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Implication of computer assisted on achievement/retention of mathematics in junior secondary school FCT Abuja: inference, for sustainable progress in Nigeria

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Abstract: The study was designed to determine the effect of computer assisted instruction on achievement and retention trigonometry functions among junior secondary school students. The study was carried out in Municipal and Abaji Area Council of Abuja FCT Nigeria using sample size of 58 junior secondary school students two (JSSII). The study makes use of quasi experimental design. Intact classes were used for both the experimental and control groups. The experimental group was taught trigonometry using computer assisted instruction while control group were taught using conventional teaching method. To guide this study, four research questions were formulated. Trigonometry achievement test (TAT) instrument with the reliability coefficient of 0.80 was used as pre-test, post-test and retention tests through reshuffled the TAT items for data collection. T-test statistics were used to test the null hypotheses at a 0.05 level of significance. The results reviewed that computer assisted instruction was more effective in improving students' academic achievement and retention in trigonometry than that of conventional approach. The computer assisted instruction significantly differentiates between the sexes (male and female) academic achievement and retention scores in trigonometry. Based on the findings, it was recommended among other things the need for computer assisted instruction in schools mostly in junior secondary schools education as it better achievement and retention among students.

Keywords: computer assisted, achievement/retention, junior secondary school, FCT Abuja, inferences and for sustainable progress

1. Introduction:

Mathematics carries with assumption that the knowledge of the subject is essential for all members of our society. Mathematics capability is a critical determinant of the post-secondary education and career options available to the young students. Mathematics as a subject has been tremendously useful to mankind. It is a tool for understanding science, technology, vocational and business. Abubakar, Madugu, & Lawal (2016) contend that, mathematics has been commonly accepted as a basis of science and technology.

some teaching techniques were conducted by researchers to confirmed that traditional teaching methods are not sufficient in teaching sciences (mathematics in particular) (Ahmed 2014). majority of students graduate with memorization majority of students graduate with memorized in traditional teaching technique, as they are not given chances of solving problems, using information, that is reforming the knowledge and they've not provided them with activities that assist them use their philosophy that can directed them to have research skills Abubakar et al (2016). Normally, advanced mathematics is often taught using lecture method that promotes passivity and isolation in students (Akinolu and Tandoann, 2006). There are large limitations to using traditional teaching methods in mathematics. According to Ahmed (2014), many potentially successful students become uninterested in mathematics, and fail to practice it well or to enroll in subsequent courses in the traditional lecture approach to the teaching of mathematics. Going by (Acikgoz 2002), traditional mathematics instruction transmits outlook of mathematics as straightforward, logical, absolute and in most cases, disconnected from reality and independent of both learners and teachers.

Akinoluo, and Tando, (2006) said that Trigonometry is a branches of mathematics, that helps developing the mind of students in determining differences at early stage of student's life where children are made to differentiate angles and line (that is, the angles, the sides and its relationship etc) in the right position or slots. These help the toddlers make deduction that expand their mind and are the first exposure to mathematics (Hassan 2010). But the study of trigonometry provides students with medium for enhancing rational reasoning and deductive thinking modeling abstract problem. Eg, men pondered elevation and depression aspect of trigonometry. It was the use of trigonometry function that helped man develops working model for elevation and depression for the movement of Airplane, building structure and creating deep whole Enemali, & Adahh. (2015).

There is a close relationship between retention and achievement. Hornby (2000) define retention as the ability to remember experiences things learnt. In the same vein, Kundu and Tutoo (2002) stand to say that retention is the conservation of mind. That is the amount of knowledge learnt and kept, skills maintained or problem-solving behaviors manifested always reflects what is retained. Thus retention of statistical knowledge is the ability of a learner to keep and remember as well as recall or replicate the required knowledge or some part of the knowledge after some period of time might have been forgotten Altun (2005).

Information and communication technology (ICT) has great potential at all level for teaching and learning process. This has enriched the teaching and learning process through the help of computer Banerjee et al. (2005). It has brought great changes, innovativeness, and creativity in teachers and in teaching learning process. Mathematics and computer are both vital in today's life as they open the gate of sufficient opportunities in this modern world (Hamza, and Aminu 2016).

