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EFFECT OF COGNITIVE LEARNING STYLE AND GENDER ON STUDENTS' ACHIEVEMENT IN BRANCHES OF MATHEMATICS IN MARARABA EDUCATION ZONE, NASARAWA STATE

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ABSTRACT
This study was conducted to examine the effect of cognitive learning style and gender on students' performance in selected areas of mathematics in Mararaba Education Zone, Nasarawa State, Nigeria. The study further looked at the performance of male and female students, classified under field independent and field dependent students in geometry, algebra and number/numeration. Six research questions and six research hypotheses guided the study. All the SS2 mathematics students in five secondary schools in Mararaba Education Zone were the target population for the study. The sample of the study consists of 100 mathematics students selected through random sampling techniques. The instruments used for data collection were Group Embedded figure Test (GEFT) and Mathematics Achievement Test (MAT). Data collected were analyzed using mean, standard deviation and t-est. The study adopted the ex-post factor research design. The results of the findings revealed that field independent students performed better than the field dependent students in geometry, algebra and numeration. There was significant difference in the mean performance scores of field independent and dependent students in these areas of mathematics. Male students achieved higher than female students in geometry, algebra while in number/numeration there was no significant difference in performance of male and female students. There was significant difference in the mean achievements of male and female students in geometry while Gender was a significant factor on students' achievement in geometry. Based on the results some recommendations were made, which include use of instructional materials and techniques that can make males and females develop critical/logical thinking abilities to improve teaching and learning of mathematics. This will help to eradicate gender inequality in class-room instructions and achievement because the aim of teaching is to make pupil learn or achieve higher regardless of sex or gender.

KEYWORDS: Cognitive Learning Style, Gender, Students' Achievement, Mathematics

INTRODUCTION

In Nigeria, mathematics is one of the core subjects at both the primary and secondary school education system. According to the Federal Government of Nigeria (FGN, 2014), mathematics is a compulsory subject taught at the primary and secondary levels of education in Nigeria. Its function

and importance to education and the society makes it to be regarded as the basis of science and technological development. According to Okafor (2005), no nation or country can develop scientifically and technologically without proper foundation in mathematics.

Hardy (2003) posits that mathematics is an aid to representing and attempting to resolve situation in all disciplines. Thompson, (2004) opines that mathematics is a subject that teaches critical thinking and problem solving in a much applied form. Thompson maintained that science and mathematics are two fields of studies that work together, towards the natural and physical relationship with other sciences. This may be why Stroud (2000) stated that mathematics should be seen beyond a subject to be taught and understood by students rather than as a service to other sciences. Therefore, one cannot avoid considering the useful aspects of mathematics in preparing people for useful living. According to Federal Republic of Nigeria (FRN, 2004), the general objective of secondary education is to generate interest in mathematics for everyday living, counting notation, addition, subtraction, multiplication, division, weighing, measuring, selling and buying are some of the simple and fundamental processes of mathematics which have practical value in life. Thus, these cultural goals of mathematics will "foster Nigeria unity with an emphasized interest on the common ties that unite us in our diversity" as well as "develop and protect Nigeria culture" (2004, P.11).

Mathematics is a language in which scientific ideas are expressed; it is the means by which other sciences including Physics, Chemistry, Biology, and disciplines like Engineering, Geology are understood. Mathematics enables the various sciences to draw the implications of their observational and experimental findings. Mathematics has become so valuable that there is nothing in all human endeavors that does not apply mathematics skills or knowledge. Therefore, scientific knowledge is impossible without a sound knowledge of mathematics. Equally; those who are grounded in mathematics are able to contribute meaningfully to scientific and technological development.

