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- Creates, refines and disseminates knowledge;
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- Brings about new inventions that change the existing technology and approaches of doing things.
- It makes teaching/learning systematic, methodical, procedural and well-organised,
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It is, therefore, important that stakeholders in education offer their full commitment and to support research in education by way of financial support towards improved education delivery and accelerated national development.

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Path Analytic study of Gender, Mathematics Conception, Manipulative Skills, Learning readiness and Students' Achievement in Mathematics.

by

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Abstract

The world of science and technology will be without meaning in the absence of mathematics. Knowing the important roles knowledge of mathematics plays in the provision of amenities for human convenience, learning of the subject should attract attention of researchers. This study therefore intended to use five-variable models to explain students' achievement in mathematics. Fourteen senior secondary schools were randomly selected out of twenty-one public senior secondary schools in Ikorodu Local Government Area. Twenty-five Senior Secondary II students were randomly selected from each school to give a total sample of 350 students. Four major items were used to collect data for this study. They were: ***Student's Conception Scale*** *(Cronbach alpha reliability coefficient = 0.83);* ***Students' Readiness Scale*** *(cronbach alpha reliability coefficient = 0.86);* ***Manipulative Skills Test*** *(Spearman Brown reliability coefficient = 0.94) and* ***Mathematics Achievement Test*** *(Spearman Brown reliability coefficient = 0.71). The Results show that among the variables investigated, only Mathematics Learning readiness and manipulative skill had direct effects on Students' achievement in mathematics with (β=.654; $p<.05$) and (β=-.114; $p<.05$) respectively. There were however, indirect effects of both exogenous and endogenous variables on students' achievement in Mathematics. Based on the findings of this study, it is recommended that teachers should support their students in acquiring high manipulative skills which will support their learning readiness for mathematics and enhance their achievements in the subject.*

Background to the problem

The importance of mathematics in most fields of human endeavor cannot be underestimated more so in this technology age. Its usefulness in science, mathematical and technological activities as well as commerce, economics, education and even humanities is almost at par with the importance of education as a whole. Mathematics is one of the key subjects in both the primary and secondary school education system in Nigeria. Fajemidagba (1991) was earlier of the opinion that the teaching of mathematics is very important to all human existence.

Mathematics is all about finding solutions to human problems. All decisions taken are based on such questions as what and how questions are best answered by converting every statement to mathematical statement before solution is sought. The depth of mathematical knowledge an individual has dictates the level of accuracy of precision and decision. This implies the fact that, before an individual can function well in society, such a person must possess or have relatively good knowledge of mathematics especially in this era of technological age. Technological

development is highly rooted in the study of mathematics. Adeleke (2007) opined that Mathematics is a fundamental subject which plays a major role in understanding and applying concepts in the sciences as well as in grappling with, the complexities of modern technology useful to mankind.

Learning of mathematics and understanding variations existing in students achievement in mathematics should therefore attract attention of researchers when it comes to human capital development.

The Nigerian government recognizes the importance of mathematics in the educational progress and this is reflected in the National Policy on Education, (FRN, 2004). With this high premium placed on mathematics learning, the need to improve the quality of learning and performance in mathematics in the senior secondary school becomes an interesting subject of inquiry. The performance of students in both the internal and external examinations, most importantly the examination conducted by West African Examinations Council in the past and present are not so encouraging (WAEC Chief Examiners report 2003, 2004, 2008). This may be due to the fact that most students dislike mathematics. Students erroneously think that mathematics is too abstract, too far removed from practical life, and as such, it is better left to those cranks who have nothing better to do with their life (Abimbade, 1995). Students' conceptions vary, some conceive mathematics as being calculable and useful, and involving thinking while others see it other way round. (Frederick, 2001). In fact, some mathematics conceptions are actually more productive and effective than others in terms of measurable learning outcomes. (Gavin, & Gerrit, 2007).

The general conceptions determine the way students approach mathematics tasks, in many cases leading them into non-productive paths. In Awofala (2000), students were found to hold a strong procedural and rule oriented view of mathematics and to assume that mathematical questions should be quickly solved in just a few steps, the goal just being get "right answer". For them, their role is to receive mathematical knowledge and to ascertain that students acquired it. (Frank, 1988, cited in Leonor, 2007).

In addressing students performance in mathematics, their manipulative skills need to be put into consideration. A major goal of mathematics instruction is to develop students' analytical and logical skills in ways that can be generalized to other areas of life (Rachel, 2003). Manipulative skills which encompass reasoning and problem-solving are likely to vary positively with students' achievement in Mathematics. This skill will enable students to develop different thinking strategies, for solving mathematical problems (Mundeep, 2008)

Readiness of students to the learning of mathematics cannot just be over looked. Readiness plays a significant role in the way and manner students behave toward mathematics, which may at the same time affect their performance in mathematics. Darling-Hammond, (1997), cited in Tomlinson 2003, were of the opinion that students received instruction suited to their varied readiness levels, interest and learning preferences, thus enabling them to maximize the opportunity for growth. Following this submission, the place of readiness in the academic performance of students needed to be looked into so as to understand variation existing in students achievement in mathematics especially in secondary schools.

A characteristic difference is noticed from person to person as well as from group to group (Adeleke, 2007). This difference also seems to be noticed in the Mathematical performances among male than female students. Further research findings on gender driven variance, on students' cognitive achievement in mathematics have attracted the interest of many researchers and educators in recent times (McGinnis & Pearsall, 1998; Popoola, 2002; Kelly, 2003). In spite of the existence of many of such studies, more investigations are being undertaken in this area. This is because a definite and stable picture of gender variance in mathematics achievement is yet to emerge. Though Popoola (2002) concluded that there is no significant relationship between gender on achievement in mathematics yet this study investigated explanation that could be given to variation in students' achievement in mathematics due to their gender.

Based on the importance of the above discussed variables, this study therefore, attempted to understand variations existing in students' achievement in mathematics due to their gender, mathematics conception, manipulative skills, and their readiness to learn using path modeling approach.

1.1 Statement of the Problem.

The general achievement of students in mathematics nowadays is not encouraging. Available records from WAEC Chief Examiner reports of 2003, 2004 and 2008 indicate that students' performance in mathematics is falling. Researchers need to provide explanation on such fall in performance using essential variables that would make such explanation meaningful, hence the need for Path Analytic study of Gender, Mathematics Conception, Manipulative Skills, Learning readiness and Students' Achievement in Mathematics".

Purpose of the Study

Based on the above stated problems, this study therefore aimed at determining:
the relationship existing between the exogenous(Gender and mathematics conception), endogenous (Manipulative skills and Learning readiness) and criterion (Students achievement in Mathematics) variables in the path model the most meaningful causal model involving the exogenous, endogenous and criterion variables.

Research Questions

Based on the background, statement of the problem and purpose of study stated above, the following research questions were raised to direct the study:
How significantly related are the exogenous (gender and mathematics conception), endogenous (Manipulative skills and Learning readiness) and criterion (Students achievement in Mathematics) variables in the path model.

What is the most meaningful causal model involving the exogenous, endogenous and criterion variables.

Research Design

This study being an *ex-post facto* type of survey research adopted path analytic modeling.

Population of the study

The target populations for the purpose of this research included Senior Secondary Schools 2 students in public senior secondary schools in Ikorodu LGAS of Lagos State.

Sample and Sampling Technique

Simple random sampling technique was adopted in selecting Senior Secondary School II students for this research. Fourteen senior secondary schools from Ikorodu Local Government areas were selected out of twenty-one public senior secondary schools in the Local Government Area. This sample represents two-third of the entire senior public secondary schools in Ikorodu Local government area of Lagos State. Twenty-five students were selected from each school using random sampling to give a total sample of 350 students.

Instrumentation

The following research instruments were used to collect data for this study:

Student's Conception Scale (SCS): This scale contained 20 items that measured Students' conception of mathematics. The items were of likert type format with response range from very true of me to never true of me. The reliability of this SCS was determined by using 30 sample (Respondents), and that after the collation of the responses of the 30 respondents, Cronbach's alpha (ά) formula was used in the calculation of the reliability with the aid of SPSS Software. A reliability coefficient of 0.83 was obtained, which confirmed the instrument as being reliable for the study.

Students' Readiness Scale (SRS): This scale contained 20 items that measured Students' Readiness for mathematics. The items were of likert type format with response ranging from very true of me to never true of me. The reliability of this SRC was determined by using 30 sample (Respondents), and that after the collation of the responses of the 30 respondents, Cronbach's alpha (ά) formula was used in the calculation of the reliability with the aid of SPSS Software. A reliability coefficient of 0.86 was obtained, which confirmed the instrument as being reliable for the study.

Manipulative Skills Test: This scale was constructed by the researcher and later validated with use of Split-half method and later Spearman Brown formula was used and a reliability of 0.94 was obtained.

Mathematics Achievement Test: This scale is constructed by the researcher and later validated with use of Split-half method and later Spearman Brown formula was used and a reliability of 0.71 was obtained.

Method of data collection

The researcher used a research assistant who was adequately trained to collect the data.

Method of data Analysis

Pearson product moment Correlation Coefficient and Path analysis using three independent Regression Analyses were used in analyzing the data:

HYPOTHESISED RECURSIVE PATH MODEL

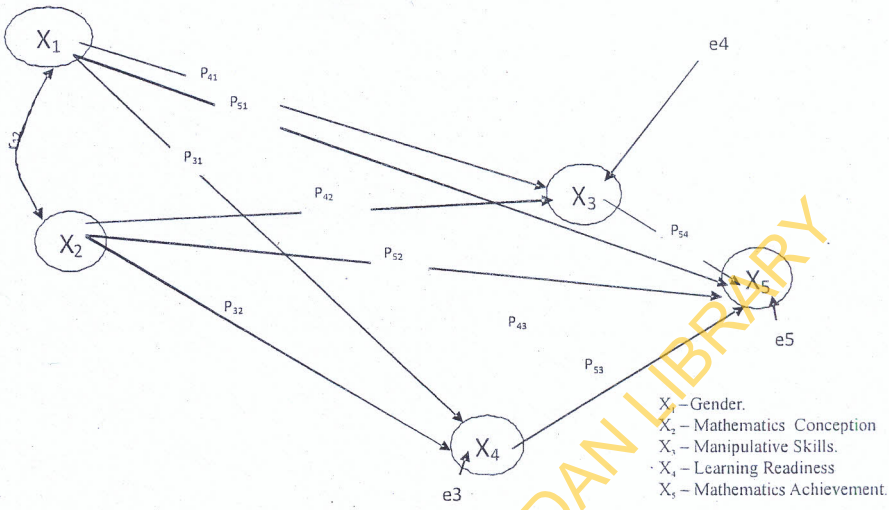

Fig1 – Recursive Path Model of Five Variables

Six structural equations labeled 1 to 3 were formed. Each equation corresponds to each dependent variable X_i (i= 5,6,7, and 8).

$$X_3 = P_{31}X_1 + P_{32}X_2 + e_5 \quad \ldots\ldots 1$$

$$X_4 = P_{41}X_1 + P_{42}X_2 + P_{43}X_3 + e_6 \quad \ldots\ldots 2$$

$$X_5 = P_{51}X_1 + P_{52}X_2 + P_{53}X_3 + P_{54}X_4 + e_7 \quad \ldots\ldots 3$$

Where X_1 - Gender
X_2 – Mathematics Conception
X_3 – Manipulative Skills
X_4 – Learning Readiness.
X_5 – Mathematics Achievement

The above equations therefore made it necessary to run three-regression analyses in order to compute values of the path coefficients for the hypothesized Model of Mathematics Achievement. The significance (at the pre-specified level of 0.05) of the path coefficients that were considered meaningful was the basis for trimming the paths of the hypothesized Model. The trimming helped the investigator to identify Meaningful paths needed to understand the variance existing in students' achievement in Mathematics.

