EFFECTS OF AUTOMATED MAP SOFTWARE ON ACHIEVEMENT AND RETENTION OF MAP CONSTRUCTION BY SECONDARY SCHOOLS GEOGRAPHY STUDENTS IN MINNA METROPOLIS

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Abstract

This study investigated the effects of automated map software on achievement and retention of map construction by secondary schools geography students in Minna Metropolis. The research design adopted for this research study is quasi experimental design. A total of 60 Senior Secondary two (SSII) students in public secondary schools in Minna Metropolis were sampled for the study. 60 students participated in the study randomly selected from the two selected schools. The instrument used for data collection was a teacher made Geography Achievement Test (GAT). The questions were multiple-choice type with four optional answers (A-D) with only one right answer. Items were subjected to expert assessment for face and content validity, in order to check how reliable the instrument was, a test-retest method was used with an interval of two weeks and r – value of 0.65 was obtained. Four null hypotheses were formulated and tested at 0.05 level of significance.t-test of the Statistical Package for Social Science (19.00 version) was used to analyzed the data obtained.The result showed that the learning achievement of the students in the experimental group was significantly better than that of the student in the control group. Based on the findings, it was recommended that use of AMS or computer software for teaching and learning should be encouraged in our schools. It was observed that the use of AMS enhance the teaching and learning of geography among students.

Keywords: Automated Map Software, Geography, Map Construction, Achievement and Retention

Introduction

Students nowadays happens to be running away from the study of geography in both higher and lower institutes, with the taught that geography is all about map studies and to draw any map thisseems to be a very tedious work, since they have lesser time for their studies as they give much time and attention to other aspects of life, for instance, the social network. Hence this will lead to the definition of what geography is and map making i.e. drawing and how important this map making is to students of geography in particular.

The actual meaning or idea of geography is to define or describe the phenomena or features that are found on or within earth's surfaces. Geography can be described as an aspect of sciencewhichis committed with the studies of land surface, their features, so also the inhabitants and the all the phenomenon's that are on the Earth(Kofo, 2012).Geography also can be regarded as the study in which space and itstemporal distribution of phenomena in

it, the processes, and features as well as the activities of humanson their space or habitat(Rilwani, Akahomen, & Gbakeji, 2014).In another point of viewGeography is predominantly the study of the activities of all physical and human phenomena and landforms created as a result of such activities.Geography is allabout three words which are how, why, and where human and natural phenomena occurs and how these phenomenon's areinterrelated with each other.Geography is regarded as a study of whole not just part of spatial and also it is aninterdisciplinary field of study that deals with the understanding of the changing in spatial structure from the past to the future (Rilwani, *et al*., 2014).

A map can be defineas a flat surface material, usually or mostly a piece paper, that depicts or indicates the spatial relationships at a minimal scale or dimensionbetween a given location or place on the earth surface, and if this piece of paper isdisplaying the whole or entirety Earth, can benamed as the map of the world. Suh, (2010) considers a map as, anillustration, generally on a simple surfacewhich is mostly piece of paper, of wholeor fraction of the earth surface or else some supplementaryfeatures showing a group of landforms in terms of their comparativedimension and spot." (Suh, 2010). This appears to be directdeclarationwhichreplaces a conventional idea ofwhat mapsare. From this relative position, maps can be regarded as mirrors ofthe reality. The art or studies at which abstract symbols are been used or put in placeto represent the Earth's surface is refer to as Cartography (map making) (Adeyemi, 2009).It can be seen today that, without much or anyprolonged or heated or doubt, that cartography happens to be the seed from which the larger field of geography grew.

Automation is the operation or control of equipment, a process, or asystem by a machine rather than by hand (Barnes, 2003). Map production includes map compilation, orassembling and fitting together the geographical data you will include in your map, as well as other elements (Buttenfield & Charlie, 2007). Map production also involvesmap construction in which the map is placed on the page or multiple related maps are placedon multiple pages, and associated elements like graphs or tables are added to the page orpages. A software is aprocess and/or procedure in which certain tasks are completed (Barnes, 2003). So, automated map software are machine-driven processes that result in the completion of tasksthat relate to the compilation, construction, or output of a map product.

There is no disbelief or argument that technology has become a part of our schools settings. Computers are used not only as a tool for helping schools to analyze data, but so also, computers have become a tool that has spread throughout, towards making the students learning best. The real revolutionary function of computer in education lies in the new area of Computer - Assisted Instruction (CAI), and this makes use of computer system as learning tool as noted in Teacher Education in Sub-Saharan Africa (TESSA, 2011). Computer Assisted Instructions (CAI) could be seen taking a major role in the Nigerian educational system for some few period of time now. Educational materials have been computerized and packaged in several ways.To some great extents to the poor achievement of students in geography could be linked to the inappropriate teaching strategies in geography.Educators and researchers have repeatedly acknowledged the drawbacks of teaching with a strict

lecture format. This format has been referred to as a method resulting in long periods of uninterrupted teacher-centered, expository discourse which relegates students to the role of passive 'spectators' in the collegeclassroom (Williams & McClure, 2010). Having students serve as passive spectators in the classroom may encourage a drop in attention and decrease their retention of knowledge.

