RELATIVE EFFECTIVENESS OF COMPUTER-BASED INSTRUCTION, DIGITAL VIDEO AND AUDIO PACKAGES ON STUDENTS ACHIEVEMENT IN ALGEBRA

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Abstract

This paper discussed the declining performance of secondary school students in mathematics, emphasized on use of new technologies to meet the challenges of the 21st century. The efficacy of researchers developed Digital Video, Audio and Computer instructional packages for teaching mathematics concepts was determined using Pretest – Posttest Experimental group design. 120 second year (SSII) students from four secondary schools in Minna, Nigeria constituted the sample. These four purposively selected schools were randomly assigned to experimental and control groups. The experimental group I was taught selected concepts of algebra using Computer-Based Instructional Package, (CBIP), experimental group II with Digital Video Instructional Package (DVIP), experimental group III with Digital Audio Instructional Package (DAIP), while Traditional Teaching Method (TTM) was used for control group. The treatment and test instruments were validated by experts. Mathematics Achievement Test (MAT) was used for data collection, its reliability coefficient was found to be 0.92 using Kuder-Richardson (KR-21). Results revealed that the students taught with CAI performed better than their counterparts in other groups. The three treatments (CAIP, DVIP, and AIP) were found to be gender friendly. Based on the findings, CAIP should be used for teaching algebra to improve students' poor performance in mathematics.

Keywords: Computer-Based Instruction, Video, Audio, Algebra, Gender, Achievement

Introduction

The secret of technological development of any nation lies in the study of science, technology and mathematics education. Unfortunately, the study of science in Nigeria has been impeded by a lot of bottlenecks right from the primary school through secondary school to tertiary level of education (James, 2001).

Mathematics has become the central intellectual discipline of all technological societies and it is indispensable in helping the individual to think more clearly about the values involved in this fast changing world (Osemwinyen, 2008). Fapohunda (2002) sees mathematics as an essential; tool in the formation of the educated man. Its application in other disciplines mostly in the sciences is appreciative and without it, knowledge of the sciences often remain superficial.

In spite of relevance of mathematics in the field of science and technology, reports have shown that Nigerian students' achievement in secondary school mathematics is relatively poor (WAEC, 2012; Habour-Peters, 2001; Sanni & Ochepa, 2002; Obodo, 2004).

Meanwhile several factors have been advanced for the poor achievement rate in secondary school mathematics among which are: poor method of teaching (WAEC, 2003 – 2011) and Habour-Peters (2001), poor interest in mathematics (Badmus (2002) and Obodo, 2004) and gender difference (Agwagah, 2000). Table 1 shows the percentage of students' performance in May/June, 2003-2011 in Nigeria,

Table 1: Percentage performance of students in May/June WASSCE, 2003-2011 in Nigeria at credit level and above

Year	Biology	Chemistry	English	Mathematics	Physics
2005	35.74	50.94	25.64	38.20	41.53
2006	49.23	44.90	32.48	41.12	58.02
2007	33.37	45.96	30.32	46.75	43.19
2008	33.94	44.44	35.02	57.27	48.26
2009	28.58	43.69	41.52	47.04	47.83
2010	54.67	49.43	34.50	41.17	51.27
2011	37.80	48.68	56.27	31.88	62.84

Source: WAEC, Lagos, Nigeria

In attempt to find solution to some of these problems, good teaching strategies and good preparation of students is the only remedy to students' poor performance in mathematics at senior secondary school certificate examination (SSCE). Strategies that would involve active participation of students should be employed by teachers (Obodo, 2004).

Finding solution requires an approach that will consider diverse variables about poor performance and retention in mathematics, attitudes, poor interest, poor teaching methods (Badmus, 2002, Harbour-Peters, 2001). Available evidences have shown that computer-based instruction has had influence on students' attitude, retention, interest towards mathematics and subsequently has affected their achievement and retention (Osemwinyen, 2008, Golden, McCrone, Walker & Rudd, 2006).

