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EFFECT OF GENDER ON SENIOR SECONDARY SCHOOL STUDENTS' ACADEMIC ACHIEVEMENT IN GEOGRAPHY IN GANYE EDUCATIONAL ZONE, NIGERIA

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Abstract:
The low enrolment and poor academic achievement of female students in Geography compared to their male counterparts in secondary schools of Ganye Educational Zone necessitated this study. Studies have it that the instructional strategies adopted by Geography teachers in teaching could interact with gender to influence students' academic achievement. To this end, the study investigated the Effect of Gender on Senior Secondary School Students' Academic Achievement in Geography when Mastery Learning Strategy and Conventional Method are used for instruction. The quasi-experimental non-randomized pre-test, post test control group design was used. The study also employed the multi-stage random sampling technique at four levels to select 207 (120 Male and 87 Female) senior secondary school two (SS II) students offering Geography from six intact classes in six co-educational secondary schools in Ganye Educational Zone in Nigeria. A 40-item Geography Achievement Test (GAT) constructed by the researcher and validated by experts in Geography education was used to obtain data. After pilot testing the instrument using 89 students from two intact classes, the data obtained were analyzed using Pearson product moment correlation coefficient statistic. A reliability index of 0.78 was obtained. Data collected were analyzed using descriptive statistics of Mean, independent t-Test and Analysis of Covariance (ANCOVA). The study revealed that Female students exposed to learning Geography through Mastery Learning Strategy performed better than their Male

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counterparts. A significant interaction effect of treatment and gender on students' achievement in Geography was also observed. It was recommended that Geography teachers should re-assess their classroom instructional strategies used in teaching and adopt that which will give the students equal opportunities to excel in Geography.

Keywords: academic achievement; conventional method; gender; geography; mastery learning strategy

1. Introduction

The problem of students' underachievement in secondary schools in Nigeria has been a much discussed educational issue. In solving any problem, it is pertinent to understand the causes of such problems. Many causes have been studied and advanced as the etiological starting point for investigating the phenomena of students' failure or success. These causes are looked into from several perspectives including the role of the students, teachers, parents, school environment, society and Government. Gender has been advanced as one of such factors that may have a considerable effect on students' academic achievement especially in science subjects such as Geography.

Gender is the range of physical, biological, mental and behavioural characteristics pertaining to and differentiating between the feminine and masculine (female and male) population. The importance of examining achievement in relation to gender is based primarily on the socio-cultural differences between girls and boys. Some vocations and professions have been regarded as men's (engineering, arts and crafts, agriculture etc.), while others as women's (catering, typing, nursing etc.). The typical African society has shown that invincible rules within the society provided what is feminine and what is masculine. Hence, science oriented subjects in most cultures are defined as masculine. The historical background of the provision of education in Nigeria serves to give a picture of how tradition and culture has placed women and girls at a disadvantage, and restricted them to a narrow range of occupation and careers. Parents assign task like car washing, grass cutting, bulbs fixing, climbing ladders to fix or remove things etc. to the boys. On the other hand, chores like dish washing, cooking, cleaning and etc. are assigned to the girls. In a nutshell, what are regarded as complex and difficult tasks are allocated to boys whereas girls are expected to handle the relatively easy and less demanding tasks. As a result of this, the larger African society has tended to see girls as a ''weaker sex''. Consequently, an average girl, especially in Northern Nigeria goes to school with these fixed stereotypes.

