

The Role of Information and Communication Technology as a Tool for Effective Teaching and Learning of Mathematics

Babangida Bature*

Department of Mathematics and Computer Sciences Umaru Musa Yar'adua University Katsina, Katsina State, Nigeria

Abstract

This study actually investigated the role of ICT as a tool for effective teaching and learning of Mathematics in Secondary Schools. The purpose of this study was to explore students and mathematics teachers' trainees' use of ICT in the teaching and learning of mathematics. The study adopted survey research design and was conducted in Kafur Local Government Area of Katsina State. The target population was the entire students and mathematics teachers in Kafur Local Government. Five out of ten secondary schools in the area of study were randomly selected as a sample. The instrument used was questionnaires for both teachers and students. Simple percentage and chi-square were used to analyze the data. Among the findings are the use of ICT by students improved their performance, problem-solving skill and mathematics achievements. Some recommendations were equally made among which are; adequate and qualitative ITC materials and computer laboratories should be made available in all secondary schools.

Keywords: ICT; Teaching and learning of mathematics; Students' mathematics achievements; Problem-solving skills; Secondary schools

Introduction

The Nigeria society seems to be influenced by the scientific and technological development. It is quite clear that if technological development is to be achieved, proficiency in mathematics must be achieved. And for this to be achieved, all problems confronting mathematics teaching and learning in secondary schools that cause poor performance of students should be addressed. One way of doing this is through the use of information and communication technology. Batiku [1] is of view that mathematics is a useful tool in the society, more so in the present technology age. Babalola [2] viewed mathematics as a basic tool in development of science based knowledge such as technology, industry and even for sound analytical reasoning in daily living in a modern society such as ours. Anibueze [3] stated that mathematics plays important roles in the following areas; mathematics as core skill for life, mathematics as key to economic prosperity, and mathematics full of beauty and mathematics education.

In recent years, it seems there have been a sudden increase in the demand of ICT for teaching and learning of mathematics in our secondary schools such as computers, internet, overhead projectors, slide projectors, A-V materials, hand held calculator, printed materials, films motion pictures, sound and video recorders, improvised materials etc.

The introduction of these modern tools in our secondary school system shall improve the teaching and learning of mathematics. The more effective these tools were used in teaching and learning of mathematics, the greater the understanding of the students for the subject.

Objectives of the Study

The major objectives of this study were to:

- Find out whether the use of ICT tools in teaching and learning of mathematics improves students' performance and achievements.
- Find out whether the use of ICT tools enhances teaching and learning of mathematics and improves students' problem-solving skills.

- Find out whether the use of ICT tools motivates and makes students interested in learning mathematics.

Research hypothesis

HO₁: There is significant different between the response of the teachers and that of the students on the role of ICT tools for teaching and learning of mathematics in the selected schools.

HO₂: There is significant different between the views expressed by the teachers and students on the role of ICT tools for teaching and learning of mathematics in the selected schools.

Scope and Limitation

The scope of this study is the entire students and mathematics teachers in secondary schools in Kafur Local Government Area. However, there is need to narrow down this research within reasonable, manageable, controllable and coverable limit so as to enable this research focus attention on all its aspects. Kafur Local Government consist of many secondary schools, but this research is limited to the five secondary schools namely;

- Government Day Secondary School Dankanjiba
- Government Day Secondary School Mahuta
- Government Day Secondary School Gamzago
- Community Secondary School Kafur

*Corresponding author: Babangida B, Department of Mathematics and Computer Sciences, Faculty of Natural and Applied Sciences, Umaru Musa Yar'adua University Katsina, Katsina State, Nigeria, Tel: +2347067704150; E-mail: bature.babangida@umyu.edu.ng

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- Government Day Pilot Secondary School Kafur
- The tale below show the distribution of the research sample population (Table 1).

Data analysis

This section concerned with presentation and analysis of data. A total of 222 questionnaires were distributed to the students and mathematics teachers in five secondary schools selected for the research. The idea behind all this was to obtained primary information that would enable the stated objectives been achieved. The data obtained was presented based on the stated objectives in the tables below (Table 2).

The above table shows that the use of ICT tools improves students’ performance and achievements in mathematics as 77% and 78% of mathematics teachers and students respectively do either agreed or strongly with the statement. The $X^2_{(cal)} = 2.27 < X^2_{(crit)} = 11.34$. This lead to rejection of the null hypothesis as there is no significant different between the opinions expressed by mathematics teachers and students of the selected schools for the research.

The above table shows that the use of ICT tools enhances teaching and learning of mathematics and improves students’ problem-solving skills as 72% and 72.5% of mathematics teachers and students respectively do either agreed or strongly with Barjo [4] the statement. The $X^2_{(cal)} = 9.36 < X^2_{(crit)} = 11$. This lead to rejection of the null hypothesis as there is no significant different between the opinions expressed by mathematics teachers and students of the selected schools for the research (Table 3).