The branches of mathematics are so numerous, these includes algebra, geometry, statistics and many others. WAEC (2012) shows that there are problems in the aspect of algebra, which concern questions on linear, simultaneous, quadratic and inequality equations. The West African Examination Council (WAEC) chief examiners report (2004) asserted that "the teaching should be student-centered and oriented with the use of computer assisted instructional package (p, 228). This research work focus on the use of digital video, computer - assisted instructional package and lecture method to facilitate learning

Many studies examined the teaching and learning of mathematics using computer-based instruction. Computer-assisted instruction allows students to work at their own pace at a time and place of their choosing from any computer with internet access. Students receive immediate feedback on assignments and can revisit topics until they have mastered the content (Cotton, 2001). They may have access to videos, guided practice problems, and online tutoring. The software can provide each student with an individualized study plan. Teachers can create

quizzes and tests to be delivered and graded by the software. It also provides the instructor with data to show how students are progressing in the course (Gambari, 2010). Studies revealed that Computer Assisted Instruction (CAI) can be used to enhance mathematics instruction (Jolly, 2003; Osemwinyen, 2009; Anyamene, Nwokolo, Anyachebelu & Anemelu (2012, etc). Babasola (2005), Reagan (2004), Mwei, Too, and Wando (2011) and Anyamene, Nwokolo, Anyachebelu and Anemelu (2012) reported that students taught mathematics with CAI outperformed those taught using conventional methods. Reagan (2004) further reported that students indicated that they enjoyed self-paced learning and immediate feedback; however, they also indicated a need for more examples and better explanations from the software program.

However, Teal (2008) found no significant difference in the test scores of pre-algebra students who received computer-assisted instruction (CAI) and traditional lecture (TL). In another study, Kathy (2009) reported no significant difference between students taught with traditional lecture and those taught with CAI. H also found female students performed better than male students in both groups. Similarly,

Video is an electronic device which provides aural and visual stimuli as well as motion thereby making possible a more realistic presentation of event, situation and phenomenon. It can be used to demonstrate the process of skill development and facilitate practical skills application. Video presentation ensures that the content or skill to be learnt is well organized, sequentialized, finished and prepackaged for use. It allows for the use of varieties of design variables such as straight viewing, replay, pause, mute, close-up, questioning and practice to facilitate learning. This instructional medium has been found to be effective in teaching theory and practical courses (Obinna & Nnena, 2008). For instance, Achebe, (2008) in home economics, Annie (2007) in practical physics, Asokoya (2007) in history, Gambari and Zubairu (2008) in primary science, Gbodi and Laleye (2006) in integrated science, Obinna and Nnenna (2008) in social studies, Offili (2010), Ofili and Okore (2012) and Orisabiyi (2007) in Biology, and Sani (2012) in Chemistry, and Nworji (2000) in woodwork technology reported that students taught using Video instructional package produced better learning outcome than their counterparts taught with conventional method.

In addition, Saibu (2002) revealed that students exposed to video demonstration employing the replay technique had a superior mean performance score than those exposed to the straight viewing technique. Zhang (2006) found that students in the e-learning environment that provided interactive video achieved significantly better than learning performance and a higher level of learner satisfaction than those in other settings. Similarly, John and Mike (2006) reported that the use of video presentation feedback in instruction of public speaking improves skill acquisition, speech content, performance on objective and results in more favourable attitudes towards the course as well as better recall of the actual speech.

