Effect Of Computer Assisted Instructional Package On Secondary School Students’ Performance In Introductory Technology In Ilorin, Nigeria

By

Onasanya, S. A.; Daramola F. O.
Department of Science Education,
University of Ilorin, Nigeria
&
Asuquo E. N.
Institute of Education,
University of Calabar, Nigeria

Abstract

The purpose of this study was to investigate the effect of Computer Assisted Instructional (CAI) packages on the performance of secondary school students in Introductory Technology in Ilorin, Kwara State, Nigeria. Forty two (42) students were used. A researcher-designed Computer Assisted Instructional package was designed validated and administered to some students of Introductory Technology while the other students were taught the same topic using conventional method. Percentages were used for demographic information while t-test statistical method was used to test the hypotheses at 0.05 level of significance. The result of the findings revealed that students using the CAI package performed better than those using the conventional method. There was no significance difference between the performance of the male and female students of Intro-Tech exposed to individualized CAI while female students of introductory technology exposed to co-operative CAI performed better than their male counterparts. Based on the findings the Federal and State Government were advised to provide the necessary instructional multimedia facilities available in schools to make teachers computer literate.


Introduction

Computer Assisted Instruction, (CAI), is an interactive technique whereby a computer is used to present the instruction and also to monitor the learning that takes place. It is also known as Computer-Assisted Learning (CAL), Computer-Based Education (CBE) and Computer-Based Training (CBT). Computer Assisted
Instruction uses a combination of texts, graphics, sound and video in the learning process. It is especially useful in distance learning situation. The explosion of the internet as well as the demand for distance learning has generated great interest and expansion of Computer Assisted Instruction. Computer Assisted Instruction (CAI) system, designed to automate certain forms of tutorial learning. Introduced in the 1960s, CAI systems deliver basic skills instructions through a drill and practice format.

Modern versions of CAI systems known as integrated learning systems are found in 30% of the nation’s schools. CAI offers a comprehensive curriculum package with extensive instructional management features. According to studies conducted by U.S. Dept. of education shows that CAI used in schools in the U.S.A have helped in increasing the rate at which students learn. Students receiving Computer-based Instructions tend to learn more and faster. Their gains exceed those in schools using traditional methods.

Student receiving CAI based instructions also enjoy their classes more and have better attitudes towards computer. Benefits of computer-based instruction are greatest for lower achieving students and those with special needs (i.e. students with disabilities). Students in technological rich schools have tendency to out perform peers in schools using traditional ways such as; Communication and presentation skills, complex, multi-step problem-solving skills social awareness and high level reasoning skills. Others are the following: Data interpretation skills, ability to represent information dynamically, ability to work independently as well as collaboratively, initiative taking and ability to synthesis different points of view and effectively state issues. Teachers using CAI can generally achieve the following results in more student-centered teaching: less lecturing, increased individual instruction, more time spent coaching and advising students, increased interest in teaching and increased productivity.

U.S.A. Department of Education identified cost as the major problem of using CAI. Computer Assisted Instruction can be either web-based (which is done using the Internet) or programmed instruction. Web-based CAI is done by first having Internet connection on the system for which CAI will be used. Generally, the programmed instruction type of Computer Assisted Instruction is based on evaluation or learner’s verification and revision; a tenet of programming which requires the programmer to try out the programme with a group of users, similar to those for whom the programme is intended, and then revise the programme based upon the feedback until it reaches a predictable level of effectiveness.

Traditionally, the accepted success criteria according to the U.S.A department of education have a 90% level of performance with 90% of the users. The design of programmed instruction generally works this way. Different sequence of delivery strategies can be used to meet the objective of providing a good programme. A number of set frames of carefully arranged programmes leave the user with a sense of accomplishment or success, which in turn increases the motivation to learn. Programmed instructions are normally validated as part of the development process to ensure reliable replicable results, that is, they are automatic and guaranteed (Bullock 284). They are usually developed to meet specific needs since the process usually begins with the need for making various assessments.
Introductory Technology as a subject in the Junior Secondary School curriculum in Nigeria today, provides significant supports for the implementation of this particular model of constructive learning. Through computer, human beings seek to influence each other’s behaviour at every level, in the homes, work places, on the street, in schools and everywhere.

