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Impact of Heuristic Approach on Students' Academic Achievement and Retention in Map Reading and Interpretation Among Secondary Schools, Municipal Zones, Kano-Nigeria

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ABSTRACT

This study explores the impact of employing a heuristic approach on students' academic achievement and retention in geography education. The sample consisted of 235 SS II students enrolled in public secondary schools in the Municipal Education Zone, Kano, Nigeria. The study utilized a quasi-experimental design, with two schools assigned to the experimental group (heuristic approach) and two schools assigned to the control group (lecture method). The Geography Achievement Test (GAT) was used as the data collection instrument. ANCOVA was used to test the hypothesis using SPSS and the findings revealed a significant difference in the mean academic achievements between students taught geography concepts using the heuristic approach and those taught using the lecture method. The experimental group exhibited higher academic achievement compared to the control group, indicating that the use of the heuristic approach enhances students' understanding and performance in geography. Also, there was a significant difference in the mean retention scores of male and female students when taught geography using the heuristic approach. Female students achieved higher retention scores than their male counterparts, suggesting that the heuristic approach is particularly effective in facilitating knowledge retention for female students in geography education. Based on the findings, it is recommended that educators and curriculum developers incorporate the heuristic approach into teaching methods for geography concepts. Training programs and workshops can be conducted to familiarize teachers with effective strategies for implementing the heuristic approach in their lessons.

INTRODUCTION

Geography is a scientific discipline that focuses on the examination and analysis of the Earth's lands, features, inhabitants, and phenomena (American Heritage Dictionary, 2016). The academic discipline of geography serves to prepare and equip learners with the necessary scientific thinking skills that will be beneficial in their future endeavors. Geography is an academic discipline that encompasses the systematic study of the description, distribution, and interaction of various physical, biological, and social features found on the Earth's surface (Minn, 2018). The study of geography enables students to develop an appreciation for the wide range of landscapes, populations, and societies that exist in the world. The purpose of geography education is to equip young individuals with the necessary skills to adapt to the challenges presented by an ever-expanding global economy. One argument posits that geography education is most effective when it facilitates self-discovery among young individuals, particularly in a distinctive and unconventional environment. Furthermore, the discipline of geography equips students with the necessary practical abilities to thrive in a contemporary economic system, which can be referred to as geographical skills. Moreover, a pedagogical tradition exists within the field of geography education that emphasizes the holistic development and cultivation of the student, as well as the promotion of

self-reflection regarding their emotions and thoughts pertaining to various locations and phenomena. In Nigeria, the subject of geography is typically taught for a duration of three years at the senior secondary school level. The secondary school curriculum consists of a combination of compulsory subjects and optional subjects, with students having the autonomy to select elective subjects from either the art or social science disciplines. Notably, certain elements of geography are encompassed within the social studies curriculum, while integrated science is a mandatory subject for all students. The National Policy on Education of the Federal Republic of Nigeria (FRN, 2013) and examination bodies, namely the West African Examination Council (WAEC, 2016) and National Examination Council (NECO, 2016), as well as the Nigerian Educational Research and Development Council (NERDC), have outlined the objectives of teaching geography at the senior secondary school level. There exist multiple pedagogical approaches to the instruction of geography, such as the lecture method and the talk and chalk method. The latter is widely employed by geography educators as a means to effectively address the syllabus, albeit potentially impacting student performance. The methods of teaching and learning have undergone changes over a specific period of time. According to Sharma (2018), the traditional lecture method has been superseded by