Audio medium stimulates the sense of hearing only. It is an electronic device that provides sound and appeal to the auditory sense only. Audio presentation is without visual and motion stimuli. However, it can compel students to listen to instruction without visual distraction. It could be effectively used to demonstrate the process of skills development and could facilitate students' level of acquisition of practical skills when they listen attentively to

instruction and are not distracted by noise or visual stimuli. It can be used to present practical steps in instruction (Saibu, 2011). Audiotape instructional package is used to achieve educational objectives in the cognitive, affective and psychomotor domains of learning. For instance Nworji (2000) carried out a study on woodwork (psychomotor domain) and found out that audiotape improved the performance of the experimental group over the control group. Davis (2006) study revealed that Audio instructional package enhanced better performance in the understanding of schiostomaisis Furthermore, empirical studies in Nigeria involving audiotape and audio compact disc recordings for learning Oral- English have been used by many researchers such as Otegbayo (2010), Adamu (2007) and Kutigi, Gambari and Gana (2010), their findings showed that those taught with audiotape and audio compact disc instructional packages did better than those taught using conventional method. In another study Igbafe (2001) and White, Easton and Anderson (2000) found that a combination of audio and print media mode of instruction is more effective than the audio or print mode alone. However, Kareem (2003) found no difference in students' cognitive learning in the use of audio and the conventional methods in college level Biology. Many of these studies were limited to audiotape instruction.

However, Saibu (2002) found that students taught biology through the conventional methods achieved a mean post-test score slightly higher than those taught by the audio-tutorial method. Though, results also revealed that audio instruction stimulate the auditory sense, aid students in listening skills and increase attention span than those in conventional method.

Empirical studies on comparative research on technology influence on students performance are very scanty. Meanwhile, Gambari, Gbodi & Olumba (2012) reported that students' taught using computer-assisted instruction performed better than those taught with video instructional package. Similarly, Nworgu and Gbodi (2010) reported that students exposed to computer performed better than those exposed to video, relaia and lecture method. Adedapo, Salawu and Afolabi (2005) found significant difference in the students' cognitive achievement and interest in Economics which were mostly enhanced by the video strategy, followed by audio strategy and minimally by the conventional method. Okwo and Asadu (2002) reported that the mean score of students exposed to video instruction was higher than that of audio picture synchronized group which in turn was higher than those treated with audio alone when taught physics concepts.

Gender differences in mathematics are a concern of educators who are attempting to prepare all students for fulfilling careers. Stereotypes that females lack mathematical ability, perform poorly in math courses, and have limited experience with computers persist in society. There is evidence that over the past several decades, the gender gap between men and women in mathematical performance has narrowed but may not be eliminated. Etukudo (2003) and Hyde, Lindberg, Linn, Ellis, and Williams (2008) and Anyamene, Nwokolo, Anyachebelu and Anemelu (2012) reported no significant difference in the post-test performance scores of male and female students taught mathematics using CAI of package. The National Center for Education Statistics (2005) reported that females are now performing as well or better than males on many indicators of achievement. However, Kurumeh (2004) reported that female achieved higher than male students on effects of ethno-mathematics approach and interest in

geometry and mensuration. Ozofor (2006) reported that females students exposed to two modes of CAI performed better than their male counterparts in mathematics achievement.

Comparative effects of technology on gender influence was reported by Nworgu and Gbodi (2010) who found no significant difference in the biology mean achievement scores between male and female students using the treatments (computer, video, and realia) separately. Gambari and Zubairu (2008), Gbodi and Laleye (2006), Obinna and Nnena (2008), and Osokoya (2007) reported no significant difference in the mean achievement scores between males and females students taught primary science, integrated science, social studies, and history using video instruction.

However, study on comparative effects of technology on students' achievement is very scarce in Nigeria educational context. Secondary school students in Nigeria are versatile with the use of computer, watching video films and listen to music via MP3, while, little is known about educational value of these technologies in Nigerian schools. However, very few empirical studies exist in Nigeria regarding the use of CAI, Video and Audio instruction for teaching and learning mathematics. Thus, much remain to be empirically studied on comparative effects of technologies in mathematics education, in Nigeria.

Objectives of the Study

The objectives of this research are to:

(i) Develop and validate the Computer, Video and Audio instructional Packages.

(ii) Determine the efficacy of CAI, Video and Audio packages in improving learning and understanding of mathematics concepts and its effect on gender.

