The Usage Of Computers In The Teaching And Learning Of Mathematics Among The Senior Secondary Schools Students

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ABSTRACT

There are connections between the fields of mathematics and computer science. A solid understanding of computer science is required for many mathematical solutions. This explains why computer technology has been incorporated into Nigeria's mathematics curriculum. Despite these connections, the majority of secondary school mathematics teachers in Nigeria don't use computer science to teach mathematics concepts. Hence, this study assessed the level of computer usage in the teaching and learning of mathematics among the senior secondary schools students in Ikere local government area of Ekiti state. The sample for the study consisted of two hundred (200) mathematics students and ten (10) mathematics teachers who were randomly selected from ten (10) senior secondary schools in the chosen local government area for the study. Four research questions were generated and six research hypotheses were tested using t –test statistic and Analysis of variance (ANOVA) at 0.05 level of significance. The study revealed that at P< 0.05, there was no significant difference between the degree to which ICT skill had aided Male and Female students in learning of mathematics and also no significant difference between highly experience and moderately experienced teachers in the difficulties of using computer to teach mathematics for teaching. Therefore, the study

recommended that, seminars and workshops should be arranged for both students and mathematics teachers in order to enhance their competency in using ICT technologies in the teaching and learning of mathematics among the senior secondary schools in Ikere Local Government Area of Ekiti State.

KEYWORDS: Assessment, Usage, Computers, Teaching and Learning, Mathematics, Senior Secondary Schools.

INTRODUCTION

An assessment is an evaluation and one type of assessment is used to learn Tests and term papers can be assessment tools. It is the process of gathering information to monitor progress and make educational decisions if necessary. It may include a test, but also includes methods such as observations, interviews, behaviour monitoring, etc. Assessment is the act of judging a person or situation or event or is the classification of someone or something with respect to its worth.

Assessment involves the use of empirical data on students' learning to refine programs and improve students' learning. [1, 2] argued that assessment is the process of gathering and discussing information from multiple and diverse sources in order to develop a deep understanding of what students understand and can do with their knowledge as a result of their educational experience. The process culminates when assessment results are used to improve subsequent learning; while [3, 4] posited that assessment is the systematic basis for making inferences about the learning and development of students. It is the process of defining, selecting, designing, collecting, analyzing, interpreting and using information to increase students' learning and development. [5] Posited that, assessment is the systematic collection, review, and use of information about educational programs untaken for the purpose of improving students' learning and development.

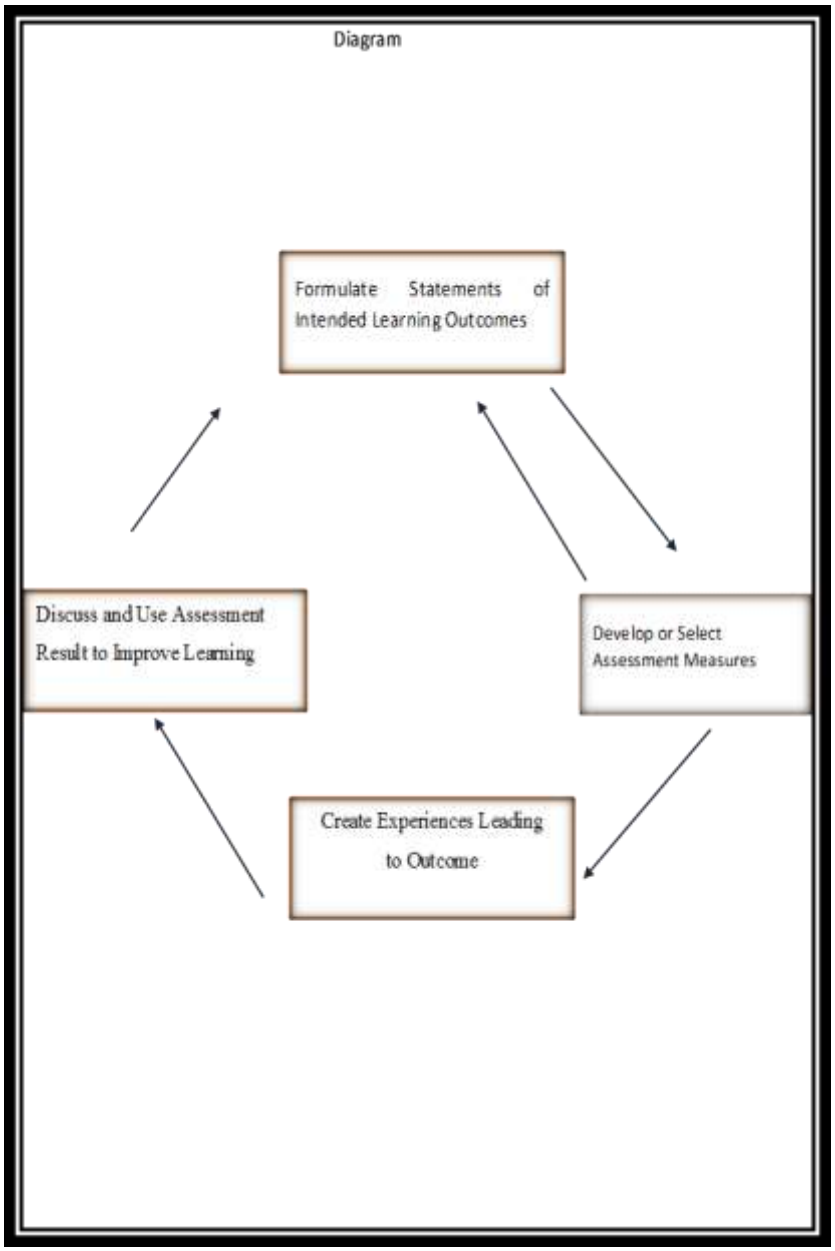
[6] Views Assessment in the context of post-compulsory schooling which is concerned primarily with making judgments about the extent to which students have achieved outcomes. [7] Defined assessment as a process of gathering data to better understand the strengths and weaknesses of students' learning. [8] Identified assessment as a process for obtaining information that is used for making decisions about students'

