Vol 41, No 2 (2024): October 2024

Jurnal Penelitian Pendidikan

https://journal.unnes.ac.id/journals/jpp

Impact of Relevant Computer Softwares on Osun State Secondary School Students and Its Learning Effectiveness in Mathematics

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Abstract

The study investigated the relevance of computer software on Osun State high school students learning effectiveness in mathematics. The study is descriptive; a sample of 300 students from Osogbo Local Government, Osun State formed the participants for the study. The instrument for data collection was a questionnaire and checklist and the reliability level was 0.75. Data collected were analyzed using descriptive statistics specifically, using percentage, mean, t-test, and Pearson Moment Correlation Co-efficient. The findings of the study revealed that the use of computer instruction improves students' achievement in mathematics at high schools' level. Application software available for teaching and learning of mathematics as 3D grapher, advanced grapher software, curve fitting, algae programming, autograph, 3d shaped figure, rotation and reflection, vectors, graphs, graphic calculator, data fit software, math type, probability and statistics, brain builder math edition and efofex. Hence, there is a significant difference in the achievement of students target with application software tools in mathematics and those not target with application software tools. The following recommendations were made such as: a digital classroom that will contain adequate computer instructions should be put in place for mathematics teachers, students should be encouraged by teachers on the benefits of computer instruction for learning, and strategies should be designed on how students can be discouraged from undue commitment to computer software use for purposes other than education, employers of teachers should give sufficient technical skills to their employees on computer instruction so as to make them competent with the use of computer software.

Keywords: Computer Software, Computer Instruction, Students' Achievement, 3d Grapher, Advanced Grapher

INTRODUCTION

Man has been using technology in mathematics for thousands of years, starting with own fingers and stones for counters. He then progressed to using the stones in an Abacus, which is still used for complex arithmetic computations by some in Japan (and perhaps in other countries). The Slide rule was invented in the 17th century, and is credited as the tool of computation used for the Apollo moon missions in the 1950's and 60's (Oughtred Society, 2011).

Various mathematicians, using the slide rule and other tools) then laboriously did millions of calculations to formulate logarithmic and trigonometric tables for all to use. However, these fell into disuse in the mid-1970's, when the first hand held scientific calculators were used by students. Nowadays, graphing calculators are common in many mathematics classrooms in western countries. Most graphing calculators also include a cable for data transfer from probes to calculators or from calculators to computers.

Since the calculator and computer have become household items in the last two decades, the number and types of electronic tools for mathematics classrooms have. These tools of technology typically serve to do and learn mathematics. However, some are primarily used to teach mathematics, while others are for publishing mathematics content (Usiskin, 2011).

In the adult world, computers and mathematics share a conflicted, sometimes negative perception. Whether they are fun diversions, useful tools, or incomprehensible tools for specialists, computers and mathematics seem to go together in the minds of people everywhere. Despite this, many people feel they do not truly understand either mathematics or computers, relegating them to the area of technology that is for use rather than for understanding. This is consistent with the learning approaches that were used in mathematics teaching prior to the 1980s, as well as the introduction of the personal computer (PC) in the 1980s and the lack of exposure in their early lives Today, children exhibit very different attitudes toward

computers, often engaging in complex computational tasks that adults continue to struggle with. The major goal of mathematics teaching was mastery of long laborious computational rules. According to (NCTM, 2014) the major goal of mathematics instruction in the first half of the nineteenth century was computation, computation involving large numbers and repetitious rules. Colburn advocated a diagnostic approach to teaching of mathematics, shifting the emphasis from the rote memorization of rules to learners' method of solution (Sovchik, 2011).

This is the legacy of growing up in a world where computers are taken for granted, rather than being novel (and expensive) technologies. However, the perception of mathematics held by children does not seem to have kept pace. In various conversations with children, it becomes clear that many consider mathematics to be an uninteresting subject used school at best, or a frustrating assault on their academic self-efficacy at worst. Clearly, there is little connection between the acceptance of computers and evolution of mathematics teaching and learning.