Research Questions

The following questions were raised to guide the study:

(i) What are the differences in the achievements of students taught mathematics (Algebraic) concept using CAI, Video, Audio and their counterparts in the control group?

(ii) Is there any difference in the achievements of male and female students taught Mathematics (Algebraic) concepts using CAI package?

(iii) What is the difference in the achievements of male and female students taught Mathematics (Algebraic) concepts using Video package?

(iv) What extent does Audio package influence male and female students mean achievements scores when taught mathematics (Algebra) concepts?

Research Hypotheses

Ho_1: There are no significant differences between the mean achievement scores of students exposed to CAI, Video, Audio and Traditional method.

$Ho_{2:}$ There is no significant gender difference in the performance of students taught mathematics using CAI package.

$Ho_{3:}$ There is no significant gender difference in the performance of students taught mathematics using Video package.

Ho_4: There is no significant gender difference in the performance of students taught mathematics using Audio package.

Methodology

The research design adopted for the study is pretest-posttest experimental group design. Four levels of independent primary variable (three treatments and a control), two levels of gender (male and female) were investigated on students' performance in Mathematics. The design layout is as shown in Table 2.

Table 2: Research design layout

Groups	Pretest	Treatment	Posttest
Experimental	O_1	Computer-Assisted Instructional Package (CAIP)	O_2
Experimental	O_3	Video Instructional Package (VIP)	O_4
Experimental	O_5	Audio Instructional Package (VIP)	O_6
Control	O_7	Traditional Teaching Method (TTM)	O_8

Based on the nature of this research, three stage sampling techniques were adopted. Firstly, purposive sampling procedure was adopted to obtain four secondary schools in Minna metropolis, Niger State, Nigeria. These schools were sampled based on (laboratories, facilities and manpower), school type (public schools), gender composition (coeducational schools). The two schools were randomly assigned to experimental group I (CAI group), experimental group II (VIP group), experimental group III (AIP group) and control group (TTM) respectively. Finally, stratified sampling technique was used to select the 80 SS1I students. Each group had 20 (10 male and 10 female) students.

Four research instruments were employed: Computer-Assisted Instructional Package (CAIP), Video Instructional Package (VIP), Audio Instructional Package (AIP) were used as treatment instruments while Algebraic Achievement Test (AAT) was employed as test instrument. CAIP was developed with the assistance of a professional computer programmer on Algebraic concepts. VIP and AIP were developed with the assistance of Video and Audio media specialists from Radio and Television Broadcasting stations in Minna, Niger State, Nigeria. AIP was produced at a Radio station after writing the scripts. Likewise, the video instruction was produced by experts from Nigeria Television Authority after writing the script and storyboards. The packages adequately covered the five sub-topics under algebraic process 1, namely; linear equations, word problems leading to linear equation, linear inequalities, word problems leading to linear inequality and subject of a formula. The packages were face and content validated by educational technology, mathematics, test and measurement, and computer programmer specialists.

Algebra Achievement Test (AAT) used in collecting data for the study was researcher adopted Algebra Achievement Test (AAT). The Algebra Achievement Test (AAT) consists of 50 multiple choice objective items with four options (A–D) adopted from past examinations of West

African Examination Council (WAEC, May/June) and National Examination Council (NECO, June/July). AAT which covered five sub-topics in Algebra Process 1, was validated by experts in Mathematics, test and measurement and its reliability coefficient determined as 0.89 using Kuder Richardson (KR-21).

The objectives and the modalities of the experiments were specified and operational guide was produced before the commencement of the treatment. The researcher administered the Algebra Achievement Test (AAT) on sample students as pretest to ascertain the equivalence of the students before the treatment. These packages were administered on experimental groups for a period of 40 minutes per lesson for five weeks.

