



EFFECT OF COMPUTER SIMULATION STRATEGY ON STUDENTS' ACHIEVEMENT IN MAP READING AND INTERPRETATION IN TARABA STATE



L.I. El-Yakubu

General Studies Unit, Federal University Wukari, PMB 1020, Taraba State, Nigeria

lawalelyakubu@gmail.com

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Abstract: This study investigated the effect of computer simulation strategy on students' achievement in map reading and interpretation in Taraba State, zone A. Two research questions and two hypotheses guided the research. A sample of 382 SSII students in Geography map reading and interpretation class was studied. The students were randomly distributed and assigned to experimental and control groups. That is, computer simulation strategy (CSS) and control. The study used MRIAT to collect data on students' achievement after being taught map reading and interpretation. Research questions were analysis and hypotheses were tested using ANCOVA at 0.05. The findings revealed that there is significant difference between the mean achievement score of students taught map reading and interpretation using ABL and those taught using with the group exposed to CSS achieving higher. Also, there was significant gender difference in mean achievement between those exposed to ABL and CSS. The study recommends among other things that geography teachers should be encouraged to use the CSS in order to provide alternative of the challenge of inadequate maps, and other instructional material for teaching map reading and interpretation in our secondary schools in Taraba State.

Keywords: Achievement, computer simulation strategy, gender, map reading, students

Introduction

Geography is concerned with human environmental interactions in the context of specific places and locations. In addition to its central concern with space and time, it is characterized by a breath of study, a range of methodologies, a willingness of to work from other disciplines and an interest in the future of people and environmental relationships (Rudoff, 2012). In finding answers to geography questions Rudoff (2012) says it requires investigation of the location, situation, interaction, spatial distribution and differentiation of features. According to Rudolf (2012), the aims, contents and methods of basic geography education are a major element of general education and also create the foundations for connectible vocational learning in many professional areas, for instance in planning, environmental protection, cartography and remote sensing, aircraft and piloting, military strategies, tourism and economic development as it is also enshrined in the National Policy on Education (FRN, 2012). Map reading and interpretation in geography curriculum is compulsory for all students of Geography in secondary school. It is often referred to as practical geography (map reading and interpretation), because students are expected to perform or carry out practical work by themselves to facilitate understanding of a map reading. Map reading involves the ability to recognize conventional signs, relief patterns, contour lines and drainage patterns. Iwena (2008) sees a map as a representation of the earth's surface on paper. A large area of land, for example a town, village or even a whole local government area can be represented on a piece of paper. Therefore, investigation into the effects of Computer Simulation Strategy (CSS) on students' achievement in map reading and interpretation in SSCE Geography is necessary as there has been the increasing desire by the Federal Government of Nigeria (FGN) to provide qualitative and affordable education to her citizens for a wholesome development of the individual (FRN, 2012). This desire manifested in the first Curriculum Conference in 1969 and had been reviewed from time to time for the aspiration of the individual and the society at large.

WAEC Chief Examiners have lamented the poor performance of Secondary school leavers in public examinations especially WASSCE. For instance, the WAEC Chief Examiners reports noted that geography students found it difficult to answer questions on map work (WAEC, 2012). Most candidates could not identify simple features on the topographical map, poor performance in question involving calculation, poor knowledge in reading and interpretation of maps. Most of them could not identify conventional signs, poor description of relief, and the relationship between relief and settlement (May/June, 2012) (Adeyemi, 2014), also observed the issue of teachers hardly they use mathematical sets, set square, drawing books, tracing paper and other relevant materials for teaching and learning of map reading and interpretation. Could this report occur as a result of students' disposition to examinations or poor teaching strategy by the teachers or what could lead to this poor performance? Equally, parents, government and even the students are concerned about the low achievement of students in geography especially in WASSCE and NECO. Salahuddin (2010) and Adesulu (2014) expressed the view that, the issues of poor performance of students in secondary schools map reading and interpretation in Geography examinations is a source of worry to teachers as well as examination bodies, In order to see their effects on the teaching of Map reading and interpretation in Taraba State. The teaching of map reading and interpretation using Computer simulation strategy (CSS) could increase students' knowledge of this aspect of geography which may enable them to attempt questions in their Senior School Certificate Examinations (SSCE). This may equally enhance the students' achievement in geography. It is for this reason that this research is focused on CSS instructional strategies. Computer simulation strategy (CSS) is a strategy for using computer software or PowerPoint projector to model the operation of "real-world" processes, systems, or events (Fishwick, 2014). Or as simplified pictures of the world having some (but not all) of the characteristics (Gatto, 2013). In particular, CSS model involves creating a

