

GENDER DIFFERENCE IN GEOGRAPHY STUDENT'S ACADEMIC ACHIEVEMENT USING CONCEPT MAPPING AND LECTURE METHOD METHODS IN TARABA STATE SECONDARY SCHOOLS IN TARABA STATE, NIGERIA

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Abstract

The study investigated the 'Effect of Concept Mapping Teaching Strategy on Senior Secondary School Geography Students' Academic Achievement in Taraba State, Nigeria'. The study specifically determined the gender difference on the Academic Achievement of geography students when taught with concept mapping and Lecture Methods in Taraba State secondary schools. One research question was raised and one hypothesis was tested at 0.05 level of significance to guide the study. The experimental design of the study was quasi-experimental pretest posttest non-equivalent control group design which involved 87 SSII students from four purposively selected senior secondary schools in Taraba State. The instrument used for data collection was a cognitive test tagged Geography Concept Achievement Test (GCAT) adapted from WAEC past questions from 2014-2021. The instrument was content validated by three experts. The instrument was also tested for reliability, using KR-20 method. The reliability coefficient of 0.92 was obtained. The treatment lasted for six weeks. The data collected were analyzed using descriptive statistics for the research question, and Analysis of Covariance (ANCOVA) for the hypothesis. The result shows that there is no significant gender difference on students' Academic Achievement scores in geography when taught with concept mapping and Lecture Teaching Methods [$F = 2.65$ (df 1, 86), $P = 0.107$]. The use of student-centered activity in teaching and learning geography should be encouraged. The result of this study clearly showed that concept mapping teaching strategy enhanced students' academic performance in geography and is gender-friendly, as both male and female students benefitted equally. Symposium and workshops should be organized and made compulsory for practicing teachers to inculcate skills in organizing and implementing concept mapping strategy. Schools should organize workshops and seminars internally which will enable teachers and their students to share ideas on the skills of designing and implementation of concept mapping strategy.

Keywords: Gender Difference, Academic Achievement, Geography Students, Concept Mapping

INTRODUCTION

Learning is a complex and systematic process, involving interplay between and interaction of cognitive, affective, and psychomotor domains (Baron & Byrne, 2003; Huffman, 2004; Joyce, Weil & Calhoun, 2004; Akbas & Gencturk, 2011). Over the years, with their roots in relevant educational theories, several teaching strategies have evolved, which propound active student-centered participation. Learning acquired through concept mapping is said to be meaningful, enabling the learner to relate newly acquired knowledge with previously learnt material. On the other hand, rote learning (which opposes meaningful learning) takes place when new knowledge is arbitrarily incorporated into the cognitive structure (Novak, 2015). It is seen that students who learn by rote are able to recall new information but cannot apply the knowledge in other situations. Therefore, to attain a meaningful learning process, the learner should be an architect of his/her own knowledge. This can only be achieved when instructors employ viable teaching methods that enhance interaction between learners' domains of learning in subjects such as geography.

Geography is a distinct and dynamic science that deals with the study of man and his physical environment (Ajayi, 2003). It helps young people to appreciate the value of their environment and its vast natural resources. As a subject, it is versatile, expressive, and intellectually stimulating, exhibiting a correlation with all other school subjects. Modern geography is a science of synthesis that seeks to understand the character of a place in terms of total integration of the various phenomena which characterize a place, as well as the interrelationships between places (Ajayi, 2003). Thus, the teaching and learning of the subject should involve realistic methods rather than the conventional teaching method mostly utilized in Nigerian classrooms. This may be a major factor militating against students' academic performance in the subject.

Wood and Gentile (2013) observed that geography teachers have traditionally used a wide range of teaching methods, but many of these have been shown to be relatively ineffective on students' ability to master and retain concepts. Learning through methods such as the lecture method is passive rather than active and does not foster critical and creative thinking (Tuna, 2015). According to Dhaaka (2012), teaching strategies within an overall student-centered pedagogy can be an effective way to boost students' academic performance, critical thinking, and problem-solving. Sakiyo and Jebson (2008) suggested that students' involvement in their learning provides adequate learning outcomes rather than teacher-centered methods.

Concept mapping is a technique of visually representing the structure of information, concepts, and their relationships. Research studies reflect that concept mapping can be used as a successful teaching-learning strategy from primary school to university level (Cheema & Mirza, 2013). According to Jacob, Joel, Linus, and Lazarus (2016), concept maps are means of developing logical thinking and study skills by revealing connections and helping learners see how individual ideas form a larger whole. It is a pedagogical and metacognitive tool designed to help students learn how to learn.