In CAIP (experimental group I) students logged-in with their password, and followed instructions and worked examples in a sequential manner. CAIP being a drill and practice mode of instruction, students read the contents and answered the question correctly before proceeding to the next concept in the frame. The computer automatically reshuffled the options after each failure attempt to discourage students from guessing the answers. In VIP (experimental group II), students selected the topic to be studied, watched the video clip in a sequential manner. Students paused to write a note, rewind to view the previous explanation, and forward the video clip as the case may be. Students answered some questions related to the clip, before proceeding to the next lesson. In AIP (experimental group III), students were provided with the printed material with VIP. They synchronized the reading of the printed material with VIP presentation. After 40 minutes of audio presentation, they answered some related questions before proceeding to the next lesson. In TTM (control group), the researcher presented the concepts of algebra lesson according to lesson plan using chalkboard to explain and solve some examples. He allowed students to ask and answer some questions at the end of the presentation. Finally, assignments and homework were also given at the end of the lesson.

After five weeks of treatment, AAT was administered as posttest to measure the achievements of the sample students in each school. The scores obtained were subjected to data analysis. The data were analyzed based on the stated hypotheses, using t-test, one-way ANOVA and Scheffe's post-hoc test. The significance of the various statistical analyses was ascertained at 0.05 alpha level.

Results

To test for the hypotheses, the data were analyzed using t-test, one-way ANOVA and Scheffe's test using Statistical Package for Social Sciences (SPSS) version 16 at 0.05 alpha level. The results are presented based on the research hypotheses.

Ho_1: There are no significant differences between the mean achievement scores of students exposed to CAI, Video, Audio and Traditional method.

To determine whether there were significant differences in the post-test mean scores of the CAIP, VIP, AIP and TM, data were analyzed using the analysis of variance (ANOVA) as shown in Table 3.

Table 3: ANOVA pre-test on SIP, TIP and CTM groups

Tests	Source of variables	Sums of square	df	Mean Square	F-value	p-value
Pretest	Between Groups	3.438	3	1.146	0.018^{ns}	0.997
	Within Groups	4893.750	76	64.391		
	Total	4897.188	79			
Posttest	Between Groups	10082.500	3	3360.833	24.578*	0.000
	Within Groups	10392.500	76	136.743		
	Total	20475.000	79			

ns: Not Significant at 0.05 level
* : Significant at 0.05 level

Table 3 shows the pre-test result of ANOVA comparing two experimental groups and control group. From the table, the F-value (0.018, p = 0.997) was not significant at 0.05 alpha level. This implies that there was no significant difference among the mean scores of the experimental group I; experimental group II and the control group at pretest.

From table 3, posttest result of ANOVA comparing two experimental groups and control group. From the table, the F-value (24.578, p = 0.000) was significant at 0.05 alpha level. This indicates that statistically significant difference was established among the experimental groups and control group. Hence the null hypothesis one (Ho_1) was rejected.

Based on the established significant difference in the post-test scores of the groups, Scheffe's test was used for post-hoc analysis. The results of this post-hoc analysis are as shown in Table 4.

Table 4: Scheffe's post-hoc analyses of the groups mean scores

Groups	Mean Scores	Group I (CAIP)	Group II (VIP)	Group III (AIP)	Group IV (TM)
Group I (CAIP)	84.25		0.420	*0.001	*0.000
Group II (VIP)	78.00	0.420		0.082	*0.000
Group III (AIP)	68.25	*0.001	*0.082		*0.005
Group IV (TM)	54.50	*0.000	*0.000	*0.005	

* The mean difference is significant at the 0.05 level

The result in Table 4 indicates that there was significant difference in the post-test mean scores of students exposed to CAIP (X = 84.25) and those exposed to VIP (X = 78.00). It indicates significant difference in the post-test mean scores of students exposed to VIP (X = 78.00) and those exposed to AIP (68.25). Significant difference was also established in the

post-test mean scores of students exposed to AIP (X = 68.25) and those exposed to TM (X = 54.50).