Despite the vital roles played by geometry, number/numeration and algebra in the development of science and mathematics, Kurumeh (2006) reported that students achieved poorly in public examinations in mathematics. For instance, in Nigeria, in the years 2008, 2009,2010 and 2011 the percentage pass with credit and above in mathematics were 23.0%, 31.0%, 24.94% and 38.98% respectively (Kurumeh & Imoko 2008;Moseri 2010; Iyi 2011). Azuka and Dike (2013) also observed that candidates recorded mass failure in 2013 WASSCE examination. To be precise, Dike indicated that only 29% made a 5 credit grade in their subjects, including English and Mathematics, that candidate who sat for the 2013 West African Senior School Certificate Examination (WASSCE) recorded mass failure as only 86,612 candidates, out of the 308,217 candidates that participated in the examinations obtained five credits (including English and Mathematics)

Also, the chief examiner's report (2008-2011) from West African Examination Council (WAEC) shows that students' achievement in senior school certificate examination SSCE May/June in Mathematics has not been encouraging. Harbor-Peters (2001), reported that achievement of students in mathematics is as a result of poor and ineffective instructional skills and methodologies by mathematics teachers. Azurku (2006) and Tukur (2007) noted that mathematics classes in the state secondary schools are overcrowded, most times one find a single teacher in a class with about one hundred (100) students which lead to use of ineffective teaching method. John (2003) argues that students' attitudes towards learning mathematics in Nigeria secondary schools are not encouraging,

particularly at junior secondary school which is the background level. Apart from these factors, there are other factors which also contribute to poor achievement in mathematics such as parental attitude towards mathematics, inadequate number or quality teachers to handle the subject particularly at the secondary level and incompetence of teachers to teach some selected areas in mathematics. The major factor is that of teachers not being able to teach some aspects of mathematics concept such as algebra, geometry, trigonometry and Statistics. This incompetence of teachers exposes the students to solve mathematics problems any how and thus have a notion that some areas are very difficult to handle. The students thus develop a dislike for some aspects of mathematics.

Eraikhuemen (2003) noted that students dislike certain topic because they feel the topics are difficult and could not be understood easily. Some teachers lack techniques and materials in teaching some topics to the extent that if they have a choice they will not teach such topics, also the teachers believe that these topics are difficult and not easy to teach. For these reasons many children in secondary schools experience difficulties in learning some aspects of mathematics in the curriculum. Teachers also experience difficulties in achieving effective teaching in the school system (Habor-Peters, 2002). Mathematics is made up of many branches like probability, statistics, algebra, geometry trigonometry, number numeration and so on. This study specifically covers geometry, number/numeration and algebra.

Geometry is an aspect of mathematics which deals with the study of geometric objects (shapes, diagrams and curves) which is done through direct observation, description and analysis of spatial distribution of points. It is a special branch of mathematics and it follows that if teachers of mathematics do not have adequate knowledge of geometry, the teaching and learning of mathematics will likely be deficient. Algebra is an aspect of mathematics which deals with the representation of alphabets to represent numbers. Numbers/Numeration is the science of numbers and the art of computation. Mensuration is also a science of numerical representation of geometrical magnitudes. It consists the measurement of angles, lengths volume and areas. Weatheril (2004) explained that mensuration is a method of using known lengths, sizes of shapes and formula to work out unknown lengths or areas in problems. These three selected areas in mathematics may have different effect on students' cognitive style. That is to say that, a student may be performing better in geometry without performing well in algebra and numeration. This calls for the need to explore effect of cognitive style on students' performance in these selected areas. The situation of poor achievement in mathematics or other science subjects have warranted this study to explore students' cognitive learning style which may be of benefit in improving performance in selected areas in mathematics. It has been observed that students have different ways of perceiving and reasoning mathematics concepts based on their mental readiness. In other words, students have different cognitive style which may affect their learning.

Cognitive learning style is a psychological construct which is concerned with how an individual learns, thinks, remembers, solves problems and relates to others. Pitcher (2002), defined cognitive learning style as the relatively stable strategies, preferences and attitudes that determine an individual' stypical modes of perceiving, remembering and problem solving. This implies that each student has a preferred cognitive style, which is affected by such factors. The Cognitive style which has received the greatest attention in research is field dependent (FD) and field independent (FI).Zhang (2004) defined field dependent and field independent as a reflection of the extent to

which an individual uses external or internal cues for conduct. FI / FD are typically referred to as a variable cognitive style. An individual is either a field independent (FI) or field dependent (FD) (Witkin 1977). A Field Independent (FI) Cognitive style learner is described as analytic, competent, individualistic, task oriented, intrinsically motivated self structuring, detail oriented and skills (Felder, 2000). A Field-dependent cognitive style learner is describe as global (holistic) group oriented, sensitive to social interactions and criticisms, externally motivated, passive learners who prefer external information and group project(Hall, 2000).

Mandana (2011) investigated the relationship between field independent / dependent cognitive styles and Iran'an learners' listening comprehension ability. Two hundred and seventy seven (277) students were used (119 male and 158 females). The following instruments were used the group embedded figures test (GEFT). (1971), the Michigan ECPE test (1996), the TOFEL listening test (1995) and the listening task preference questionnaires were administered. The data was analysis using the correlation between the TOTEL and the GEFT scores for FD learners (both males and females) was significant (r = 0.70), and higher scores on the GEFT lead to an increase in the FD learners TOTEL scores. One-way and two way ANOVAs was suggested that while there was a relationship between and listening comprehension (F = 18.02) and also no relationship between sex and listening comprehensive (F = 0.269), the interaction effect was significant (F= 7.03). Therefore, sex can be regarded as a source of performance difference in listening comprehension but not by itself and it seems that the interaction of sex and cognitive style can have a stronger effect on this skill. Regarding the learners favoured the short conversation, informal assessment and one item or one conversation from the findings however, the F1 ones did better on the longer conversations of the second and the third parts of the TOTEL listening test findings.

Bassey, Umoren and Udida (2011) conducted a study to investigate the influence of cognitive styles and attitude on academic performance of students in chemistry in AkwaIbom state. Two hypotheses were formulated to guide the study. The expo facto research design was adopted for the study. Simple random sampling technique was used to select 200 senior secondary school students. Students Questionnaires containing three sectors namely Siegel cognitive style test, chemistry students' attitude test and chemistry Achievement test was administered to the 200 randomly selected senior secondary three (SS111) students offering chemistry. The data collected were subjected to data analysis using Analysis of variance, Fisher LSD multiple comparison test and Pearson product moment co relational Analysis. Based on the analysis, the following results emerged. There is significant difference in students academic performance in chemistry due to their cognitive styles, students with analytic (field independent) cognitive perform significantly higher than relational (field dependent) and inferential ones. There is a significant positive relationship between students' attitude to chemistry and their performance in chemistry

Gender refers to the roles of men and women that are socially or culturally biased. Sex on the other hand, refers to the biological differences of men and women .Therefore, most people agree that learning differences are gender based and are related to the individuals socialization and culturalization rather than based on biological differences (Feldstein and Jiggins, 1994).Gender relates to the difference in sex (that is, either male or female) and how this quality affects their dispositions and perception toward academic activities (Okoh, 2007). Also Okeke (2006) explained that gender is socially or culturally constructed characteristic, qualities behaviours and roles which

different societies ascribe to females and males. Unlike sex which is biological, gender expectations, roles and characteristics of member of a society are made evident in the approved process of socialization dictated by the society.

Many studies have shown that gender as a variable relates to performance (Ezeugo andAgwagah, 2000). For instance, Olaguaju, (2001) observed that boys choose science courses in high schools than girls, especially mathematics, Chemistry, and Physics. This is due to the long held view that women are weaker vessels who cannot stand the stress involved in the subject. To this end, ugwu (1998) argued that at present females are struggling to fight the oppression, suppressionand domination by their male counterparts in mathematics. Etukudo (2002) found that female students performed significantly higher than their male counterparts in mathematics. Also, several researches conducted revealed that males performed significantly better than female counterparts (Onasanya, 2008; Popoola, 2007; Odili, 2006; Ogunkunle, 2007&Tyoor, 2010). Therefore, the study examines the effect of cognitive style and gender performance of students in the selected areas of mathematics curriculum.

