PREVIOUS EXPERIENCE, LEARNING ENVIRONMENT AND ANXIETY AS PREDICTORS OF ATTITUDE TOWARDS BUSINESS MATHEMATICS IN COLLEGES OF EDUCATION IN LAGOS STATE

Oluwakemi ALADENUSI, Ph.D.
Department of Educational Psychology
Federal College of Education (Technical) Akoka, Lagos-State.
E-mail: kemab2004@yahoo.com
Phone: +2348033355525

Abstract
Despite the importance of Mathematics to personal and professional endeavours of individual, experiences of learners, their environment and anxiety towards mathematics may have affected their attitude towards learning business mathematics. Thus, this study appraises previous experiences, learning environment and anxiety as predictors of attitude towards learning Business Mathematics among students in colleges of education in Lagos State. A survey research design was adopted. The population of the study comprised students who had taken Business Mathematics in the three public institutions in Lagos State with 311 respondents selected through proportionate sampling as sample. Four hypotheseswere tested at 0.05 level of significance. Business Mathematics Attitudinal Questionnaire (BMAQ) was used to collect relevant data and the data collected were analyzed using Pearson Product Moment Correlation Coefficient and Multiple Regression Analysis. The study revealed that previous experience and learning environment had positive relationships with attitude towards Business Mathematics while anxiety related negatively with attitude towards Business Mathematics. Besides, previous experience and anxiety were observed to jointly predict learners' attitude towards Business Mathematics while learning environment was observed to be insignificant. It was recommended that adequate measures while teaching Mathematics at pre-tertiary institutions should be taken to avoid negative experience and anxiety among students.

Keywords: Previous Experience, Learning Environment, Anxiety, Business Mathematics, Colleges of Education

Introduction

Mathematics plays a noteworthy role in the understanding of several disciplines as well as day to day individual's activities. Besides, Mathematics also plays a significant role in the scientific and technological development of countries. Consequently, Mathematics is taken as a key subject in school curriculum with the aim of exposing learners with the required knowledge and skills that are essential for their daily activities, engaging in business, future profession and promoting scientific and technological development (Aladenusi, 2019; Mazana, Montero&Casmir, 2019;Alade &Kuku, 2017).

In the educational system in Nigeria, Mathematics is one of the mandatory subjects for learners from preprimary, primary, secondary and to some extent tertiary institutions. However, the focus will be on the learning experience in secondary schools. Despite the importance of Mathematics as reflected by its inclusion as a compulsory subject up to senior secondary school education, the

51

OLUWAKEMI ALADENUSI,

PREVIOUS EXPERIENCE, LEARNING ENVIRONMENT AND ANXIETY AS PREDICTORS OF ATTITUDE TOWARDS BUSINESS
MATHEMATICS IN COLLEGES OF EDUCATION IN LAGOS STATE

52

achievement of learners had been relatively low (Alade, Kuku & Folorunsho, 2020; Kuku, 2019) and has been a cause for concerns to stakeholders. This continued trend of low achievement in Mathematics has led to the fears of the ability of the educational system to produce graduates who will fit into the society as well as seeking admission for higher studies. Moreso, the ability of these learners to take upthe challenge of achieving the scientific and technological progress of the nation is underthreat should the trend continue. The continued trend of low achievement in Mathematics may have prompted an appraisal on factors that could have influenced learners' achievement in the subject.

Previous studies had shown that low achievement in Mathematics may be as a result of cross-factors related to learners, teachers and schools (Mazana, Montero&Casmir, 2019; Yang, 2013). Attitude is one of the learners' related factor, which is a psychological construct that affects learner's achievement particularly in Mathematics. Attitude is defined as a learned disposition or tendency on the part of an individual to respond positively or negatively to some object, situation, concept or another person (Aiken, 1970, as cited in Recber, Isiksal& Koç, 2018).Zimbardo and Leippe (1991) describes attitude as an evaluative disposition towards some object based upon cognitions, affective reactions, behavioural intentions and past behaviour which influence cognitions, affective responses and future intentions and behaviours (as cited in Vandecandelaere, et al., 2012). While the definition shows the affective responses and cognitions intentions, the affective dimensions involves the learner's subjective evaluation of a situation, object or persons, the extent to which the learner likes it and the learner's emotional response to it. The affective dimensions would induce individual to react in certain ways to events or observation. Learners' perception and involvement in activities has been observed to likely influence their emotions, feelings and self-beliefs toward such activities. Consequently, Recber, Isiksal and Koç (2018) educating learners with strong self-beliefs in Mathematics and positive attitudes towards Mathematics should be the overarchingaim of all educators. Some of the events that could induce attitude to Mathematics include previous experience, learning environment and anxiety.

Attitude are an indication of how well the environment around learners, that is the school, home and society has shaped the way learners think and feel about Mathematics (Korbel, 2015). The researcher conceived that attitude as the product of three sub-domains namely: instrumental motivation, self-concept and intrinsic motivation. Consequently, the three outcomes of literacy, attitude and intention are interrelated and they are also shaped by the environment around the learners which can be shaped by experiences learners have of Mathematics in classes during schooling, at home and the society at large. Besides, the observation of Chui (2016) while investigating prior knowledge and instructional visual aidon different Mathematical order thinking skills of remembering, understanding and analyzingin multimedia learning was that the stronger group learned better onremembering while the weaker group benefited from the aid on understanding, thought the aid wasmore beneficial on analyzing. In addition, Hailikari(2009)

explored the interactions between academic self-beliefs, prior knowledge and student achievement in Mathematics and found out that prior knowledge was more predictive of learners' achievement than self-beliefs. It could be observed that previous knowledge of learners could have had significant effect on learners' attitude towards Mathematics.This brings to question how business students' previous or prior experience in Mathematics has contributed to their attitude towards business Mathematics that employs Mathematics in the solving business challenges.

Learners' learning environment is another variable that was observed to influence the attitude of learners towards Mathematics and probably by extension Business Mathematics. Students' learning of and performance in mathematics is affected by a number of factors, including students' attitude towards the subject, teachers' instructional practices, and school environment (Mazana, Montero&Casmir, 2019). A supportive and classroom instruction was reported by Davadas and Lay (2018) to predict learners' attitude towards Mathematics when compared with parental influences. In addition, Vandecandelaere, et al. (2012) observed that learningenvironment significantly determines the level at which Mathematics is enjoyed among eight grade students in Belgium. Besides, Kuku and Oladesu (2019);Aladenusi (2019) and Siebers (2015) reported that learners who experience high Mathematics anxiety tend to have low achievement and findings a recipe to overcoming Mathematics anxiety will improve learners' achievement in Mathematics. However, this study aims at identifying the single and joint relation of anxiety and learners' attitude towards Mathematics.

From the foregoing, the beliefs about Mathematics and attitudes towards Mathematics may significantly determine the amount and nature of Mathematics a learner will be disposed to in future. Such initial experience could determine their emotions, feelings and attitude towards Mathematics and Mathematics related field such as Business Mathematics which is the focus of the study. The learners' previous experience, learning environment and anxiety level could either push them towards or further away from their careers that require even moderate level Mathematics in Business Mathematics.

Research Hypotheses

The following hypotheses were tested with the data collected at 0.05 level of significance,

1. