fact in the individual learner. Mathematics equally helps to develop proper moral attitude in individuals as there is no place for biased feelings, no place for dishonesty and it trains people to observe riches respect procedure and value time (Kravitz, 2021). As Anugwo (2019) [12] stipulates that mathematics enables students to acquire and broaden their knowledge, skills, and outlook in many fields because of its applicability to many areas of life. However, for students to possess the conceptual understanding in different ways, they should know how and when these different mathematical representations can be used for different purposes. Such presentation would enable the students experience, discover, discuss and reconstruct their views about the nature of mathematics.

In spite of the indispensability and essentiality of mathematical knowledge to all works of life**,** mathematics education in Nigeria over the years has been grappling with numerous man-made problems despite all the efforts by the government through huge investments, different policies and programmes (Egbulefu, Amaele & Osaat, 2022). Nigerians especially parents are now forced and compelled to accept poor performance in the subject as normal. On the pages of The Sun and Vanguard Newspapers, and on the television and radio stations, reports about this ugly trend of students' abysmal performance in mathematics are been rolled out. No year passes, that parents do not hear about poor and below average achievement of their children and wards in this all-important subject (i.e., mathematics). In fact, many students now live with the misconception and wrong belief that mathematics cannot be passed by oneself or through one's personal efforts, which is an erroneous impression. Most Nigerian children dread mathematics due to poor handling of the subject by teachers right from primary school. As a result of the ugly development which has become a reoccurring decimal, Adeniyi and Salman (2022) [6] noted that Nigerian students do not immediately see the use or applicability of the subject to their lives and to the larger world and so wonder why they should be bordered or troubled with the study of the subject.

Furthermore, it is particularly disappointing and disheartening to find that mathematics has remained one of the least successful subjects in Nigerian school system despite its role in our everyday life and its importance in society (Ahmed, 2022) [40]. Many students fear it and also have the obnoxious notion that Mathematics learning is an unattainable task, and that it is exclusively reserved for the gifted ones (Ajai & Imoko, 2023) [11]. Indeed, most adults openly tell how much they hated Mathematics while in School and how they never did well in the subject. The kind of attitude towards mathematics displayed by the adult members of the society including some teachers is embarrassing. The fact that people, who should call the students to order and encourage them to study harder so as to excel in the subject are themselves bittered about the difficulty of understanding the subject raises a serious concern.

The downward-trend in the performance of students in mathematics is indeed a worrisome situation; Ebonyi State not left out. Nwoba (2024) [42] had stated that analysis of Senior Secondary Certificate Examination from 2022 [43]-2025 revealed that students performed poorly in most schools in Ebonyi State. The situation, if allowed to continue and unchecked, will get to a point in time when there will be only a few students that will qualify to enroll into mathematics related courses in the higher institutions of learning. This is not healthy for the future of mathematics related courses in particular and the scientific advancement of nation in general. This poor performance has been attributed to the present problems associated with the conduct of examination in our secondary schools such as inadequate number of teachers and examination halls or classrooms to check and control candidates during examination, impersonation in the examination hall, Leakages of examination questions, mercenaries hired by students to write the exam for them, bribing of teachers who supervise and invigilate exams, desperation of parents to buy questions for their wards, conspiracy and collaboration of non-tutorial staff to compromise the integrity of the examination. Equally, students' poor preparedness for E-examination has also been adduced a constraint.

E-examination is an electronic examination approach to assessment that explains the conditions under which students' abilities will be tested (Okonkwo, 2023) [35]. It restricts the time and place where assessment tasks will be performed. Moreso, Joshua, Joshua and Ikiroma (2024) [29] explained E-examination as electronic examination system which involves the conduct of examination through the web or the intranet. It reduces the large proportion of workload on examination; from training, grading and reviewing. Yussuff, Akanmu, Enikumehin and Salman (2023) [33] added that the education system has moved from pen and paper assessment to the e-platform. The use of E-examination is aimed at resolving many questions and limitations inherent in the traditional paper and pen form of examination. The procedure equally helps to cater for leakages and malpractices, demand for gratification by teachers in the form of assistance during examination and bribe-taking by supervisors and invigilators of examinations. Olawale and Shafi-Mahammad (2023) [36] outlined some of the challenges of the traditional pen and paper assessments to include heavy work load as a result of marking/grading of students' scripts, recording, organizing the statistical analysis and presentation of the results, poor security, poor feedback, wasting of paper resources among others. These challenges make the assessment cumbersome but with e-assessment, it becomes easier to take examinations. Equally, whether students are well-prepared to sit for examination through e-assessment modes is a course of worry.