Statement of the Problem

Mathematics is a compulsory subject untaken by both sciences and art students in senior secondary certificate examination .Regardless the significance accorded mathematics in the educational system in Nigeria, students in secondary schools continually achieve poorly at senior secondary certificate examination and other external examinations .There are several out cries over students' performance at mathematics in various levels of education .This could be attributed to inadequate teachers, use of ineffective instructional materials ,poor teaching methods and incompetence of teachers in teaching some mathematics topics like geometry, algebra, trigonometry, number and statistics. Gender have been a controversial issue in mathematics and other science subjects, despite the effort made at global level in promoting gender equality in education and the society at large .All these reports point to the fact that there are gender gap in the field of mathematics and sciences. Factors such as the students' cognitive style and gender have been implicated in the students' poor performance in mathematics. Students have different cognitive styles which may affect their learning. Students with certain cognitive styles are either expedited or hindered by the particular teaching methods to which they are exposed to. Teaching students to reason think critically and solve problems in mathematics and sciences generally have been a concern to all educators. The problem of this study posed as a question therefore is: Do cognitive learning style and gender have effect on students' achievement in selected branches of mathematics.

Objectives of the Study

The main objective of this study was to examine the effect of cognitive style and gender performance of students in selected branches of mathematics. Specifically the study sought to find out:

1. The effect of cognitive learning styles on students' achievement in geometry
2. The effect of cognitive learning styles on students' achievement in algebra
3. The effect of cognitive learning styles on students' achievement in number/numeration
4. The effect of gender on students' achievement in geometry
5. The effect of gender /Sex on students' achievement in algebra
6. The effect of gender/Sex on students' achievement in number/ numeration.

Research Questions

The following questions were stated and answered in the study

1. What is the mean achievement score of field-dependent and field independent mathematics students in geometry?
2. What is the mean achievement score of field-dependent and field independent mathematics students in algebra?
3. What is the mean achievement score of field-dependent and field independent mathematics students in number/numeration?
4. What is the mean achievement score of male and female students in geometry?
5. What is the mean achievement score of male and female students in algebra?
6. What is the mean achievement score of male and female students in number/numeration?

Research Hypotheses

The following null hypotheses were tested at 0.05 level of significance.

$H0_1$: There is no significant difference in the mean achievement score of field dependent and field independent

Students in geometry.

$H0_2$: There is no significant difference in the mean achievement score of field dependent and field independent

students in algebra.

$H0_3$: There is no significant difference in the mean achievement score of field dependent and field independent

students in statistics

$H0_4$: There is no significant difference in the mean achievement score of male and female students in geometry.

$H0_5$: There is no significant difference in the mean achievement score of male and female students in algebra.

$H0_6$: There is no significant difference in the mean achievement score of male and female students in number/numeration.

MATERIALS AND METHODS

Research Design

The study utilized a causal comparative design (ex-post facto). According to Gall and Borg (2007) causal comparative design allows the researcher to identify cause and effect relationship between groups and individuals. In this study the independent variables cognitive style and Gender had already occurred and no attempt will be made to manipulate or control them. The researcher then studies the independent variables in retrospect for the possible relation to have effect on the dependent variables (performance in mathematics).

Population of the Study

The population of the study comprised 2, 153 SS2mathematics students in 2017/2018 academic session in co-education secondary schools in Mararaba Education Zone, Nasarawa State.

Sample and Sampling Techniques

The sample of this study covered a total of 100 senior secondary schools two (SS2) mathematics students from both public and private schools in Mararaba Educational Zone. The sample was randomly selected from the two (2) schools. Similarly, the sample is made up of 50 male and 50 female mathematics students from each selected schools, which includes 30 male and 20 female students from each of the school.

Instruments for Data Collection

The instruments used for data collection include Group Embedded Figure Test (GEFT) and Mathematics Achievement Test (MAT).The Group Embedded Figure Test is a standardized psychological test developed by Oltaman, Raskin and Witkin (1971) in America. The GEFT was used in this study to determine the students measure of field independence / dependence .GEFT consist of 25 test items in which simple geometric forms are hidden within progressively more complex geometric design. The complex designs are arranged in three sections. The first section is made up of seven questions and was used as practice. The second and third sections have nine questions respectively and served as the test. The test requires students to trace the out line of the simple form located incomplex form. Their responses are scored as one when students correctly locate the figure and aszero when they failed it. Test score was total number of figures correctly located. Thus, the cut off mark for GEFT is nine (9).Students with scores below nine (9)are field dependent while those with scores above are field independent. GEFT was adopted because it is culture free and relatively easy to work with large class. It has been validated and standardized according to the test manual.

Mathematics Achievement Test (MAT) was developed by the researcher based on SS2 mathematics curriculum for senior secondary schools. Some selected areas in mathematics (Geometry, Algebraic processes and Number/Numeration) were chosen from the curriculum. The test consist of 30 multiple choice questions with options A-E. The Mathematics Achievement Test items were designed to measure the academic performance of students on the three selected areas of: Geometry, Algebraic processes and Number/numeration which were arranged in clusters or sections A, B, and C respectively The items were constructed based on cognitive domain of Bloom's taxonomy of education.

Validation of Research Instruments

The Group Embedded Figure Test (GEFT) is a standardized psychological test which is used all over the world. It is adopted, culture free and standardized test hence, and the GEFT was not subjected to validation. For Mathematics Performance Test (MAT), it was validated by a panel of three certified experts with a minimum qualification of PhD and Senior Lecturers in the Department of Science and Technology Education, University of Jos. They agreed that the instrument can capture the data for this study after the validation.

Reliability of Instrument

The reliability coefficient of the instrument (MAT) was determined using Kuder Richardson formula 20 (K-R 20) to ascertain the internal consistency, and was found to be (0.85) which shows that instrument is reliable. The choice of K-R20 was due to the fact that MAT was administered to students once and the items were dichotomously scored.

Procedure for Data Analysis

The mean and Standard Deviation was used to answer the research question that is to analyze the data in order to answer the research questions, while hypotheses were tested to generalize findings from the data, using the t-test statistics.

RESULTS

The results were presented based on the research questions stated and hypotheses formulated. Mean and standard deviation was used to answer the research questions while t- test was used to test the hypotheses.

Research Question One

What is the mean achievement score of field-dependent and field independent mathematics students in geometry?

Table 1: Mean and standard deviation of field independent and field dependent students in geometry

Cognitive Style	Number	Mean(X)	SD Mean (X) Diff.
Field independent	5015.18	3.75	2.83
Field dependent	50 12.34	2.75	
Source: Field Survey, 2018			

Table 1 shows the mean or average achievement score of field independent and field dependent students in geometry. Field independent students had a mean score of 15.18 and standard deviation of 3.75 while field dependent students recorded a mean score of 12.34 with the standard deviation of 2.75. By comparison, field independent students had a higher mean score than field dependent students in geometry. This implies that the cognitive style of students had an effect on their performance in geometry

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Research Question Two

What is the mean achievement score of field-dependent and field independent mathematics students in algebra?

Table 2: Mean and standard deviation of field independent and field dependent students in algebra

Cognitive Style	Number	Mean (X)	SD Mean (X) Diff.
Field independent	50 15.203.333.43		
Field dependent	50	11.8	3.07
Source: Field Survey, 2018			

Table 2 presents the mean achievement of field independent students to be 15.20 with standard deviation of 3.33. The mean score of Field dependent students was 11.8 and a standard deviation of

3.07. Therefore, the field independent students had a higher mean score than the field dependent students in algebra.

Research Question Three

What is the mean achievement score of field-dependent and field independent mathematics students in number/numeration?