curricula, programmes and educational policy. The decisions made with assessment information may concern the following students, such as whether a student understands a topic or needs additional instruction on the topic.

Programme: such as if the programme is not achieving its objective or not.

Educational Policy: such as whether a policy that requires students to be promoted to the next grade is more or less detrimental than a policy that allows low achieving students to be retained.

Fundamental components of assessment: four fundamental elements of learning centered assessment.



1. Formulate statements of intended learning outcomes – statements that

Students show what they know, understand and be able to do with their knowledge when they graduate.

2. Developing or selecting assessment measures-designing or selecting data gathering measures to assess whether or not our intended learning outcomes have been achieved includes

a) Direct assessments – projects products, papers/theses, exhibitions performances case studies clinical evaluations, portfolios, interviews and oral exams- which ask students to demonstrate what they know or can do with their knowledge.

b) Indirect Assessment – self report measures such as surveys – in which respondents share their perceptions about what graduates know or can do with their knowledge.

3. Creating experiences leading to outcomes- ensuring that students have experiences both in and outside their courses that help them achieve the intended learning outcomes.

4. Discussing and using Assessment results to improve teaching and learning using the results to improve individual student's performance [2].

While these four fundament components has been translated into assessment cycle that includes four stages:

- Plan – do –check-act – plan- what do I want student to learn? This stage includes the first fundamental component of assessment formulating statements of intended learning outcomes.
- Do – how do I teach effectively? This stage includes the second and third fundamental components – developing or selecting assessment measures & creating experiences leading to outcomes.
- Check- are my outcomes being met? This stage involves evaluation of assessment data (part of the fourth component).
- Act – how do I use what I have learned? This stage involves reinforcing successful practices and making revisions to enhance student learning (part of the fourth component).

LITERATURE REVIEW

The emergence of Information and Communication Technology (ICT) has led to a progressive transformation of the world into a global village. All facets of human existence, including education, are being affected by the ICT revolution. It is important to consider this impact and incorporate it into the fields of Science, Technology, Engineering, and Mathematics (STEM). Therefore, the importance of having teachers who are well-prepared to teach mathematics cannot be overstated [9]. This is because teachers affect learning results, and developing human capital via the use of ICT is one-way society may advance. ICT is considered a crucial instrument to assist and encourage new methods of teaching and studying mathematics around the world [10]. ICT boosts students' knowledge of mathematical fundamentals and enhances the way mathematics is taught. A paradigm change from a teacher -

centred to a learner - centered, from individual to collaborative learning, and from the teacher as the source of knowledge to the student as the source of knowledge is presented by the use of ICT in teaching. By giving students greater opportunities to link technology with course content, the use of ICT in the design of classroom instruction might affect how interested students are in learning mathematics [11].

[12] Argued that using computers in mathematics classes enables students to concentrate on techniques and answer interpretation rather than spending time on laborious computational operations. Calculus takes the use of computers in mathematics training to new heights by helping students visualize the process and concept role of symbols [13]. [14] Posited that technology boosts students' knowledge of fundamental ideas and improves the way mathematics should be taught. It places more emphasis on the development of mathematical concepts while de-emphasizing algorithmic skills. The majority of pure mathematicians are likely to argue that it is possible to explore the essence of Mathematics without using a computer, but for a mathematics educator, that argument may seem academic and esoteric in light of his duty to his students; the vast majority of whom are probably users of mathematics rather than pure mathematicians in any sense.

In Nigeria, all students in primary and secondary schools are required to take mathematics. Teachers now seize the opportunities to use computer technology to aid students as they learn mathematics. Using computers to aid students in learning mathematics through the use of courseware is increasingly popular. Teachers can utilize a variety of instructional software to teach and study mathematics. Some of them can even be downloaded for free via the Internet and are known as freeware. In Nigeria, computer-based learning has become an instructional tool with the ability to transcend conventional media constraints and offer learning environments with strong visual components. However, it is not meant to replace conventional teaching strategies, which typically involve chalk and talk [15]. Despite the use of computer-based learning, teachers continue to play a crucial role in the teaching and learning process [16]. The computer is merely assistance to learning for teachers in some subjects that demand more focus. In addition to the conventional methods of instruction, there is educational software available that can

help teachers [15]. As a result, Computer Based Learning (CBL) emerges as the most innovative development in educational technology. CBL is a set of programming guidelines used in the educational process to help students build specific predetermined abilities for their mastery of the subject material. Typically, it refers to a particular program intended to teach [17].

