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EFFECT OF TUTORIAL MODE OF COMPUTER-ASSISTED INSTRUCTION ON STUDENTS' ACADEMIC PERFORMANCE IN SECONDARY SCHOOL PRACTICAL GEOGRAPHY IN NIGERIA

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Abstract

This study investigated the effect of Tutorial Mode of Computer-Assisted Instruction (CAI) on students' academic performance in practical geography in Nigeria. However, the sample population of eighty (80) Senior Secondary School Two geography students that were randomly selected from two privately owned secondary schools in Ibadan metropolis, Nigeria, participated in the study. They were comprised male and female students. Pre-test, post-test control group

quasi-experimental design was adopted in the study. Two instruments were utilized for data collection viz: Geography Tutorial CAI MODE [GTCAIM, KR=0.85] and Practical Geography Performance Test [PGPT, KR=0.82]. Two null hypotheses were tested at $p < 0.05$, T-test statistical analysis was employed to compute the data collected. Finding revealed that, there was a significant difference in students' performance between the students' exposed to GTCAIM and the control group [conventional. method-Talk and Chalk] with the result $t_v = 4.05 > t_c = 1.98$, $df = 78$, at $p < 0.05$. That is, students exposed to GTCAIM performed significantly better than their counterparts in control group: However, there was no significant difference in the male and female students' performance with the result $t_v = 1.67 < t_c = 1.98$, $df = 78$, at $p < 0.05$. The implication of these findings is that, the tutorial mode of CAI enhanced students' performance in geography more than the conventional method and that, with the utilization of tutorial mode of CAI, gender-inequality in geography instruction is no more a barrier. Therefore, recommendations are proffered for the utilization of tutorial mode of CAI, so as to enhance students' performance in geography and in fact, in other school subjects.

Key Words: Effect, Tutorial mode, Computer-assisted instruction, Practical geography, Secondary school, Nigeria.

Background to the Study

The knowledge of geography is not only important and useful to the learners, but to everyone who seeks to cope with the ever-emerging realities of our time (Mansaray, 1990). In fact, the earth which is the focus of the geographical study is the “theatre” where virtually all human activities are carried out. Therefore, it is only plausible and imperative that man knows about the nature and character of the earth and the consequences of the interactions between man and his environment (Dompseh, 1978; Egunjobi, 2002).

In Nigeria, geography is an important school subject as is manifested in the following general objectives of the teaching and learning of geography.

- To develop a sense of responsibility towards one's own society and an intelligent interest in the formulation of national goals and policies, especially as they influence the different resources and regions of the area.
- To develop respect for accurate orderly and objective methods of investigation.
- To understand spatial relationship and the differential character of the earth's surface.
- To develop a sympathetic understanding of the people of other lands based on the recognition that they may have different goals and different problem from the people of one's own home area.
- To understand spatial relationships and the differential character of the earth's surface (Okunrotifa, 1973).

From these afore-stated objectives, geography is not only taught for the learners' acquisition of knowledge but also to develop certain values and skills such as endurance, painstaking, patience, respect for others' opinions etc (values) and sound judgement, keen observation, accurate measurement, reflective thinking, among others (skills). The acquisition of these values and skills will assist the learners to cope with the challenges in their daily lives.

In the Nigeria secondary schools, geography instruction is dichotomised thus; practical geography and physical human and regional geography. This study centred on practical geography; particularly map reading because students often have difficulty in it. Also, reports of the students' performance in this aspect of practical geography in Senior Secondary School Certificate Examinations

conducted by both West African Examinations Council (WAEC) and National Examinations Council (NECO) have not been encouraging. For instance, WAEC Chief Examiners' reports have highlighted poor candidates' performance in SSSCE geography map reading persistently (WAEC, 2005, 2006, 2007, 2008, 2009).

The importance of map reading in the study of geography has been highlighted by several researchers such as Mansaray (1992), Adeyemi (2002), Egunjobi (2002) and Oludaisi (2011). In fact, they agreed that maps are indispensable tools used by the geographers at different levels and for various purposes. Meanwhile, geographers make use of different types of maps. Topographical map is one of such map which is an integral tool in map reading at the secondary school level in Nigeria. This map exhibits details of the physical and cultural landscapes of the area mapped with the aid of contour lines (Egunjobi, 2002).

At the secondary school level in Nigeria, map reading is concerned with the topographical maps which are made up of contour lines. These lines connect all points which are at the same elevation above or below a datum surface which usually means the sea level (Aguda and Egunjobi, 1988). However, the reading and interpretation of topographical maps demand certain skills in the part of the students and teachers. These skills include identification of relief features on topographical maps, ability to perceive three-dimensional features depicted as two-dimensional on the flat map and the ability to give a description of human activities of the area mapped in a simple form (Egunjobi, 2002).