Table 3: Mean and standard deviation of field independent and field dependent students in Number/numeration

Cognitive Style	Number	Mean (X)	SD Mean (X) Diff.
Field independent	2824.16.540.34		
Field dependent	2223.8	6.38	

Source: Field Survey, 2018

Table 3 shows the mean achievement score of field independent and dependent students in number/numeration. Field independent students had a mean score of 24.1 and standard deviation of 6.54.01. Similarly, field dependent students obtained a mean of 23.8 with a standard deviation of 6.38. Hence, field independent students had a higher mean score than the field dependent students in number/numeration, with a mean difference of 0.34 which show that cognitive style has effect on students' achievement in number/numeration.

Research Question Four

What is the mean achievement score of male and female students in geometry?

Table 4: Descriptive statistics of male and female students in geometry

Gender/Sex Number	Mean (X)	SD.	Mean (X) Diff.
Male 3656.94.78 12.9			
Female 3644.03.47			
Source: Field Survey, 2018			

The analysis of table 4 shows the mean achievement scores of students in geometry according to gender/ sexes. Male students obtained a mean score of 54.9 with a standard deviation of 4.78 while their female counterparts had a mean achievement score of 44. 0 and a standard deviation of 3.47. Relatively, male students achieved better than the females with a mean achievement difference of (12.9). Therefore the difference observed in the mean score is an indication that gender has effect on students' performance in geometry.

Research Question Five

What is the mean achievement score of male and female students in algebra?

Table 5: Descriptive statistics of male and female students in algebra

Gender /Sex	Number	Mean (X)	SD Mean (X) Diff.
Male	4515.33.3912.6		
Female	452.621.30		

Source: Field Survey, 2018

Table 5 shows the mean achievement score of male and female students in algebra. Male students had a mean score of 15.3 with a standard deviation of 3.39 while female students obtained a mean score of 2.62 with a standard deviation of 1.30. The high mean score favoured the males with a mean score difference of 12.6. However, this also reveals thatgender has effect on student's achievement in algebra.

Research Question Six

What is the mean achievement score of male and female students in number/numeration?

Table 6: Descriptive statistics of male and female students in number/numeration

Gender /Sex	Number	Mean (X)	SDMean (X) Diff.
Male 47 3.891.39		1.03	
Female	47	2.861.44	

Source: Field Survey, 2018

The analysis of data in table 6 indicates that male students' obtained a mean score of3.89and a standard deviation of 1.39. On the other hand, female students obtained a mean score of 2.86 and a standard deviation of 1.44. Comparatively, the high mean performance score favoured males with a mean score difference of 1.03. So, there is gender effect amongst the students in number /numeration.

Hypothesis One

There is no significant difference in the mean performance scores of field independent and field dependent students in geometry

Table 7: t-test analysis of students' achievement according to cognitive Learning style

Cognitive Style	Number	Mean (X)	SDDf	t-Cal.	t-Crit.	Decision
Field independent	50	15.18	3.75	984.07	1.96	Rejected
Field dependent	5012.34	2.75				

Source: Field Survey, 2018

The data presented in Table 7 shows a significant difference in the mean achievement scores of field dependent and field independent students in geometry, in favour of field independent students. This implies that the calculated t value of 4.07 for cognitive style (field dependent and field independent) mean achievement score is significant at 0.05 probability level because the calculated t- value is greater than the t- table value (t-critical) of1.96 at 0.05 level of significance.Thus, the hypothesis of

no significant difference is rejected or refuted.

Hypothesis Two

There is no significant difference in the mean achievement score of field dependent and field independent students in algebra

Table 8: t-test analysis of students' achievement according to cognitive Learning style

Cognitive Style	Number	Mean (X)	SD.	Df	t-Cal.	t-Crit.	Decision
Field independent	50	15.20	3.33	98	5.31	1.96	Rejected
Field dependent	50	12.34	2.75				

Source: Field Survey, 2018

The result of the t-test presented in table 8 shows the mean achievement of field independent and dependent students' in algebra. The calculated t value of 5.31 is significant at 0.05 level of significance because the calculated t-value is greater than the t- table value (t-critical) of 1.96. Therefore, the null hypothesis of no significant difference was rejected. This means there is significant difference in the mean performance score of field independent and field dependent students in algebra. However, field independent students performed better than the field dependent student in algebra.