three types of criteria may be used in path trimming that is statistical significance, or meaningfulness or both. In this study, for meaningfulness, the absolute value of a path coefficient was taken to be at least 0.05 as recommended by Land (1969) cited by Adeleke (2007). For the significance criterion, the choice of the investigator was at 0.05. These two

criteria were applied to avoid the uncomfortable situation where some minute path coefficients were found to be significant because the analysis was based on fairly large sample (Kerlinger and Pedhazur, 1973) cited in (Utoh 2006). Based on the two criteria selected, for this study, the term "Significance" Therefore connoted Statistical Significance as well as meaningfulness. The paths found not to be significant or meaningful were dropped. Those units found to be significant causal factors were retained as the identified meaningful paths.

Results

Research Question One

A relationship existed between the exogenous (gender and mathematics conception), endogenous (Manipulative skills and Learning readiness) and criterion (Students achievement in Mathematics) variables in the path model.

Table 1: Correlations Among exogenous, endogenous and criterion Variables

		gender	Mathematics Conception	Manipulative Skill		Mathematics Achievement Score
gender	Pearson Correlation	1	-.176(**)	-.153(**)	-.106(*)	-0.046
	Sig. (2-tailed)		0.001	0.004	0.047	0.388
	N	350	350	350	350	350
Mathematics Conception	Pearson Correlation	-.176(**)	1	.505(**)	.637(**)	.297(**)
	Sig. (2-tailed)	0.001		.000	.000	.000
	N	350	350	350	350	350
Manipulative Skill	Pearson Correlation	-.153(**)	.505(**)	1	.508(**)	.613(**)
	Sig. (2-tailed)	0.004	.000		.000	.000
	N	350	350	350	350	350
Mathematics Learning Readiness	Pearson Correlation	-.106(*)	.637(**)	.508(**)	1	.244(**)
	Sig. (2-tailed)	0.047	.000	.000		.000
	N	350	350	350	350	350
Mathematics Achievement Score	Pearson Correlation	-0.046	.297(**)	.613(**)	.244(**)	1
	Sig. (2-tailed)	0.388	.000	.000	.000	
	N	350	350	350	350	350

****Correlation is significant at the 0.01 level (2-tailed).**
***Correlation is significant at the 0.05 level (2-tailed).**

Table 1 shows that apart from gender (-0.046; P>.05), Mathematics conception(r=.297; P<.05), manipulative skills(r=.613; P<.05) and Learning readiness(r=.244; P<.05) are significantly and positively related to students' achievement in mathematics.

Research Question Two

i. What is the most meaningful causal model involving the exogenous, endogenous and criterion variables?

The hypothesized Causal Model of the Five-Variable System Showing Path and Zero Order Correlation Coefficients

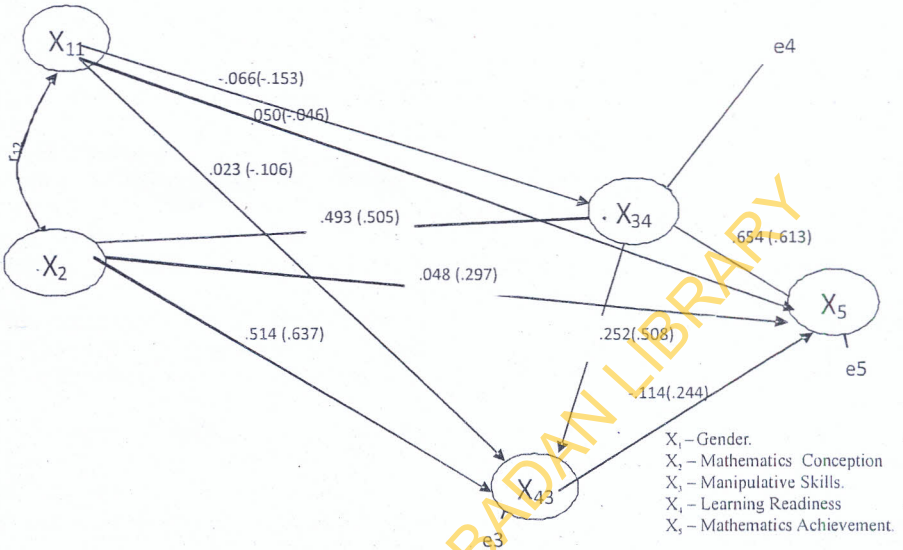

Fig2 – Recursive Path Model of Eight Variables

The Trimmed Causal Model of the Five-Variable System Showing Path and Zero Order Correlation Coefficients