In Nigeria, most geography teachers usually employ conventional method (talk and chalk method) to teach the students the map reading, this integral and difficult aspect of practical geography. This teaching method is an organised verbal presentation of subject-matter, where the teacher dominates the exercise for long period with or without the learners' involvement. By this method, the teacher organises resources, prepares outlines and presents the topic, while the learners

are made to listen. Seldomly, the teacher writes some points on the chalkboard with his/her chalk, thus, the method is christened “talk and chalk method” (Egunjobi, 2007). Therefore, this “talk and chalk method” coupled with other factors such as, inadequate appropriate instructional materials to illustrate and demonstrate the topic taught students’ poor background in mathematical and some major geographical concepts. Also, geography not given sufficient periods on the school timetable to cover the wide topics, too technical topics, inadequate time to learn the fact properly, among others (Adeyemi, 2002; Egunjobi, 2002; Oludaisi, 2011).

There is no doubt that, the afore-listed factors have contributed greatly to the poor students’ performance in geography in the Nigerian secondary schools, hence, the urgent need to explore further solutions that could foster teachers’ presentation and enhance learners’ performance in the subject (geography).

Therefore, one possible means of finding solution to these problems is the utilisation of Computer-Assisted Instruction (CAI). CAI is an individualised learning strategy, that involves many modes viz tutorial, drill and practice, games, simulations, modelling, information handling, dialogue and problem analysis (Egunjobi, 2007).

However, this study focused on tutorial mode of CAI because of its easy adaptability to the subject (geography) and its comprehensiveness in the mode of presentation. It is also the most superior mode of CAI. This mode is characterised by textual presentation in small steps, active learners’ participation in the learning process, frequent feedback and reinforcement (Suppes, 1975). In fact, it is a self-learning package, which allows the individual learner to go at his/her own rate and pace through the use of computer.

By and large, in this study, the tutorial mode of CAI was experimented vis-à-vis the conventional method of teaching (talk and chalk method) to treat selected basic and difficult topics in map

reading. The topics are contour forms of relief features, graphical representations of relief features and types of slopes.

Statement of the Problem

The study examined the effects of tutorial mode of CAI on students' academic performance in secondary school practical geography in Ibadan metropolis, Nigeria.

Hypotheses

These hypotheses were tested at $p < 0.05$.

HO₁: There is no significant difference in the academic performance between the students exposed to tutorial mode of CAI and those exposed to conventional method in practical geography.

HO₂: There is no significant difference in academic performance of male and female students exposed to tutorial mode of CAI and those exposed to conventional method in practical geography.

Methodology

Design

This study adopted the pre-test, post-test control group quasi-experimental design, with one experimental group (tutorial mode) and a control group (conventional method – talk and chalk). Gender and academic performance were also investigated as moderator and dependent variables respectively.

The conceptual model is illustrated thus.

E O₁ X₁ O₂ (Experimental group)

C O₃ X₂ O₄ (Control group)

Where O₁ O₃ pretest scores for the two groups

O₂ O₄ posttest scores for the two groups

X₁ the treatment (Tutorial Mode)

X₂ the placebo treatment (talk and chalk method)

Population and sampling technique

From two privately owned secondary schools in Ibadan Metropolis, Oyo State, Nigeria, eighty Senior Secondary School Two (SSS II) Geography students were randomly selected. They consisted of both male and female students (40 each). From each school, forty students were selected (20 males and 20 females). The SSS II geography students were chosen for the study because they have been exposed to geography in their SSS I class. Moreover, they were not sitting for any public examination like WAEC or NECO hence, they have time to participate in the research. The school used for the experimental group was selected based on the following parameters. The students should have been exposed to computer studies at their Junior Secondary School level; availability of a geography teacher, a computer tutor, at least ten functioning computer sets (Desktop computers) and a generator in standby.

Instrumentation

Two major research instruments used for the data collection in the study are Geography Tutorial Computer-Assisted Instruction Mode (GTCAIM) and Practical Geography Performance Test (PGPT). GTCAIM was programmed through computer with the assistance of a computer programmer. The instrument consisted of twenty items which covered the following basic and difficult topics in map reading, an aspect of practical geography.

- (i) Contour Forms of Relief Features
- (ii) Graphical Representations of Relief Features
- (iii) Types of Slopes

The GTCAIM was designed and programmed based on the following procedural steps in computer programming.