Mathematics is widely used in computers both in hardware and software. Computer helps in improving the knowledge of mathematics. It also helps in making classroom teaching lively. It can play vital role in learning process since it can work with imagination of students. Rivet (2011)

Several concepts in mathematics can be explained with the help of pictures, the visual image can easily help in understanding the concept. Paper pencil method can get student bored easily and find it difficult to practice the sum over again. CAI increases the curiosity of students and can easy their learning in an interesting way without any difficulty. Also whatever is learnt through computer aids instructions, the content can be retained for longer time as they use more senses of the students. Certain chapters like the relationship function in trigonometry can be explained very easily using CAI. Varity of exercises can be provided according to the needs of the students. (Dhevakrishnsn, Devi and Chnnaiyan, 2012)

What then is gender? Gender is generally credited as attribute that differentiates masculine from feminine. A number of studies have verified the influence of gender on mathematics achievement of students. This had led to series of divergent views on the influence of gender on the mathematics achievement and interest of students (Ahmed, 2014).

Education is a perception that has a dynamic definition depending on one's perspective. It is a universal concept that differs from humanity to humanity. Merriam- Webster (2004) refers to education as a tool or training by which people learn to develop and use their mental, moral and physical influence. It involves acquiring literacy and numeracy, being skilled in a job with capability to live in a society. Okafor (2012) took education to be a diffusion of what is preferred for individuals to make them knowledgeable and contributing member of the society. It also involves knowledge and understanding in a way that it characterizes the person's way of looking at things and is committed to the positive use of knowledge. The repercussion of education to the Nigerian National modification Agenda is that education should modified people for better, socially, ethically and efficiently. The tool needed for the developmental goals are Mathematics, sciences and technology. For this goals to be attained, Afolabi, (2009) said there should be a calculated policy to promote and persuade the development of indigenous technology and the application of such to a limited developmental goals. To attain this, the environment must also be right. Example, Japan considerably reviewed the instructive curriculum of the children by making science and technology compulsory for every child (Ogodo, 2012). Practically today, Japan is the world leading power to reckon with in the area of science and technology. The outcome of Japan's decision to make science and technology compulsory for every child is apparent for all to witness today. If we talk of the most highly developed and appreciated country in the world today, we talk of Japan. The position is indeed not based on Japan's proficiency in football, but on the proficiency of its citizens in science and technology. It is significant to note that science and technology as a means of existence is not a field for short-term commitment but a full-life engagement (Ogodo 2012). This is because they are instruments for each merit for societal and economic reformation, rebuilding and transformation. Thus, the implications therefore, are the use of mathematics science and technical education to;

1. enlarge sustainable 21st century skill;
2. instill clearness and excellent authority inside people
3. develop suitable private-public partnership ;and
4. build up suitable skills
5. developing egalitarian and self reliance
6. instill sufficient capitalist and ICT skills in our youth

"The present generation failed to generate sufficient numbers of high-quality mathematics teachers in schools." As obtained by Acikgoz (2002), the sum of this massive knowledge that man built over the last few centuries will be too onerous to carry into future on the shoulder of unprepared school mathematics teachers. This is so since teaching mathematics to vulnerable young minds is a specialized task many mathematicians

may not measure. Mathematics is a hard task master that demands implicit and whole attention from the disciple.

Ravindra, (2006) said in order to overcome the difficulties faced by student, teacher should accept different methodology in teaching mathematics like drill method, using different audio visual aids, computer aided instruction, mathematics club etc. one of the methods is auto-instructional method. It is a method of individualized instruction. One of its forms is CAI (Computer Assisted/Aided Instruction) auto instructional teaching.

Kundu and Tutoo (2007) studied constructions using multimedia package for teaching of physics in SS 1 student. The study exposed that there is a significant difference between mean of per-test scores of the experimental group. This shows the usefulness of multimedia packages. Prove that there is a significant difference between mean post test scores of controlled groups and experimental group.

A study was conducted by Rivet, (2011) on students achievement in central school mathematics Computer Assisted Instruction as against traditional method among primary school pupils in mathematics, he examined difference scores to validate the achievement when compares to traditional instruction techniques. Despite the inconsistency in performance in individual types of operations, the general progressive score were appreciably greater in Computer Assisted classrooms than in the traditional classroom.

