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Effects of Computer Simulation Teaching Strategy on Senior Secondary School Students Attitude in Geography in Jos Metropolis Plateau State, Nigeria

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ABSTRACT

This study was conducted to examine the effects of computer simulation teaching strategy on senior secondary two students' attitude in geography in Jos Metropolis Plateau State, Nigeria. The study adopted a pretest posttest quasi non-equivalent experimental design. 1,012 students drawn from 33 public senior secondary schools. The population is made up of 626 males and 386 females. The sample of the study was 56 from both the experimental and control group. This comprised 24 and 32 male and female both the experimental and control groups. This was obtained through simple random sampling technique. Students Attitude Towards Geography Questionnaire (SATGQ) was the instrument used in data collection. the instrument undergoes a content and construct validity. The content validity was established by three experts from faculty of education, University of Jos. While the construct validity was established after pilot testing of the instrument using factor analysis. The alpha factoring scores of the SATGQ ranges between 0.97 – 0.42. This shows that the instrument has the construct validity. Two research questions and hypotheses were raised and formulated. Data were analyse using Mean and SD to answered the research questions while analysis of covariance (ANCOVA) was used in testing the null hypotheses at α 0.05 level of significance. Findings of the study revealed that: there is a significant difference between the posttest attitude towards Geography mean scores of Senior Secondary Two students in the experimental and control groups. Also, there is no significant difference in the posttest attitude towards Geography mean scores of male and female students in the experimental group. It was recommended that teachers at all level should adopt the use of computer simulation teaching strategy because it is gender friendly. Additionally, teachers should be trained on the use of the strategy to improved students' attitude in Geography.

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INTRODUCTION

Geography is a science that is concerned with the study of the interaction of phenomena in space. It deals with the description, analysis and explanation of the types and patterns of interaction of phenomena on the earth's surface (Dakur, 2021). This definition focuses on the interaction existing between phenomena on the earth surface, such as the interaction between climate and vegetation. There are other interactions and processes taking place beneath the earth's surface that are of geographical interest. This includes the plate tectonic, earthquake and volcanic activities. Geography involves the description, analysis and interpretation of spatial phenomena such as

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weather, soil, vegetation, drainage, population and the general topography of places. Geography also explains the relationship between different phenomena in a given Geographical region and how they interact within themselves. This deals with how human beings interact with phenomena on the earth surface, including the interaction between biotic and abiotic components of the environment and the interaction between the biotic components themselves.

The National Curriculum of Geography (2014) posit that the scope of Geography includes: physical, human and regional Geography, map reading, Geographical Information Systems (GIS) and Remote Sensing as well as Climate Change. Physical Geography is a branch of Geography that focuses on the natural features of the earth, including landforms, climate, vegetation and ecosystem. The aspect of Human Geography deals with the activities of man in his environment including how to utilize available resources to satisfy the needs of man for sustainable growth and development. It covers human activities like industrialization, mineral resources exploration, mining, transportation, population, agriculture and sources of energy.

Learners can use the knowledge of human Geography to provide solutions to environmental problems caused by different processes and raise the per capita income and gross domestic product (GDP) across different regions and localities. Regional Geography on the other hand consists of the various cultural and human activities conducted across different regions of Nigeria, West Africa, Africa and the world at large. It deals with population, agriculture, commercial activities, mining, tourism, transportation, industrialization and technological development of different region that can be conceptualized using sketch maps to locate and site these environmental features and activities.

Map reading is an aspect of Geography that enables individuals to understand and navigate both physical, social and human environments. Whether using traditional paper maps or digital mapping services like google maps, the Scope of map reading includes scale, relief and drainage, physical and human features, enlargement and reduction, cross-section, cross profile, bearing, distance calculation and vertical exaggeration. Due to technological development, the Geographical representation of phenomena on the map is gradually being replaced with the use of information and communication technology through the use of remote sensing and Geographic Information Systems (GIS). The GIS Remote Sensing are innovative technology for studying the environment that uses ICT for capturing, analysing, presenting and storing both data and information with the help of their coordinates. These skills are of paramount importance to teachers and learners in providing answers to Geographical questions like why environmental degradation, climate change and environmental pollution and applying different instructional strategies that employ the use of technology in teaching and learning.