The key to a greater development of any region or nation depends solely on level of technological advancement of that particular region or nation. Even with the easy technology has brought into our society, despite the relevance of geography to man, and development of the society, teaching and learning is faced with many problems. It is on these bases and the carefree attitude of teachers towards the adoption of instructional materials in teaching geography that this research study is aimed at investigating the effects of automated map software on achievement and retention of secondary schools geography students in map construction.

Research Questions

(i) Is there any significant difference between the achievement of students taught Map Construction with the use of automated map software and those taught by the use of conventional lecture method?

(ii) Will there be any gender difference in achievement among students' taught Map Construction with the automated map software and those taught with the conventional lecture method?

(iii) Will there be any significant difference between the retention scores of students' taught Map Construction with the use of automated map software and those taught with the conventional lecture method?

(iv) Is there any gender difference in retention scores of students' taught Map Construction with automated map software?

Research Hypotheses

HO1: There is no significant difference between the mean achievement scores of students' taught Map construction with the use of automated map software and those taught with theconventionallecture method.

HO_2: There is no significant difference between the mean achievement scores of male and female students' taught Map construction with the use of automated map software.

HO_3: There is no significant difference between the mean retention scores of students' taught Map construction with the automated map software and those taught with the conventionallecture method.

HO_4: There is no significant difference between the mean retention scores of male and female students' taught Map construction with the use of automated map software.

Methods

Table 1 shows research design layout.

Research Design Layout

Groups	Pretest	Treatment	Posttest	Retention Test
Experimental Group	O_1	X_1	O_2	O_{rt}
Control Group	O_3	X_2	O_4	O_{rt}

Where:

O_1 O_3.....Pretest

X_1 X_2.....Treatment

O_2 O_4 .....Posttest

O_{rt}.....Retention Test

The population of the study consists of all the SSII students from all the senior secondary schools in Minna Metropolis of Niger State: They are 4500 students in the 2013/2014 academic session.

From the 25 secondary schools in Minna (2) that were selected randomly because of the availability of computer laboratory in the schools. The sample size used for the research study was (60) students which were randomly selected. Simple random sampling techniques was used in the selection of experimental group and control group in the two coeducational schools used 15 males and 15 females were sampled through simple stratified sampling.

Two instruments were used for the research work. First was the Automated Map Software (AMS) which was used for the experimental group that severed as a treatment while the otherinstrument used in this study for data collection was developed before the field work, and named Geography Achievement Test (GAT). A carefully structured multiple choiceTwenty (20) question test was developed by the researcher from Essential Geography for senior secondary schools by O.A Iwena also the Geography Achievement Test (GAT) were based on SSII Geography curriculum on the concept of map construction and map reading which were administered to 60 students from the two secondary schools offering geography in Minna metropolis. The instrument (GAT) was used for both the experimental and control groups as pretest and retention test correspondingly after which the general scores were transformed into one hundredth by the researcher.

The Automated Map Software (AMS) was validated by oneeducational technologist and two instructional experts. The Geography Achievement Test (GAT) instrument was validated by three Geography teachers, and lecturers in Geography and Science Education department of Federal University of Technology Minna and some test and measurement experts for face and content validity.Helpful and productiveproposition were made which show the way to the reformation of some of the items.

In order to check the reliability of the Geography Achievement Test (GAT), 20 students were randomly selected from a school within the population but not selected for the main study. Test-retest technique was used to establish the reliability coefficient of the test items. The

response of the subjects was scored after the first and second administrations of the test. The scores obtained were correlated using Pearson's Product Moment Correlation Coefficient (PPMC) which yieldeda reliable coefficient 0.65.

Three different methods were used in the collection of data for the study. A pilot study was used in the collection of data to determine the entry behavior of the students before the administration of the treatment. After this, a posttest was used in the collection of data to answer the research hypotheses formulated at 0.05 alpha level of significance after the treatment. After two weeks of administration of the treatment, posttest delayed was administered to the same group of students to determine the retention ability of the students in both the experimental and control group.

The data gathered were analyzed using descriptive and inferential statistic and t-test was used to answerthe formulated hypotheses using the Statistical Package for Social Science (SPSS) 19.00 version.