NCTM (2000), pointed out that the impact of computer on academic (mostly in mathematics) achievement is a much studied topic in the developed world, with numerous studies spring out from research in united Kingdom. As pointed out by Enemali et al (2015), scenery recently analyzed the impact of ICT in schools. Right from 2000, over 300 literature sources published are related to the impact of ICT in UK schools. The conclusion is the inconsistent, although there are some indications that in some contexts, with some pupils, in any of these areas, are to draw firm conclusions in terms of explanatory or contributory factors"(Banerjee et al. 2005)

Trigonometry has long been a standard constituent of the secondary school curriculum in all countries, usually in the latter half of the secondary years. As an ancient branch of mathematics, trigonometry was revolutionized by the innovation and publication of trigonometric tables hundreds of years ago, and facilitated more recently by the availability of trigonometric tables on, slide rules and then 'scientific' calculators, ask.com (2018). One of the unique differences between scientific and less sophisticated calculators is the accessibility of instant access to trigonometric ratios and inverse trigonometric ratios, of interest not only to 'scientists' Mistrett, M.R. (2000)

Reasons such advances in technology were significant, they offered mathematics education little more than a chance to avoid the boredom of locating trigonometric values in table books, and did not have substantial effect on how trigonometry was taught and learned or even what was regarded as important about trigonometry to justify its place in the school curriculum. This paper describes and analyses some of the ways teaching of trigonometry and the curriculum in trigonometry are potentially affected by the recent availability of technologies for both students and teachers Ahmed, et al (2014).

This topic has been amazingly neglected in the research journalism. Even the wider research literature contains very few references to teaching and learning trigonometry. The omission is: at the college level, providing evidence of the lack of success of 'traditional' lecture-based teaching methods. In another study involving year 10 students, it was found that only 4 out of 178 students pass a score of zero on a test of trigonometry a year after it was first taught, which suggests that there might be a good case for looking at alternatives to traditional instruction. (PDF) in Ask.com 2018

By definition of trigonometric ratios the approach used by many teachers to introduce trigonometric ratios is to have students draw many right triangles with the same angles and to explore the ratios of sides. Such an activity continues to be worthwhile, although is boring and, of course, sometime error-prone when student measurements are used Altun (2005). The outstanding means of using this idea with the aid of technology involves constructing a dynamic triangle using a geometry program and hence automating the exploration to some extent. Taking from ask.com 2018, after constructing triangle ADE, with angle E controlled to be 90 degrees, changing the dimensions of the triangle by dragging point D (constructed on line AC) changes all the side lengths but does not change the (automatically calculated) ratio of DE/AD, the sine of angle A. Dragging C allows students to explore an angle of a different size Harrison et al. (2002). Through manipulating such a triangle, students can experience the key relationship that the ratio is independent of the size of the triangle, of fundamental importance to defining trigonometric ratios. (That is, students who have idea of similar triangle relationships will not be astonished by this, but the point of this sort of activity is precisely that students may not yet fully appreciate the idea of similarity. Indeed, part of learning about similarity may be well engaged in explorations of this type.). Once this idea is clear to students, the concept of sine of an angle size (such as 23.7 degrees), rather than a particular angle, becomes accessible, and the tabulation of these in either table books or calculator will be meaningful. Ergin, Pekme, and Erdal (2005) Various studies shows positive effect of

computer in trig functions software and tutoring programmes on relation of ratio in trigonometry. Exam scores as reviewed by Mari (2002). Hennessy (2002) illustrated the benefits of the use of computers in developing data-hanging skills, extrapolation and interpolation.

A study on the use of dynamic trigonometry software was reported by Isaksal and Askar (2005), no statistical significant impact in computer was use. This study, involves 7^{th} grade pupils from one school instructed in a variety of mathematics topics, showed that there was no mean significant difference between the scores of the Autograph-and traditionally taught groups.

In a study on the effects of CAIP with senior Secondary School students' performance in further mathematics, it was found that students taught further mathematics with CAIP performed better than those taught with conventional teaching methods Famuagan, ipinlaye and Akinremi (2016).

In Nigeria, many research findings show that boys perform better than girls in mathematics, despite the fact that they are been under the same class-roof situation (Ergin et al 2005). The findings of Okereke (2006) reported gender as a significant factor in achievement on teaching mathematics with certain strategies/techniques. Onwioduokit and akinbobola (2005) also reported gender as significant feature in physics achievement when it is taught with pictorial and written advance organizers. In Famuagan et al (2016) it was show those students' gender influences on their academic performance in further mathematics when exposed to CAI approach.

11.2 Statement of the Problem:

Trigonometry began as the computational element of geometry. Example, one declaration of plane geometry states that a triangle is determined by a side and two angles. That is, given one side of a triangle and two angles in the triangle, then the other two sides and the remaining angle are determined. Trigonometry includes the methods for computing those other two sides. The remaining angle is easy to find since the sum of the three angles equals 180 degrees (written as 180°).

If there is anything that distinguishes trigonometry from the rest of geometry, it is that trig depends on angle dimension and quantities determined by the measure of the angle. All of geometry depends on treating angles as quantities, but in the rest of geometry, angles are not measured, they are just compared or added or subtracted.

Trigonometric functions such as sine, cosine, and tangent are used in computations in trigonometry. These functions relate measurements of angles to measurements of linked straight lines, ask.com.

Trig functions are not easy to calculate like polynomials. It involves a lot of time in computing them in ancient times that tables were completed for their values. Even with tables, using trig functions takes time due to its involvement in multiplication or division, and, when several digits are involved, even multiplication and division will be slow. In the early 17th century computation sped up with the invention of logarithms and soon after slide rules. With the advent of electronics computation has become easy. Tables, logarithms, and slide rules are no longer needed in trigonometric computations. All that is needed is enter the numbers and push a few buttons to get the answer. Performing computations one of the things that make learning trig difficult which is no longer a problem with the advent of computer, asc.com.

As a result of this, the decline position of students' performance in trigonometry in junior secondary certificate examination (JSCE) and senior secondary certificate examination (SSCE) result across the nation is a major concern to parent, teachers and stakeholders. In support to this, chief examiners of West African Examination Council (WACE 2017) observed that candidates were weak in the area of trigonometry functions. Following their reports, most candidates avoid questions on elevation and depression. If at all they attempt trig questions, the candidates hardly show understanding of the problem in their workings. This affects the standard performance at post primary level which is certainly attributable to pedagogical approaches adopted by teachers in schools. Most finders reported that learning and understanding of school subject has been aggravated by awkward method and the instructional materials used (Altun 2005). To sustain this statement, Okigbo (2008) said that many researchers have adduced that poor performance in public examination is noticeable to methods admitted by teachers which led to low achievement and low conservation level in students' outcome of both internal and external examination. As a result to this, there is a wide spread concern among parent and extensively public about the methods used in teaching mathematics at secondary school level in Nigeria.

This led to the developing of technique that is capable of humanizing the reasoning, and logical ability of the learners to enable them performs and retains trigonometric functions. It is on the conception of this fact that this research work is going into investigating the efficacy of using Computer Assisted Instruction as an instructional delivery strategy in teaching trigonometry in junior secondary school.

1.3 Objective of this Study:

This study aim at determine the efficacy of computer assisted instruction on students' academic achievement and retention in trigonometry. Base on this topic the study has the following specific objectives:

1. Examine the efficacy of computer assisted instruction on the academic achievement of junior secondary students in trigonometry.
2. Investigate the efficacy of computer assisted instruction on students' retention ability on trigonometric function in junior secondary school.
3. Establish the efficacy of computer assisted instruction on students' academic achievement in trigonometric function with respect to gender.
4. Explore the efficacy of computer assisted instruction on students' retention ability on trigonometric function with respect to gender.

1.4 Research Questions:

The following research questions were formulated to guide this study:

1. Do exposure to computer assisted instruction affect academic achievement of students taught trigonometry using computer assisted instruction and those taught using conventional teaching method?
2. Do exposure to computer assisted instruction effect students' retention ability of trigonometric function?
3. To what extent does the use of computer assisted instruction affect students' academic achievement in trigonometry function/concepts based on gender?
4. At what level is exposure to computer assisted instruction in the retention of trigonometry function affect male and female taught using computer assisted instruction?

1.5 Research Hypothesis

1. Exposure to computer assisted instruction does not significantly affect academic achievement of students taught trigonometry using computer assisted instruction.
2. Computer assisted instruction does not significantly affect the mean retention of students thought with conventional teaching methods
3. Computer assisted instruction does not significantly affect students' academic achievement in trigonometry function/concepts based on gender.
4. There is no significant difference between exposures to computer assisted instruction in the retention of trigonometry function of male and female taught using computer assisted instruction?

2. Methodology/Research Design:

The study used quasi-experimental research design. Precisely, a pre-test and post-test experimental and control group design is adopted for the study. The experimental and control group were pre-tested before the treatment to determine the equivalence in all relevant aspects particularly in trigonometric concepts. There were also post-tested after the treatment and then was given a delayed post-test three weeks after post-tested to determine the retention level of both experimental and control group. Whole classes were randomly assigned to experimental group (EG) and control group (CG) though balloting.

2.1 Population for the study:

The population for the study covered all public junior secondary school two students (JSSII) in FCT Abuja. There are about 108 public junior secondary schools with population of 64,581 students in the study area. The area contains six area councils.

Sample and sampling procedure

The study involves two area councils Municipal and Abaji Area Council of FCT Abuja. The two Area Councils were selected using purposive sampling techniques. The two Area Councils have 32 and 26 making a total of 58 junior secondary schools respectively, with total number of 18950 students which represent 33 percent of the total number of schools and 29 percent of total number of students in the state. A simple random sampling without replacement was used to select one school with mathematics laboratory from each area council. Another two schools without mathematics laboratory, one from each area council was also selected using simple random sampling. Therefore, four junior secondary schools were chosen to form the sample of this study. In addition, the selected schools for this study are all co-educational schools. Which are: JSS Lugbe and JSS karu from Municipal Area Council and JSS Abaji1 and Abaji Central all from Abaji Area Council, making a total of four (4) schools with a sample population of 154 students.

In a final stage of sampling, a sample random sampling without replacement was used in selecting a class in each school with more than two arms. Intact classes consisting of boys and girls were used to form the subject of the study. Total samples of hundred and fifty four (154) students distributed between the four junior secondary schools across the two Area Councils were selected.

2.2 Instruments:

This study involved the use of two instruments developed by the researcher, Consist of: trigonometry achievement test (TAT) used as pre-test before the treatment and after the treatment as post-test/trigonometrically function retention test (TRFT) used three weeks after post-test to measured retention ability of the experimental and control group.

3. Analysis/Results Presentation

The results obtained from the study were analyzed using t-test statistic and correlation r-test determine any significant different. The result obtained is presented in the table below:

3.1 Research Question One/Hypothesis One

Q_1. Do exposure to computer assisted instruction affect academic achievement of students taught trigonometry using computer assisted instruction and those taught using conventional teaching method?

H_O: Exposure to computer assisted instruction does not significantly affect academic achievement of students taught trigonometry using computer assisted instruction.

Table 1: T-Test Analysis of pre-test Mean Scores of Experimental And Control Group

Variable	No. of Responses	$\bar{x}$	$\bar{x}$ Diff.	SD	DF	T_{CAL}	T_{CRIT}	Remark
Experimental	77	50.18		21.52				
			2.99		152	0.19	1.96	no significant
Control	77	47.19		19.03				

significant at $p<0.05$

Table 1 show that the mean performance of experimental is 50.18 with standard deviation of 21.52 and mean performance of control group is 47.19 with standard deviation of 19.03. The difference between experimental and control group is 2.99 in favor of experiment group. It was then reveals that the calculated t-value (0.19) is less than the t-critical (1.96) at a 0.05 level of significance. Means the result of the study fell outside the confidence interval. Hence the null hypothesis of no significant difference is hereby accepted. This implies that both the use of computer and conventional teaching have impact on the academic achievement of student in the practicing of mathematics in junior secondary schools.

3.2 Research Question Two/Hypothesis Two

Q_2: Do exposure to computer assisted instruction effect mean retention of students' ability of trigonometric function?

HO_2 Computer assisted instruction does not significantly affect the mean retention of students thought with conventional teaching methods

Table 2: T-Test Analysis of Post-test Mean Score of Experimental and Control Group

Variable	No. of Responses	$\bar{x}$	$\bar{x}$ Diff.	SD	DF	T_{CAL}	T_{CRIT}	Remark
Experimental	77	56.02		21.56				
			11.56		152	4.00	1.96	significant
Control	77	44.46		13.30				

significant at $p<0.05$

Table 2 above shows that the mean achievement of those thought with experimental was 56.02 with standard deviation of 21.56. While mean achievement of control group, was 44.46 and standard deviation was 13.30. The mean achievement difference between the two (2) groups of students taught experimental and control group in mathematics is 11.56 in favor of those taught with experimental methods.

It was reveals that the calculated t-value (4.00) is greater than the t-critical (1.96) at a 0.05 level of significance. Hence the null hypothesis of no significant difference is hereby rejected. It implies that the teaching method used in teaching mathematics has significant impact on academic achievement of mathematics students.

Table 3: T-Test Analysis of Post-Post-test Mean Scores of Experimental and Control Group.

Variable	No. of Responses	$\bar{x}$	$\bar{x}$ Diff.	SD	DF	T_{CAL}	T_{CRIT}	Remark
Experimental	77	52.90		21.16				
			8.83		152	2.62	1.96	significant
Control	77	44.07		20.62				

significant at p<0.05

Table 3 show post-post-test, the mean performance of experimental is 52.90 with standard deviation of 21.16 and control group mean performance was 44.07 with standard deviation of 20.62. The differences between the mean of experimental and control group are 8.83 in favor of experiment group. It was also reveals that the calculated t-value (2.62) is greater than the t-critical (1.96) at a 0.05 level of significance, which fell within confidence interval. Hence the null hypothesis of no significant difference is hereby rejected. This implies that the use of computer is of more significant on the academic achievement of student in mathematics in junior secondary schools.