The reason for the inclusion of Geography on the senior secondary school curriculum is because of its relevance to the National development. The objectives of Geography curriculum in Nigeria include: Development of understanding and importance of spatial planning, ensuring continuity of human and natural growth and development in the environment. Also, it enabling students to acquire knowledge of natural resources and developing in students an understanding of how environment and climatic factors influence our environment. Similarly, Geographic learning helping students to acquire knowledge of their physical and social environmental and to develop an understanding of basic concepts, principles and theories related to Geographical phenomena.

As a result of non-coverage of the syllabus, coupled with inappropriate teaching methods. The chief examiners' reports for 2018-2022 pointed out that the weakness of students is largely on physical and regional Geography. This poor achievement of students in Geography is also attributed to inappropriate use of teaching strategies, unavailability of instructional materials, parental influence, absence of qualified teachers, abstract nature of the subject student and student's unfavourable attitudes. The attitude of students significantly influences their

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achievement. Positive attitude enhances motivation, resilience and confidence Among the learners. While negative attitude impedes achievement levels of students. This is done through self-doubt and resistance to change.

Even though the government through the Ministry of Education has been recruiting qualified teachers to facilitate meaningful teaching and learning (Anjorin & Bola 2023). This is with the aim to improve the attitude and achievement of students.

Attitude is a predisposition that allows the display of psychological responses that may be negative or positive. Students' attitude is interpreted by their ability to register a subject or to perform credibly well in a particular subject. There is a correlation between the attitude of Students and their Achievements in a subject. On the other hand, Gertrude, and Onderi, (2021) maintained that student's attitude largely affects their achievement. This can be translated that, when students have positive attitude towards a subject, that will influence their achievement in the subject. Also, when the attitude of learners is negative towards a subject, that would affect their achievement to be poor in the subject. There are many factors affecting the attitudes of students in Geography. It includes: School, home, psychological and emotional factors (Suleiman, 2023).

There is thus, inconsistency in the effects of gender on the achievements of students in Geography and Science subjects in general. For instance, Jibril and Dakur (2022) reported that there is no significant difference in Geography achievement between male and female Students. On the contrary, another study conducted by Irfan and Shabana (2018) found that there was a gender difference in Achievements of Secondary School Students in Physics. This indicates how gender and students' achievement remained a controversial issue among educationists and researchers up till today. In Subjects that requires less mathematical application like Biology, Literature, Government and English language, female students performed better (Ilojeme & Okorieocha, 2021). In subjects like mathematics, physics and Geography because of their calculation and outdoor activities, male students performed better than their female counterparts (Felix & Mogege, 2023). These suggest the need for continued investigation into the gender differences in Geography achievement and other disciplines by utilising teaching strategy that allow the learner to be learner cantered using technology.

Computer simulation teaching strategy is an approach that aims at providing students with realistic learning experiences and simplified abstract and complex learning experiences. Visualization of the mode of formation especially through the senses of seeing and hearing can easily help the learner to conceptualize the needed Geographical knowledge. It involves creating imitation scenarios that mirror real-life situations. It allows students to actively participate and apply their knowledge and skills in a controlled environment. This strategy is professed to have improved students' achievements in subjects like physics, chemistry, biology and agricultural sciences and Basic Science and Technology.

This is as a result of its ability to enhance critical thinking, decision-making and problem-solving skills (Magaji, 2018). Therefore, the use of the computer simulation teaching strategy could activate multiple skills in learning Geography. Such skills as observing, sketching, calculating, measuring, predicting, controlling variables, formulating hypotheses and interpreting results could be fostered by simulation strategy. Computer simulation teaching strategy may imply the forms of representation (images, animations, graphics and digital data) for a better understanding of concepts. This may lead to students' active engagement with the subject matter which enables them to develop critical thinking skills that can change the scenario of poor students' achievement in Geography.