Computer being the most important invention of the 20th century has dramatically and irrevocably changed the way we live. One of the universally agreed upon implication of this is that the educated should be computer-literate. This appeal underscores the need to teach Introductory Technology in the Junior Secondary Schools in Nigeria. The use of computers should also be emphasized in Secondary Schools as a teaching aid for easy access for the students.

Some researchers opined that CAI dehumanized its users while others see it as a way of throwing teachers out of job and that computer use will add little value to current school practices (Philips & Moss, 1993). Schofield (1995) opined that teachers would normally not use computers if they consider them useless in the classroom. Secondary school students have been having poor results in their final year examination particularly in science subjects. This situation has existed even before the Nigerian independence. Failure in science subjects predates Nigerians independence (Taiwo 1981). This situation has not improved rather it is deteriorating (Okebukola et al 1986).

Researchers have identified defective teaching strategies as one of the reasons of the poor performance of students in the sciences at the senior secondary school certificate examination. Hence, a number of studies relating to the strategies used in teaching Biology and the other sciences have emerged. Jegede, Okebukola and Ajewole (1992) examined the attitude of students to the use of CAI in teaching Biology through cooperative strategy. Research work intended to enhance students academic performance has been done in other subjects. Learning packages have been designed and used for teaching science and non-science subjects too. For instance, Egunjobi (2002) found that Computer Assisted Instruction (CAI) packages enhanced students’ academic performance in an aspect of Geography in secondary schools. Udousoro (2000) and Ajelabi (1998) used the same CAI package to teach Mathematics and Social Studies respectively while Kareem (2003) used audio graphics self-instruction packages for teaching Biology concepts in secondary schools. The current trend in research all over the world is the input of computer facilities to enhance students learning. The interest of this present study is to investigate the effect of CAI Introductory Technology package on the academic performance of secondary school students in Introductory Technology.

Research Hypotheses
The following research hypotheses were generated for the study:

1. There is no significant difference in the performance of students who were exposed to individualized computer assisted instruction and the conventional method of instruction.

2. There is no significant difference between the performance of male and female students in Intro-Tech exposed to individualized CAI.
3. There is no significant difference between the performance of male and female students in Intro-Tech exposed to co-operatives CAI.

Research Design

This study is a quasi experimental type of the static-group comparison design. This design of experimental and control groups is without a pretest. The graphic representation of this design is presented in the figure below. A t-test was used to statistically analyze the difference in the post test mean scores of the experimental and control group. Campbell and Stanley (1966) classified this type of research as “quasi experimental” in order to differentiate them from the “true experimental” design which has pre-test-posttest with randomization.

Sample and Sampling Technique.

The target population of this study was the first year junior secondary school (JSS1) Introductory Technology students in Ilorin South L.G.A of Kwara State. The nature of the study required the purposive selection of the research sample since a study on CAI must be conducted in schools where students are computer literate and computers are available and accessible for students’ use. Ebenezer High School, Ilorin was selected for the study since it is qualified as having the required attributes. Forty-two (42) students from JSS1 were chosen to avoid disruption of the preparations of the JSS3 students who were getting ready for their Junior WAEC examinations. The JSS2 students have already been taught the topic used for the study; hence they were not suitable for the study.

Research Instruments.

The instruments used for this research was the Computer Assisted Instructional Package (CAIP) and the test instrument. With the assistance of a professional computer programmer, the researchers developed the treatment (CAIP) on introductory technology. The package is interactive. It was structured in the following ways: A short text appears on the computer screen as the students open the package, the students read the text then a question based on it is followed with four (4) options (a) to (d) out of which the student picks one. A feedback of “correct” or “wrong” is given by the computer and the score of 3 marks is awarded for a correct answer for the students’ first attempt.

This self-interactive instructional package contains 5 major lessons. Each lasts for 30 minutes. The topics covered include maintenance, food storage, and preservation of food, Energy & forms of energy respectively. This package was used for experimental groups 1 and 2. Each of the five lessons that made up the CAIP is called MODULE. There are modules 1 to 5 in all. The sequence of text display, question and answer options, feedback continues until all the five modules were covered. The computer then displayed the final score of the students as feedback.