computational representation of the underlying theoretical logic that links constructs together within these simplified worlds (Wescott, 2013); these representations are then coded into software or PowerPoint that is run repeatedly under varying experimental conditions (e.g., alternative assumptions, varied construct values) in order to obtain results. Today's students are growing with and also getting their information via visual tools like television, GSM sets, computer and internet, Getting students interest by this methods of teaching where a lot of channels compete for their attention is even becoming difficult (Jong, 2009). Literature indicates that ICT, can play a key role of better engaging students in computer classes through computer simulated strategy (Psycharis, 2010). According to Wescott (2013), in other to support geography classes and teaching of map reading and interpretation topics easily, computer-simulation strategy such as interactive geography computer power point shows are prepared in slides. These programmes contain simulations that can be used in performing teaching with the computer and projectors. Even though, some authors and researchers have indicated the effectiveness of CSS over other strategy, there conflicting views (Jong, 2009) revealed that CSS are more effective than other strategy of teaching, but some researchers like Gatto (2013) did not find any difference between their effectiveness.

In Nigeria, females have under achievement relatively to their male counterpart in Basic Sciences, particularly in Geography (Adeyemi, 2014). This stereotypical belief regarding gender differences in the area of perceptions and cognitive ability has become a serious concern; studies carried out in Nigeria with reference to gender and geography achievement and related task around gender has been acknowledged as one of the attribute that affects student's achievement in geography subjects at senior secondary school level. The research conducted by Mitra and Steffeensmeier (2000) on gender and computer use in an academic institution where all students were provided with network access and laptop computers over a four year period. The results indicated that women were less positive about computers than men and the use level of computers by women were less frequent than for men. Another research conducted by Falode *et al.* (2014) revealed that students taught geography through Computer Simulation Instruction (CSI) perform better than their counterparts taught using lecture method. However, there was no significant difference in the achievement of boys and girls taught using CSI strategy. The researcher is interested in using these instructional strategy CSS to see if it can enhance students' performance in learning map reading and interpretation. Available record from Post Primary Schools Management Board in the Taraba State Ministry of Education (2014) revealed that, there is higher achievement of male than female in Senior Secondary Schools Examinations. There is however scanty study on the difference in achievement in the male and female students in Geography in the Taraba State.

The recurring poor performance of students in SSCE Geography examinations has led the researcher to carry out an investigation into the teaching strategy that may improve students' achievement in map reading and interpretation. Reports from WAEC Chief Examiners 2014 have shown that map reading and interpretation is one of the difficult concepts experienced by teachers and students in the Geography curriculum. It was also observed that the causes of students' difficulties include: poor teaching strategy and low interest of students toward some mathematical and practical aspects of map reading and

interpretation (Adeyemi, 2014). Therefore, there is the need to investigate the instructional strategy that could best enhance achievement of both male and female students in map reading and interpretation

Purpose of the study

The purpose of this study is to investigate the effects of Computer Simulation Strategy on gender achievement in teaching map reading and interpretation in Taraba State. The study will specifically investigate the

1. What is the difference in mean achievement score of students taught map reading and interpretation using activity-based learning and those taught using computer simulation strategy?
2. What is the difference in the mean achievement score of male and female students taught map reading and interpretation using activity-based learning and those taught using computer simulation strategy.

Hypotheses

The study will test the following hypotheses at 0.05 level of significance:

H₀₁: There is no significant difference between the mean achievement score of male and female students taught map reading and interpretation using computer simulation strategy.