STATEMENT OF THE PROBLEM

The Poor students' achievement in Geography at both the National and promotional examination continue to signal problems in the teaching and learning processes despite efforts by government, teachers and educational stake

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holders. Students are expected to achieve excellently when appropriate teaching strategies are applied. Effective teaching strategies facilitate students' learning and engagement in the classroom. When teachers implement strategies that align with students' individual's needs and learning styles, there is a tendency to accomplish educational objectives. When teachers are using differentiating instructions, lessons can be tailored to meet the diverse needs of their students. This may include using a variety of instructional methods, such as hands-on activities and technology integration. Through accommodating different learning style, teachers can create a more inclusive learning environment where all students have the opportunity to improve their attitude positively as well as higher achievement in Geography.

Despite the importance of Geography to National development, students' achievement in the subject has been consistently poor in external examinations such as the Senior School Certificate Examination SSCE of West African Examination Council WAEC and National Examination Commission NECO (Chief examiners' reports, 2018-2023). For many years, Geography students' results revealed poor achievement. Wakjissa (2016) found that the geography performance of secondary school students in Plateau State is as low as 3.2% and 3.7% in WAEC and NECO SSCE. This level of poor achievement is attributed to inappropriate teaching methods used by Geography teachers. Other factors include negative attitude of students towards Geography. In the same vein, Dakur's (2018) study revealed that more than 50% of the credits in Geography for many years were credits 5 and 6. Some schools only pass the subject with credit levels ranging from 0% to 17% in Plateau State. Likewise, the WAEC SSCE Chief examiner's reports for 2019, 2020 and 2021 depict under-achievements of students

One of the main reasons for this poor attitude towards Geography could be the misconception that it is just memorization of maps and capitals. Many students fail to see the relevance of Geography in their everyday lives because of the teaching methods that are applied by teachers which make students not to consider the subject as important. This is attributed to factors that include attitude in Geography. The factors that affect students' attitude and achievement include instructional strategy. Therefore, the problem of the study is seen in the following broad question: What are the effects of computer simulation teaching strategy on Senior Secondary Two students' attitude in Geography in Jos Metropolis, Platea State?

Aim and Objectives of the Study

The aim of the study is to investigate the effects of computer simulation teaching strategy on Senior Secondary Two students' attitude and achievement in Geography in Jos Metropolis, Plateau State, Nigeria. The objectives of the study are to:

1. find the pretest and posttest attitude scores of Senior Secondary Two students towards Geography in the experimental and control groups.
2. ascertain the posttest attitude towards geography scores of Senior Secondary Two male and female students in the experimental group.

Research Questions

The following research questions are raised to guide the study.

1. What are the pretest and posttest attitude mean score of Senior Secondary Two students towards Geography in the experimental and control group?
2. What is the posttest attitude towards geography mean score of Senior Secondary Two male and female students in the experimental group?

Hypotheses

The following null hypothesis will be formulated and tested at 0.05 level of significance:

1. There is no significant difference between the pretest and posttest attitude towards Geography mean scores of Senior Secondary Two

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students in the experimental and control groups.

2. There is no significant difference in the posttest attitude towards Geography mean scores of male and female students in the experimental group.

It is hoped that the findings of this study would benefit Students, Teachers, Researchers, Government, professional bodies, school administrators and Parents. This study adapts the cognitive dissonance theory, proposed by Leon Festinger in 1957. Cognitive dissonance theory explains how individuals strive to maintain consistency in their attitudes and behaviours. According to this theory, when individuals experience inconsistencies between their behaviours, they feel psychologically uncomfortable, leading them to engage in cognitive processes to restore harmony and reduce dissonance. The theory suggests that when individuals are faced with conflicting behaviours, they are motivated to resolve the dissonance by either changing their attitudes or behaviours. This is by acquiring new information to support their beliefs, or dismissing the conflicting information altogether.

Attitude largely influence students learning skills. Bhowmik and Banerjee (2016); Asrat (2017); Adu-Mensah (2018); Baji (2021); Akbaş, (2021) and Gertrude and Onderi (2021) maintained that the use of appropriate teaching strategy affects student's attitude. This makes the attitude of the students to be positive or negative if the required teaching strategy is not utilised by the teacher.

METHODOLOGY

The study employed quasi-experimental research design, specifically the non - equivalent pretest-posttest control group design. Quasi experimental group is a design that is utilised where it is not possible to carry out random assignment of subject to groups (Olubusayo, Olajumoke, Joshua & Semilore, 2023, Oyetola & Adetokunbo, 2023). In this case, subjects are not randomised into the experimental and control groups. To control for internal invalidity, intact classes of the schools involved will be used. This is because the school authorities may not allow their class settings to be distorted. The population for the study consists of all public senior secondary II students in Jos Metropolis who offer Geography as one of their subjects. The population consists of 1,012 students drawn from 33 public senior secondary schools.

The population is made up of 626 males and 386 females. The sample of the study was 56 from both the experimental and control group. This comprised 24 (16males and 8 females) in the experimental group and 32 (21 males and 11 female) in the control group. This was obtained through simple random sampling technique. Students Attitude Towards Geography Questionnaire (SATGQ**)** was the instrument used in data collection. the instrument undergoes a thorough content and construct validity. The content validity was established by three experts from faculty of education, university of Jos. While the construct validity was established after pilot testing of the instrument using factor analysis. Also, factor analysis was conducted to determine the construct validity of the SATGQ. The alpha factor scores of the SATGQ ranges between 0.97 – 0.42. This shows that the instrument has the construct validity with the exception of six items that were below 0.50. The six items were readjusted.

RESULTS

Research Question One:

What are the pretest and posttest attitude mean scores of Senior Secondary Two students towards Geography in the experimental and control group?

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Table 1: Summary of Pretest and Posttest Attitude mean Scores of Senior Secondary Two Students Towards Geography in the Experimental and Control Group

	Pretest			Posttest		
Group	**N**	**Mean**	**SD**	**Mean**	**SD**	**Mean Diff**
Experimental	24	62.75	18.17	117.08	15.19	43.92
Control	32	60.94	15.31	73.16	17.27	

Data in table 1 revealed that the number of students in the experimental and control were 24 and 32 respectively. The pretest attitude mean scores of the experimental group was (62.75) with SD (18.17). While the attitude mean scores of the control group was (60.94) with SD (15.31). The pretest mean scores difference for the experimental and control groups was (1.81). while the posttest attitude mean scores for the experimental group was (106.4) with SD (15.19). Posttest attitude mean scores of the control group was (73.16) with SD (17.27). Posttest attitude mean score difference between the experimental and control group was (43.93). The study clearly revealed that the posttest attitude mean score difference (43.93) between the experimental and control group is much higher than that of the pretest (1.8). This strongly indicates that the treatment improves students' attitude towards Geography.

Hypothesis One

There is no significant difference between the pretest and posttest attitude towards Geography mean scores of Senior Secondary Two students in the experimental and control groups.