Gender, as a concept, has captured the interest of educators in Nigeria, especially now that gender equity is being emphasized in many quotas. The ABC of women's right and gender equality (2000) defines gender as the socially constructed differences and relations between males and females. According to the document, the term "gender" is not interchangeable with the term "sex", which refers exclusively to the biological differences between men and women, which are universal and do not change. Gender characterizes the differing roles, responsibilities, constraints, opportunities and needs of females and males in all areas and in any given social context. Reports from various academic sources have it that Geography as a course of study is gender sensitive (Filgona, 2016, Gender Geography, 2010). Inputs from girls during Geography classes in secondary schools of Ganye Educational Zone were observed to be considerably lower. While boys are likely to ask more questions and engage the teacher during Geography classes (active), the girls will rather choose to remain quiet, even when they know (passive). Achievement could be a strong correlate to students continuing in Geography as a course of study, of which the girls were observed to lag behind their male counterparts. Moreover, the enrolment of girls in senior secondary school Geography in the study area was also observed to be at its lowest ebb. What could be responsible for this low interest of female students in Geography? Such discussions have consistently centred round instructional strategies used in teaching the subject (Filgona, 2016).

Of great concern is that most Geography teachers in the study area still rely primarily on the lecture method for imparting knowledge, while the manner of presentation is supposed to be activity-based (Filgona, Filgona & Sababa, 2016, Filgona, Ndatuwong & Filgona, 2016). This does not give students the opportunity to contribute to the teaching learning process. Studies like those of Arisi (2002), Akpochafo (2001) Okobia (2000) have pointed out that despite the more than thirty-year existence of learning style theories, most teachers still dispense information using conventional lecture method without regard to students' learning abilities. This teaching method is theoretical and teacher-directed, instead of being constructive or activity-based. In the lecture method, the teacher, according to Filgona, Sababa and Iyasco (2016), Oganwu, (2004) and Ogundare, (2000), simply becomes the centre of knowledge transmission while the learner remains the listener and a storehouse of facts; and expected to regurgitate same when ask to do so.

Several studies have documented that female students have lower self-efficacy in science compared to male students (Amedu, 2015 & Nwona & Akogun, 2013). Girls' capabilities may be undermined by sex-role stereotypes in many cultures intimating that females are not as able as males, especially in such disciplines as Geography. This

difference in treatment through education created and sustained gender gap, which also became visible in the science related disciplines. Because of this reason, fewer female students may study Geography at University level. Another contributing factor may be the low level of expectations that some parents, teachers, and counsellors often hold for girls, which can discourage further study in scientific and technical fields. However, certain studies indicated that gender differences generally are small or non-existent. For instance, Hedges and Newell (1995) found that in science, boys outperform girls, but in reading and writing girls have the advantage. Studies on gender differences and students' achievement abounds. While some of these studies observed gender disparity in science in favour of males (Ekeh, 2004), others report females' superiority (Shaibu & Mari, 1997) and others still, zero disparity (Udo & Udofia, 2006; Udo, 2010, 2011). Hence, studies on gender and students' performance are conflicting and inconclusive. Researchers reporting male dominance explain their observations in terms of cultural factors and gender stereotyping. Owuamanam and Babatunde (2007) in a study on gender role stereotypes and career choice of secondary school students observed that boys showed interest on brain tasking careers while girls were more interested on courses that do not require much brain work.

Filgona (2016) and Nwona (2013) noted imbalance against girls in Geography, science, technology and mathematics. These are perceived as masculine subjects. Research has demonstrated that different teaching methods produce different results. The identification of the best teaching strategy for a given set of students must be done if the best result must be achieved. Could it be that the teaching methods adopted by teachers presently accounts for the low level of enrolment and achievement of female students in Geography observed in the study area? To ensure a learner-friendly learning environment, effective instructional method that involves activities with students taking over their learning should be encouraged. Mastery learning strategy is one of such innovative learner-friendly teaching approach that may bridge the achievement gaps between male and female students in Geography observed in the study area.

Mastery learning is an instructional strategy that is based on the principle that all students can learn a set of reasonable objectives when provided with appropriate instruction and sufficient time. It is a method in which students are given unlimited opportunities to demonstrate mastery of content taught. It involves breaking down the subject matter to be learnt into units of learning each with its own objectives. It gives students the opportunity to study a material unit after unit until they master it. Obih and Ekomaru (2011) stated that mastery learning is the mastery of a task, topic, or subject by every learner whereby the instruction is well related with the learner's

characteristics and the learner is given the time required to learn the task, topic or subject and at the same time given the optimum quality of instruction. Mastery learning uses differentiated and individualized instruction, progress monitoring, formative assessment, feedback, corrective procedures, and instructional alignment to minimize achievement gaps, and focuses on how to improve the process of mastering content rather than changing it. Following a previous instruction, the teacher administers a brief formative assessment based on a unit learning goals (Bloom, 1971). The assessment as a feedback informs the teacher about the student, which helps to identify what have been learnt and what needs to be learnt better. Students who have learnt the specified concepts continue their learning experiences while others who have not properly learnt the concept receive feedback paired with corrective activities different from the initial instruction and offer guidance and direction on how to remedy their learning challenges. These correctives can include varying activities, individualized instruction, and additional time to complete assignments. The challenge therefore becomes providing enough time and ensuring that all students can attain the same level of learning. Expectedly, this is what Mastery Learning Strategy could do to bridge the achievement gaps between male and female students offering Geography in secondary schools of Ganye Educational Zone.

Literature abounds on the efficacy of the Mastery Learning Strategy on students' achievement in different localities and in diverse fields (Hussain & Suleman, 2016, Lamidi, Oyelekan & Olorundare, 2015, Udo & Udofia, 2014). However, the effect of gender on secondary school students' academic achievement in the use of the Mastery Learning Strategy has not been explored in Ganye Educational Zone. This is the rationale for this study.

1.2 Statement of the Problem

Reports from various academic sources have indicated that Geography as a course of study is gender sensitive (Filgona, 2016, Gender Geography, 2010). Inputs from girls during Geography classes in secondary schools of Ganye Educational Zone were observed to be considerably lower. While boys are likely to ask more questions and engage the teacher during lesson delivery, the girls will rather choose to remain quiet, even when they know. Moreover, the enrolment of girls in senior secondary school Geography was also observed to be at its lowest ebb. What could be responsible for this low interest of female students in Geography?

Studies have it that the instructional strategies adopted by Geography teachers in teaching could interact with gender to influence students' academic achievement (Suwopoleme, Sababa & Filgona, 2016). Of great concern is that most Geography

teachers in the study area still rely primarily on the lecture method for imparting knowledge, while the manner of presentation is supposed to be activity-based (Filgona, 2016). This does not give students the opportunity to contribute to the teaching learning process. Therefore, there is the need to adopt newer and innovative learner-friendly teaching approach that could bridge the achievement gaps between male and female students in Geography. Mastery Learning Strategy is one of such innovative learner-friendly teaching strategy that may enhance the achievement of both male and female students offering Geography in secondary schools of Ganye Educational Zone.

1.3 Purpose of the Study

This study sought to find out the effect of gender on senior secondary school students academic achievement taught Geography using mastery learning strategy. The specific objectives of the study were to:

1) determine the effect of Gender on students' academic achievement taught Geography using Mastery Learning Strategy; and
2) compare the interaction effect of Treatment and Gender on the academic achievement of students in Geography.

1.4 Research Question

The study was guided by the following question: "*What is the academic achievement of Male and Female students taught Geography using Mastery Learning Strategy and Conventional Method?"*

1.5 Hypotheses

The following hypotheses were formulated and tested at 0.05 alpha level:

H_{O1}: There is no statistically significant difference in the academic achievement of Male and Female students taught Geography using Mastery Learning Strategy.

H_{O2}: There is no significant interaction effect of Treatment and Gender on students' academic achievement in Geography.