3.3 Research Question Three/Hypothesis Three

Q_3 To what extent does the use of computer assisted instruction affect students' academic achievement in trigonometry function/concepts based on gender?

HO_3 Computer assisted instruction does not significantly affect students' academic achievement in trigonometry function/concepts based on gender.

Table 4: T-Test Analysis of Pre-Test Mean Score of Male and Female Taught Trigonometry Function using Computer Assisted Instruction.

Variable	No. of Responses	$\bar{x}$	$\bar{x}$ Diff.	SD	DF	T_{CAL}	T_{CRIT}	Remark
Male	119	50.29		21.41				
			13.03		152	3.05	1.96	significant
Female	35	37.26		21.88				

significant at p <0.05

Table 4 shows that the mean performance of male is 50.29 with standard deviation of 21.41 and the mean performance of control group is 37.26 and standard deviation of 21.88. The difference between male and female are 2.99 in favor of male group. It was also revealed that the calculated t-value (3.05) is greater than t-critical (1.96) at 0.05 level of significance which falls within the confidence interval. Hence the null hypothesis of no significant difference is hereby rejected. This implies that male have significant impact on the academic achievement of student in the practicing of mathematics in secondary schools.

3.4 Research Question Four/Hypothesis Four

Q_4 At what level is exposure to computer assisted instruction in the retention of trigonometry function affect male and female taught using computer assisted instruction?

HO_4 There is no significant difference between exposures to computer assisted instruction in the retention of trigonometry function of male and female taught using computer assisted instruction

Table 5: T-test Analysis of Post-test Mean score of Male and Female Taught Trigonometry Function Using Computer Assisted Instruction

Variable	No. of Responses	$\bar{x}$	$\bar{x}$ Diff.	SD	DF	T_{CAL}	T_{CRIT}	Remark
Male	119	37.26		21.83				
			2.05		152	0.5	1.94	significant
Female	35	35..21		18.69				

Significant at p<0.05

Table 5 show that the mean performance of male is 37.26 with standard deviation of 21.83 compared with female mean performance of 35.21 and standard deviation of 18.69. The difference between the mean retention of male and female is 2.99 in favor of male student. Notwithstanding, reveal have shown that after the use of electronics for three weeks, the calculated t-value (0.5) less than the t-critical (1.96) at 0.05 level of significance which falls outside the confidence interval. Hence the null hypothesis of no significant difference is hereby rejected. This implies that the mean retention of both male and female have significant impact on the practicing of mathematics in secondary schools.

Table 6: T-Test Analysis of Post-post-test Mean score of Male and Female Taught Trigonometry Function Using Computer Assisted Instruction.

Interest Level	No. of Responses	$\bar{x}$	$\bar{x}$ Diff.	SD	DF	T_{CAL}	T_{CRIT}	Remark
High	119	33.74		23.53				
			3.38		152	0.75	1.96	significant
Low	35	30.36		21.56				

significant at p<0.05

Table 6 shows that the mean performance of experimental is 33.74 with standard deviation of 23.53 and that of control group mean performance is 30.36 with standard deviation of 21.56. The difference between male and female is 2.99 in favor of male group. The result of table 6 revealed that t-calculated observed was 0.75 which is less than t-critical (1.96) at 0.05 level of significant. Therefore null hypothesis was thus, retained. Thus, there is no significant difference in the mean retention of male and female taught trigonometry function using mathematics Computer Assisted Instruction in favor of boys. This shows that the retention ability of male was not significant higher than those of female.

Discussion

The result in Table 5 shows the mean score of male in experimental group was higher than that of the female in experimental group. This indicates that male performed better in mathematics than the female. This finding agreed with the finding of Kabir, (2010), Paden & Dereshiwsky (2007) and Okereke (2006). They reported gender as a significant factor in achievement when mathematics is taught with certain strategies/ techniques.

Go by the result in Table 6 showed that the mean score after joining the pre-test and post-test of male in experimental group was higher than that of female in retention ability of trigonometry function. These indicate that male retained trigonometric function than their female counterpart in experimental group. This finding is in line with that of Afolabi, (2009)who reported that male on the experimental group showed higher retention level than there female counterpart of the same group.

The result in table 2 showed that the mean scores of subjects in experimental group is greater than the subject in control group. This shows that the use of Computer Assisted Instruction in teaching trigonometrically function is potentially viable in enhancing students' achievement in junior secondary school level. This upshot is supported by the finding of other researcher like `(Tsai 1999, Telli 2004, Duru 2010). But go against the decision of (Hamza & Aminu, 2016).