Table 2: ANCOVA Results of Effects of Computer Simulation Strategy on Senior Secondary Two Students' Attitude in Geography

Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Corrected Model	29189.151[a]	2	14594.575	65.398	0.000
Intercept	17096.762	1	17096.762	76.610	0.000
Pretest	2726.221	1	2726.221	12.216	0.001
Treatment	25458.793	1	25458.793	114.080	0.000
Error	11827.831	53	223.167		
Total	514817.000	56			
Corrected Total	41016.982	55			

a. R Squared = .712 (Adjusted R Squared = .701)

Table 2 revealed that F (1, 53 =114.080), P-value (0.000). This shows that the P value is < 0.05. This provide sufficient evidence that there is a significant difference between the experimental and control groups on posttest students' attitude towards Geography mean scores. Therefore, the null hypothesis was rejected and considered that there is a significant difference between the experimental and control group on posttest students' attitude mean scores towards Geography. The Adjusted R Square (0.712) indicates that 71.2% of changes in students' attitude was largely due to the teaching strategy while the remaining 28.8% were captured as error. The Sidak post hoc test in table 3 shows that the adjusted mean difference between the experimental and control group was significant, (I-J) = 43.151, P<.05. this shows that the mean difference was significant. Therefore, CSS as the treatment was effective in improving students' attitude in Geography.

Research Question Three

What is the posttest attitude towards geography scores of Senior Secondary Two male and female students in the experimental group?

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Table 3: Summary of Posttest Attitude Towards Geography Scores of Senior Secondary Two Male and Female Students in the Experimental Group

Group	N	Mean	SD	Mean Gain
Male	16	122.3	12.35	15.5
Female	8	106.8	15.74	

Table 3 revealed that the number of students in the experimental 24 (16 males and 8 females). The posttest attitude mean scores of male students was (122.3) with SD (12.35). while the posttest attitude mean scores of female students in the experimental group was (106.8) with SD (15.74). Posttest attitude mean score difference between the male and female students in the experimental group was (15.5) in favour of male students. This indicates that the treatment improves male students' attitude more than their female counterparts towards Geography.

Hypothesis Two:

There is no significant difference between the pretest and posttest achievement in Geography mean scores of Senior Secondary Two students in the experimental and control groups.

Table 4: ANCOVA Results of the Posttest Attitude Towards Geography Mean Scores of Male and Female Students in the Experimental Group.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	442.169[a]	1	442.169	2.001	0.171
Intercept	18552.81	1	18552.81	83.955	0.000
Pretest	442.169	1	442.169	2.001	0.171
Gender	1468.729	1	1468.729	9.09	0.073
Error	4861.664	22	220.985		
Total	334308	24			
Corrected Total	5303.833	23			

a. R Squared = .083 (Adjusted R Squared = .042)

Table 4 revealed theta the F (1, 22 =2.001), while (P = 0.171). Since the P value is > 0.05, it means that the difference between male and female posttest attitude mean scores in the experimental group was not significant. Similarly, The Adjusted R Square (0.042) implies that < 1% of the changes in students' attitude in the group was due to the changes in the treatment. That is the use of computer simulation strategy while others were due to factors captured as error. Therefore, the null hypothesis was accepted. That, there was no significant difference between the male and female students' posttest attitude towards geography mean scores. This shows that the treatment improved the attitude of both male and female students.

The findings that emanates from this study revealed that posttest attitude mean scores of the experimental group was greater than the control group. This shows that the treatment was effective in improving students' attitude in geography. This corroborate the findings of Baji (2021); Akbaş, (2021) and Gertrude and Onderi (2021) that shows an improvement on students' attitude after exposure to treatment. Also, the study shows that there is a significant attitude in Geography mean scores difference between the experimental and control group. This is in favour of the experimental group that were exposed to computer simulation teaching strategy in geography.

Similarly, this study revealed that gender is not a factor that affects student's attitude. Findings of the study confirmed that male students' attitude more than their female counterparts in the experimental group. Even

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though, the difference was not significance. This shows that CSTS is a gender friendly that should be adopted by teachers in their classrooms. This finding validate the result of Bhowmik and Banerjee (2016); Asrat (2017) which recorded that there is no significant difference in male and female students mean score difference in Geography that were taught using CSTS.

RECOMMENDATION

Base on the findings of this study, it was recommended that teachers at all level should adopt the use of computer simulation teaching strategy because it is gender friendly. Additionally, teachers should be trained on the use of the strategy to improved students' attitude in Geography.

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