

ASSESSMENT OF TEACHERS' USAGE AND APPLICATION OF INFORMATION AND COMMUNICATION TECHNOLOGY IN THE TEACHING OF MATHEMATICS IN SECONDARY SCHOOLS IN OYO CENTRAL SENATORIAL DISTRICT OF OYO STATE

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Abstract

This study examines the usage and application of Information and communication technology in teaching Mathematics among senior secondary school students in Oyo Central Senatorial District of Oyo State. A descriptive survey design is adopted in this research work. The research work is guided by three research hypotheses. The sample size for the study consisted of 350 teachers in public secondary schools. A questionnaire was used as the instrument for gathering data for the study and was validated with a reliability coefficient of 0.85. Data collected were analyzed using chi-square. Results of the study showed that there is a significant difference in the usage of traditional methods and ICT in the teaching of Mathematics in Senior Secondary Schools. Also, the finding stated that there is significant difference usage of ICT in teaching science subjects and Mathematics in Senior Secondary Schools. While one of the results of the findings stated that the attitudes of male and female students taught with ICT instructional materials are not significant during teaching and learning Mathematics. However, these results indicated that ICT does not have effects on the teaching and learning of Mathematics in secondary schools of Oyo Central Senatorial District of Oyo State. Based on the findings of the study, teachers should be given appropriate training which can go a long way to address some of the barriers in the integration of ICTs tools in the teaching of Mathematics also ICT infrastructure such as computer labs, projectors, internet facilities, etc. should be provided at the secondary schools for effective teaching and learning of Mathematics.

Keywords: Application, ICT, Mathematics, public secondary schools, Teaching

Introduction

The rapid development of technology in the twenty-first century has made it necessary for education and learning of Mathematics to advance and enable students at all levels to compete in the global economy. Since the world has become more globalized, it is crucial to know everything that is needed to be known. It is obvious that technology is a major element and plays a central role in all aspects of our lives as the world changes and becomes more diversified. The teacher has a key role in deciding how technology is integrated into teaching of Mathematics. The use of technologies including hardware, software, networks, and media for the gathering, transmission, processing, and presentation of information in audio, visual, textual, and multimodal formats is known as information and communication technology (Igwe, 2011). Tukur and Adamu (2014) viewed ICT as the use of the internet and computer-based technologies to provide information and communication services to a variety of users. The term is generally used to describe a variety of technologies, including phones, e-mail, and other things. The internet is at the center of the spectrum of technologies because it offers a means of transferring data in many formats, including text, photos, sound, and video. Bamiro (2011) viewed ICT as the application of computer systems and digital devices to manipulate data. Integration of ICT has infiltrated every

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aspect of life in our contemporary society and as a result of this, ICT is widely and mostly embraced in the educational sector and this has led to rapid development in the educational sector, most especially in the teaching and learning of mathematics also it has become a powerful driving force of globalization and made a continual impact on the educational system of any nation and for any nation to be among developed nations such a nation must anchor its sciences and technology on the quality of Mathematics attainment. For effective teaching and learning to take place teachers must genuinely incorporate these technologies into their pedagogy, therefore for technology to have any discernible educational effects (Chigona et al., 2014). This claim is supported by a study conducted by Joshi (2017), which notes that ICT is helpful in mathematics teaching and learning since it enhances instructional strategies and encourages students engagement. If educators successfully integrate technological resources into their classrooms, the teaching and learning environment may thus change to reflect a new dynamic (Oldknow et al., 2010). At all levels of the educational system, introduction of technology presents considerable hurdles, from the purchase of ICT equipment to curriculum and teaching technique modifications and the incorporation of new instructional tools (Johnson, et al., 2016). As a result, educators must always give careful thought to the ICT hardware and applications they use in the classroom. Before using an ICT tool in a lesson, it should be carefully considered, and the teacher should keep an eye on it while it is being used. Teachers are crucial to providing high-quality education. The range of teaching techniques they use in the classroom improves both students performance and understanding of mathematical concepts. Due to inadequate curriculum material and restricted access to ICTs, schools have not utilized ICTs as a means of acquiring new knowledge and skills (Dhital, 2018). Gerick and Koop (2016) have identified some influencing factors that include none availability of computers, inadequate IT infrastructure, including PCs and the Internet, school leadership (professional development, school goals, and importance of student competencies), school strategies, and teacher attitudes. Despite the initial optimism for the future of technology integration in mathematics education, several types of research suggest that technology has not significantly changed mathematics teaching and that institutional support, access to digital technologies, and educational policies are more important than technology in this regard. The majority of mathematics teachers and students primarily use ICT tools to perform straightforward calculations, store data, and display static materials. These activities are unlikely to advance student understanding, pique their interests, or boost their mathematical proficiency (Ertmer, 2005). Self-efficacy beliefs, epistemological views, and beliefs about teaching with technology (Griffish et al., 2020). When Mathematics teachers use ICT, it suggests that they have a favorable view of technology and that they are using teaching strategies that are compatible with using ICT both within and outside of the classroom (Gispert, 2014). The advancement of all fields of knowledge and the modernization of society are both facilitated by mathematics, which is significant. Since arithmetic is regarded as a deciding factor in children's future academic pathways, all youngsters are taught to become proficient in it. Gandhi and Lynch (2016) claim that teachers who successfully incorporate technology into the classroom are more productive in their instructional processes because courses are well-planned using the diversity of resources at their disposal. According to Ghavifekr and Rosdy (2015), teachers must receive ongoing technical support to integrate technology into learning environments successfully.