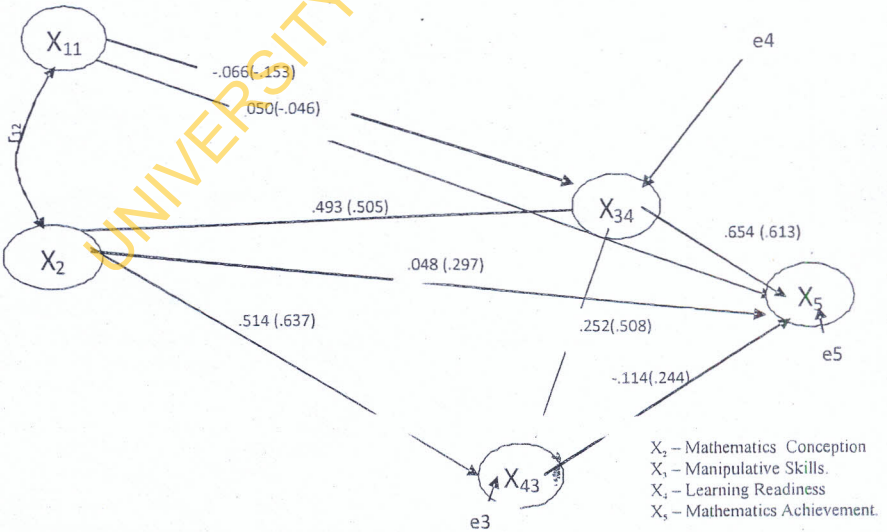

Fig3 – Recursive Path Model of Five Variables

Fig 2 shows the values of all the hypothesized path coefficients with their corresponding Zero order correlation coefficients. Both values were used to determine whether a path is significant or not. Any path coefficient (P_{ji}) found to be meaningful (greater than or equal to 0.05) with its corresponding zero order correlation coefficient (r_{ij}) being significant at 0.05 was retained. Only P_{41} were found not to be significant. The hypothesized causal model of the Five-variable system showing path and Zero order correlation coefficients is presented on the fig1. The hypothesized model shown in figure 1 is reproduced as figure 2 with the path and zero order correlation coefficients written on each path way (the correlation coefficient in parenthesis). In trimming the paths in the model, paths were considered significant at 0.05 alpha level and considered meaningful if the absolute value of the path coefficient is at least 0.05 as recommended by Land(1969). Based on these criteria the new path model (figure 3) is obtained. Eight out of nine hypothesized paths survived the trimming exercise. The survived paths are presented in figure 3. Conclusion can be drawn through the model that gender, mathematics conception, manipulative skills and learning readiness formed a meaningful causal model that can be used to explain variance in academic achievement of senior secondary students.

Discussion

The results revealed that there is positive relationship between students' conception of mathematics and their achievement. The responses of the students to the items in MCS, show that the conception of students about mathematics determines their performance in mathematics. It was observed that those that had positive conception about mathematics actually performed better. This was a strong indication that whatever the conception of students about mathematics determines overall performance. This corroborates the finding of Anthony 2000 that conception of mathematics has overall effects on the performance of students in mathematics.

The results also indicated that there was significant relationship between manipulative skills and mathematics achievement. The results pointed out that students' performance in mathematics would be totally affected if students did not have good manipulative skills. It can then be deduced from the findings that if any student does not possess sufficient manipulative skills, such student may not be able to solve sufficient mathematics problems. This finding was in line with the WAEC Chief Examiner Report (2003, 2004, 2005, and 2006) that consistently reported that candidate lack skills in answering almost all the questions asked in general mathematics.