The result in Table 3 when pre/post-test are summed together, shows that the mean score of the experimental group retention ability was higher than that of control group. Therefore the result of the T-Test analysis shows that the experimental group retained the learnt some topics in geometry significantly higher than the control group. The result agree with the findings of (Afolabi, 2009) who in his separate studies reported that

mathematics Computer Assisted Instruction was very superior in increasing students' academic achievement and retention.

As reported Onwioduokit et al (2005), gender has a significant factor in physics achievement when pictorial and written advance organizers are used in teaching physics. However, the finding is in line with the finding of Fin, and Sindhi (2006) who reported that students' gender has no significant effect on their achievement when taught with tangram puzzle game. Obioma, (1985) in their study revealed that there was no significant different in the academic achievement between male and female.

Conclusion

This study has shown that the use of mathematics laboratory in the teaching of trigonometry function can be good tool that can help student understand trigonometric functions. The male taught using computer achieved higher in trigonometry. Experimental mathematics laboratory teaching method has the potential of enhancing students' academic performance and retention in mathematics at large

Recommendations

Based on the finding of study, the following recommendations were made:

1. The need to use computer in teaching mathematics in schools by mathematics teachers.
2. The need for FCT Ministry of Education to build and equip Computer Laboratory in all public secondary schools in its locality.
3. Made all schools boarding school to brake the gap of children going for hawking when they should be in school.
4. The need for FCT ministry of education in collaboration with mathematics Association of Nigeria (MAN) and Science Teachers Association of Nigeria (STAN) to organize a seminar/workshop for secondary school mathematics teachers on the method of teaching mathematics using CAI**.**

Reference

[1]. Abubakar, H., Madugu A., & Lawal A. (2016) Efficacy of Computer Assisted/ Aided Instruction on Mathematics Achievement and Retention Among Junior Secondary School Students in Kastina State: Implication for Sustainable Development In Nigeria.

[2]. Acikgoz k.u. (2002) active learning (aktif O_renme). Izmir: world education press.

[3]. Akinoluo, and Tando, OR (2006). The effect of problem-based active learning in science education on student academic achievement attitude and concept learning Eurasi journal of science and technical education, 3(1), 71-81. Anastasi, A. (1990) psychological testing. New yoke: Macmillan publishing co.

[4]. Altun M (2005) mathematics teaching for education faculties and elementary teachers (E_itim Fakulteleri Ve_iko_retim O_retmenleri Icin MAtematik O_retimi). Bursa: Aktuel press.

[5]. Ahmed, M. Hamza, A. and Surajo, y 2014. The efficacy of mathematics laboratory instructional strategies on geometry achievement retention among junior secondary school student in mathematics. Kusugu *journal of education. VOL.3, NO.2*

[6]. Afolabi, D.(2009). Repositioning the Nigerian Economy through scientific and Technological innovations. A key note address on conference on repositioning the Nigerian Economy through scientific and technological innovations. 26th-30th October. Now multi-purpose hall, the federal polytechnic, IIaro, Ogun state, Nigeria.

[7]. Ask.com 2018 method of teaching trigonometry retrieved on 27th July 2018

[8]. Ballo, M.Y.(2010). Effect of computer Assisted Instruction on Performance, Attitude and Retention in Geometry among Secondary School Students in Kano state. An unpublished Masters Dissertation faculty of education, Ahmadu Bello University, Zaria.

[9]. Banerjee et al. (2005): a study on computer-assisted learning (CAL) in teaching of physical concept. International journal of r0esearch. Available "www. International journal of research. Vol. 2, No.4.2014. pp23-27

[10]. Dhevakrishnan, R. Devi, S. and Chinnaiyan, K. (2012): Effectiveness of Computer Assisted Instructions (CAI) in Teaching of mathematics at secondary level *international journal of Advancements in Research &Technology, Volume 1, issue 4, September-2012*

[11]. Duru, A. (2010). The experimental teaching in some of topics geometry Faculty of Education, Usak University, Turkey. Available online at http://www.academicjournals.ors/ERR2

[12]. Enemali, I.A. & Adahh O.C. (2015) Empowering Individuals and Communities through Agricultural Egucation: The Role of Mathematics Education. Journal of Vocational and Technical Educators 4(4)46 -50

[13]. Ergin O., Pekmez E. ve Erdal SO (2005). From theory to practice science education via experiment (Kuramdan Uygulamaya Deney). *Zmir kanyilmaz press*