H₀₂: There is no significant difference between mean achievement scores of male and female students taught map reading and interpretation using activity-based learning and those taught using computer simulation strategy.

Materials and Methods

The study employed the quasi-experimental research design; the study was carried out in Taraba State, Nigeria. The target population of the study was 382 SSII geography students from Zone A of Taraba state, consisting of 264 males and 118 females from six schools in the zone. A purposive sampling was done by selecting co-educational schools to reflect gender. All second year students of geography were used as sampled, two out of six local governments were randomly selected by hat and draw technique, six of the schools (two each from a selected local government) were randomly selected to take part in the study. The selected schools were randomly assigned to two groups (A and B) using hat and draw method, the groups are CSS and control group. The instrument for the data collection for the study was map reading and interpretation achievement Test (MRIAT) designed to test the cognitive ability of the students of SSII after being taught map reading and interpretation by their teachers.

The data collected for the study were analyzed using mean and standard deviation to answer the research questions and analysis of covariance (ANCOVA) for the hypotheses were tested at 0.05 level of significance.

Results and discussion

The result was presented based on the research questions and hypotheses of the study;

1. What is the difference in mean achievement score of students taught map reading and interpretation using activity-based learning and those taught using computer simulation strategy?

The results in Table 1 shows that there is a significant difference in the mean achievement score of students taught map reading and interpretation using CSS and ABSL, as the post test study had a mean gain of 6.4611 above the pretest. Below is a further analysis.

H₀₁. There is no significant difference between the mean achievement scores of students taught map reading and interpretation using activity-based learning and those taught using computer simulation strategy.

From Table 2, it is evident that the mean achievement scores of students taught map reading and interpretation using activity-based learning and those taught using computer simulation strategy are significantly different. The results of test of interaction effect between difference between the mean achievement scores of students taught map reading and interpretation using activity-based learning and those taught using computer simulation strategy is shown above in Table 2.

Table 1: Difference in mean achievement score of students taught map reading and interpretation using activity-based learning and those taught using computer simulation strategy

	Pretest	Post test	Mean gain
Mean	2.6579	9.119	6.4611
Std	.93798	0.098	

Table 2: Tests of between-subjects effects

Dependent Variable: Achievement Scores

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	61.478 ^(a)	4	15.370	221.982	.000	.702
Intercept	8.400	1	8.400	121.325	.000	.243
Gender	13.640	1	13.640	197.002	.000	.343
ABLS	.182	1	.182	2.623	.106	.007
CSBL	4.104	1	4.104	59.275	.000	.136
ABLS * CSBL	.815	1	.815	11.767	.001	.030
Error	26.103	377	.069			
Total	8326.000	382				
Corrected Total	87.581	381				

^(a)R Squared = .702 (Adjusted R Squared = .699)

Table 2 shows that ANCOVA was significant, $F(1725) = 11.767$, $P < 0.05$. Therefore, we reject the null hypothesis and conclude that there is significant difference between the mean achievement scores of students taught map reading and interpretation using activity-based learning and those taught using computer simulation strategy. The result of follow up tests carried out to determine pair wise differences among the adjusted mean for activity based learning strategy and computer-simulation learning strategy is shown in Table 2. The result of hypothesis one revealed that a significant different in achievement is shown among the map reading and interpretation students exposed to ABL and CSS. To specify the direction of the effect the post result indicated that CSS was found to be more effective than ABL Table 1. That is the students who were taught using CSS strategy had higher map reading and interpretation achievement scores then those who were taught using ABL. this means that the CSS strategy adopted in teaching map reading and interpretation is significant in enhancing students achievement in map reading and interpretation This result agrees to what was earlier find Oguzerin (2014); Zohareh and Naderinin (2014) by Falade *et al.* (2014) that students achievement in a subject can be improved through the appropriate use of strategy. Interactive teaching with the use of PowerPoint projector in map reading and interpretation are expected to by highly stimulating thereby increasing students'

achievement in the subject but they can also be stressful and frustrating, thereby making the learning process difficult (Gatto, 2013; Schlechter *et al.*, 2012; Wescott and John, 2013). CSS can overcome these problems and make positive contribution in reading the objective of teaching. The fact that achievement scores of ABL was significantly lower than that of the CSS is another points to show that these students were less disposed to the instructional materials in the class room. As earlier pointed out in literature, today's students are growing with and also getting their information with visual tools like, internet, GSM, computer, television etc.