In evidence-based researches by Ukpebor and Emwanta (2024), Abubakar and Adebayo (2023), and Okonkwo (2022) [1, 3, 42], on tertiary students' preparedness for E-examination, it was reported that that participants preferred E-examination mode to pen and paper mode and are therefore tolerant of the examination process. However, studies by Dermo and Eyre (2021) [17], and George (2020) on computer-mediated examinations, students' perceptions, students' attitude and performance, found out that students believe the traditional paper and pencil test (PPT) enhance their performance while computer-based test had a negative effect, and other varied result. This inconsistency coupled with paucity of research studies on secondary school students' preparedness for e-examinations, calls for further research to ascertain senior secondary school students' level of preparedness for Mathematics E-examination in Ebonyi State.

Notwithstanding the gains inherent in e-examination, there are challenges constraining its effective implementation and they include; inadequate number of computers, unreliable internet connections, poor power supply, lack of backup systems (e.g., generators), insufficient trained teachers for e-examination or ICT support staff, and lack or no closed-circuit television (CCVT) surveillance. Inadequate number of computers contributes to unequal access to examination opportunities, especially for students in rural or underserved regions. Reports on Nigeria's transition to CBT examinations show that some states have only a few accredited CBT centers despite having tens of thousands of candidates (Lawal, *et al*., 2025) [31]. In some areas, one CBT center may serve thousands of candidates, forcing students to travel long distances or wait for extended periods before writing their examinations (Ohiorenoya & Imonike, 2024) [21]. This uneven distribution of facilities creates disparities between urban and rural students and undermines the objective of ensuring fair and inclusive assessment.

Furthermore, E-examinations depend heavily on stable internet connectivity for accessing examination platforms, downloading questions, submitting answers, and maintaining communication servers (Joshua, Joshua, & Ikiroma, 2024) [29]. However, many Nigerian schools experience slow, unstable, or completely unavailable internet services, which disrupt its effectiveness (Ukpebor & Emwanta, 2024) [42]. Equally, the success of E-examinations depends significantly on stable electricity to operate computers, servers, and networking equipment. However, the Nigerian power sector is characterized by frequent outages and unreliable electricity supply, which disrupt digital learning and assessment systems (Ohiorenoya & Imonikhe, 2024). Empirical studies (Lawal *et al*., 2025; Ikobirima, 2022) [21, 26, 31], indicate that erratic electricity supply significantly constrains the integration of ICT-based examinations in schools, as interruptions during tests can cause system failures, data loss, and delays in examination processes.

More so, E-examinations require teachers who possess adequate digital literacy and technical competence to design, administer, and manage computer-based assessments. However, many teachers in Nigerian secondary schools have limited ICT skills due to insufficient training and professional development opportunities (Olawale & Shafi-Mahammad, 2023) [36]. Studies show that inadequate teacher training in ICT tools reduce teachers' confidence and limits the effective use of digital platforms for teaching and assessment (Bawa, Ojo & Musa, 2023) [20]. Research in Nigerian secondary schools indicates that many institutions lack technical support staff and regular training programmes, which hinders the integration of ICT into educational practice (Onjewu, 2023) [2]. Whether this is the situation in public secondary schools in Ebonyi State, is a subject of empirical research, hence, this study.

It therefore, follows that there is urgent need for mathematics teachers to employ innovative and learner centered instructional approaches driven by technological integration, to enhance students' understanding and set them in motion for E-examination. The researchers are of the

view that effective teaching and learning of mathematics is still attainable with the integration of technology into the teaching and learning process as well as modes of testing and examination. The researchers are advocating the use of e-learning in mathematics teaching, learning and assessment, since the popular talk and chalk method prevalently used in most public secondary schools have failed. The researchers asserts that with this approach, mathematics can be more learner friendly and students irrespective of their gender and location, would be well-equipped to face examinations especially through electronic means.