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contemporary instructional approaches. The approach to education has evolved beyond the traditional lecture-based method known as the “chalk and talk” method. The pedagogical approach to teaching geography has experienced significant transformations, transitioning from traditional methods to contemporary approaches that cater to the unique requirements of each subject. Scholars have delineated a variety of strategies for instructing geography, encompassing laboratory activities, lectures, discovery-based learning, inquiry-based learning, demonstrations, problem-solving exercises, process-oriented instruction, deductive and inductive methods, as well as simulation and animation techniques (Salisu, 2016). The heuristic approach is widely regarded as the most suitable and efficacious pedagogical method for the instruction of geography. The objective of this approach is to foster the cultivation of a scientific mindset and disposition among students. The heuristic method is characterized by learners independently discovering knowledge and information. Students are strategically positioned to assume the role of explorers, with the aim of minimizing direct instruction and encouraging independent discovery of knowledge. The inherent curiosity within students motivates them to engage in the process of acquiring knowledge. This approach emphasizes the pursuit of truth, which is grounded in rationality and individual empirical observations. The concept is grounded in the psychological principles of the “trial and error” theory. According to Jay (2021), possessing logical and imaginative thinking abilities is essential for implementing this particular teaching strategy. Academic achievement refers to the quantifiable assessment of an individual’s accomplishments following their participation in an educational program (Lucy, 2015). On the contrary, academic achievement can be understood as an assessment of the outcomes and significant transformations in individuals’ knowledge, skills, and attitudes that arise from their educational experiences (Arokoyu, 2017). Therefore, when assessing academic performance, it has been found that grades obtained in examinations can be utilized as both predictive and criterion measures (Adeyemi & Awolere, 2016). Despite the efforts made by the Nigerian government and parents to invest in science education in order to address the current challenges of the 21st century, The academic performance of students in the subject of geography at the Senior Secondary Certificate Examination (SSCE) has consistently demonstrated a lower level of achievement in comparison to the increasing number of students enrolled in the course over the course of several years. This observation is supported by the findings presented in the reports of the Chief Examiners of the West African Examinations Council (WAEC) for the years 2014 and 2018. Educators who possess effective pedagogical strategies or approaches are able to motivate students to engage in higher-order thinking, achieve notable academic success, and enhance their capacity for knowledge retention. Retention can be

defined as the process of maintaining or retaining possession of something or someone for an extended period of time (Noe *et al.*, 2018). Retention refers to the ongoing process of preserving and upholding newly acquired information or components thereof. However, the process of retaining acquired information involves the storage of said information in long-term memory in a manner that facilitates easy retrieval. According to Okoye and Arimonu (2016), In the context of geography education, educators aspire for students to retain the concepts taught, as the level of retention plays a crucial role in determining students’ performance in assigned tasks or activities. Over the years, there has been significant concern regarding academic achievement in the field of geography educational testing (Igbudu, 2015). There has been a notable inclination towards a substantial proportion of geography students experiencing academic failure in their examinations at the senior secondary school level. Despite being provided with adequate resources and instructional assistance, a significant proportion of students consistently struggle to attain a satisfactory grade in their geography examinations. This matter becomes a subject of significance due to the fact that geography holds a pivotal role in comprehending the complexities of the world and cultivating the capacity for critical analysis. It is imperative to ascertain and rectify the underlying causes of this widespread failure in order to enhance the academic achievements of students studying geography. In order to ascertain the underlying causes of this issue, it is imperative to conduct an examination of various factors, including curriculum design, teaching methodologies, student engagement, and examination format. Moreover, when contemplating the enduring consequences of this matter, such as constrained professional opportunities and waning enthusiasm towards geography as an academic discipline, the identification and implementation of efficacious remedies assume utmost significance for the holistic advancement of students and the educational framework. The purpose of this study is to investigate the impact of employing a heuristic approach on students’ academic performance and retention in secondary schools within the Municipal Education Zone of Kano, Nigeria. The focus of the research is on map reading and interpretation.

Objective of the Study

The specific objectives formulated to guide the study are to:

1. Investigate the difference between the academic achievements of secondary school students taught Geography concepts using heuristic approach and those taught lecture method of teaching in Kano Municipal.
2. Compare the retention ability of male and female students when taught Geography concepts using heuristic teaching strategy in secondary schools in Kano state.

LITERATURE REVIEW

Mona (2012) conducted a study to investigate the effects

of employing the heuristic teaching approach in the instruction of mathematics to tenth-grade students in Jordan. The study utilized an equivalent pre- and post-test two-group design to assess the impact of this approach. To measure student achievement in mathematics, a pre/post-test was developed as part of the study's objectives. The study sample comprised 142 students, with 69 male students and 73 female students from the tenth grade at King Abdullah School in Irbid, Jordan, during the first semester of the academic year 2011/2012. The participants of the study were randomly assigned to either an experimental group or a control group. The participants in the study were divided into two groups: the experimental group, which received instruction in mathematics using the heuristic approach, and the control group, which received instruction in mathematics using the lecture method of teaching. The experimental group consisted of 34 male students, while the control group included 35 male students. Additionally, the experimental group consisted of 37 female students, while the control group had 36 female students. The pre- and post-tests of students were subjected to descriptive statistical analyses, specifically using means and standard deviation. The statistical method employed for comparing the control and experimental groups, as well as the gender variable, was a two-way ANOVA (analysis of variance). The results of the study revealed that there were statistically significant disparities in the post-test scores between the control and experimental groups, with the experimental group demonstrating superior performance. Additionally, no statistically significant discrepancy in academic achievement was observed based on gender. The research findings indicate that the interaction between gender and group did not yield any statistically significant differences. The researcher suggests several recommendations aimed at improving the efficacy of employing a heuristic approach in mathematics instruction and its impact on students' academic performance. These recommendations include conducting additional studies at various academic institutions. The research conducted by Mona (2012) examined the influence of employing the heuristic teaching approach in the instruction of mathematics to tenth grade students in Jordan. In a similar vein, the present study aims to explore the impact of utilizing the heuristic strategy on maps. Reading and interpretation among geography students. A previous study was conducted in Jordan at King Abdullah School in Irbid, focusing on academic achievement and retention in secondary schools. The present study, on the other hand, will be carried out in the Kano Municipal Education Zone in Nigeria. In the previous study, a sample size of 142 tenth-grade students was utilized, whereas in the current study, a sample size of 239 students from SSII will be employed. Both the past and present studies share similarities as they aim to assess academic achievement. Both the present and past studies utilize a quasi-experimental design for data collection. In the present study, the Geography Achievement Test (GAT) will be

employed, whereas in the past study, the Measurement of Academic Talent (MAT) was used for data collection. The past study focused solely on student achievement, whereas the present study aims to investigate both achievement and retention.

In a study conducted by Antony and Adiel (2016), the researchers aimed to investigate the impact of the Vee Heuristic Teaching Approach on students' attitudes towards the acquisition of knowledge in the field of biology. The research was carried out in public secondary schools located in Tharaka Nithi County. The Solomon Four-Group Non-Equivalent Control Group Design was employed in this study. A sample of 12 schools was randomly selected from the county, and data was collected from these schools. The sample consisted of 396 participants, with 2 students selected from each of the four boys' schools, four girls' schools, and four co-educational schools. A questionnaire assessing attitudes towards biology was developed and employed for the purpose of data collection. The instruments underwent a pilot test in a single-gender school for boys, a single-gender school for girls, and a coeducational school in Embu East Sub-county in order to determine their reliability. The estimation of the reliability coefficient was conducted using Cronbach's alpha. The research instruments yielded a coefficient value of 0.83. The hypotheses were evaluated using analysis of variance (ANOVA) and t-test statistics at a significance level of $\alpha = 0.05$. The means were separated using the least significant difference (LSD) method. The research revealed that the implementation of the Vee Heuristics Teaching Approach (VHTA) had a positive impact on students' attitudes towards the subject of biology. Given that the implementation of VHTA has proven to be advantageous for students regardless of their gender or the type of school they attend, it is recommended that educational authorities actively promote its utilization among biology teachers, curriculum developers, quality assurance and standards officers, as well as teacher trainers, in order to enhance the effectiveness of their teaching practices. This research will investigate the impact of employing a heuristic strategy on the academic achievement and retention of geography students in secondary schools within the municipal education zone of Kano State, Nigeria. The specific focus will be on map reading and interpretation.

The study conducted by Antony, Leonard, and Jonathan (2018) aimed to investigate the impact of the Vee Heuristic teaching approach on students' attitudes towards learning biology in Kenya. The previous study examined individuals' attitudes, whereas the current study aims to explore the effects of achievement and retention. Both present and past research studies exhibit differences in terms of research design. In the past, a study was conducted utilizing the Solomon design. The present study employs a four-group non-equivalent control group design, which is a quasi-experimental design. In contrast, the previous study utilized the Biology Attitude

Test (BAT) as an instrument, whereas the present study will employ the General Attitude Test (GAT) as the instrument. Both the present and previous studies included samples consisting of both males and females. The present study will utilize four educational institutions. The previous study utilized a sample size of 239 senior class students (SS II) from 12 schools. Additionally, 396 junior class students (form 2) were included in the study. In their study, Nwafor *et al.* (2019) conducted research to investigate the impact of the heuristic method of instruction on the academic performance of senior secondary school students in computer studies. The study was conducted in the Ebonyi North Education district, specifically in Abakaliki, Ebonyi State. The study was guided by three research questions and three null hypotheses. The research utilized a quasi-experimental design and implemented a pre-test, post-test, non-equivalent control group design, consisting of an experimental group and a control group. A total of 200 students in their second year of senior secondary education were selected for this study. Out of these, 101 students were male and 99 were female. The students were drawn from six senior secondary schools, consisting of two boys' schools, two girls' schools, and two co-educational schools. The selection process employed simple random sampling. Among the six educational institutions under consideration, three were designated as the experimental group, consisting of one girls' school, one boys' school, and one co-educational school. The remaining three schools were assigned to the control group. The students were instructed in the fundamental principles of computer hardware through their respective computer studies instructors, as outlined in the computer science curriculum. The experimental group received instruction using the heuristic method, whereas the control group received instruction using the conventional method. The instruction was conducted within regular school hours, adhering to the standard school timetable. Prior to the commencement of the study, a preliminary assessment was conducted among the participants in both experimental groups, and relevant data were duly documented. Following the conclusion of the experiment, a post-test was administered, and the data were subsequently recorded. The research inquiries were addressed by employing measures of central tendency and variability, specifically mean and standard deviation. The hypotheses were evaluated through the utilization of Analysis of Co-Variance (ANCOVA) at a significance level of 0.05. The data collection instrument utilized in this study was the Computer Studies Achievement Test (CSAT). The instrument underwent both content and face validation, with a reliability coefficient of 0.98 achieved through the use of the K-R 20 approach. The findings of the study indicated that students who were exposed to the heuristic method of instruction demonstrated superior performance compared to those who were taught using the conventional method. Additionally, there was a notable disparity in academic

performance between male and female students, with male students exhibiting higher levels of achievement. The study's findings indicate that the heuristic method of instruction was associated with increased levels of academic achievement. Therefore, it is suggested that the heuristic method of instruction be implemented in the teaching of computer studies in secondary schools in order to improve students' academic performance. The research conducted by Nwafor *et al.* (2019) examined the impact of employing heuristics as an instructional method on the academic performance of senior secondary school students in computer studies within Ebonyi State. This current study aims to investigate the influence of heuristic strategies on map comprehension. Reading and interpretation among geography students is a topic of interest within the academic community. The present study focuses on the examination of academic achievement and retention rates within secondary schools located in a specific municipal education zone. The city of Kano is located in northern Nigeria. In previous studies, a sample of 200 SS II students was selected. For the current study, a sample of 239 intact classes was chosen. Previous research has utilized the Computer Achievement Test (CAT), while the current study will employ the Geography Achievement Test (GAT). Both the present and past research share a common experimental design, specifically a quasi-experimental design. Furthermore, both studies are similar in that they seek to investigate the impact of student academic achievement.

In a study conducted by Yaman (2017), an examination was carried out to explore the impact of the science writing heuristic approach on the overall quality of prospective science. The present study examines the relationship between teachers' proficiency in argumentative writing and their comprehension of science argumentation, specifically the Science Writing Heuristic (SWH) approach. The study focuses on the impact of teachers' abilities on Grade 9 students' performance on a post-test, taking into account their academic achievement levels. The study included four intact classes from a Turkish public high school, taught by two chemistry teachers. One class from each teacher was designated as the treatment group, while the other class from each teacher served as the control group. The students in the treatment group received instruction utilizing the SWH (student-generated questions, worked examples, and hands-on activities) approach, whereas the students in the control group received instruction through traditional lecture-based methods. The assessment of students' academic performance was conducted by analyzing their average scores in chemistry from the preceding semester. These scores were utilized to evaluate the influence of the intervention on different levels of achievement. A pre- and post-test was administered to both groups in order to measure students' achievement in the areas of chemical change and mixture. The data were subjected to analysis using Analysis of Covariance (ANCOVA). The results of the study revealed that the Student-Generated

Work Homework (SWH) approach had a significantly greater impact on students' test scores compared to the traditional lecture approach. There was a significant difference in student performance on the post-test based on their levels of academic achievement. The post-test results indicate that individuals classified as low achievers and middle achievers within the SWH group exhibited significantly higher performance compared to their counterparts in the lecture group.