There are both content-specific and content-neutral technological instruments. Computer algebra systems, dynamic geometry settings, interactive applets, handheld computation, data gathering, and analysis devices, and computer-based apps are some examples of content-specific technology used in mathematics education. These tools assist students in investigating and recognizing mathematical relationships and concepts. Communication and collaboration tools, as well as Web-based digital media, are examples of content-neutral technology that give students more access to knowledge, interactions, and ideas that can assist and improve sense-making, which is essential to the process of taking ownership of knowledge. Teachers and curriculum designers must be competent decision-makers when deciding how and when to employ technology to enhance students' learning. Access to instructional technology, including classroom hardware, mobile and lab-based devices with mathematical software and apps, and Web-based resources, should be made available to all schools and mathematics programs, together with adequate training to ensure its effective use.

The expertise of practitioners in teacher education and professional development regarding technology and its use to promote learning must be continuously updated. The creation of mathematics lessons that take advantage of technologically advanced environments and the incorporation of digital tools into regular classroom instruction should be part of this collaboration with practitioners, instilling respect for technology's potential influence on students' understanding and use of mathematics [18, 19]. The use of such technologies optimizes the opportunities provided by students' growing familiarity with and compliance with technology-driven means of communication and information retrieval, in addition to enhancing students' experiences as math learners [20, 21].

The majority of teachers still utilize the old techniques of teaching and learning mathematics, such as chalkboards, and

outdated tools for teaching courses on skill acquisition, such as typewriters, despite the emergence of modern teaching methods that are computer-based. There were many arguments put forth by both teachers and students alike for continuing to use the traditional approach to teaching and learning. They claim that the majority of teachers continue to adopt the outdated approach since most schools lack adequate and appropriate ICT resources. [22] Asserted that ICT proficiency is necessary for mathematics teachers to advance their careers and stay current. But in a study on the investigation of the availability and functionality of ICT facilities in Ondo state secondary schools for effective teaching and learning of science subjects [23] found that although scientific teachers have embraced the use of ICT in their lessons, the facilities in Ondo State schools are poor, consequently they are not being used to the fullest. He also found that science teachers in the investigated area lacked the necessary skills to use ICT services. Based on the aforementioned, this study is interested in finding out the extent to which secondary schools use computer applications to teach and learn mathematics. In light of this, the study aims at assessing how computer applications affect computation, problem-solving, and conceptual knowledge of mathematics.

[24] Incorporating technology into teaching and learning increases students' performance as well as their confidence, motivation, and attitudes while, the instructors are developing professionally, possessing enough pedagogical materials, understanding and engaging Mathematics lessons [12]. The curriculum is computer-based and mathematically robust, giving students the chance to study crucial mathematical concepts and techniques with comprehension [25].

It is impossible to overstate the importance of computers in mathematics education. The use of computers in mathematics instruction and learning improves productivity, problem-solving, decision-making, communication, and research [26]. Technology also aids students' appreciation and comprehension of mathematics. This is significant; since the Curriculum on Assessment Policy Statement emphasizes it [27].

While [28] posited that, technology is now a crucial instrument for learning mathematics because it can be employed to enhance and encourage such learning. This is further emphasized in the National Council of Teachers of Mathematics

(NSTM, 2000) standard, which mentions how technology can assist mathematical reasoning, problem-solving, and communication. [26, 28] on the other hand place more emphasis on the notion that students may apply the mathematics they learn in the classroom to real-world situations. At first, using technology to study mathematics was viewed as a way to come up with answers. Today, the function of technology is considered a catalyst for a shift away from laborious practices and toward in-depth comprehension [29]. They also indicate that students will be better equipped to utilize technology appropriately, confidently, and effectively if technology is employed to enhance mathematics instruction at all levels.

The emphasis on incorporating technology into mathematics curricula has primarily favoured experimenting with cutting-edge software tools that have been purposely created and put into use to support learning mathematics and develop mathematical thinking [29]. Despite the fact that such important research has been done, it is still extremely difficult to integrate technology into mathematics classes. With the use of computers, students can move from ingenuity to activity and from boredom to creativity [29]. Students become researchers, motivated, interested, engaged, active, and collaborative in the study of mathematics; while using computers as learning tools [24].

The constructivist paradigm of learning is supported by computer usage. Under this model, teachers serve as facilitators rather than transmitters of knowledge. The teacher and technology work together to plan and deliver each lesson. It appeals to the students because it has the ability to transform the classroom environment in mathematics into a friendly and engaging one. Computers have the power to re-engage students in mathematics, and teachers applaud this technology's attractive, interactive, and visual features [30]. Therefore, the purpose of this research is to identify a way to alter the way that technology can be used to teach mathematics.