Results

Table 1: Pre-test achievement score of control and experimental group

Group	No.	Mean	SD	df	t	P-value
Control	30	44.33	13.30	58	1.057	0.308
Experimental	30	48.67	11.21			

ns: Not Significant at P<0.05

Table 1 shows t-test comparison between the mean achievement score of Control group and the mean achievement score of the Experimental in the pre-test. The mean and standard deviation of the control group score are 44.33 and 13.30 while that of the experimental group are 48.67 and 11.21. This indicates that there is no significant difference in the score (t=1.057, df= 58, p>0.05). Hence it was discovered that the scores of both experimental and control groups were at equal level before the treatment with the Automated Map Software (AMS).

Ho_1: There is no significant difference between the mean achievement scores of secondary school students taught Map construction with the use of automated map software and those taught by conventional lecture method.

Table 2: t-test analysis of achievement scores of experimental and control groups

Group	No.	Mean	SD	df	t	P-value
Control	30	54.83	15.83	58	4.866	0.031
Experimental	30	76.67	10.28			

Significant at 0.05

Table 2 shows the t-test comparison between the mean achievement score of students taught with the automated map software (AMS) and the mean achievement score of those taught using conventional teaching method. The mean score and standard deviation of the

control group are 54.83 and 15.83 respectively while that of the experimental group are 76.67 and 10.28. This result indicates that there is a significant difference in the mean achievement score of students taught map construction using the automated map software (AMS) and those who were taught with the use of conventional method (t= 4.866, df= 58, P<0.05). Hence the null hypothesis stated that there is no significant difference between the mean achievement score of students taught map construction using the automated map software (AMS) and those taught using conventional teaching method was therefore rejected. That is there significant difference between the two groups on their achievement score in favour of experimental group.

Ho_2: There is no significant difference between the mean achievement scores of male and female secondary school students taught Map construction with the use of automated map software.

Table 3: t-test posttest analysis of mean achievement scores of male and female in experimental group

Group	No.	Mean	SD	df	t	P-value
Male	15	82.00	7.270	28	1.646^{ns}	0.210
Female	15	71.33	10.259			

ns: Not Significant at P<0.05

Table 3 shows the t-test comparison between the mean achievement score of male students and the mean achievement score of female students which were taught with automated map software (AMS). The mean score and standard deviation of the male students are 82.00 and 7.270 respectively while that of the female students are 71.33 and 10.259. This result indicates that there is a significant difference in the mean achievement score of male and female students taught map construction using the automated map software (AMS) with (t= 1.646, df= 28, P>0.05). Hence the null hypothesis stated above that there is no significant difference between the mean achievement scores of male and female students' taught map construction with the use of automated map software (AMS) is thereby accepted. This means that there is no significant difference between the two groups on their respective achievement.

Ho_3: There is no significant difference between the mean retention scores of secondary school studentstaught map construction with automated map software and those taught with conventional lecture method.

Table 4: t-test analysis of mean retention scores of experimental and control group

Group	No.	Mean	SD	df	t	P-value
Control	30	46.83	14.232	58	6.444	0.014
Experimental	30	68.33	8.644			

Significant at 0.05

Table 4 shows the t-test comparison between the mean retention score of students taught with automated map software (AMS) and the mean retention score of those taught using the conventional method of teaching. The mean score and standard deviation of the control group are 46.83 and 14.232 respectively while that of the experimental group are 68.33 and 8.644. This results indicates that there is a significant difference in the mean achievement score of the students taught map construction with the automated map software (AMS) and those taught using conventional method of teaching (t= 6.444, df= 58, P<0.05). Hence the null hypothesis mentioned above that there is no significant difference between the mean retention scores of students' taught map construction with the automated map software and those taught by conventional method is thereby rejected in favour of experimental group.

Ho_4: There is no significant difference between the mean retention scores of male and female secondary school students taught Map construction with the use of automated map software.

Table 5: t-test analysis of mean retention scores of male and female students in experimental group

EX. Group	No.	Mean	SD	df	t	P-value
Male	15	74.67	3.994	28	5.081^{ns}	0.032
Female	15	62.00	7.270			

ns: Not Significant at P<0.05

Table 5 shows the t-test comparison between the mean retention score of male students and the mean retention score of female students taught with automated map software (AMS). The mean score and standard deviation of the male students are 74.67 and 3.994 respectively while that of female students are 62.00 and 7.270. This result indicates that there is a significant difference in the mean retention score of male and female students taught map construction using automated map software (AMS)(t= 5.081, df= 28, P<0.05). Hence the null hypothesis stated above that there is no significant difference between the mean retention scores of male and female students' taught Map construction with the use of automated map software (AMS) is thereby rejected.

Discussion

Table 1 shows t-test comparison between the mean achievement score of Control group and the mean achievement score of the Experimental in the pre-test. The mean and standard deviation of the control group score are 44.33 and 13.30 while that of the experimental group are 48.67 and 11.21. This indicates that there is no significant difference in the score (t=1.057, df= 58, p>0.05). Hence it was discovered that the scores of both experimental and control groups were at equal level before the treatment with the Automated Map Software (AMS).