Validation of the Instruments
The CAIP was made to pass through specialists in computer programming. The instrument was later given to the researcher’s supervisor, educational technology lecturers in the Department of Science Education Ilorin, for further face and content validity. This package was also assessed for suggestions and questions and necessary corrections by some computer specialists within the Department of Science Education, University of Ilorin.

Data Analysis and Results.

For the analysis, t-test statistics was employed. This was possible as the questions were structured. The students were required to answer the questions from which it was possible to calculate the total scores of each student. The means and standard deviation were arrived at on the basis of the scores. To test if any differences exist in the performance of the students, the t-test technique was adopted. Besides, percentages and tables were used as supplement in presenting the findings of this study. This study aimed at examining the effect of computer assisted instructional package on secondary school students’ performance in Introductory Technology in Ilorin, Nigeria. Three hypotheses were postulated and tested. These are: There is no significant difference in the performance of students who were exposed to individualized CAI and those that were taught using conventional method of instruction. There is no significant difference between the performance of male and female students in Introductory Technology exposed to individualized CAI. There is no significant difference between the performance of male and female students in Introductory Technology exposed to cooperative CAI.

Demographic Information

Table 1: Distribution of Participants by Group

<table>
<thead>
<tr>
<th>Group</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>Experimental Group</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 1 reveals the distribution of the participants by group. The table indicates that 10 participants (50%) were in the control group while another 10 participants (50%) took part in the individualized CAI learning package.

Table 2: Distribution of Participants by Sex for Individualized CAI.

<table>
<thead>
<tr>
<th>Sex</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>Female</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2: Distribution of Participants by Sex for Individualized CAI.
Table 2 shows that 5 participants (50%) were females while 5 participants (50%) were males that took part in the individualized CAI package.

Table 3: Distribution of Participants by Sex for Cooperative CAI

<table>
<thead>
<tr>
<th>Sex</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>Female</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3 presents the percentage and distribution of the participants in the cooperative CAI package. The results indicate that 6 participants (50%) were females.

Results
Hypothesis I states that there is no significant difference in the performance of students who were exposed to individualized CAI package and those exposed to the conventional method of instruction. In order to provide evidence for this hypothesis, t-test was used.

Table 5: Mean, Variance and t-test of Participants on the Basis of Individualized CAI

<table>
<thead>
<tr>
<th>Respondents</th>
<th>No</th>
<th>Mean</th>
<th>Variance</th>
<th>df</th>
<th>Calculated t-value</th>
<th>Critical t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>10</td>
<td>17.3</td>
<td>2.678</td>
<td>18</td>
<td>0.3</td>
<td>1.734</td>
</tr>
<tr>
<td>Control</td>
<td>10</td>
<td>17.1</td>
<td>1.878</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significance level: 0.05

A critical examination of this result shows that the calculated t-test value 0.3 is less than the critical value of 1.734 at 0.05 significance level. This means that there is no significant difference between the performance of the students exposed to the CAI package and those exposed to the conventional method of instruction. Hence, the hypothesis is accepted.

Hypothesis Two states that there is no significant difference between the performance of male and female students in Introductory Technology exposed to individualized CAI. To test the evidence for this hypothesis, t-test was employed.

Table 5: Mean, Variance and t-test of Participants on the basis of gender for Individualized CAI
<table>
<thead>
<tr>
<th>Sex</th>
<th>No</th>
<th>Mean</th>
<th>Variance</th>
<th>df</th>
<th>Calculated t-value</th>
<th>Critical t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>6</td>
<td>16.8</td>
<td>2.700</td>
<td>8</td>
<td>-0.670</td>
<td>1.859</td>
</tr>
<tr>
<td>Female</td>
<td>6</td>
<td>17.4</td>
<td>1.300</td>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significance level: 0.05

Table 5 shows a summary of the result and this shows the calculated t-value of -0.670 being less than critical t-value of 1.859 at 0.05 significance level. It means there is no significant difference between the performance of male and female students in Introductory Technology exposed to individualized CAI. Thus, the hypothesis is accepted.

Hypothesis Three states that there is no significant difference between the performance of male and female students in Introductory Technology exposed to cooperative CAI. To test this hypothesis, t-test was used. A summary of the result is shown in Table 6 below.