The use of technology to teach and learn mathematics has several benefits, among which is the increase in the student’s interest and a better attitude toward the subject. Studies have also shown that using ICT to teach mathematics has several advantages for educators as well as students. For

example, when ICT is used to teach mathematics, learning is made more dynamic and engaging, abstract mathematical concepts are visually represented for students, and chances for individualized learning are provided [31, 32, and 33]. Also, [24] found that Computer Simulation Package (CSP) helps improve students' attitudes towards some science concepts in Ekiti State. Additionally, technology shortens the learning period and gives students the chance to learn using contemporary techniques, such that occasionally, students' understanding of technology surpasses that of the teacher. Technology is still the way to go, despite the fact that some teachers feel inferior and stop utilizing it because they constantly want to be in charge of the classroom and demonstrate their superior expertise. When used effectively in the teaching and learning process, technology produces effective learning outcomes and alters the educational experience [34]. Therefore, the goal of this study is to look into how using computers might help students understand mathematics, specifically the field of linear functions.

The way and what is taught to the students who will be the future leaders of society are current issues in education. In order for students to succeed in life and in work, researchers have concluded that it is imperative to educate them with the knowledge, skills, and talents necessary for the 21st century [35].

[36] focuses on a subject called computer-based mathematics, in which students learn mathematics using computers, as an example of how computers might be integrated into the classroom to increase students' performance. He discovered that mathematics becomes more conceptual and practical when it is done on a computer. Additionally, it enhances comprehension, enhancing students' achievement. He makes the point that whereas performing calculations by hand could keep a learner-focused for hours on end, using a computer allows for the completion of numerous computations of varying degrees of complexity in a short time. The evidence suggests that using computers could enable students to complete a variety of problem-solving tasks in a condensed amount of time. It is clear that despite the fact that incorporating technology into the classroom is still tough or challenging, doing so is crucial and will increase students' conceptual knowledge.

Using ICT in the classroom is necessary to improve mathematics learning results and raise educational standards overall. The usage of ICT can help students develop skills for the twenty-first century, such as problem-solving, teamwork, and communication [37]. The use of ICT tools can improve the efficiency of teaching and learning by providing access to digital tools and resources. ICT integration, according to [38], can boost the chances of success in life and provide students with disadvantaged backgrounds with the opportunity to get a high-quality education.

The application of technology-instruction resulted in a significantly higher difference between the average achievements of the students who received technology instructions during the lesson in all three subjects of mathematics, English, and geography, according to research on how technology affects attention and achievement in a classroom setting [12]. The analysis makes a significant contribution to the argument that technology support for teaching and learning should be encouraged across the curriculum in all subject areas. This underlines how learners would learn more by utilizing suitably engaging technology elements in their course materials. In a similar study conducted by [24] on the effects of Computer Simulation Package (CSP) on the academic performance of senior secondary school students in some science concepts in Ekiti State Nigeria, it was found that CSP has a significant effect on the student's academic performance. The study also shows that students' gender has no profound influence on the use of the Computer Simulation Package.

Although it can never completely replace the human elements of teaching, technology is now a requirement in the classroom. Because the teacher may use computers to hold everyone's attention during a lesson, technology can also help improve classroom management. Because the students will be actively involved in expanding their own knowledge, this could help them achieve strong academic outcomes and most likely result in fewer disciplinary issues.

[27] Contends that the relationship between the teacher and the learner is weakened when computers are used to facilitate teaching and learning in the classroom. Inactive mental activity will be replaced by artificial intelligence. Additionally, since students can learn anywhere and not just within the four walls

of a classroom, education will be more informal [27]. This shows that there are still people who worry that technology would sever the connection they have with their students. [39] conducted a systematic review of the use of ICT in teaching and learning mathematics at the College of Education in Ghana and discovered that among the difficulties tutors encounter when using ICTs for teach are a lack of technical support, a lack of technological pedagogical content knowledge, a resistance to change on the part of mathematics instructors, and insufficient training and professional development. However, as other studies have shown, technology should be viewed as a partner rather than an adversary.

According to a study on the impact of cooperative group computer-supported concept map instruction on probability by [40], conceptual learning was greatly improved by cooperative group computer-supported instruction over traditional approaches. Learners' achievement is increased when computers are used in research groups. Students that used computers for learning appreciated the experience and engaged with their peers. Additionally, they had the chance to visualize their knowledge. In accordance with their research, a computer can help students with challenges involving problem-solving and can also make abstract mathematical concepts concrete [41].

Statement of the problem

The performance of secondary school students in the disciplines has not improved or been promising despite the inclusion of computer technology in the mathematics curriculum in Nigeria. The majority of teachers still favour using typewriters and chalkboards to teach courses in skills acquisition and the traditional approach to teaching mathematics despite the advent of innovative computer-based teaching methods. However, neither the instructors nor students provided any explanations for keeping up the antiquated teaching and learning methods. Based on the researchers' interactions with a few students and teachers, it was found that the lack of appropriate ICT resources for classroom use has prevented computer applications from having a significant impact on the way mathematics topics are taught. Students also claim that the government's inadequate provision of ICT resources to schools prevents them from

reaching all of the students. Some students also complain that some of their teachers are not adept at using ICT resources. This explains why these teachers continue to use conventional teaching techniques. This circumstance leaves the students lacking in the use of modern technologies and prevents the effective teaching and learning of mathematical ideas. To the best of the researcher's knowledge, no research of this kind has been done in the local government area under investigation. Based on the foregoing, the researchers have concerns about how many senior secondary schools in the Ikere Local Government area of the state of Ekiti are using computers to teach and learn mathematics.