2. Materials and Methods

The study adopted the non-equivalent pre-test, post test, control group design to verify the relative effectiveness of Gender as an organismic variable on learning outcomes of students taught Geography using Mastery Learning Strategy. The non-equivalent pre-test, post test, control group design is a type of quasi-experimental design. Quasi-experimental design is similar to experimental design except for the lack of

randomization of students into groups. This research design is used because secondary schools exist in intact classes and the randomization of students into groups for experimental purpose is not allowed to avoid the disintegration of the classes. The pre-test, post test suggests that measurements are taken before and after the introduction of the intervention. The pre-test helps in examining the differences between the experimental and the control groups' entry behaviour and to establish a baseline for the effect of the treatment. The design is represented schematically as follows:

O_1 X_1 O_2

O_3 X_2 O_4

where: O_1 and O_3, are the pre-test scores of the experimental and the control groups respectively. O_2 and O_4 are the respective post test scores of the two groups.

X_1 = Experimental treatment using Mastery Learning Strategy (MLS).

X_2 = Control treatment using Conventional Teaching Method.

2.1 Sample and Sampling Technique

The sample for this study consisted of 207 (120 Male and 87 Female) Senior Secondary School two (SS II) students offering Geography in six intact classes from six selected Government secondary schools in three Local Government Areas in Ganye Educational Zone of Adamawa State. Ganye Educational Zone is one of the five educational zones in Adamawa State. It is located in North Eastern part of Nigeria, having a vast majority of its inhabitant as farmers. The three selected LGAs were Toungo, Ganye and Jada. In order to provide a suitable sampling frame for the study, the multi-stage random sampling technique at four levels using the balloting technique was employed. The six selected schools were randomly assigned into the experimental and control groups. The schools were co-educational schools located in both urban and rural areas of Ganye Educational Zone of Adamawa State. Three schools comprised of 103 (61 Male and 42 Female) students formed the Experimental group taught Geography through the Mastery Learning Strategy, while the other three schools with 104 (59 Male and 45 Female) students constituted the Control group exposed to learning of concepts in Geography through the Conventional Teaching Method.

2.2 Research Instrument

The instrument used for data collection was Geography Achievement Test (GAT), which consisted of 35 structured multiple choice questions and 5 essay items drawn from West African Certificate Examination and National Examinational Council past questions. It was based on SS II Geography curriculum on five content areas namely: earthquake, vulcanicity, faulting and folding, weathering and mass movement. The

GAT was used as a pre-test to ascertain equivalent ability of students as well as a post test after treatment to determine the effect of the intervention on academic achievement.

The instrument was given to two experts in Geography Education in secondary schools and two Geography lecturers from the Department of Educational Foundation, Adamawa State University, Mubi, for face and content validation. The validators were specifically requested to check for the appropriateness of the items and content coverage considering the grade level and the objectives of the study. Based on their comments and suggestion, which included revising some of the items and dropping some, the number of items was increased in the GAT from 30 to 45 items. The corrections made by the validators were followed in selecting the items included in the instrument.

To further strengthen the validity of the GAT, the 45 items were trial-tested on 89 students offering Geography from two intact classes (Class A: 41, Class B: 48) of co-educational secondary schools different from the selected schools used for the study. Class A was used as the experimental and B control groups. The test-re-test method was used to generate two sets of scores for the students. The data obtained were used to determine the reliability, difficulty and discrimination indices of the items. For the purpose of this work, objective items with difficulty indices below 0.30 were deleted for being difficult and those above 0.75 were also deleted for being too simple (Anikweze, 2010). With respect to the discriminating powers or item efficiency, only items (objective) with discriminatory indices ranging between 0.30 and 0.70 were accepted, those outside this range were deleted for lacking the powers to discriminate between the slow and fast learners. These further reduced the number of items from 45 to 40 items in the final draft of the GAT. In order to determine the reliability of the instrument, the two sets of scores were subjected to correlation using the Pearson product moment correlation coefficient statistic. The reliability coefficient was found to be 0.78. This reliability index showed that the instrument was reliable and capable of measuring the intended objectives of the study with consistency.