For a variety of reasons, many teachers are reluctant to use these resources, and as a result, they prefer using ICT in traditional classrooms. Furthermore, according to Kler (2014), a lot of teachers are averse to changing their teaching methods because they are at ease with them. They will gain confidence through experience, which may transform their attitudes toward incorporating technology into their education, if these instructors are given the right training to maximize the use of technology in teaching and learning (González et al., 2017). Students' academic talents are not developed by ICTs, but rather by teachers who use them effectively, therefore we live in a digital age, and ICT is being used to further academic objectives in teaching and learning.

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Statement of the Problem

Mathematics is a fundamental tool in all other fields of study and is a language of science, due to this, it has become one of the core subjects at all levels of the educational system. ICT is now dominating every aspect of the education sector to the extent that teaching and learning Mathematics have become more essential as we are moving rapidly into the world of digital media and information. But the incessant failure in Mathematics across the globe is a result of teachers' incompetence in the use of ICT tools, lack of stable electricity, lack of commitment to the usage of ICT tools, and poor integration of ICT tools in the teaching and learning process, unfavorable government policy towards implementation as well as non-availability of external support for the schools and cost of ICT infrastructure. However, if the above-stated problems are often addressed by the government, school management, and stakeholders to the least levels of education therefore both external and internal mathematics examinations would be encouraging. Therefore, this research work intends to determine the level of information and communication technology usage which has to do with the benefit derived from the ICT tools as well as an application that has to do with how ICT tools are used to produce the benefits.

Purpose of the Study

The purpose of my research study is to explore the extent to which ICT is integrated into the teaching and learning of Mathematics in secondary school in Oyo central senatorial district of Oyo state.

Research Hypotheses

This research work is guided by three hypotheses:

1. There is no significant difference between using the traditional method and ICT in the teaching of Mathematics in Senior Secondary Schools.
2. There is no significant difference in the usage of ICT in teaching science subjects and Mathematics in Senior Secondary Schools.
3. There is no significant difference in the attitudes of male and female students taught using ICT instructional aids in Mathematics lessons.

Methodology

The study used a descriptive survey research design methodology as its method of investigation. Public secondary schools in the 11 local government areas were captured in the Oyo Central Senatorial District of Oyo State which were: Afijio-30, Akinyele-40, Atiba-35, Egbeda-35, Lagelu-30, Surulere-30, Oyo-West-30, Oyo-East-30, Oluyole-30, Ogo-oluwa-30, and Ona-ara-30. The sample size of the study comprises three hundred and fifty (350) teachers randomly selected across public secondary schools in Oyo Central Senatorial District of Oyo State. The data was collected employing a structured questionnaire. And was validated with a reliability coefficient of 0.85. This instrument consists of twenty items the hypothesis was tested at a significance level and data collected were analyzed using chi-square.

Results

Hypothesis 1: There is no significant difference between using traditional methods and ICT in the teaching of Mathematics in Senior Secondary Schools.

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Table 1: Shown chi-square on the usage of traditional method and ICT in the teaching of Mathematics in Senior Secondary Schools.