Learning readiness and mathematics achievement were found to be significantly related. This indicates that the level of readiness to learn mathematics on the part of students determine the level of performance of students in the subject. Gender is found in this study not to be significantly related to cognitive achievement. There was a claim that secondary school male students perform better than female in mathematics (Baron- Cohen, 2003; Casey, Nuttal, Pezaris, and Bembow, 1995; Geary, 1998; Kimura, 1999). Some other researchers in this area claim equality in performance among male and female students in mathematics (Halpern. Wai. [illegible] the study by Adeleke, (2007) favoured female students in cognitive achievement in mathematics where female students achieved significantly better than male students. This suggests that the stable position on gender variation in mathematics achievement is yet to be reached.

Conclusion

Emphasis on varied teaching pedagogy as solution to students' learning deficiency in Mathematics needs to be redirected. Efforts need to be directed toward motivating students to have openness to mathematics being an important subject for career development. Manipulative skills of the learners if improved by engaging learners in learning supportive activities such as project work will definitely lead to better achievement in mathematics.

Recommendations

Based on the findings of this study, a number of recommendations are made in this study. One, it is recommended, among others, that mathematics teachers should make efforts to get students ready for lessons in mathematics. This is because readiness has been found to be one of the variables that play important roles in promoting the leaning of mathematics in schools.

Two, mathematics teachers should encourage mathematics students to acquire and develop manipulative skills to facilitate their leaning of mathematics. A well-developed manipulative skill will go a long way in enhancing students' performance in the subject.

Three, adequate opportunities should be given to teachers and students to apply their manipulative skills in the teaching and learning of mathematics because such skills will help teachers to present their subject matter well and also help students to demonstrate the knowledge they have acquire in the process of teaching and learning.

Finally, textbook writers and curriculum developers should give room for the application of readiness and manipulative skills in the curriculum of mathematics. This will make it possible for teachers to compulsorily give room for the application of the skills.

References

Abimbade, A. (1995). Mathematics methodology II, unpublished Lecture Notes. Department of Teacher Education, University of Ibadan, Ibadan.

Adeleke, J. O. (2007). Identification and effect of cognitive entry characteristics on students' learning outcomes in bearing in Mathematics, unpublished PhD Thesis University of Ibadan.

Awofala, A. A. (2000). Status of Mathematics in secondary schools, unpublished PhD Thesis, University of Ibadan.

Darling-Hammond, L. (1997). The right to learn: a blueprint for creating schools that work. San Francisco: Jossey Bass and Motivation. Child Development 66(1): 209–223.

Fajemidagba, O. (1991). School mathematics and mass education in Nigeria: the result of an exploratory study. In S. O. Ayodele (ed.), Education in the Service of Humanity.

Frank, E. (1988). Gender and perceived self-efficacy in self-regulated learning. Theory with practice.

canonical commonality analysis. In B. Thompson (ed.), *Advances in social sciences methodology* (Vol. 5, pp. 305-318). Stamford, CT: JAI Press.

Garvin, T. L. & Gerrit, H. F. (2007). Student's conceptions of assessment and mathematics; self-regulations raises achievement, Journal of Education and Development Psychology, Vol. 17.

Kelly, D. B. (2003). The development of mathematics achievement in secondary schools, individual differences and school effects.

Leonor, M. (2007). Conceptions of students in mathematics. University Press.

Mc Ginnis, J. R. & Pearsall, M. (1998). Teaching elementary science methods to women: a male professor's experience from two perspectives. *Journal of Research in Science Teaching* 35. 919 – 949.

Mundeep, G. (2008). Issues with teaching mathematics to none mathematician.

Popoola, A. A. (2002). Effects of heuristic problem-solving and programme instructional strategies on senior secondary school student learning outcomes in Mathematics in Ekiti State, Nigeria, unpublished PhD, Thesis, University of Ibadan. 115 – 123.

Rachel, S. (2003). Effective teaching of high school mathematics. University press

Tomlinson, C. A. (2003). Deciding to teach them all. Educational Leadership, 61(2), 6-11.

West African Examinations Council (WAEC) Chief Examiners' Reports (2002, 2003, 2004, 2005, & 2006).