Gender as an important determinant factor in an educational setting may constitute a hindrance to students' academic performance in geography and has received research attention for some years (Nnanna, 2021). Gender has been the concern of all classes and groups of people all over the world, especially researchers and educators. In the colonial days, boys were allowed to attend school while girls remained in the house to do house chores. Today, girl child education still suffers some setbacks due to some negative factors. The poor performance of some female students is attributed to certain factors such as negative and discouraging attitudes of parents to the ideas of women engaging in "male careers" such as science subjects (Nnanna, 2021; Enohuan, 2015). In relation to the present study, gender will be considered as a moderator variable since it has been proved by research (Enohuan, 2015; Nnanna, 2021) to be a significant determinant of academic performance in science subjects. This study will therefore investigate the effect of concept mapping teaching strategy on senior secondary school geography students' academic achievement in Taraba State, considering students' gender as a moderator variable.

This study holds significant potential to provide empirical evidence benefiting geography teachers, students, teacher training institutions, curriculum planners, and educational administrators, with teachers gaining insights to improve their methods, students experiencing enhanced achievement, interest, retention, and interaction, and planners understanding concept mapping's cost-effectiveness, while also examining gender differences to inform gender-sensitive educational policies. The research focuses specifically on Senior Secondary School II students in Taraba State's public secondary schools, investigating concept mapping's effect on geography achievement with gender as a moderator variable, and draws on Bruner's Discovery Learning (1960) and Ausubel's Meaningful Learning (1968) theories, both of which support active, meaningful learning and suggest that concept mapping should be equally accessible and beneficial for male and female students. Academic achievement, defined as the measure of cognitive performance against standards through examinations and assessments, contrasts sharply with the traditional lecture method, a passive, one-way communication approach that dominates geography teaching despite criticism for failing to address diverse learning needs and for reinforcing gender disparities. Gender, understood as socially constructed roles and expectations rather than mere biological differences, has historically created gaps in Nigerian education through discriminatory attitudes, stereotyping, cultural factors, and gender-biased curricula that often disadvantage female students and lead to lower performance and psychological effects. However, empirical studies consistently show that concept mapping outperforms traditional methods across various subjects, and as an active, engaging strategy, it has the potential to create more inclusive learning environments that reduce gender gaps by equally involving all students. This study is therefore unique in investigating concept mapping's effectiveness specifically for geography achievement in Taraba State while also examining gender as a moderator, thereby addressing the limitations of the

prevalent lecture method and contributing to more equitable, student-centered geography education in Nigeria.

Statement of the Problem

Despite the importance of Geography, it has been observed that students generally perform poorly in the subject in Nigeria over the years, as shown by WAEC results 2018-2023 (See Appendix A). This problem of poor achievement has remained a source of concern to geography teachers, ministries of education, and other stakeholders. If the situation is not properly addressed, it will retard the geographical advancement of Nigeria at large, since the knowledge of geography is key to the development of both the individual citizen and society.

Therefore, to get a rapid solution to the problem of poor academic achievement, there is a need to look afresh into the methods of geography curriculum delivery at the secondary school level. The Lecture Method commonly used by geography teachers has not yielded the desired goal of meaningful learning and improved achievement. Thus, there is a need to explore teaching methods which are teacher-student based, such as concept mapping, in an attempt to enhance academic achievement in the subject. Furthermore, the role of gender in academic achievement has been a subject of debate, and it is important to determine whether concept mapping strategy benefits male and female students equally. The problem of this study put in question form is therefore: "Will the application of concept mapping Teaching Methods (considering gender as a moderator variable) improve secondary school students' academic achievement in geography in Taraba state?"

Purpose of the Study

The purpose of this study is to investigate the effects of Concept Mapping Teaching Strategy on Senior Secondary School Students' academic achievement in Geography. Specifically, the study determines:

1. Gender difference on the Academic Achievement of geography students when taught with concept mapping and Lecture Methods in Taraba State secondary schools.

Research Question

The following research question has been raised and answered in this study:

1. What are the mean Geography achievement scores of male and female geography students taught with the concept mapping and lecture Methods?