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square		1	0.017		
Continuity Correction ^b	5.747 ^a	3	0.022		
Likelihood Ratio	5.221	346	0.016	0.018	0.011
Fisher's Exact Test	5.760		0.017		
Linear-by-Linear Association	5.731	350			
N of Valid Cases	375				

0 cells (50.0%) have an expected count of less than 5. The minimum expected count is 55.33 Since the Asymptotic Significant value (5.747) is greater than the alpha value of 0.05, then the null hypothesis is, therefore, rejected and it was concluded that there is a significant difference in the usage of the traditional method and ICT in the teaching of Mathematics in Senior Secondary Schools.

Hypothesis 2: There is no significant difference in the usage of ICT in teaching science subjects and Mathematics in Senior Secondary Schools.

Table 2: Shown chi-square on the usage of ICT in teaching science subjects and Mathematics in Senior Secondary Schools.

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	0.008 ^a	1	0.930		
Continuity Correction ^b	0.000	3	1.000		
Likelihood Ratio	0.000	346	0.930	1.000	0.510
Fisher's Exact Test	0.008	350	0.930		
Linear-by-Linear Association	375				
N of Valid Cases					

The minimum expected count is 53.39 Since the Asymptotic Significant value (.008) is greater than the alpha value of 0.05, the null hypothesis is therefore rejected and it was concluded that there is significant difference usage of ICT in teaching science subjects and Mathematics in Senior Secondary Schools.

Hypothesis 3: There is no significant difference in the attitudes of male and female students taught using ICT instructional aids in Mathematics lessons.

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Table 3: Summary of ANOVA on whether there is a difference in the attitude of male and female students taught using ICT instructional aids in teaching Mathematics.

Sources of variable	Sum of Squares	Df	Mean Square	F-Cal	F-Tab	Sig.
Between Groups	0.237	1	0.237	0.984	2.74	0.322
Within Groups	89.960	349	0.241			
Total	90.197	350				

Table 3 indicates that F-cal .984 is not greater than F-table 2.74. The source of variance between groups is .237 and the source of variance within groups is 89.960 therefore, the null hypothesis is accepted which clearly shows that both male and female students who were taught mathematics using ICT instructional tools were not significantly different.

Discussion of Findings

Hypothesis 1: There is no significant difference between using of traditional method and ICT in the teaching of Mathematics in Senior Secondary Schools. 0 cells (50.0%) have an expected count of less than 5. The minimum expected count is 55.33 Since the Asymptotic Significant value (5.747) is greater than the alpha value of 0.05, the null hypothesis is therefore rejected and it was concluded that there is a significant difference in the usage of the traditional method and ICT in the teaching of Mathematics in Senior Secondary Schools. The result of the study for research hypothesis 2 shows that usage of ICT has a major impact on the teaching and learning of Mathematics in senior secondary schools it was observed that ICT facilitates can students' learning ability. In this fitness, from table 1 the minimum expected count is 55.33 Since the Asymptotic Significant value (5.747) is greater than the alpha value of 0.05; from table 2 the minimum expected count is 53.39 Since the Asymptotic Significant value (.008) is greater than alpha value 0.05; also from table 3 the minimum expected count is 51.93 Since the Asymptotic Significant value (3.293) is greater than alpha value 0.05, this finding corroborates Kwache (2007) who submitted that the application of ICT makes schools more effective and productive, enhance and facilitate pedagogical activities. From table 3, F-cal .984 is not greater than F-table 2. The source of variance between groups is 0.237 and the source of variance within groups is 89.960. Here null hypothesis three was accepted. Meaning that the way male and female students react to the ICT instructional aids is not the same, but both male and female students may embrace it or reject it.

Conclusion

This research work focused on the usage of ICT tools in teaching Mathematics in secondary schools, and the level of application of the available ICT tools. The finding of this study revealed that most of our secondary schools are lagging in the level of application of ICT in teaching Mathematics even though there are few ICT instructional aids available in those secondary schools. However, if Mathematics teachers judiciously use those ICT infrastructures It can influence the way students are taught and how they learn. It would provide a rich environment and motivation for the teaching-learning.

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Recommendations

Due to the outcome of the findings, the following recommendations are made:

1. Teachers should be given appropriate training which can go a long way to address some of the barriers to the integration of ICTs tools in the teaching of Mathematics
2. ICT infrastructure such as computer labs, projectors, internet facilities, etc. should be provided at secondary schools for effective teaching and learning of Mathematics.
3. School management at all levels of educational sectors most especially secondary schools should enforce and also encourage teachers to use ICT instructional aids while teaching Mathematics.

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