Objectives of the study

The study's main goal is to evaluate how computers are used in mathematics instruction and learning. The study's specific goals are to:

(1) Identify the ICT skills required for mathematics instruction at senior secondary schools in Ikere Local Government Area, Ekiti State

(2) Examine whether senior secondary schools in Ikere Local Government Area of Ekiti state have access to computers hardware and accessories.

(3) Identify the difficulties in the Ikere Local Government Area of Ekiti State in using computers for the teaching and learning of mathematics.

(4) Assess how much ICT aids students in Ikere Local Government Area of Ekiti State in their study of mathematics.

Research Questions

The following research issues served as the study's guiding principles:

(1) What are the ICT skills required for mathematics instruction in Ikere Local Government Area of the state of Ekiti?

(2) How accessible are computers and related equipment in senior secondary schools in Ikere Local Government Area of Ekiti state?

(3) What difficulties do people in Ikere Local Government Area of Ekiti have using computers for teaching and learning Mathematics?

(4) How much has ICT aided mathematics instruction in Ikere Local Government Area in Ekiti State in their study of

mathematics?

Hypotheses

The following six hypotheses were formulated to guide the study from research questions above:

(1) There is no significant difference between male and female students in term of how much ICT skills have aided the study of Mathematics

(2) There is no significant difference between single and mixed schools in which ICT skills have aided teachers in the teaching of Mathematics

(3) There is no significant difference between qualified and incompetent teachers where using computers to teach Mathematics

(4) There is no significant difference in the difficulties of using a computer to teach Mathematics between highly skilled and moderately experienced teachers

(5) Students in various school types will not significantly differ in the abilities required to master Mathematics

(6) Teacher in various school types will not significantly differ in the abilities required to teach Mathematics

(3) What difficulties do people in Ikere Local Government Area of Ekiti have using computers for teaching and learning Mathematics?

(4) How much has ICT aided mathematics instruction in Ikere Local Government Area in Ekiti State in their study of mathematics?

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(5) Students in various school types will not significantly differ in the abilities required to
master Mathematics
(6) Teacher in various school types will not significantly differ in the abilities
required to teach Mathematics

Methodology

The study is a descriptive research of survey type which involved strictly on the assessment of the usage of computers in the teaching and learning of mathematics among the senior secondary school students in Ikere Local Government Area of Ekiti state. It is a survey type aimed at collecting data on and describing in a systematic manner the characteristics, features or facts about a given population [42, 43, 44, and 46].

Population

All government public secondary school students in Ikere Local Government Area of Ekiti State, Nigeria, totaling ten (10) schools, forty (40), mathematics teachers, and two thousand (2000) students, were the study's target population. Ikere is a multicultural town that draws visitors from all over the state and, by extension, the nation. This is because it is a university town. As a result, the findings of any study conducted in the town will probably be an accurate representation of the entire state.

Sample and sampling techniques

A sample of twenty (20) students purposively selected from the ten schools totalling two hundred students depicts the sample for the study.

Instrumentation

The instrument for the study was a five-scale questionnaire designed by the researchers based on some variables related to the usage of computers in the teaching and learning of mathematics among senior secondary school students. The face and content validities were ascertained by three experts in mathematics computer and information

technology departments and one expert in test and measurement from the School of Social Science Education; Bamidele Olumilua University of Education, Science and Technology, Ikere Ekiti. The construct validity and reliability were determined by the researchers using the alpha Cronbach formula. The result of the estimate was 0.81 and this index is considered high and significant enough for this kind of study it corroborates with [47, 48] who argued that the reliability Coefficient should range between 0.50-0.85 and above. With the assistance of the various mathematics teachers whose classes were used for the study; mostly from the ten sampled public schools, the completed questionnaire was collected from the respondents and coded and analyzed accordingly with the aid of computer assistance. There was no report of any loss of the questionnaire. With this, a 100% return rate was achieved.

Data Analysis

The data collected were analysed descriptively to answer the general questions raised while t-test and ANOVA statistics were used to test the six hypotheses formulated at 0.05 level of significance or Tolerable limit of error using SPSS version 20.

RESULTS

Descriptive Analysis

Research Question 1: What are the ICT skills required for mathematics instruction in Ikere Local Government Area of Ekiti state?

Table 1: ICT Skills needed in learning of Mathematics

S/N	ITEM	SA	A	D	SD	RMK
1.	Students browsed for materials on internet to improve their learning of mathematics	82 (41.0)	109 (54.5)	5 (2.5)	4 (2.0)	A
2.	Students use Microsoft word in the classroom while learning mathematics	15 (7.5)	63 (31.5)	49 (24.5)	73 (36.5)	SD

Table 1 shows the influence of ICT Skills needed in learning Mathematics in senior secondary schools in Ikere local government of Ekiti state. The table revealed that 191 (95.5%) respondents agree that students browsed for materials on the

internet to improve their learning of mathematics while 9 (4.5%) respondents held a contrary opinion. In item 2, 78 (39.0%) respondents agreed that students use Microsoft Word in the classroom while learning mathematics while 122 (61.0%) disagreed.

Research Question 2: How accessible are computers and related equipment in senior secondary schools in Ikere Local Government Area of Ekiti state?