The word preparedness according to Hornby (2022) [24], is the state of being ready or prepared for something. In the context of this study, the researcher views preparedness as the ability and willingness of senior secondary school students to embrace E-examination. It is obvious that in any innovation there are apprehensions and public outcry among the citizenry including various stakeholders in the education sector with the introduction of E-examination in our secondary school. Consequently, Ayo *et al*. (2023) [13] affirmed that getting assessment of students right implies generating assessment results which are reliable, valid, useable, credible and interpretable. Osuji (2021) [32] stressed that E- examination can be used in reducing or eliminating most of the problems of the traditional assessment, which have resulted to the general falling standards of education particularly among secondary school students in Nigeria. This implies that E-examination is a way of getting assessment right. But are the students' prepared to embrace this sustainable mode of examination? In seeking answer to this question, this study empirically investigated senior secondary school students' preparedness and challenges they face in mathematics E-examination in public secondary schools in Ebonyi State, Nigeria.

Objectives

The study examined:

1. how science and non-science students' preparedness vary when exposed to mock mathematics e-examination in public secondary schools in Ebonyi State; and
2. the challenges faced by students of public secondary schools in Ebonyi State in preparing for mathematics E-examination.

Methodology

Descriptive survey design was adopted for this study. The researchers chose the research design to answer the research and question objectively, rapidly and economically as possible by explaining the true state of e-examination practices in Ebonyi State with particular emphasis on students' preparedness and challenges of e-examination in the state. This study was carried out in Ebonyi State comprising three (3) Education zones namely: Abakaliki Education Zone, Onueke Education Zone, and Afikpo Education zone.

The population of this study was 12,163 SSIII students (2024 [42] set) from all the two hundred and thirty-three (233) public secondary schools in Ebonyi State. A total of three hundred and fifty-two (352) students were used as sample for this study. Ebonyi State Unified Mock-Examination (EB-UME) and a structured questionnaire on the challenges faced by students of public secondary schools in Ebonyi State in preparing for mathematics E-examination with reliability coefficient of 0.83 was used for data collection. Research questions were answered using mean and standard deviation while the research hypotheses were tested using t-test at an alpha level of 0.05.

Results

Table 1: Mean and Standard Deviation of Achievement stores of Science and Non-science Students Prepared for Mathematics E-examination

Group	Adjusted Mean	SD	N
Science Students	42.51	3.64	123
Non-Science Students	38.74	4.89	229

Source: Researcher's field work, 2026.

Summary of results presented in table 1 revealed that science students had mean achievement score of 42.51 and standard deviation score of 3.64 while the rural students had mean score of 38.74 and standard deviation (SD) score of 4.89. This implies that the science students are more prepared for mathematics E-examination compared to non-science students in public secondary schools in Ebonyi State.

Table 2: Mean and Standard Deviation on the Challenges Faced by Students in Preparing for Mathematics E-examination

S/N	Items	N	Mean	SD	Decision
1	Inadequate number of computers	352	3.70	0.46	Agreed
2	Unreliable internet connections	352	3.43	0.49	Agreed
3	Poor power supply	352	3.64	0.48	Agreed
4	Lack of backup systems including generators	352	3.74	0.44	Agreed
5	Lack of trained teachers for the E-examination/support staff	352	3.46	0.49	Agreed
6	Lack of/non-availability of CCTV surveillance	352	3.26	0.47	Agreed

Source: Researcher's field work, 2026.

Summary of result in table 2 showed that the students agreed on all the as the challenges facing them in preparing for E-examinations in public secondary schools in Ebonyi State with inadequate computers (mean = 3.70) and lack of backup systems (mean = 3.74), ranking highest.