Table 5: Mean, Variance and t-test of Participants on the Basis of Sex for Individualized CAI

<table>
<thead>
<tr>
<th>Respondents</th>
<th>No</th>
<th>Mean</th>
<th>Variance</th>
<th>df</th>
<th>Calculated t-value</th>
<th>Critical t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>6</td>
<td>16.5</td>
<td>1.9</td>
<td>10</td>
<td>0.133</td>
<td>1.812</td>
</tr>
<tr>
<td>Female</td>
<td>6</td>
<td>16.3</td>
<td>7.467</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significance level: 0.05

The calculated t-value 0.133 is less than the critical t-value 1.812 at 0.05 level of significance. It means there is no significant difference between the performance of the male and female students in Introductory Technology exposed to cooperative CAI. Thus, the hypothesis is accepted.

Discussion on Findings.

Theses researchers investigated the effect of computer assisted instructional package on students’ performance in Introductory Technology. The result of the t-test analysis showed that there was no significant difference in the performance of students of Introductory Technology who were exposed to individualized CAI package and those taught by the conventional method of instruction. This result is contrary to results of similar studies in other subjects.

Similar studies confirmed that the performance of students exposed to CAI packages were enhanced in other subjects like Social studies (Ajelabi, 1998), Geography (Egunjobi, 2002), Mathematics (Udousoro, 2000), Chemistry (Okoro & Etukodo, 2001). There is also an abundant literature on the efficacy of CAI for science and other subjects in the elementary schools, (Ravaglia, Suppers, Stillinger & Alpher, 1995; Christmann, Badgett and Lucking, 1997, Chang, 2000) in secondary schools (Brophy 1997, Sterr and Repha, 2000; Dunn, 2002) as well as post secondary schools (Ivers and Barron 1998, Glickman, 2000; Springer, 2002; Jenks, 2002). This finding which is inconsistent with results of studies in other subject
areas could be attributable to the fact that use of CAI packages is a novelty in the school used and also the smallness of the sample.

The result of the second hypothesis revealed that there was no significant difference between the performance of male and female students in Introductory Technology exposed to individualized CAI. Hence gender had no effect on the students’ performance in Introductory Technology when exposed to individualized CAI. The mean score of the females (17.4) is higher than that of the male (16.8). The difference in the mean scores highlights the greater commitment of the females to experience the new technique of learning.

The result of the third hypothesis also revealed that there was no significant difference in the performance of male and female students in Introductory Technology when taught with cooperative CAI. Thus gender had no effect on students’ performance in Introductory Technology when exposed to cooperative CAI.

Conclusion

From the findings, the following conclusions could be drawn. There was no significant difference in the performance of students of Introductory Technology who were exposed to individualized CAI package and those taught by the conventional method of instruction. Gender did not affect the students’ performance when they were exposed to individualized CAI. Gender did not affect the students’ performance when they were exposed to cooperative CAI.

Recommendations

The following are the recommendations made based on the findings of this study. The essence of teaching by the teachers is that learners will learn. When learning takes place, academic performance is automatically enhanced. It is therefore, necessary that this teaching strategy (computer assisted instruction) should be put to use in secondary schools. In order to make this possible the federal and the state governments should make it mandatory for all federal colleges and state-owned secondary schools respectively to fix computer literacy and operation in their school curricular. Specialists in computer operation should be employed to teach computer literacy and utilization in secondary schools.

The necessary attention will be accorded computer literacy and operation in the secondary schools when West African Examination Council (WAEC) and (NECO) should go further by converting the subjects in the secondary schools into individualized CAI programmes for students to run. One or two subjects may be used as test cases to start with. Curriculum planners in teacher training institutions such as National Commission for Colleges of Education (NCCE) and National Universities Commission (NUC) need to incorporate courses that will make teachers in training to be computer literate into the curriculum for training teachers. This will help teachers to properly supervise CAI programmes for their students in the secondary schools.

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*Corresponding Author: Dr. S.A Onasanya, Department of Science Education, University of Ilorin, PMB 1515, Ilorin, Nigeria. E-mail: bonasanya2003@yahoo.com