2.3 Procedure for Data Collection

The procedure for data collection was done in phases. In the first phase, the researcher visited the sampled schools to seek for permission to engage the students and some Geography teachers in the study. Two validated researcher-developed instructional packages (one for the Mastery Learning Strategy and the other for Conventional Teaching Method groups) were used for teaching the selected concepts to students in the Experimental and Control groups. The subject teachers in the six selected schools who were experienced graduate teachers with at least BSc. Degree in Geography

Education were used as Research Assistants; after training for one week using the instructional packages for the respective groups.

This was followed by the administration of the GAT as a pre-test to the students in the experimental and control groups to ascertain the equivalence in ability of the students in Geography. In the second phase, the treatments were introduced to the experimental and control groups. Students in experimental group were taught using the MLS, while the control group were taught using the Conventional lecture approach. Five topics (earthquake, vulcanicity, faulting and folding, weathering and mass movement) were taught concurrently in all the six schools using the appropriate treatment in each school for a period of five weeks. Each class period lasted for 40 minute and in each of the schools, Geography was taught for at least thrice a week for the six weeks that this study lasted. This was quite adequate considering the content area investigated. The teaching was closely monitored and supervised by the researcher after which a reshuffled version of GAT was re-administered as post test to both the experimental and control groups. This was done on the sixth week. The pre-test and post test of students were scored over 100 to generate quantitative data for further statistical analysis.

2.4 Method of Data Analysis

The data collected were analyzed using descriptive statistics of mean, Independent samples t-Test and Analysis of Covariance (ANCOVA). Descriptive statistics of mean was used to answer the research question. The t-Test was used to test hypothesis one because of its superior power to detect differences between two means (Male and Female students' post test scores in the experimental group). Hypothesis two was tested using Analysis of Covariance (ANCOVA). ANCOVA was used where the post test scores of the students were the dependent variables, treatment and gender the independent variables while pre-test scores were the covariates. Significance level of 0.05 was used to test the null hypotheses.

3. Results

The students that were engaged in the study have prior knowledge in Geography and in topics related to those that were used in the study. Hence, a pre-test was administered to the experimental and control groups at the commencement of the study to determine the equivalence in their entry behaviour. The results of the analysis of pre-test scores in the GAT for the experimental and the control groups taught Geography were analyzed and the results presented in Table 1.

Table 1: Summary of Mann-Whitney U test of Pre-test Results of Students in the Mastery Learning Strategy and Conventional Method

Variable	N	Mean Rank	Sum of Ranks	U	Asymp. Sig. (2-tailed)
Mastery Learning Strategy	103	109.17	11245.00	4823.00	.216
Conventional Method	104	98.88	10283.00		

Not Significant, p > .05

Tables 1 shows that the difference in students pre-test scores in Geography at the start of the study is not significant (U = 4823.00, p = 0.216). This implies that students in the experimental and control groups had equivalent entry behaviour before treatment.