Ho_2: There is no significant gender difference in the performance of students taught mathematics using CAI package.

Table 5: t-test analysis on achievement scores of male and female students exposed to CAIP

Variable	No of sample	df	Mean (x)	SD	t – value	p-value
Males	10		84.50	12.791		
		18			0.077^{ns}	0.331
Females	10		84.00	9.661		

ns – Not significant at 0.05 level

Table 5 presents the t-test of male and female students of experimental group. The mean scores of the male students were 84.50 and 84.00 for the females. The calculated t-value of 0.077 was not significant at the 0.05 level. This indicates that there is statistically no significant difference between the male and female students taught with CAIP, (t = 0.077, df = 18, p = 0.331). Hence, $H0_2$ was upheld. Therefore, there is no significant difference between male and female students taught with Computer-Assisted Instructional Package (CAIP).

Ho_3: There is no significant gender difference in the performance of students taught mathematics using Video Instructional Package (VIP).

Table 6: t-test analysis on achievement scores of male and female students exposed to VIP

Variable	No of sample	df	Mean (x)	SD	t – value	p – value
Male	10		78.50	13.954		
		18			0.134^{ns}	0.331
Female	10		77.50	14.767		

ns – Not significant at 0.05 level

Table 6 presents the t-test of male and female students of experimental group. The mean scores of the male students were 78.50 and 77.50 for the females. The calculated t-value of 0.134 was not significant at the 0.05 level. This indicates that there is statistically no significant difference between the male and female students taught with VIP, (t = 0.134, df = 18, p = 0.331). Hence, Ho_2 was upheld. Therefore, there is no significant difference between male and female students taught with Video Instructional Package (VIP).

Ho_4: There is no significant gender difference in the performance of students taught mathematics using Audio Instructional Package (AIP).

Table 7: t-test analysis on achievement scores of male and female students exposed to AIP

Variable	No of sample	df	Mean (x)	SD	t – value	p - value
Male	10	18	68.50	11.068	0.122^{ns}	0.939
Female	10		68.00	7.149		

ns – Not significant at 0.05 level

Table 7 presents the t-test of male and female students of experimental group. The mean scores of the male students were 68.50 and 68.00 for the female. The calculated t-value of 0.122 was not significant at the 0.05 level. This indicates that there is statistically no significant difference between the male and female students taught with CAI, ($t = 0.122$, $df = 18$, $p = 0.939$). Hence, Ho_2 was upheld. Therefore, there is no significant difference between male and female students taught with Audio Instructional Package (AIP).

Discussion

The results of hypothesis one revealed that there is significant difference in the learning achievements in favour of the group taught algebra concept with computer-assisted instruction, followed by video instruction, audio instruction and conventional teaching method respectively. This result agrees with the findings of Reagan (2004), Mwei, Too, and Wando (2011) and Anyamene, Nwokolo, Anyachebelu and Anemelu (2012) who reported that students taught mathematics with CAI outperformed those taught using conventional method. However, it contradicts the findings of Teal (2008) who found no significant difference in the test scores of pre-algebra students who received computer-assisted instruction (CAI) and traditional lecture (TL). It is also in disagreement with the findings of Kathy (2009) who found no statistically significant difference in the posttest scores of students receiving traditional instruction and traditional instruction supplemented with computer-assisted instruction.

These findings also agree with earlier findings of Achebe (2008) in home economics, Annie (2007) in practical physics, Asokoya (2007) in history, Gambari and Zubairu (2008) in primary science, Gbodi and Laleye (2006) in integrated science, Obinna and Nnenna (2008) in social studies, Offili (2010), Ofili and Okore (2012) and Orisabiyi (2007) in Biology, and Sani (2012) in Chemistry, and Nworji (2000) in woodwork technology who reported that students taught using Video instructional package produced better learning outcome than their counterparts taught with conventional method.