- Functional specification of requirements

- Systems specification
- Programme specification
- Writing and testing of the programme
- Acceptance by the user

The GTCAIM was designed and presented in form of programmed instruction (PI). It consists of 20 frames with stimuli (questions) and responses (3 options A-C). The user will go through the 20 frames and respond to the question (stimulus) at the end of each frame. Three attempts are available to the user. If the correct response is got at the first attempt, the user gets 3 marks, second attempt 2 marks and third attempt 1 mark. If at the 3rd attempt, the correct option is not got, computer will display the correct option, then the user will go to the next frame. If at the first attempt, the correct option is got, computer will display a congratulatory message. At the end of the 20 frames, computer will display the total mark scored by the user. The total mark obtainable is 60.

PGPT: It was developed by the researcher to serve as a performance test for the students on the selected three topics. It consists of 30 items of multiple choice objective test with four options A-D. The items centred on the following levels of cognitive domain remembering, understanding and thinking, based on the Educational Testing Service Scheme. It was used for both pre and post-tests.

IGCG: This is the Instructional Guide for the control group. This is to guide the geography teacher on how the three topics selected for the study will be taught to the students in the group using the conventional method of teaching (Talk and Chalk). The guide was designed by the researcher in form of lesson plans which involve the major features viz: topic to be taught, instructional objectives, instructional media, introduction, presentation and evaluation.

Validation and reliability of instruments

GTCAIM: It was given to the experts in computer and geography for proper scrutiny and content validity. However, eight SSS II geography students, apart from those participated in the main study worked individually using the programme on computer to ensure the instructional functionality, clearance of the content and to ascertain if the students could really work with the programme on computer. The instrument was trial-tested on the same eight students used for validation to determine its reliability. The data collected were analysed using Kuder Richardson (KR21). The result was 0.85, which was found reliable and appropriate for the study.

PGPT: It was given to the experts in geography for face and content validity. Furthermore, the content validity of the instrument was also carried out through the construction of the Test Blue Print developed by the researcher. The 30 items in the test were developed based on the three levels of cognitive domain in line with the scheme employed by the Educational Testing Service (Remembering, Understanding and Thinking). For the reliability, instrument was trial-tested on the same eight students used for GTCAIM. The data collected were subjected to KR21. The result was 0.82, which was found reliable and appropriate for the study. Further analyses, such as, the difficulty index (ID) and Discrimination Power (DP) were also carried out on the 30 items with the results ranges between 50 to 75 and 0.40 to 0.50 respectively. These results were found reliable and appropriate for the study.

Procedure for data collection

Six weeks were used for the study. First week was used for the training and orientation of the geography teacher(s) and computer instructor(s) involved in the research. The cooperation and understanding of the principals and those teachers and instructors were also solicited for. Students in the schools used for the study were also assigned to their groups viz experimental and control group

respectively. During the first week also, the administration of the PGPT was conducted in the two schools used for the study as pre-test.

The 2nd to 5th weeks were for the treatments in the experimental and control groups. The forty students in the school assigned to experimental group were exposed to GTCAIM with the help of the geography teacher and that of the computer instructor. In the school assigned to control group, students were treated with IGCG through the geography teacher). The students in the experimental group used 80 minutes for the treatment through computer weekly. The strategy employed was that, these students left their classroom for the computer room to work on the computer using the package (GTCAIM). Ten functioning computer were allocated to the students with 4 students to one computer. So, a student spent at least 20 minutes practising with the computer daily under the guidance and monitoring of the geography teacher and computer instructor. The marks scored by the students during the practice; shown on the computer monitor were recorded by the geography teacher or computer instructor so as to motivate the students to put more efforts in using the package. By the end of the 5th week, they have practised several times with the package (GTCAIM). The control group students were taught by their geography teacher using the (IGCG). The three topics selected for the study were treated between 2nd and 5th week of the research with the students through conventional method (talk and chalk). The 6th week was used for the administration of PGPT again as post-test, concurrently in the two schools used for the research.

Data analysis and findings

The data collected were analysed based on the hypotheses tested in the study.

HO₁: *There is no significant difference in the academic performance between the students exposed to tutorial mode of CAI and those exposed to conventional method in practical geography.*

The data collected in testing this hypothesis were computed using t-test statistical method. Table I shows the finding.