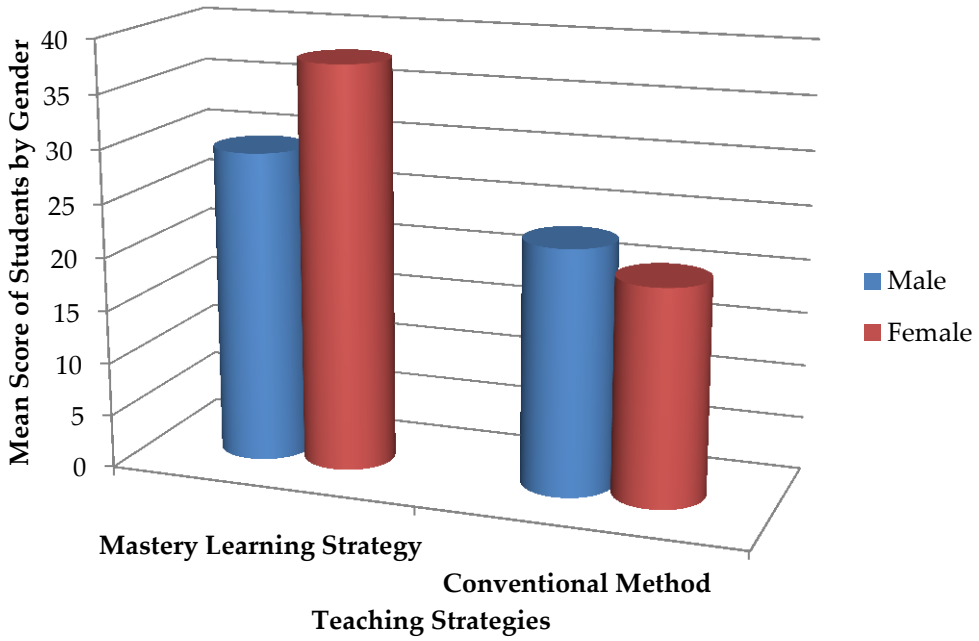
Research Question: *"What is the academic achievement of Male and Female students taught Geography using Mastery Learning Strategy and Conventional Method?"* Descriptive statistics of students' mean achievement scores taught Geography using Mastery Learning Strategy and Conventional Method by gender was used to answer this question. The result shows that the Female students in Mastery Learning Strategy group had the highest mean score in Geography (M = 37.83) compared to their Male counterparts (M = 29.23). On the other hand, Male students academic achievement (M = 22.92) in Conventional Method group was slightly higher than the academic achievement of their Female counterparts (M = 20.24) (Table 2).

Table 2: Summary of Descriptive Statistics of Students' Academic Achievement in Mastery Learning Strategy and Conventional Teaching Method by Gender

Source	Gender	N	Mean	Std. Dev.
Mastery Learning Strategy	Male	61	29.23	20.07
	Female	42	37.83	16.53
Conventional Method	Male	59	22.92	15.19
	Female	45	20.24	12.29

Furthermore, the table suggests that Male and Female students exposed to Geography using Mastery Learning Strategy obtained higher academic achievement scores than their counterparts in the control group. This scenario can also be depicted graphically (Fig 1).

Figure 1: A Graphical illustration of Academic Achievement of Male and Female Students taught Geography using Mastery Learning Strategy and Conventional Method



Hypothesis One: The hypothesis sought to find out if a significant difference exists in the academic achievement of Male and Female students taught Geography using Mastery Learning Strategy.

This hypothesis was tested by comparing the mean scores of Male and Female students taught using MLS. The independent samples t-test result is summarized in Table 3.

Table 3: Summary of t-Test Analysis of Post Test Scores of Male and Female Students taught Geography using Mastery Learning Strategy

Variable	N	Mean	SD	df	t	Sig. (2-tailed)
Male	61	29.23	20.07			
				101	-2.299	.024*
Female	42	37.83	16.53			

*Significant; $p < .05$.

Table 3 shows the independent samples t-test results of male and female students in the experimental group. The result indicates a statistical significant difference in the post test scores of Male and Female students taught Geography by Mastery Learning Strategy ($t = -2.299$, $df = 101$, $p = 0.024$). This implies that the achievement of Female students in Geography improved significantly compared to their Male counterparts.

Hypothesis Two: There is no significant interaction effect of Treatment and Gender on students' academic achievement in Geography.

This hypothesis was tested using ANCOVA. The post test scores of the students were the dependent variables, treatment and gender the independent variables while pre-test scores were the covariates.

Table 4: Summary of Analysis of Covariance of Interaction Effect of Treatment and Gender on Students' Achievements in Geography

Source	Type III Sum of Squares	df	Mean Square	F	Sig. (2-tailed)
Corrected Model	8049.571[a]	2	4024.786	7.730	.001
Intercept	134322.326	1	134322.326	257.983	.000
Pre-test	1269.790	1	1269.790	2.439	.120
Treatment*Gender	6671.896	1	6671.896	12.814	.000*
Error	106215.424	204	520.664		
Total	541670.000	207			
Corrected Total	114264.995	206			

*Significant; $p < .05$.