Research Hypothesis

The following null hypothesis was formulated and will be tested at a 0.05 level of significance in this study:

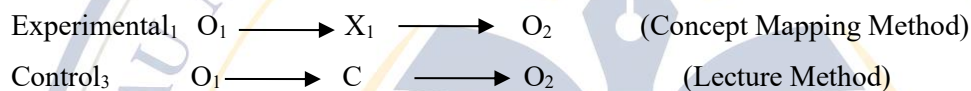
H₀₁: There is no significant gender difference on students' Academic Achievement scores in geography when taught with concept mapping and Lecture Teaching Methods.

Methodology

Research Design

This study employed a quasi-experimental design, specifically the pretest, posttest, non-equivalent, control group design (Cohen, Manion, & Morrison, 2007). This design is appropriate for the study because intact classes were used to avoid disruption of normal class lessons. In order to match the various variables in the study, a quasi-experimental research design was adopted. This involves teaching Method manipulated at two levels (concept mapping Method and Lecture Teaching Method) and gender categorized at two levels (male and female). The independent variable is teaching strategy (concept mapping and lecture method), while the dependent variable is students' achievement in geography. Students' gender served as a moderator variable.

The research design layout is:



O₁ represents the pretests for groups 1 and 2 respectively; O₂ represents the post-test for groups 1, and 2 respectively; X₁ represents treatment for the experimental group one and C represents treatment for control group.

Area of Study

The study was conducted in Jalingo Education Zone of Taraba State. The zone comprises Jalingo, Ardo Kola, and Lau Local Government Areas. The choice of Jalingo Education Zone is because it is one of the largest education zones in the state in terms of number of schools and populations of students, offering the researcher the opportunity to draw a representative sample.

Population

The population for this study consisted of all senior secondary school two (SSII) students offering geography in the government grant-aided secondary schools during the 2022/2023 academic session in Jalingo Education Zone of Taraba State, totaling 2,646 students. The distribution of SS II students that form the population includes 678 from Ardo Kola L.G.A., 1,350 from Jalingo L.G.A., and 618 from Lau L.G.A.

Sample and Sampling Technique

The sample consisted of intact classes in selected secondary schools within the study area. A multistage sampling technique was used. First, Jalingo Education Zone was purposively selected from the nine education zones in Taraba State. Second, two local government areas (Jalingo and Ardo Kola) were selected out of three. Third, four schools (two from each selected LGA) were purposively selected to take part in the study. The selected schools were randomly assigned to two groups: Group A (Concept mapping)

and Group B (Lecture method). The sample size comprised 46 male students and 41 female students, totaling 87 students.

Research Instrument

Two instruments were used for the study:

1. **Geography Concepts Achievement Test (GCAT):** A 30-item multiple-choice test developed by the researcher to measure students' achievement on the units covered. The test was validated by three experts and its reliability was determined using Kuder-Richardson formula-20 (KR-20), yielding a reliability coefficient of 0.92.

Procedure for Data Collection

The procedure followed stages including: presenting an introductory letter to schools, training research assistants, administering the pre-test to both groups, teaching the topics for three weeks, and administering the post-test to both groups.

Method of Data Analysis

Data collected for the study was analyzed using descriptive statistics (mean and standard deviation) to answer the research question, and inferential statistics of Analysis of Covariance (ANCOVA) was used to test the research hypothesis at a 0.05 level of significance. ANCOVA was used to take care of initial group differences statistically.

Results and Discussion

Data Analysis

Research Question 1: What are the mean Geography achievement scores of male and female geography students taught with the concept mapping and lecture Methods?

Table 1: Mean and Standard Deviation of mean Geography achievement scores of male and female geography students taught with the different teaching Methods.

Gender	N	Pretest Mean	SD	Posttest Mean	SD
MALE	46	23.17	15.02	48.73	19.72
FEMALE	41	24.14	15.22	55.02	14.77

The descriptive statistics in Table 1 show that male students (N=46) had a pretest mean score of 23.17 with a standard deviation of 15.02. In the posttest, male students had a mean score of 48.73 with a standard deviation of 19.72. Female students (N=41) had a pretest mean score of 24.14 with a standard deviation of 15.22, and a posttest mean score of 55.02 with a standard deviation of 14.77. In summary, the mean difference of scores between male and female students shows that female students had a higher posttest mean score (55.02) compared to male students (48.73).

Hypothesis Testing

H₀₁: There is no significant gender difference on students' Academic Achievement scores in geography when taught with concept mapping and Lecture Teaching Methods.