Table 1: T-test Analysis of the Students' Academic Performance of those exposed to GTCAIM and Conventional Method (CM) in Practical Geography

Variable Category	N	Mean	SD	DF	t-value	t-critical	P
GTCAIM (Exp)	40	49.30	6.53	78	4.05	1.98	*
CM (Con)	40	44.30	6.25				

* Significant at $p < 0.05$

Table 1 shows that, there was a significant difference between the students' academic performance of those exposed to GTCAIM and those exposed to conventional method (CM) with the result t-value = 4.05 greater than the t-critical = 1.98, $df = 78$ at $p < 0.05$. Hence, this hypothesis was rejected. This implies that, students exposed to tutorial mode of CAI performed significantly better than their counterparts exposed to the conventional methods (talk and chalk).

HO₂: There is no significant difference in academic performance of male and female students exposed to tutorial mode of CAI and those exposed to conventional method in practical geography.

Data were collected and subjected to t-test analysis in testing this hypothesis. Tables 2 and 3 show the findings.

Table 2: Multiple T-test Comparison of Male and Female Students' Academic Performance of those exposed to GTCAIM and CM in SSS Practical Geography

Variable Category	N	Mean	SD	DF	t-value	t-critical	P
Male GTCAIM	20	49.20	6.10	18	1.74	2.01	NS
Female GTCAIM	20	48.50	5.50				
Male CM	20	48.00	5.20	18	2.46	2.01	*
Female CM	20	45.10	5.10				

NS = Not Significant at $p < 0.05$

* Significant at $p < 0.05$

Table 2 indicates findings that were both significant and not significant in the students' academic performance of male and female students in control and experimental groups with the results $t\text{-value} = 2.46$ greater than $t\text{-critical} = 2.01$ and $t\text{-value} = 1.74$ less than $t\text{-critical} = 2.01$, $df = 18$ at $p < 0.05$ respectively. These findings connote that, both male and female students in the experimental group performed equally better with their exposure to GTCAIM, while, the male students performed better than their female counterparts in the control group treated with conventional method. Hence, in the experimental group, the hypothesis was not relected, while in the control group the hypothesis was rejected. However, further t-test analysis of both male and female students in both groups together shows the finding in table 3.

Table 3: T-test Analysis of Male and Female Students Academic Performance in both Experimental and Control Groups

Variable Category	N	Mean	SD	DF	t-value	t-critical	P
Males in Experimental and Control groups	40	57.20	11.32	78	1.67	1.98	NS
Females in Experimental and Control groups	40	56.80	10.33				

NS = Not Significant at $p < 0.05$.

Table 3 reveals the result with $t\text{-value} = 1.67$ less than $t\text{-critical} = 1.98$, $df = 78$ at $p < 0.05$, thus the hypothesis was not rejected. This

means that, both male and female students performed equally better with their exposure to GTCAIM particularly those in the experimental group.

Discussion of findings

Table 1 indicates significant difference in the academic performance of students exposed to the GTCAIM and those exposed to conventional method (CM). This means that, the students exposed to GTCAIM performed significantly better than those exposed to the conventional method (talk and chalk). It implies that the tutorial mode of CAI seems to be a better strategy that can enhance learners' academic performance in practical geography most especially in map reading than the conventional method. This finding supports that of Wilson (1993) who stated that tutorial mode of CAI enhances students' academic performance in mathematics more than drill and practice mode of CAI. Udousoro (2000) also recommended the use of tutorial mode of CAI for mathematics instruction. In fact, tutorial mode of CAI is sequential, comprehensive and easy to operate electronically through computer by the user who is computer literate (Egunjobi, 2002).

Tables 2 and 3 show not significant and significant differences respectively in the male and female students' academic performance in practical geography. That is, both male and female students in experimental group (GTCAIM) performed better equally, while, male students performed better than their female counterparts in the control group. However, further statistical analysis for both male and female students in both experimental and control groups was not significantly. This connotes that, with the use of tutorial mode of CAI, gender-in-equality is no more a barrier. Also, that geography which was regarded as "masculine oriented discipline" has become "gender-friendly-inclined subject" with the utilisation of tutorial mode of CAI as against conventional method (talk and chalk). This finding supports that of Udousoro (2000) that the use of CAI enhances both male and female students' performance in mathematics. The finding of

Sangodoyin (2010) is also in support of the finding that with the use of graphics and animation computer presentation, male and female students' performance in biology will be enhanced. Ahmed's (2008) finding that the use of computer-based instruction in total quality management among managers in selected private organisations also supports that both male and female managers performed equally better with the use of computer in their managerial quality control.

Conclusion and recommendation

Based on the findings of this study, the following conclusions are deduced. Tutorial mode of CAI enhances students' performance in geography and puts the masculine-domination in the discipline into oblivion. Also, geography teachers should be more ICT compliant and even be computer literate.