Table 4 shows a significant interaction effect of treatment and gender on students' achievement in Geography ($F(1, 204) = 12.814$, $p = 0.000$). This implies that students' gender is sensitive to the treatments administered; this was why interaction did manifest.

4. Discussion

Gender has been advanced as one of the predictor variable that may be factored in students' academic achievement. However, findings from substantial body of literatures regarding gender and students' achievement are conflicting and inconclusive. Mastery learning approach is effective as it insist on attainment of mastery of unit objective before proceeding to the next topic. It increases student motivation by providing peer support. Hence the prerequisite to a topic is mastered well before studying the next topic. In this study, the pre-test scores of students in the experimental and control groups taught Geography using Mastery Learning Strategy and Conventional Method were compared. The results showed that students in the two groups did not differ significantly in their pre-test scores at the onset of the treatment. This is an indication of the students attaining equivalence in their background knowledge of Geography before the study.

Descriptive statistics of research question one suggests that Male and Female students exposed to Geography using Mastery Learning Strategy obtained higher academic achievement scores than their counterparts in the control group. This implies that Mastery Learning Strategy was effective in improving students' achievement in Geography when compared with the Conventional Lecture Method. This finding tallies with that of Wambugu and Changeiywo (2008) who found Mastery Learning Strategy to be better in improving students' achievement than the conventional method. Testing hypothesis one revealed that female students exposed to learning Geography through Mastery Learning Strategy performed better than their Male counterparts in the same group. This finding is in concomitance with those of Nnamani and Oyibe, (2016), Zember and Blume (2011), Dayioglu and Turut-asit (2004) which showed that girls perform better than boys in schools. The finding however disagrees with those of Suwopoleme et. al (2016), Udo and Udofia (2014), Oleabhiele (2011) who held that male students perform better than female students in Geography or in any classroom instructional activities. Furthermore, the finding is at variance with the studies of Lamidi, *et. al* (2015), Wambugu and Changeiywo (2008), which showed no significant influence of gender on students' achievement taught with mastery learning approach.

In respect to hypothesis two, a significant interaction effect of treatment and gender on students' academic achievement in Geography was observed. This implies that the treatments administered to the experimental and control groups using Mastery Learning Strategy and Conventional Teaching Method to teach Geography was sensitive to the students' gender. The finding agrees with those of some authors who reported a significant treatment-gender interaction effect on students' achievement (Obiageli, 2013, Ifeakor, 2005). However, it disagrees with the findings of others who reported no significant treatment-gender interaction effect on students' achievement (Gambari, 2004, Ibe, 2004).

Findings of this study have demystified the perception held by Geographers that Geography is a male dominated discipline (Gender Geography, 2010). The reason that could be advanced for the better achievement of female students in the experimental group could lie on the instructional strategy adopted. It gave the students (irrespective of gender) the ample opportunities to learn and master every concept in Geography unit by unit. Even though the girls were observed to interact more during lesson delivery, the use of this strategy gave them the freedom to relate with their peers in and outside the classroom, in an effort to unravel what appears difficult to them.

5. Conclusion

The Mastery Learning Strategy has been shown to enhance students' achievement in Geography better than the conventional method. However, the strategy favoured Female students in Geography more than their Male counterparts. Similarly, the treatments administered to the two groups did interact significantly with gender to influence students' academic achievement in Geography. The implications of these observations are that teaching strategies adopted by Geography teachers and students' gender are significant predictors of students' achievement. Consequently, Geography teachers should always diversify their teaching strategy and that gender factor should not be overlooked in any teaching-learning situation. Hence, earnest efforts should always be put in place to ensure gender-friendly classrooms.

6. Recommendations

The following recommendations were made:

1. All learners should be given equal opportunity and the same level of encouragement irrespective of gender. Learners should be thoroughly and deliberately motivated to engender higher level of achievement in Secondary School Geography irrespective of gender.
2. There should be no differentiation in the way male and female are treated academically. Equal treatment of male and female should be factored in Geography instruction and school policy formulation.

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