Table 2: Availability of computers and related equipment

S/N	ITEM	SA	A	D	SD	RMK
1.	Student have access to digital library	61 (30.5)	54 (27.0)	50 (25.0)	35 (17.5)	SA
2.	School has ICT laboratory	113 (56.5)	42 (21.0)	9 (4.5)	36 (18.0)	SA
3.	School has enough ICT support personnel	17 (8.5)	79 (39.5)	69 (34.5)	35 (17.5)	A
4.	Students do not have personal computer	13 (6.5)	146 (73.0)	22 (11.0)	19 (9.5)	A
5.	Students do not have access to multimedia project	15 (7.5)	92 (46.0)	49 (24.5)	44 (22.0)	A
6.	Students have access to data project	24 (12.0)	22 (11.0)	76 (38.0)	78 (39.0)	SD

Table 2 lists the senior secondary schools' access to computers in the Ikere local government of the state of Ekiti. The data showed that 85 (42.5%) respondents disagreed with the statement that students had access to digital libraries, while 115 (57.5%) respondents agreed with it. In response to question two, 155 respondents (77.5%) confirmed that their schools have an ICT lab, whereas 45 (22.5%) disagreed. In response to question 3, 96 (48.0%) students believed that their schools had enough ICT support staff, while 104 (52.0%)

respondents disagreed. When asked whether students have personal computers, 159 respondents (79.5%) agreed, while 41 (20.5%) disagreed. In response to question 5, 107 (53.5%) students concurred that they lack access to multimedia projects, while 93 (46.5%) did not. In response to question 6, 46 (23% of students) and 154 (77%) students both agreed that students have access to data projects.

Research Question 3: What difficulties do people in Ikere Local Government Area of Ekiti have using computers for teaching and learning Mathematics?

Table 3: Difficulties of using computers for teaching and learning.

S/N	ITEM	SA	A	D	SD	RMK
1.	High cost of procurement and installation of computer	89 (44.5)	81 (40.5)	25 (12.5)	5 (2.5)	SA
2.	Shortage of skilled manpower	68 (34.0)	93 (46.5)	34 (17.0)	5 (2.5)	A
3.	Lack of specialize ICT learning center	51 (25.5)	88 (44.0)	51 (25.5)	10 (5.0)	A
4.	High cost of remission of information in Nigeria	60 (30.0)	89 (44.5)	28 (14.0)	23 (11.5)	A
5.	Poor power supply	38 (19.0)	74 (37.0)	54 (27.0)	34 (17.0)	A
6.	Poor maintenance of existing telecommunication facilities	38 (19.0)	51 (25.5)	54 (27.0)	19 (9.5)	D

The difficulties with computer use in senior secondary schools in Ikere local government, Ekiti state, are shown in Table 3. According to the table, 170 respondents (85.0%) agreed that buying and installing computers is expensive, whereas 30 respondents (15.0%) disagreed. In response to question 2, 161 respondents (80.5%) agreed that there is a scarcity of competent labor, while 39 respondents (19.5%) disagreed. In response to question 3, 139 students (69.5%) felt that there aren't enough specialized ICT learning facilities, whereas 61 respondents (30.5%) disagreed. In response to question 4, 149 respondents (74.5%) agreed that the cost of transmitting information is high in Nigeria, whereas 51 (25.5%) disagreed. When asked whether there is a bad power supply, 112 (56.0%) students agreed, while 88 (44.0%) did not. In response to

question 6, 127 respondents (63.5%) agreed that current telecommunications facilities are not maintained well, while 73 (36.5%) disagreed.

Research Question 4: How much has ICT aided mathematics instruction in the Ikere Local Government Area in Ekiti State?

Table 4: ICT aided math instruction in the Ikere Local Government

S/N	ITEM	SA	A	D	SD	RMK
1.	The introduction of ICT has motivated student to learn	132 (66.0)	55 (27.5)	9 (4.5)	4 (2.0)	SA
2.	ICT has made the learning of mathematics easier for student	133 (66.5)	54 (27.0)	12 (6.0)	1 (0.5)	SA
3.	With ICT, students need little assistance from teachers in learning mathematics	103 (51.5)	83 (41.5)	12 (6.0)	2 (1.0)	SA
4.	Learning with ICT has improved academic performance	132 (66.0)	54 (27.0)	13 (6.5)	1 (0.5)	SA
5.	Learning with ICT has created awareness in students	112 (56.0)	76 (38.0)	10 (5.0)	2 (1.0)	SA
6.	With ICT, Mathematics is more interesting to students	167 (83.5)	21 (11.5)	10 (5.0)	2 (1.0)	SA

The use of ICT in senior secondary schools in the Ikere local government of Ekiti state is shown in Table 4 as having a positive impact on student learning. According to the data in the table, 187 respondents (93.5%) agreed that the use of ICT has encouraged students to learn, whereas 13 respondents (6.5%) disagreed. ICT has made mathematics learning easier for kids, according to 187 (93.5%) respondents who responded to question 2, while 13 (6.5%) disagreed. In response to question 3, 186 students (93.0%) agreed that using ICT, students require little help from teachers to learn mathematics, while 14 respondents (7.0%) disagreed. In response to question 4, 186 respondents (93.0%) agreed that using ICT to learn had enhanced academic performance, whereas 14 respondents (7.0%) disagreed. In response to question 5, 188 (94.0%) students agreed that using ICT in the classroom has increased student awareness, while 12 (6.0%) disagreed. With ICT, mathematics is more engaging for kids, according to 188 (94.0%) respondents who responded to question 6, while 12 (6.0%) disagreed.