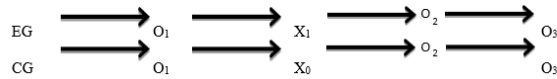
In a study conducted by Okechuku (2014), the objective was to examine the impact of heuristic teaching methods on the academic performance and knowledge retention of students in the field of algebra. The research utilized a quasi-experimental design with a nonequivalent control group. The research was conducted in the state of Anambra, located in Nigeria. The study utilized two educational institutions. The treatment group received instruction on the theory of indices using a heuristic method, whereas the control group was taught the same topics using a conventional approach. At the commencement of the experiment, a pre-test in the form of an algebra achievement test was administered to the students in both groups. Following an eight-week treatment session, the same algebra achievement test was administered to the students as a posttest. The study was guided by three research questions and three null hypotheses. The research inquiries were addressed by employing measures of central tendency such as the mean and variability measures such as the standard deviation. The null hypotheses were examined at a significance level of 0.05 utilizing the statistical technique known as Analysis of Covariance (ANCOVA). The findings of the research indicate that the heuristic approach exhibits greater effectiveness compared to the conventional approach in promoting students' academic performance and long-term retention in the subject of linear algebra. The findings of the study indicated that male students who were instructed in linear algebra using the heuristic method exhibited superior performance compared to their female peers. Additionally, the study concluded that there was no significant interaction between the instructional method employed and gender in relation to students' achievement in the field of linear algebra. The purpose of this study is to examine the impact of employing a heuristic strategy on the process of map interpretation. Reading and interpretation among geography students is a topic of interest in academic circles. The study conducted by Okechuku Sunday (2014) examines the impact of the heuristic teaching method on students' achievement in algebra in Anambra State, Nigeria. The focus of the study is on academic achievement and retention in secondary schools within the municipal education zone of Kano, Nigeria. The similarities between past and present studies lie in their examination of students' academic achievement and their utilization of a quasi-experimental design. In the past study, data was collected using an algebra achievement

test paper, which comprised 25 questions. Conversely, the present study will employ a different subject test/question paper called the Geography Achievement Test (GAT) in the field of geography, consisting of 35 questions. The previous study utilized a sample of 100 students from two secondary schools who were in their second year of senior secondary education (SS II). In contrast, the current study will involve selecting one intact class from each of four schools, resulting in a total sample size of 239 students. Numerous studies conducted in both historical and contemporary contexts have been dedicated to investigating the impact of student academic achievement.

The study conducted by Muhammad *et al.* (2020) examines the effects of heuristic and lecture methods of teaching on students' academic performance. This study employs an experimental design with a pre-test and post-test group arrangement. The treatment group received instruction using the heuristic method, while the non-treatment group received instruction through the lecture method. The duration of the intervention spanned eight weeks. The treatment groups were instructed using activity-based instruction, which involved the utilization of semi-standardized lessons and science kits. The findings of the study indicated that the performance of the treatment group was superior to that of the non-treatment group, suggesting that the use of the heuristic method is more effective than the lecture method in the instruction of science in elementary schools (Muhammad *et al.*, 2020). Julie S. B *et. al* (2020). In their study to assess the effectiveness of using the SIMaTAR mobile application as a tool for improving the Grade 8 students' academic performance, motivation, and attitude towards learning science, as well as the teachers' assessment upon using the application. Results showed that all indicators on the teacher's and students' assessment of the SIMaTAR mobile augmented reality application were rated as strongly agree. All indicators of students' attitudes towards science showed improvement after implementing the AR application in science teaching. Further, the scores of the student participants in the pre-test and post-test were remarkably increased after using the application. As for the challenges, results revealed that students need the gadgets to use, and they need to gain knowledge on how to manipulate the application. Through data analysis using paired samples t-test, it is concluded that the integration of SIMaTAR in teaching science increases the engagement and interest of the students in learning the subject, and the application of mobile augmented reality could substantially improve the teaching and learning process. Previous research has utilized the SIMaTAR mobile application, while the current study will employ the Geography Achievement Test (GAT). Both the present and past research share a common experimental design, specifically a quasi-experimental design. Furthermore, both studies are similar in that they seek to investigate the impact of student academic achievement.

METHODOLOGY

The study used quasi-experimental design, which is a research design that does not involve random assignment to groups. In this study, two schools were assigned to the experimental group and two schools were assigned to the control group. The experimental group was taught using heuristic approach, while the control group was taught using lecture approach.



Source: Kerlinger (1973)

Population and Sample of the Study

The population of this study comprised of all SSII students offering geography in 20 public Secondary Schools in Kano Municipal Educational Zone. Specifically, the population of this study covered 4,735 SS II students for 2019/2020 academic session among which 3,619 were boys and 1,116 were girls selected from Municipal Zone, Kano State and the sample size of 118 females and 117 males making a total of 235 was used for this study using the intact classes experimental and control groups from the municipal secondary schools education zone, kano. A Stratified Random Sampling technique was used in selecting the sample size of SS II students for this study, while simple Random Sampling technique was used to select the schools.