[14]. Fin, A.L. and Sindhi, B. (2006): the construction and try out of multimedia package for the teaching f physics in standard. *Journal of computer Education resources* of information in *tehsil Faisalabad.J.Anim. PI.sci., 18(2-3): 99-101* international publishers, New delhi

[15]. Famuagan, K.S., Ipinlaye, A.B. and Akinremi, B.V. (2016): the effectiveness of CAI in teaching and learning of menstruation at junior secondary school level. *International journal of curriculum and instruction. Vol.2NO4*

[16]. Hamza, A, and Aminu, R. (2016): *the impact of Computer Assisted Instruction in the teaching and learning of menstruations in katsina state.* a paper presented at the 3rd collages of education academic staff union Seminar series, May 2016.

[17]. Harrison et al. (2002): *statistics in psychology and education.* Twelfth Indian Reprint, Paragon.

[18]. Hennessy, K. (2002): *media Analysis Techniques.* New Delhi, sage publications.

[19]. Hassan, A.A (2010) effect of school type on visual perception of geometric shape and performance of junior Secondary School Students in minna metropolis. *Journal of studies in science and mathematics education, 1(1) 12-18*

[20]. Hornby, A.S (2000). *Oxford Advance learning Dictionary.* Oxford university press.

[21]. Isaksal and Askar (2005): the use of dynamic geometry software. A paper presented at the 2nd national conference of school of science FCE, Isa Kaita COE, Dutsin-Ma, Katsina, 2014

[22]. Kabir, u. (2010): the usefulness of computer in teaching. A paper presented at 2nd national conference of school of science FCE, Okene. August, 2010

[23]. Kundu, C.l and Tutoo, N.N (2007). *Educational psychology.* Sterling publishers: new Delhi

[24]. Mistrett, M.R. (2000). Enhancing geometric reasoning. Adolescence, 35:365-379.

[25]. Mari, J.S. (2002). Gender Related Difference in acquisition of formal reasoning schematic: Pedagogic implication of teaching chemistry using process-based approach. *Journal of the science teachers association of Nigeria, 52 (1&2), 76-80.*

[26]. Merriam-webster (2004). The new webster's Dictionary of he English language. *International edition, lexicon international-publishers* guild group New York, New York.

[27]. NCTM (2000). Principles and standard for school mathematics. National council of Teachers of Mathematics VA, Reston,.

[28]. Obioma, G.O. (1985). The development and validation of a Diagnostic Mathematics test for junior Secondary students. Unpublished doctorial dissertation, UNN

[29]. Okereke, S.C. (2006). Effects of prior knowledge of implication of mathematical tasks/concepts to career types and gender on students' achievement, interest and retention. in U. Nzewi (Ed)STAN procedures of the 47th annual conference, 253-259

[30]. Ogodo, A.D. (2012). *the role of chemistry in national Transformation Through Intellectual Property Rights (IPR) for Technology Transfer-is Nigeria Ready?* Being a scientific research paper presented at the 2010 chemtech conference of the chemical society of Nigeria (CSN), Edo state Chapter in collaboration with university of Benin, Benin city and south-south zone of the chemical Society of Nigeria(CSN)

[31]. Okafor, J.O.(2012). *Transforming the Nigerian Nation through Science, Technology and mathematics Education.* a paper presented at the 2nd annual conference of school of science, federal college of education, obudu, coss river state, Nigeria. 26th-29th march, 2012.

[32]. Onwioduokit F. A and Akinbobola A. D (2005). Effect of pictorial and written advance organizers on students' achievement in senior secondary school physics. *Journal of science and technology 40(12),* 109-116.

[33]. Paden, R. R. & Dereshiwsky, M. I. (2007). A Comparison of students achievement and retention in an introductory mathematics course. A paper presented to the teaching, colleges and community (TCC) 2007. Worldwide Conference, April 17-19.

[34]. Rivet, I. (2011) the achievement of middle school mathematic assisted instruction versus traditional instruction method. *International* journal of educational research. Publishers, new dew Delhi

[35]. Telli A. N. (2004) A study on the effect of use of experimental method in teaching the topic of simple machines on 7th grade primary school students achievement. *Journal of Gazi Education, 23(3), 291-30*

[36]. Tsai C. (1999). Laboratory exercises help me memorize the scientific truths: a study of eight graders' scientific epistemological views and learning in laboratory activities *journal of science Education 13(6). 654-670.*

[37]. Ravindra, G. (2006): Researches on curriculum and teaching: mathematics: A Trend report in NCERT(Ed) Sixth Survey of education research 1993-2000, vol.II NCERT.