Hypotheses Testing

Hypothesis 1: There is no significant difference between Male and Female students in terms of how much ICT skills have aided their study of mathematics.

Table 5: t-test analysis of students' response

Group	N	Mean	SD	Df	t_{cal}	t_{tab}	Decision
Male	104	1.63	0.67	198	0.65	1.96	Not Significant
Female	96	1.70	0.70				

The result in Table 5 shows the difference in the mean rating of Male and Female students. The t-test analyses revealed that the mean score for male students (1.63) was less than the mean score for female students (1.70) with a mean difference of (0.03). The t-test analysis also showed that t_{cal} (0.65) was less than t_{tab} (1.96) at $p < 0.05$ level of significance. This implies that there was no significant difference in the extent ICT skills has helped male and female students in learning mathematics. Hence, the null hypothesis was upheld.

Hypothesis 2: There is no significant difference between single and mixed schools in the degree to which ICT skills have aided teachers in teaching mathematics.

Table 6: t-test analysis of teachers' response

Group	N	Mean	SD	Df	t_{cal}	t_{tab}	Decision
Same gender	9	1.58	0.72	18	0.57	1.96	Not Significant
Mixed	11	1.67	0.66				

The result in Table 6 shows the difference in mean rating of same-gender and mixed-school teachers. The t-test analysis revealed that the mean score for teachers in same-gender schools (0.72) was greater than the mean score for teachers in mixed schools (0.66) with a mean difference of (0.04). The t-test analysis also showed that t_{cal} (0.57) was less than t_{tab} (1.96) at $p < 0.05$ level of significance. This implies that there was no significant difference in the extent ICT skills have helped teachers in teaching mathematics in same-gender and mixed schools. Hence, the null hypothesis was upheld.

Hypothesis 3: There is no significant difference between qualified and unqualified teachers, when using computers to teach mathematics.

Table 7: t-test analysis of teachers' response

Group	N	Mean	SD	Df	t_{cal}	t_{tab}	Decision
Qualified	12	2.37	0.52	18	0.18	1.96	Not Significant
Unqualified	8	2.42	0.51				

The result in Table 7 shows the difference in mean rating for between qualified and unqualified mathematics teachers. The t-test analysis revealed that the mean score for qualified teachers (2.37) was greater than the mean score for unqualified teachers (2.42) with a mean difference of (0.05). The t-test analysis also showed that t_{cal} (0.18) was less than t_{cal} (1.96) at $p < 0.05$ level of significance. This implies that there was no significant difference between qualified and unqualified teachers in the utilization of computers for teaching mathematics. Hence, the null hypothesis was upheld.

Hypothesis 4: There is no significant difference in the difficulties of using a computer to teach mathematics between highly skilled and moderately experienced teachers.

Table 8: t-test analysis of teachers' response

Group	N	Mean	SD	Df	t_{cal}	t_{tab}	Decision
Highly experienced	9	1.44	0.53	18	1.27	1.96	Not Significant
Moderately experienced	11	1.72	0.47				

The result in Table 8 shows the difference in mean scores between highly experienced and moderately experienced teachers. The t-test analyses revealed that the mean score for highly experienced teachers (1.44) was less than the mean score for moderately experienced teachers (1.72) with a mean difference of (0.28). The t-test analysis also showed that t_{cal} (1.27) was less than t_{tab} (1.96) at $p < 0.05$ level of significance. This implies that there was no significant difference between

highly experienced and moderately experienced teachers in the challenges of the use of computers for teaching mathematics. Hence, the null hypothesis was upheld.

Hypothesis 5: Students in various school types do not significantly differ in the ICT abilities required to master mathematics.

Table 9: ANOVA test analysis of students' response

	Sum of squares	**Df**	**Mean square**	**F_{cal}**	**F_{tab}**	**Sig.**	**Decision**
Between Groups	0.661	2	0.331	0.33	3.03	0.464	NS
Within Groups	84.494	197	0.249				
Total	85.155	199					

p< 0.05 level of significance. NS = Not Significant

The result of the analysis in Table 9 shows the differences in the responses of students of different school types. The Analysis of Variance revealed that Fcal (0.33) was less than Ftab (3.03) at a $p < 0.05$ level of significance. This means that there was no significant difference ICT skills needed in learning mathematics among students in different school types. Hence, the null hypothesis 5 was upheld.

Hypothesis 6: There is no significant difference among the teachers in various school types in the usage of ICT in the teaching of mathematics.

Table 10: ICT for the teaching of Mathematics from the various schools.

	Sum of squares	**Df**	**Mean square**	**F_{cal}**	**F_{tab}**	**Sig.**	**Decision**
Between Groups	0.093	2	0.046	0.92	3.03	0.417	NS
Within Groups	0.857	17	0.050				

Total	0.950	19					

p< 0.05 level of significance. NS = Not Significant

The result of the analysis in Table 10 shows the differences in the responses of teachers of different school types. The Analysis of Variance revealed that Fcal (0.92) was less than Ftab (3.03) at a $p < 0.05$ level of significance. This means that there was no significant difference in ICT skills needed in teaching mathematics among students in different school types. Hence, the null hypothesis 6 was upheld.