Research Instrument

The instrument used for this study is Geography Achievement Test (GAT). GAT was adapted from past question papers of Senior School Certificate Examination (SSCE) (2011, 2013, 2018 & 2019). GAT was used for pretest, posttest and post-posttest in order to measure the level of academic achievement and retention. However, the nature of the data on the instrument was multiple choice questions. The data collection instrument was divided into two sections, A and B. Section A required the demographic data of the respondents such as name, school, class, and gender. Section B contained multiple-choice questions related to map reading and interpretation. The GAT was made of thirty-five (35) items with multiple choice answered letter A-D. each of which carried 1 mark. Hence, the data collection instrument was nominal in nature.

RESULT AND DISCUSSION

The study was conducted on 235 students in the sampled schools with school B and C as the experimental group with sixty-four (64) female students and sixty-five (65) male students respectively, and schools A and D as the Control group with fifty-four (54) female students and fifty-two (52) male students respectively. The first null hypothesis 1 states that there is no significant difference in the mean academic achievements of students taught Geography concept using heuristic

Table 1: ANCOVA results for the mean achievement scores of Experimental and Control

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	263.169 ^a	2	131.584	21.937	.000	.159
Intercept	4639.609	1	4639.609	773.506	.000	.769
Pretest	12.893	1	12.893	2.150	.144	.009
Group	246.065	1	246.065	41.024	.000	.150
Error	1391.572	232	5.998			
Total	142787.000	235				
Corrected Total	1654.740	234				

a. R Squared = .159 (Adjusted R Squared = .152)

approach and those taught using lecture method. The result reveals that there is significant difference in the mean academic achievements of students taught Geography concept using heuristic approach and those taught using lecture method in favour of the experimental group. This finding implies that the use of heuristic approach in teaching map reading in Geography enhances the academic achievement of the students which is in line with the findings of Mona (2012), Nwafor, Okpala and Okato (2019) and Yaman (2017) who found out in their studies, that students learning heuristic approach have higher achievement than those who learnt through conventional or lecture method of teaching. The study observed carefully that the heuristic approach helps a lot in the experimental group and the students performed better than the control group. Unlike the conventional

method of teaching where the teacher will only teach without making sure that all students were carried together and making sure that no one is left behind. Using heuristic approach to teach map reading and interpretation, learning becomes all-inclusive, experiential and evidence-based. Learners become active, instead of being passive as they are objectively involved in teaching and learning process. This enhances retention. The second null hypothesis 2 states that there is no significant difference in the mean retention scores of male and female students when taught Geography using heuristic approach. The result reveals that there is significant difference in the mean retention scores of male and female students when taught Geography using heuristic approach in favour of the female students. This result is contrary to the findings

Table 2: ANCOVA test for the post posttest retention scores of male and female geography students taught using heuristic approach.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	136.941 ^a	2	68.471	9.327	.000	.129
Intercept	2311.008	1	2311.008	314.787	.000	.714
Pretest	1.895	1	1.895	.258	.612	.002
Gender	135.055	1	135.055	18.396	.000	.127
Error	925.028	126	7.341			
Total	69211.000	129				
Corrected Total	1061.969	128				

a. $R \text{ Squared} = .129$ ($Adjusted R \text{ Squared} = .115$)

of Okechuku (2014) who conducted a research on the effect of heuristic method of teaching on students' achievement and retention in algebra who found that male performed better than their female counterpart and also in line with the cognitive theory of heuristics that explains that by using heuristics to interpret maps in the context of this study, students may develop a deeper understanding of geographic concepts and improve their academic achievement and retention regardless of gender differences.

CONCLUSIONS

The study concluded that there is a significant difference in the mean academic achievements between students taught Geography concepts using the heuristic approach and those taught using the lecture method. The experimental group, which received instruction through the heuristic approach, demonstrated higher academic achievement compared to the control group and suggested that the heuristic approach can effectively enhance students' understanding and performance in Geography.

Also there is a significant difference in the mean retention scores of male and female students when taught Geography using the heuristic approach and indicated that female students achieved higher retention scores than their male counterparts, emphasizing the potential advantages of the heuristic approach in facilitating knowledge retention for female students in the context of Geography education.

RECOMMENDATIONS

The Study recommended that educators and curriculum developers should consider integrating the heuristic approach into the teaching methods for Geography concepts as training programs and workshops can be conducted to familiarize teachers with effective strategies for incorporating the heuristic approach into their lessons. Also educators should employ teaching methods and materials that cater to the unique learning needs and preferences of both male and female students. This may include providing additional support to male students or creating an inclusive classroom environment that encourages the active participation of female students.

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