The following recommendations are proffered based on the findings of this study:

At all educational levels in Nigeria, teachers and students should be more ICT compliant; that is, they should be more computer literate.

Gender balance should be encouraged in the enrolment of students for science, social science and technology-oriented disciplines in secondary and tertiary institutions in Nigeria.

Provision of functioning laptops for the students, free of charge and for teachers at subsidised rate for instructional and pedagogical practices should be encouraged. There should also be the provision of adequate functioning desktops to institutions by the government, corporate bodies, non-governmental organizations, foreign associations, religious organisations and wealthy individuals in the society.

There should be effective and efficient utilisation of CAI, particularly tutorial modes and other modes, in all school subjects.

Finally, the issue of regular and effective supply of power (hydro, solar and thermal) in the country should not be over-emphasised.

References

- Adeyemi, S.B. (2002). *Relative Effects of Cooperative and Individualistic Learning Strategies on Students' Declarative and Procedural Knowledge in Mapwork in Osun State, Nigeria*. Unpublished Ph.D. Thesis, University of Ibadan, Ibadan, Nigeria.
- Aguda, S. A. & Egunjobi, A.O. (1988). *Ilesanmi Senior Secondary School Geography Book Two*, Akure: Ilesanmi Publishers Ltd. Pp 40-50.
- Ahmed, B. R. (2009). *Effects of Computer-Based Instruction on Learning Outcomes in Total Quality Management among Managers in Selected Private Organisations*. Unpublished Ph.D. Thesis, University of Ibadan, Ibadan, Nigeria.
- Dompreeh, C. (1978). *School Certificate Map Reading for West Africa*, Accra: Fep International Private Ltd, pp. 22-30.
- Egunjobi, A.O. (2002). *The Relative Effectiveness of Computer-Assisted Instructional Modes on Students' Learning Outcomes in Geography*. Unpublished Ph.D. Thesis, University of Ibadan, Ibadan, Nigeria.
- Egunjobi, A.O. (2007). *Concise and Basic Concepts of Educational Technology*. Ibadan: Ejon Publishers Ltd., pp. 107-124.
- Mansaray, A. (1990). Issues in the Teaching of Geography for Effective Learning in the 6-3-3-4 Educational System in Onasanya, K. & Ogunnowo, C.O. (Eds). *Teaching Geography for Optimal Learning Outcomes in Senior Secondary Schools Nigeria Geography Teachers' Association (SW Zone)* pp. 43-63.

- Mansaray, A. (1992). *Geography Method I*, External Studies Programme, Adult Education Department, University of Ibadan, Ibadan, Nigeria, pp. 12-15.
- Okunrotifa, P.O. (1973). The Objectives of Geography Education in Majasan J.A. & Adejuyigbe O. (Eds.) *Curriculum Innovation in High School Geography*. Ibadan, Nigeria: University of Ibadan, Pp. 30-35.
- Oludaisi, E.M. (2011). *The Effect of Group and Inquiry Based Learning on Students' Achievement in Map Reading in Oyo State, Nigeria*. Unpublished M.Ed Dissertation, University of Ibadan, Ibadan, Nigeria.
- Sangodoyin, I.A. (2010). *Effects of Computer Graphics and Animation Presentations on Students' Learning Outcomes in Senior Secondary School Biology in South Western Nigeria*. Unpublished Ph.D. Thesis, University of Ibadan, Ibadan, Nigeria.
- Suppes, P. (1975). The Teachers and CAI. In Rich, J.M. (Ed.) *Innovations in Education Reformers and their Critics*. Boston: Allyn and Bacon, Inc, pp. 10-15.
- Udousuro, U.J. (2000). *The Relative Effectiveness of Computer-Assisted Instruction and Text-Assisted Programmed Instruction on Students' Learning Outcomes in Mathematics*. Unpublished Ph.D. Thesis, University of Ibadan, Ibadan, Nigeria.
- WAEC (2005). *West African Examinations Council, Chief Examiners' Report May/June SSSCE* pp. 20-23.
- WAEC (2006). *West African Examinations Council, Chief Examiners' Report May/June SSSCE* pp5-19.
- WAEC (2007). *West African Examinations Council, Chief Examiners' Report May/June SSSCE* pp. 20-24.

WAEC (2008). *West African Examinations Council, Chief Examiners' Report May/June SSSCE* pp. 15-18.

WAEC (2009). *West African Examinations Council, Chief Examiners' Report May/June SSSCE* pp. 14-16.

Wilson, P. (1993). An individual Self-study System in a Numerical Mathematics Course based on Education Software. *International Journal of Mathematics Education in Science and Technology* 26(11), 5-10.