2. What is the difference in the mean achievement score of male and female students taught map reading and interpretation using activity-based learning and those taught using computer simulation strategy?

The above shows there is a significant difference in the mean achievement score of students taught map reading and interpretation using CSS and ABL, as the post test study had a mean gain of 6.4611 above the pretest.

H₀₂: There is no significant difference between mean achievement scores of male and female students taught map reading and interpretation using activity-based learning and those taught using computer simulation strategy.

Table 3 shows the result to be significant as $F = 197.002$ and $P < 0.05$. Therefore, the null hypothesis is rejected which states that there is no significant difference between mean achievement scores of male and female students taught map reading and interpretation using activity-based learning and those taught using computer simulation strategy. It is authoritative to state that gender have effect on achievement scores of male and female students taught map reading and interpretation using activity-based learning and those taught using computer simulation strategy. Therefore, it is worthy to conclude that there is significant difference between the mean achievement scores of male and female students taught map reading and interpretation using activity-based learning and those taught using computer simulation strategy.

The results in Tables (3, 4) reveals that on the average male students taught with ABL performed better than their female counter parts taught with same treatment. Also male students taught with CSS performed better than their female counter parts taught with same treatment. In both cases however, the differences in map reading and interpretation achievement of male and female were little significant. The result confirms the finding of Chen and Howard (2010) who found out that male student are doing better than their female counter parts in achievement while using computer simulation strategy that the use of ICI has the potential of eliminating gender disparities in the class room while providing relevant and functional education. The finding is also in line with the contention of Adeyemi (2014) who argued that student's performance in map and interpretation is dependent on gender.

Table 3: Difference in mean achievement score of students taught map reading and interpretation using activity-based learning and those taught using computer simulation strategy

	Pretest	Post test	Mean gain
Mean	2.6579	9.119	6.4611
Std	.93798	0.098	

Table 4: Tests of between-subjects effects
Dependent Variable: Achievement Scores

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	61.478 ^(a)	4	15.370	221.982	.000	.702
Intercept	8.400	1	8.400	121.325	.000	.243
Gender	13.640	1	13.640	197.002	.000	.343
ABLS	.182	1	.182	2.623	.106	.007
CSBL	4.104	1	4.104	59.275	.000	.136
ABLS * CSBL	.815	1	.815	11.767	.001	.030
Error	26.103	377	.069			
Total	8326.000	382				
Corrected Total	87.581	381				

^(a)R Squared = .702 (Adjusted R Squared = .699)

The finding is also in disagreement with the views of Mitra and Steffensmeier (2000) that there are significant differences in achievement in respect of gender. It is the option of the researcher that the assertions that male performs better than female or vice versa is not a stereotype assumption as this research proves it. Although, Imoko (2013) contended that the determinant factors of student's achievement in science are complex functions of all of a child's innate ability, Cognitive ability on one hand and environmental influence on the other. The use of CSS active learning atmosphere are created for both Male and female students to enable them acquire scientific skills and visualize the concepts they have difficulty in understanding, thus the adaptation and use of computer-simulation in map reading and interpretation can be one the strategy for addressing inequality in our educational system especially in map reading and interpretation and Geography in general.

Conclusion

The study concluded that enhancing map reading and interpretation skills are realizable to attain with any of the two methods (ABL and CSS). However CSS is, by empirical evidence of the research, a more effective approach in enhancing student's interest toward the study for better achievement in map reading and interpretation in secondary school WAEC and NECO examination. The ABL is an effective method in imparting map reading and interpretation even though less interest than CSS. Although, the CSS provide favorable outcome in the teaching of map reading and interpretation, there is significance to claim that the CSS is more effective than the ABL in terms of achievement. However, the subject (geography) map reading and interpretation in particular, in the modern way using high tech scheme of academic instruction especially in the absence of ABL materials.

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