Hypothesis Three

There is no significant difference in the mean achievement score of field dependent and field independent students in number/numeration.

Table 9: t-test analysis of students' achievement according to cognitive Learning style

Cognitive Style	Number	Mean (X)	SD.	Df	t-Cal.	t-Crit.	Decision
Field independent	28	24.1	6.54	48	0.18	2.01	Accepted
Field dependent	22	23.8	6.38				

Source: Field Survey, 2018

Table 9 indicates no significant difference in the mean achievement score of field dependent and field independent students in number/numeration. This shows that the calculated t-value of 0.18 for cognitive style field dependent and independent mean scores is not significant at 0.05 level of significance because the calculated t- value is greater than the t- table value (t-critical) of 2.01 at 0.05 level of significance. Hence, the hypothesis of no significant difference was accepted or upheld.

Hypothesis Four

There is no significant difference in the mean achievement score of male and female students in geometry.

Table 10: t-test analysis of male and female students' achievement in geometry

Gender /Sex	Number	Mean (X)	SD.	Dft-Cal.	t-Crit.	Decision
Male	3656.9	4.7870	13.1	1.96	Rejected	
Female	36	44.0	3.47			

Source: Field Survey, 2018

The result in table 10 indicates the t-test analysis of male and female students' performance in geometry. The calculated t value of 13.0 is significant at 0.05 level for gender main effect. This is because the calculated t- value is > than the t-critical value of 1.96.The null hypothesis was rejected; therefore there is significant difference in the mean performance score of male and female students in geometry.

Hypothesis Five

There is no significant difference in the mean achievement score of male and female students in algebra.

Table 11: t-test analysis of male and female students' achievement in algebra

Gender /Sex	Number	Mean (X)	SD.	Df	t-Cal.	t-Crit.	Decision
Male	45	15.31	3.39	88	23.8	1.96	Rejected
Female	45	2.62	1.30				

Source: Field Survey, 2018

The result in table 11 indicates the t-test analysis of male and female students' achievement in geometry. The calculated t value of 23.8 is significant at 0.05 level for gender main effect. This is because the calculated t- value is > than the t-critical value of 1.96. The null hypothesis was rejected; therefore there is significant difference in the mean performance or achievement score of male and female students in algebra.

3.8 Hypothesis Six

There is no significant difference in the mean achievement score of male and female students in number/numeration.

Table 12: t-test analysis of male and female students' achievement in number/numeration

Gender /Sex	Number	Mean (X)	SD	Df	t-Cal.	t-Crit.	Decision
Male	47	3.89	1.39	88	3.55	1.96	Rejected
Female	47	2.86	1.44				

Source: Field Survey, 2018

The result of t-test analysis in table 12 shows that, there was significant difference in the mean achievement score of male and female students in number/numeration. This is because the computed t-value of 3.55 is greater than the critical value (1.96). Hence, the null hypothesis is therefore rejected.

DISCUSSION

The findings of this study revealed that field independent students performed better than the field dependent students in geometry. Further analysis was carried out using the t test and the results show that there is significant difference in the mean achievement scores of field independent and field dependent students in geometry. The findings of this study corroborates with the findings of Awofala, Balogun and Olagunju (2012) and koleoso , Oyekan and Olabode (1988)who in their separate studies showed that field independent cognitive style students achieved betterthan the field dependent students in mathematics. But the findings of the study are in disagreement with the findings of Alomyan and Au (2004) who reported that they found no difference between students' attitudes towards web-based learning and their cognitive learning style.

The results of this study show that field independent students achieved higher than the field dependent students in algebra. There is significant difference in the mean achievement scores of field independent and field dependent students in algebra. The result of this study corresponds with the findings of Tinajero and Paramo (1997) who examined the relationship between field independent and field dependent cognitive style and academic achievement of students and reported that field independent boys and girls performed better than field dependent students in mathematics. The findings are also in line with the findings of Dwyer and Moore (1995) found that field independent learners to be superior to filed dependent learners' on test measuring different educational objectives and concluded that cognitive style had a significant association with students' academic achievements.