Discussion of Findings

The following were found from the descriptive analyses in Tables 1 through 5. Table 1 shows that most of the respondents agreed that students browsed for the materials on the internet to improve their learning of Mathematics in item 1, while in item 2, respondents exhibited strongly disagreed with the students' use of Microsoft Word in the classroom while learning Mathematics. This corroborates the finding of [49].

According to Table 2, respondents strongly agreed with items 1 and 2, indicating that students have access to digital libraries and that schools have ICT libraries. However, respondents strongly disagreed with items 3, 4, and 5, indicating that students lack a personal computer and do not have access to the multimedia project despite the fact that schools have enough ICT support staff.

Six items are listed in Table 3. Item 1 indicates Strongly Agree (S.A.) that the high cost of purchasing and installing computers, and respondents showed agreement with items 2, 3, 4, and 5 indicating a lack of skilled labor, a lack of specialized ICT learning centers, a high cost of information revision in Nigeria, and poor power supply in all the schools sampled for the study. This finding is consistent with that of [39], who carried out a systematic review of the use of ICT in teaching and learning mathematics at the College of Education in Ghana. They found that among the challenges tutors face when using ICTs for teaching are a lack of technical support, a lack of technological pedagogical content knowledge, a resistance to change on the part of mathematics instructors, and insufficient

funding. The majority of respondents, however, disagreed with item 6's assertion that current telecommunications infrastructure was not being properly maintained.

Six items make up Table 4, and respondents indicated that they strongly agreed with each one. This suggests that the adoption of ICT has the potential to inspire students to learn and facilitate their learning of mathematics. The use of ICT in teaching and learning has reduced the amount of teacher support that students require to understand mathematics, which has unquestionably enhanced academic achievement and raised student awareness. Additionally, using ICT to teach mathematics has made the subject to be more engaging for students. This finding supports those of [31, 32 and 33] who found that using ICT to teach mathematics makes learning more dynamic and engaging, helps students visualize abstract mathematical concepts, and improves their chances for individualized learning.

The respondents indicated strong agreement (S.A.) on all five (5) of the issues in Table 5: Teachers of mathematics searched the internet for resources to help them deliver better lessons. High levels of proficiency are displayed by mathematics teachers while using PowerPoint to explain mathematical concepts. The teachers used an overhead projector to demonstrate mathematical applications. When teaching mathematics in the classroom, teachers utilize Microsoft Word. The teacher assigns homework to students using Microsoft Excel. This works in tandem with [49]'s (2015) and those of [50] findings, but not always with those of [24, 23].

The study found that while there was variation in mean ICT capabilities (0.07), there was no significant difference between male and female students' ICT skill levels in studying mathematics at $P<0.05$. Males have a lower mean ICT (1.63) than females (1.70), and there was very little variation in the mean (0.7). The results of [23] support this; however, they differ from those of [49]. Additionally, there was no statistically significant difference between single and mixed schools in terms of how much ICT expertise has benefited instructors in the delivery of mathematics at the $P<0.05$ level. The mean ICT proficiency of teachers in single and mixed schools varied by (0.11), with the mean of teachers in single ICT schools being lower (1.58) than the mean of teachers in mixed schools (1.67). The difference from the mean was only (0.11)

percent. This supports the conclusions reached by [49] but differs with those reached by [23, 24].

The study also revealed that when utilizing computers to teach mathematics, there was no discernible difference between competent and inexperienced teachers at P<0.05. There is a difference between the qualified (2.37) and unqualified (2.42) means, however the difference was not statistically significant at P<0.05. The study also found no difference between highly experienced and moderately experienced teachers in the difficulties they encountered when using computers to teach mathematics (p>0.05). However, the highly experienced teachers' mean variation was lower (1.44) than that of the moderately experienced teachers' mean variation (1.72), which was (0.28). The results of [49, 24, 23] all corroborated this conclusion.

While hypothesis 5 from Tables 10 and 11 demonstrated that there was no significant difference between teachers' use of ICT for the teaching of Mathematics from different schools and students' ICT abilities necessary to master Mathematics in different school types and also among students at P<0.05. As a result, both hypotheses five and six were confirmed.

Conclusion

According to the study, there are no appreciable differences in the ways that different teachers and schools use computers to instruct their students in mathematics in senior secondary schools in the Ikere Local Government Area of Ekiti State across all of the variables taken into account for the study.

Recommendations

According to the study's findings, it is now advised that senior secondary schools in the Ikere Local Government Area of Ekiti state pay enough attention to ICT usage for mathematics lessons in order to ensure successful teaching and learning of the subject. To help learners communicate with the outside world and develop their listening, speaking, reading, and writing skills in mathematics, mathematics teachers should provide opportunities for their students to use computers and the internet. Teachers should often attend conferences and seminars on how to use computer programs to teach mathematics effectively. In order to improve effective teaching

and learning of mathematics at senior secondary schools in Ikere Local Government Area of Ekiti State, computer literacy should be a requirement for employment. Similar to this, all levels of government should prioritize providing secondary schools with computer hardware and accessories.

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