The above table shows that the use of ICT tools motivates and makes students interested in learning mathematics as 72% and 72.5% of mathematics teachers and students respectively do either agreed or strongly with the statement. The $X^2_{(cal)} = 0.30 < X^2_{(crit)} = 11$. This lead to rejection of the null hypothesis as there is no significant different between the opinions expressed by mathematics teachers and students of the selected schools for the research [5].

SN	Name of Schools	No. of Students	No. of Teachers
1	GDSS Dankanjiba	40	5
2	GDSS Mahuta	40	4
3	GDSS Gamzago	40	3
4	CSS Kafur	40	4
5	GDPSS Kafur	40	6
	Total	200	22

Table 1: Student and teachers population for the study.

Major Findings

The discovered the following:

- Effective use of ICT tools in teaching and learning of mathematics improves students’ performance and achievements.
- Effective use of ICT tools enhances teaching and learning of mathematics and improves students’ problem-solving skills.
- Effective use of ICT tools motivates and makes students interested in learning mathematics.

Discussion of Findings

This study investigated the role of ICT in teaching and learning of mathematics in secondary schools in Kafur LGA of Katsina State. The study was a survey design which sampled 222 mathematics teachers and students of Kafur LGA of Katsina State. The study was guided by three objectives and two null hypotheses. The data obtained from the questionnaire was presented and analyzed in the above tables.

Table 1 studied the effects of ICT tools in students’ performance and achievements in mathematics. The table revealed that it was generally agreed that the of ICT tools improves students’ performance and achievements in mathematics.

Table 2 analyzed the role of ICT tools in enhancing teaching and learning of mathematics and improves students’ problem-solving skills. It is highly agreed that effective use of ICT enhances teaching and learning of mathematics as well as improving students’ problem-solving skills.

Finally, Table 3 proved that ICT tools motivates and makes students interested in learning mathematics. It is highly agreed that ICT tools when effectively use motivates and makes students interested in learning mathematics.

Conclusion

This study examined the role of ICT in teaching and learning of mathematics in secondary schools in Kafur LGA of Katsina State. Among the findings which appeared to validate this study are; effective use of ICT tools in teaching and learning of mathematics improves students’ performance and achievements, use of ICT tools enhances teaching and learning of mathematics and improves students’ problem-solving skills and use of ICT tools motivates and makes students interested in learning mathematics.

Students	Opinions	GDSS Mahuta	GDSS Dankanjiba	GDPSS Kafur	CSS Kafur	GDSS Gamzago	Total	percentage	Chi-Square Calculated	Chi-Square Table
	A	15	17	10	10	11	63	31.50%		
	SA	17	11	22	23	20	93	46.50%		
	D	5	8	6	3	5	27	13.50%		
	SD	3	4	2	4	4	17	8.50%		
	Total	40	40	40	40	40	200	100%		
Teachers	Opinions	GDSS Mahuta	GDSS Dankanjiba	GDPSS Kafur	CSS Kafue	GDSS Gamzago	Total	percentage	2.27	11.34
	A	1	1	2	2	1	7	32%		
	SA	2	3	3	-	2	10	45%		
	D	-	1	-	1	-	2	9%		
	SD	1	-	1	1	-	3	14%		
	Total	4	5	6	4	3	22	100%		

Table 2: The use of ICT tools enhances teaching and learning of mathematics and improves students’ problem-solving skills.

Students	Opinions	GDSS Mahuta	GDSS Dankanjiba	GDPSS Kafur	CSS Kafur	GDSS Gamzago	Total	Percentage	Chi-Square Calculated	Chi-Square Table
	A	14	8	9	6	9	46	23%	9.36	11.34
	SA	15	20	21	23	20	99	49.50%		
	D	7	7	6	4	5	29	14.50%		
	SD	4	5	4	7	6	26	13%		
	Total	40	40	40	40	40	200	100%		
Teachers	Opinions	GDSS Mahuta	GDSS Dankanjiba	GDPSS Kafur	CSS Kafue	GDSS Gamzago	Total	percentage		
	A	3	1	2	2	1	9	41%		
	SA	-	2	3	1	1	7	31%		
	D	-	1	1	1	-	3	14%		
	SD	1	1	-	-	1	3	14%		
	Total	4	5	6	4	3	22	100%		

Table 3: The use of ICT tools motivates and makes students interested in learning mathematics.

Recommendation

Based on the finding in this study, the following recommendations are made:

- Adequate and qualitative ICT tools should be provided to all secondary schools in Nigeria.
- Computer laboratories should be made available secondary schools.
- Constant supervision and maintenance of the provide material should be made.
- Supply of power should be made constantly in our secondary schools.

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