Table 3: Summary table of t-test between two means

Location	N	X	SD	$t_{cal.}$	$t_{crit.}$	decision
Science Students	81	43.72	3.58	2.17	1.96	S
Non-science Students	171	31.63	5.46			

The result in table 3 shows that the calculated t-value of 2.17 is more than the critical t-value of 1.96 at 0.05 level of significant. The null hypothesis is hereby rejected. This means that there is a significant difference in the mean level of preparedness of science and non-science students for mathematics E-examination.

Table 4: Mean and standard deviation of male and female students on the challenges they in preparing for mathematics e-examination

Items	Location	N	Mean	SD	t.cal.	Df	P.value	Decision
1	Urban, Rural	81, 271	3.68, 3.71	0.47, 0.46	2.573	350	0.567	Significant
2	Urban, Rural	81, 271	3.44, 3.42	0.50, 0.49	2.320	350	0.749	Significant

3	Urban, Rural	81, 271	3.64, 3.63	0.48, 0.48	2.119	350	0.905	Significant
4	Urban, Rural	81, 271	3.72, 3.75	0.45, 0.44	2.526	350	0.599	Significant
5	Urban, Rural	81, 271	3.48, 3.45	0.50, 0.49	2.436	350	0.663	Significant
6	Urban, Rural	81, 271	3.25, 3.27	0.51, 0.46	2.375	350	0.708	Significant

Source: Researcher's Field Work, 2026.

Summary of result on table 7 showed that across the six items, the P.values are greater than alpha level of 0.05, and therefore, the null hypothesis is rejected. This implies that there was significant difference in the mean ratings of urban and rural students on the factors they face in preparing for E-examinations in public secondary schools in Ebonyi State.

Discussions

The finding of this study shows that there is a significant difference in the mean level of preparedness of science students compared to the non-science students in favour of science students for mathematics E-examination. Notwithstanding that science students obtained a slightly higher mean score than the non-science students, George (2023) [5] reported that field of study is liken to a social attributes and opportunity associated with what one is studying and can influence achievement level. These attributes and relationship are socially constructed and learned through socialization processes while technology development serves as forum for exploring the technological development. Traditionally, technology is a science sphere, and research has previously shown that science students have a greater interest in technology itself than non-science. This may be that the science students are more interested in experimenting than the non-science respondent. This finding is in agreement with this study and the works of Ayo's *et al* (2023), Kadel (2022) and Joshua *et al* (2023) and Okonkwo (2023) [13, 28]. The senior secondary three students are adequately exposed, perhaps through their use of sophisticated cell phones, computers at cybercafé home computers and some-time personal home laptops to acquire the basic skills required for writing E-examination. It is in the best of Nigeria as a leading country in Africa to take the lead in massive use of E-examination facilities to enhance and maximize effective and efficient delivery in education sector.

In addition, the result of the study under this theme revealed that the students agreed that inadequate number of computers, poor internet connectivity and power supply, lack of competent trained teachers on e-examination as well as support staff, among others are the challenges faced in public secondary schools for effective preparation for e-examination. This is evident as no significant difference was recorded in their ratings of the challenges. This finding aligns with that of Olawale and Shafi-Muhammad (2023) as well as Abubakar and Adebayo (2023) [1, 36] who reported that lack of computers, poor internet connection, and lack of competent trained manpower to implement e=examination are fundamental challenges constraining public secondary schools from embracing e-examinations.

Conclusion

The researchers in line with the findings of the study, concluded that science students had higher mean preparedness compared to the non-science students. Equally, lack of computers in good number, poor internet connectivity and poor power supply are among the cardinal challenges facing poor implementation of e-examination in public secondary schools in Ebonyi state.

Recommendations

Based on the findings of the study, the researcher made the following recommendations.

1. In order to motivate, stimulate and sustain students' interest in mathematics with the sole aim of enhancing their achievement in mathematics, teachers and students of mathematics should employ E-examination mode of teaching.
2. Local, State and Federal Governments should encourage and sponsor in-service trainings, workshops and seminars so as to assist them update their knowledge, skills, attitude and new ideas on newly developed software on E-examination.
3. The technical issues such as computer functionalities, power outages and internet accesses need to be continually addressed to ensure that they do not mitigate the successful implementation of E-examination.

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