According to Sobchak (2011) launching of sputnik in 1957 united the public opinion in United States and highlighted the strong need to establish experimental mathematics and science programs at all grade levels. Many universities developed experimental curricula that gradually affected the content of elementary school mathematics giving birth to the term "new math". New math was a wave of change, content of mathematics curricula were modified and stress was placed on mathematics structure. Mathematics instruction has also undergone change and emphasis shifted to guided discovery instead of lecturing (Cauthen, 2013).

According to Abe and Gbenro (2014) point out that mathematics plays a multidimensional role in science and technology of which its application outspread to all areas of science, technology as well as business enterprises. Due to the importance that mathematics engulfs; the subject became key in school curriculum.

In the study by Clotfelter, C.T, Ladd, H.F, & Vigor, J.L. (2010), they employed statewide end-of-course tests that were carried out in Carolina to establish the connection among tutors qualifications and learners achievement in high schools. According to the findings, there was compelling proof that tutors' qualifications, especially the license and credited ones, have significant impacts on learner success of high magnitude. The results mean that the uneven division of tutor testimonial brought about by racial profiling and economic condition of school learners influenced student achievement (Clotfelter et al., 2010).

In the world of education, the connection between computers and mathematics has been developing over some time. The theoretical discussions regarding computers in the mathematics classroom dates back to the late 1970s, when educators and computer scientists began to consider the role of computers in the classroom and, at the same time, began to reconsider the ways in which mathematics could be taught. However, this introduction of computers was not immediate, as computers of the time were still slow and expensive and were not generally conducive to positive classroom experiences. It is with the constructivist movement of the 1980s to today that computer in the classroom have emerged as a major tool for mathematics teaching and learning. Properly used technology helps teachers' present concepts to students more efficiently and helps students learn with more convenience. Technology has also allowed students to learn math in a more dynamic way" (Ferguson, 2011). Students are surrounded by technology, at school and at home. Students are drawn to technology, whether it is their iPod, cell phone, or computer; they are almost constantly using some form of technology.

Using technology as a teaching tool to increase students desire to learn and understand mathematics naturally feeds off their desire to be engrained with technology, which can result in better learning and improved performance on standardized tests

The "old" style of teaching, strictly in front of the class on a chalk board, is no longer capable of effectively reaching all students. Prensky (2012) coined the term "Digital Natives" to describe students who are "native speakers" of the technology they are surrounded by which has many teachers cringing due to their lack of technological vocabulary. Yet, to reach all students, teachers need to embrace the technology, becoming "Digital Immigrants, those who were not born into the digital world but have, at some later point in our lives, become fascinated by and adopted many or most aspects of technology" (Prensky, 2012). If teachers do this, they will capture the attention of students and enhance their learning environment. Statistics also show 44% of American Indian eighth graders score below grade level in mathematics (Ornstein & Levine, 2011). In this age of changing world new techniques and technology is replacing the traditional ways of teaching learning process to achieve the desired targets. The research that is presented in this Paper studied the impact of relevant computer software on Osun State high school students learning effectiveness in mathematics.

Statement of the Problem

The constructivist teaching movement, which began in the 1970s, focuses on the role of learning

through experience and individual construction of knowledge, rather than rote memorisation learning as a sequential, formalist logical process. This movement rejected the formalist view of mathematics and began to substitute a view that integrated learning and knowledge that allowed students to make sense in multiple ways of information they are presented with. It led to an approach in the elementary school environment where it was applied, which began to consider mathematics not as a series of formal rules or logics to be taught, but instead as higher order knowledge that could be gained through individual construction of understanding (Hickey, Moore and Pellegrino, 2011). This movement incorporated computers into mathematics learning as tools, or teaching aids, extending the focus on mathematics into other areas of the classroom (Vannatta and Fordham, 2014). It is therefore, this study seeks to investigate the relevant of computer software on Osun State high school students learning effectiveness in mathematics.