The findings of this study show that field independent students achieved higher than the field dependent students in number/numeration. There is no significant difference in the mean achievement scores of field independent and field dependent students in number/numeration. The findings of this study are not in line with the results of Bassey, Umoren and Udida (2011) who reported that there is a significant difference in students' academic performance in chemistry due to their cognitive styles, students with analytic cognitive style performed significantly higher than relational and inferential ones. Also the findings of this study corresponds with the findings of Day and Young (1997),Guisande, Pramo, Tinajero and Almeida (2007) who in their separate studies showed that field independent students performed better than field dependent students in technical courses and all tests except the digital forward test.

The results of this study show that male students achieved more than their female students in geometry. There is significant difference in the achievement mean score of male and female students in geometry. The likely cause of this finding could be that students see mathematics as a subject that can only be done by males. This is why Olaguaju (2001) hinted that boys choose sciencecourses in high schools than girls, especially mathematics, chemistry and physics. The result ofthis study disagrees to the findings of Jabor, Machtmes, Kingu and Bunat (2011) that show that female students had higher mathematics GPA scores than male counterparts and Etukudo (2002) who found that female students performed significantly higher than their male counterparts in mathematics.

Results from this study show that male students achieved more than their female counterpart students in algebra. Further analysis indicates a significant difference in the mean achievement score of male and female students in algebra. Therefore the achievement in favour of male students is significant. The result of this study corroborates with the findings of Etukudo(2002) and

Muthukrishna (2010) who reported significant differences in the performance of male and female students in quadratic.

Results from this study also show that the achievement of male and female students in number/numeration is similar or same. This means that there is no difference in the mean achievement scores of students due to gender in numeration. Whereas, t-test analysis has further shown that there is significant difference in the mean achievement scores of male and female students in number/numeration. However the results of the study agrees with the findings of Ezeameyi (2002) and Stockdale (1995) who revealed that male students benefited more than their female colleagues in mathematics achievement.

CONCLUSION

This study investigated the effect of cognitive learning style and gender on students' achievement in branches of mathematics, therefore the results of the study confirmed that:

1. Field independent students achieved more than the field dependent students in geometry. This explains that cognitive learning style have effect on students' achievement in geometry.
2. Field independent students had a higher mean achievement score in algebra than their counterpart field dependent students.
3. Field independent students obtained a higher achievement mean score when compare to the field dependent students.
4. Male students achieved more than the female students in geometry
5. Male students achieved more than their female counterparts students in algebra.
6. The achievement of male and female students in number/numeration is similar or the same. This means that there is no difference in the mean achievement scores of students due to gender in number.
7. There is significant difference in the mean achievement of field independent and field dependent students in geometry.
8. There is significant difference in the mean achievement score of field independent and field dependent students in algebra.
9. There is no significant difference in the mean achievement scores of field independent and field dependent students in number/numeration
10. There is significant difference in the mean achievement scores of male and female students in geometry
11. There is significant difference in the mean achievement scores of male and female students in algebra
12. There is significant difference in the mean achievement scores of male and female students in number/numeration

RECOMMENDATIONS

Based on the research findings, the following recommendations are made:

1 Teachers should always encourage peer teaching among the students. Field independent students should teach the field dependent students in areas or aspects where they encountered difficult in mathematics class.

2 Teachers should use instructional materials and techniques that are not gender sensitive. This will eradicate gender inequality in classroom and achievement, because the aim of teaching is to make

pupil learn or achieve higher not in favour of male or female.

3 Seminars, conferences and workshop should be organized at state levels, education zone and ministries of education levels where teachers, textbook authors and curriculum planners will be taught various ways of teaching mathematics so as to ensure achievement of students irrespective of gender or cognitive style in different branches of mathematics.

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