These findings also agree with earlier findings of Otegbayo (2010), Adamu (2007) and Kutigi, Gambari and Gana (2010) who reported that those taught with audiotape and audio compact disc instructional packages did better than those taught using conventional method. Specifically, this study is in line with Igbafe (2001) and White, Easton and Anderson (2000) who found that a combination of audio and print media mode of instruction is more effective than the audio or print mode alone. However, it disagree with the findings of Kareem (2003) who found no difference in students' cognitive learning in the use of audio and the conventional methods in college level Biology.

These findings also agree with earlier findings of Adebayo (2008), Gambari, Gbodi & Olumba (2012), Nworgu and Gbodi (2010) who reported that students' taught using computer-assisted instruction performed better than those taught with other instructional packages. Similarly, the findings agree with that of Adedapo, Salawu and Afolabi (2005) who found significant difference in the students' cognitive achievement and interest in Economics were mostly enhanced by the video strategy, followed by audio strategy and minimally by the conventional method. It also agree with the findings of Okwo and Asadu (2002) who reported that the mean achievement scores of students exposed to video instruction was higher than that of audio picture synchronized group which in turn was higher than those treated with audio alone when taught physics concepts.

The superiority of CAI over video, audio and traditional teaching method stem from the fact that CAI is more interactive, user friendly, students receive immediate feedback on assignments and can revisit topics until they have mastered the content (Cotton, 2001). It caters for individual differences because students move at their own pace.

The results of hypothesis two, three and four showed that there is no gender effect on the achievement of male and female students taught algebra concepts with CAIP, VIP, and AIP. This finding is in agreement with the results of Etukudo (2003) and Hyde, Lindberg, Linn, Ellis, and Williams (2008) and Anyamene, Nwokolo, Anyachebelu and Anemelu (2012) who reported no significant difference in the post-test performance scores of male and female students taught mathematics using CAI of package. However, it contradicts the findings of Kurumeh (2004) and Kathy (2009) who reported that female achieved higher than male students on effects of ethno-mathematics approach and interest in geometry and mensuration. Gambari and Zubairu (2008) and Ozofor (2006) who found no gender difference when students exposed primary science and mathematics using CAI and video instructional package. These finding also conform with the earlier results of Nworgu and Gbodi (2010) who found no significant difference in the biology mean achievement scores between male and female students using the treatments (computer, video, and realia) separately. Similarly, it confirmed the findings of Gbodi and Laleye (2006), Obinna and Nnena (2008), and Osokoya (2007) who reported no significant difference in the mean achievement scores between males and females students taught primary science, integrated science, social studies, and history using video instruction

Conclusion

The paper has critically examined the causes of poor performance of secondary school students in Nigeria with emphasizes on poor teaching methods being the major causes of such problem. It is the view of the authors that there is still a wide gap to be filled in the area of innovative teaching and learning. Using modern technology such as CAIP VIP and AIP seems to be the answer. Computer Assisted Instruction Package was more effective in teaching the algebra concepts and is also gender friendly.

Recommendations

The study showed that the use of CAIP have the capability of improving the performance of students in algebra concept (mathematics) than Video and Audio Instructional

Packages and conventional method respectively. Based on this, the following recommendations were proffered:

(i) Teachers should be encouraged to teach students with computer-assisted instructional package in order to improve their academic performance in the mathematics concepts.

(iii) The use of computer-assisted instruction should be infused into pre-service teachers' curriculum to enable them master the use of CAI and integrate it into their teaching.

(iii) The government and non-governmental agencies should equip schools with computers and new technologies for easy access by both teachers and students.

(iv) There should also be provision of functional computer laboratory in schools with regular supply of electricity at all times.

(v) Teachers in schools should be given free computer training by the government (State and Federal) to enable them use these new technologies when supplied to schools.

(vi) There is the need to develop relevant computer assisted instructional packages for use within the Nigerian school system.

(vii) Student should be encouraged to own their computers, possibly laptops, to enable them use it more even in their individual studies.

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