Purpose of the Study

The purpose of the study is to:

1. find out the overall effectiveness of computer instruction on students' achievement in mathematics at high schools.
2. examine the application software tools available for teaching and learning of mathematics.

Research Questions

1. What is the overall effectiveness of computer instruction on students' achievement in mathematics at high schools?
2. What are the application software tools available for teaching and learning of mathematics?

Research Hypothesis

Ho_1. Is there significant difference in the achievement of students target with application software tools in mathematics and those not target with application software tools?

Significance of the Study

In an effort to reach students with a style of teaching that captures their attention and enhances their learning requires teachers to look to new Instructional ideas that appeal to students. CEO Forum (2011), a partnership between technology-based companies and educators, believes that teachers will use technology as effectively and seamlessly as they employ chalkboards today. In his review of 219 research initiatives, completed from 1990 to 1997. Sivin-Kachala (2011) found these positive effects from integrating technology into the classroom. Students in technology rich environments experienced positive effects on achievement in all major subject areas.

Research Design

A descriptive (survey) research design was adopted for this study. This design is suitable for this study because this study involves collection of data from a sample for analysis and generalization without manipulating any of the variables.

Population

The population consists of all Secondary School Students in Osun State High Schools.

Sample and Sampling Techniques

Random sampling technique was used to select 300 students in Ten Secondary Schools in Osogbo Local Government while (30) students were selected in each of the selected schools, making a total of 300 respondents.

Research Instrument

A self-constructed questionnaire was used for this study. The questionnaire was categorized into two (2) sections. Section A is for demographic data of the respondents while section B consist 20 items on "Impact of relevant Computer Softwares on high school students learning effectiveness in mathematics.

Validity of the Instrument

A validated questionnaire was used for the study titled "Impact of Relevant Computer Softwares on Osun State High School Students and it's Learning Effectiveness in Mathematics (IRCSOSHSSLEM)". The questionnaire was given to two among the colleagues of one of the two researchers and another expert in tests and measurement to assess the relevance of the items to the study in terms of appropriateness and use of sentence. Their corrections and observations were put into consideration in designing the final instrument

that was used.

Reliability of Instrument

Test re-test method was used to determine the consistency of the instruments. The questionnaire was administered to 300 students. The administration was repeated after the period of three weeks. The responses were scored and Pearson Product Moment Correlation Co-efficient was used to determine the reliability of the instrument which gave a reliability index of 0.86, a strong indication that the instrument is very reliable.

Procedures for Data Collection

The researcher personally visited the schools and obtained permission from the school authorities. Copies of the questionnaires were distributed to the respondents and efforts were made to see that the respondents understood the content of the materials so that they complied with the directives. At the end of the exercise, the questionnaires were collected by the researcher.

Method of Data Analysis

Data collected were analysed using percentage, mean and t-test.

RESULTS

This section presents the analysis of data and interpretation of results. The first part presents the demographic distribution of respondents using descriptive statistics (frequency count and simple percentages) while the second part gives the analysis of research question using frequency and percentage.

Table 1. Respondent Distribution by Gender (N = 300)

	F	%
Male	180	60.0
Female	120	40.0
Total	300	100.0

Table 1 presents the gender distribution of respondent. It shows that 60.0% are male while 40.0% are female.

Table 2. Respondent Distribution by Age N = 300

	F	%
15-20	258	86.0
21-25	38	12.7
26-30	4	1.3
Total	300	100.0

Table 2 presents the Age distribution of respondent. It shows that 86.0% are between 15 and 20, 12.7% are between 21 and 25 while 1.3% are between 26 and 30.

Analysis of Research Question

Research Question 1: What is the overall effectiveness of computer instruction on students' achievement in mathematics at high schools?