Table 2: ANCOVA table of gender effects on students' Academic Achievement in geography when taught with concept mapping and Lecture Teaching Methods.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2143.939 ^a	2	1071.970	3.607	.031	.079
Intercept	51978.186	1	51978.186	174.897	.000	.676
PRETEST	1287.554	1	1287.554	4.332	.040	.049
GENDER	788.699	1	788.699	2.654	.107	.031
Error	24964.291	84	297.194			
Total	259660.000	87				
Corrected Total	27108.230	86				

a. R Squared = .079 (Adjusted R Squared = .057)

The results of the analysis in Table 2 show that there is no significant gender difference on students' Academic Achievement scores in geography when taught with concept mapping and Lecture Teaching Methods [$F(1, 86) = 2.654, P = 0.107$]. Since the computed p-value (0.107) is greater than 0.05 level of significance, the null hypothesis of no significant difference is upheld. It is concluded that there is no significant effect of gender on students' Academic Achievement in geography when taught with concept mapping and Lecture Teaching Methods. The partial eta of 0.031 indicates that only 3.1% of students' academic performance in this study was as a result of gender difference.

Summary of the Results

There is no significant gender difference on students' Academic Achievement scores in geography when taught with concept mapping and Lecture Teaching Methods [$F(1, 86) = 2.654, P = 0.107$].

Discussion of Findings

The finding of the study revealed that there is no significant gender difference on students' academic achievement scores in geography when taught with concept mapping and lecture teaching methods. This finding is consistent with that of Chawla (2014), who investigated the effect of teaching through concept mapping on achievement in geography in relation to gender in Kenya. The results of the study showed that boys and girls of the experimental group do not differ in their achievement in geography. Similarly, Ukpai, Gabriel, Okechukwu, and Ugama (2016) found that concept mapping boosts the achievement of both male and female students in the subject, and there is no interaction between gender and teaching methods on students' achievement in basic science.

The finding is also consistent with Peter (2014), who investigated the effect of gender on students' academic achievement in secondary school Social Studies in Nigeria, and found that gender (male/female) had no significant effect on students' achievement. Furthermore, Joseph, John, Eric, Yusuf, and Olunbunmi

(2015) found that even though male students had slightly better performance compared to female students in computer science, it was not significant.

However, the finding contrasts with that of Cheema and Mirza (2013), who found that male students taught through concept mapping performed significantly better than female students. It also contrasts with Amedu (2015), who found a significant difference between the mean scores in favor of the males in biology using the jigsaw method.

The finding of no significant gender difference in this study is encouraging and suggests that the concept mapping strategy is gender-friendly. This could be attributed to the active, student-centered nature of concept mapping, which engages all learners regardless of their gender. The strategy requires students to organize, connect, and synthesize information in a graphical form, which allows both male and female students to demonstrate their understanding equally. Additionally, the collaborative and participatory nature of the learning environment created by concept mapping might have reduced traditional gender biases that often affect academic performance in science subjects.

The study investigated the effects of Concept Mapping Teaching Strategy on Senior Secondary School Students' academic achievement in Geography in Taraba State, Nigeria, with a focus on gender differences. The study was hinged on two important theories: Jerome Bruner's Theory of learning by Discovery (1960) and David Paul Ausubel's theory of Meaningful Learning (1968). A quasi-experimental design (pretest, posttest, non-equivalent control group) was employed, involving 87 SSII students from four purposively selected senior secondary schools in Taraba State. The instrument used for data collection was the Geography Concept Achievement Test (GCAT), adapted from WAEC past questions. The treatment lasted for six weeks. The data collected were analyzed using descriptive statistics (mean and standard deviation) for the research question and Analysis of Covariance (ANCOVA) for the hypothesis.

Conclusion

Based on the findings of the study, it is concluded that the concept mapping strategy is gender-friendly, as both male and female students benefitted equally from the strategy. The strategy proved to be effective in improving the academic achievement of students in Geography, with no significant gender disparity in performance. Therefore, it is concluded that the adoption of concept mapping as a teaching strategy can help bridge the gender gap in academic achievement in geography in Taraba State, Nigeria.

Recommendations

On the basis of results from this study, the following recommendations are made:
The use of student-centered activity in teaching and learning geography should be encouraged. The result of this study clearly showed that concept mapping teaching strategy enhanced students' academic performance in geography for both male and female students.

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