Table 2 shows the t-test comparison between the mean achievement score of students taught with the automated map software (AMS) and the mean achievement score of those taught using conventional teaching method. The mean score and standard deviation of the control group are 54.83 and 15.83 respectively while that of the experimental group are

76.67 and 10.28. This result indicates that there is a significant difference in the mean achievement score of students taught map construction using the automated map software (AMS) and those who were taught with the use of conventional method (t= 4.866, df= 58, P<0.05). Hence the null hypothesis stated that there is no significant difference between the mean achievement score of students taught map construction using the automated map software (AMS) and those taught using conventional teaching method was therefore rejected. That is there significant difference between the two groups on their achievement score in favour of experimental group.This result is therefore in agreement with that of Gambari and Mogbo, (2006); Damola, Onasanya, and Asuqo, (2006); Adegoke, (2011);Aiyelabegan, (2003) who noted that CAI enhances student's achievement.

Table 3 shows the t-test comparison between the mean achievement score of male students and the mean achievement score of female students which were taught with automated map software (AMS). The mean score and standard deviation of the male students are 82.00 and 7.270 respectively while that of the female students are 71.33 and 10.259. This result indicates that there is a significant difference in the mean achievement score of male and female students taught map construction using the automated map software (AMS) with (t= 1.646, df= 28, P>0.05). Hence the null hypothesis stated above that there is no significant difference between the mean achievement scores of male and female students' taught map construction with the use of automated map software (AMS) is thereby accepted. This means that there is no significant difference between the two groups on their respective achievement.The result therefore is in agreement with that ofAdebule, (2004); Akabukike, (2000); Alabi and Aniah, (2014) and Nakakaand Okwo, (2011). This shows that CAI enhances bothmale and female achievement.

Table 4 shows the t-test comparison between the mean retention score of students taught with automated map software (AMS) and the mean retention score of those taught using the conventional method of teaching. The mean score and standard deviation of the control group are 46.83 and 14.232 respectively while that of the experimental group are 68.33 and 8.644. This results indicates that there is a significant difference in the mean achievement score of the students taught map construction with the automated map software (AMS) and those taught using conventional method of teaching (t= 6.444, df= 58, P<0.05). Hence the null hypothesis mentioned above that there is no significant difference between the mean retention scores of students' taught map construction with the automated map software and those taught by conventional method is thereby rejected in favour of experimental group.The findings is in line also with the findings ofAlabi, (2011); Danmole and Femi-Adeoye, (2004); Afolabi and Yusuf (2010) who stated that CAI as teaching strategies enhances students overall achievement in science related courses for longer period of time (retention).

Table 5 shows the t-test comparison between the mean retention score of male students and the mean retention score of female students taught with automated map software (AMS). The mean score and standard deviation of the male students are 74.67 and 3.994 respectively while that of female students are 62.00 and 7.270. This result indicates that there is a significant difference in the mean retention score of male and female students

taught map construction using automated map software (AMS)($t= 5.081$, $df= 28$, $P<0.05$). Hence the null hypothesis stated above that there is no significant difference between the mean retention scores of male and female students' taught Map construction with the use of automated map software (AMS) is thereby rejected. This result is agreement with the findings of Cepni, OrsergecandEMre,(2004). Who noted there was a significant difference in retention of the concepts learnt by the two different gender when CAI is applied when teaching.

Conclusion

The study looked in to the effects of map construction in Geography on senior secondary schools students' achievement and retention in Minna Niger state. The study was based on the current issues of poor academic of students in the two standard examinations conducted by NECO and WAEC in the country. Findings from the study shows that Automated Map Software has some many merits most especially in enhancement of teaching and learning of geography, Automated Map Software is a perfect tool that can lead to enhancement of achievement score amongst geography students, Automated Map Software happens not to determine much effect of difference on gender achievement when they were expose to it, Automated Map Software has greater influence on the retention level of the map construction taught for a longer period of timeIt was strongly advice that the government should try to provide funding for the retraining of teachers so as educational objectives of secondary school could be attained.

Recommendations

Based on the findings some recommendations were made

(i) Teachers should endeavour to make use of Automated Map Software to teach students how to construct maps considering the fact that the findings indicated that students perform better if taught in such way rather than convention lecture method they tends to stick to.

(ii) The provision of computers and other electronic gadgets that will be used to run these Automated Map Software by the government will a long way in bringing about the end of poor performance in students final examinations.

(iii) The act of teachers retraining through the means of seminars and conferences about newer idea and development in education toward the use of Automated Map Software in teaching will also help to change the current state of education in country.

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