Table 3. Analysis of the overall effectiveness of computer instruction on students'achievement in mathematics at high schools (N = 300)

ITEMS	RESPONSE									
	Strongly Agree		Agree		Undecided		Disagree		Strongly Disagree	
	F	%	F	%	F	%	F	%	f	%
The use of computer instruction makes me to adapt well to the new teaching and learning experience	124	41.3%	98	32.7%	50	16.7%	9	3.0%	19	6.3%
I prefer using Computer to do my homework than textbook	132	44.0%	70	23.3%	59	19.7%	13	4.3%	26	8.7%
I use computer to download my education materials online	116	38.7%	53	17.7%	57	19.0%	25	8.3%	49	16.3
The use of Computer software improved my academic	126	42.0%	62	20.7%	51	17.0%	17	5.7%	44	14.7%
My performance as a mathematics student has improved with the effectiveness use computer software	90	30.0%	120	40.0%	48	16.0%	18	6.0%	24	8.0%
I quickly master the skills taught with use of computer	111		74		71		29		15	

than classroom teaching and learning	37.0%	24.7%	23.7%	9.7%	5.0%
I easily figure out how to do most difficult works with computer instruction	75 25.0%	9531.7%	47 15.7%	44 14.7%	39 13.0%
The use of computer software increases my logical thinking	64 21.3%	111 37.0%	67 22.3%	22 7.3%	36 12.0%

Table 3 presents the analysis of the overall effectiveness of computer instruction on students' achievement in mathematics at high schools. The items the respondent agreed with were; the use of computer instruction makes me to adapt well to the new teaching and learning experience (74.0%), they prefer using Computer to do my homework than textbook (67.3%), I use computer to download my education materials online (56.4%), the use of Computer software improved my academic (62.7%), there performance as a mathematics students has improved with the effectiveness use computer software (70.0%), they quickly master the skills taught with use of computer than classroom teaching and learning (61.7%), they easily figure out how to do most difficult works with computer instruction (56.7%), The use of computer software increase my logical thinking (58.3%).

Research Question 2: What are the application softwares available for teaching and learning of mathematics?

Table 4. Analysis of the application software available for teaching and learning of mathematics (N = 300)

ITEMS	RESPONSE			
	Not Available		Available	
	F	%	F	%
3D Grapher	120	40.0%	180	60.0%
Advanced Grapher software	132	44.0%	168	56.0%
Curve fitting	78	26.0%	222	74.0%
Algae Programming	53	17.7%	247	82.3%
Autograph	60	20.0%	240	80.0%
3D shaped figure	55	18.3%	245	81.7%
Rotation and reflection	65	21.7%	235	78.3%
Vectors	55	18.3%	245	81.7%
Graphs	55	18.3%	245	81.7%
Graphic Calculator	64	21.3%	236	78.7%
Data Fit software	107	35.7%	193	64.3%
Math Type	79	26.3%	221	73.7%
Probability and statistics	71	23.7%	229	76.3%
Brain builder Math edition	59	19.7%	241	80.3%
Efofex	42	14.0%	258	86.0%

Table 4 presents the analysis of the application software available for teaching and learning of mathematics. The mathematics application software that are not available for teaching and learning of mathematics were;3D Grapher (60.0%), Advanced Grapher software (56.0%), Curve fitting (74.0%), Algae Programming (82.3%), Autograph (80.0%), 3D shaped figure (81.7%), Rotation and reflection (78.3%), Vectors (81.7%), Graphs (81.7%), Graphic Calculator (78.7%), Data Fit software (64.3%), Math Type (73.7%), Probability and statistics (76.3%), Brain builder Math edition (80.3%), Efofex (86.0%).

Research Hypothesis

Hypothesis 1: there is no significant difference in the achievement of student target with application software tools in mathematics and those not target with application software tools.

Table 5. Summary of t-test Analysis to know if there is difference in the achievement of student target with application

software tools in mathematics and those not target with application software tools

	N	Mean	S. D	T	Df	Sig. (2-tailed)	Remark
Student target with application software tools	150	19.18	2.16	3.124	298	0.00	Significant
Student not target with application software tools	150	28.78	4.60				

Table 5 presents the analysis to know if there is difference in the achievement of student target with application software tools in mathematics and those not target with application software tools. The result reveals that there is a significant difference in the achievement of student target with application software tools in mathematics and those not target with application software tools ($t = 3.124$, $df = 198$, $p < 0.05$). This implies that there is difference in the achievement of student target with application software tools in mathematics and those not target with application software tools.

Summary of Findings

Based on the analysis of the findings above, the following were deduced:

1.Findings of the study revealed that the use of computer instruction improves students' achievement in mathematics at high schools' level

2. Findings of the study revealed that application software that are available for teaching and learning of mathematics as 3D grapher, advanced grapher software, curve fitting, algae programming, autograph, 3d shaped figure, rotation and reflection, vectors, graphs, graphic calculator, data fit software, math type, probability and statistics, brain builder math edition and efofex.

3. Finally, the study revealed that there is a significant difference in the achievement of student target with application software tools in mathematics and those not target with application software tools.

DISCUSSION

Discussion of findings

Research Question One

Majority of the respondents agreed that the use of computer instruction makes me to adapt well to the new teaching and learning experience, they prefer using Computer to do my homework than textbook, they use computer to download my education materials online, the use of Computer software improved their academic, there performance as a mathematics students has improved with the effectiveness use computer software, they quickly master the skills taught with use of computer than classroom teaching and learning, they easily figure out how to do most difficult works with computer instruction and the use of computer software increase my logical thinking. This in agreement with the findings of Renees (2019) which revealed that the use of computer software would yield a more conducive learning environment in the understanding and learning of mathematics.

Research Question Two

Majority of the respondents agree on the application software that are available for teaching and learning of mathematics as 3D grapher, advanced grapher software, curve fitting, algae programming, autograph, 3d shaped figure, rotation and reflection, vectors , graphs, graphic calculator, data fit software, math type, probability and statistics, brain builder math edition and efofex. This claim is in tandem with the findings Abiola (2017), who found that availability of computer software such as graphs, graphic calculator particularly the internet facilities, data fit software will be impacting positively on students' success in mathematics and science subjects. This finding is also consistent with the study done by Brett (2012), who found that there is a preference for computer instruction in improving teaching and learning, because there is accessibility to get information through computer for learning among students thereby making them to develop interest in learning. Hein (2015) affirmed that the availability and use of ICT help students exploit enormous possibilities for acquiring information for schooling purposes. Ormrod (2014) posited that computer-aided instruction strategies by providing immediate positive reinforcement to strengthen student performance.

Research Hypothesis

The study revealed that there is no significant difference in the achievement of student target with application software tools in mathematics and those not target with application software tools. This finding is also consistent with the study done by Tatsis (2018) that there is no significant difference in the achievement of students using arithmetic software and those that are not. Dweck & Leggett (2017) posited that there is no significant difference in the performance of student using computer instruction and those use not. Dede (2016) posited that there is no significant difference between the performance of students using application software and those not as they are all aware of their academic strengths and weaknesses and are

well versed in the strategies, they use to address the day-to-day challenges of academic work. However, the study of

CONCLUSION

The study examined the relevant of computer software on Osun State high school students learning effectiveness in mathematics. Therefore, the adoption of computer instruction should be taken as effective would require a closer look into how computer software is used and whether they are linked with better learner experience and learning outcomes, not just its mere use per se. Study revealed that the use of computer instruction improves students' achievement in mathematics at high schools level. Application software available for teaching and learning of mathematics as 3D grapher, advanced grapher software, curve fitting, algae programming, autograph, 3d shaped figure, rotation and reflection, vectors, graphs, graphic calculator, data fit software, math type, probability and statistics, brain builder math edition and efofex and there is a significant difference in the achievement of student target with application software tools in mathematics and those not target with application software tools.

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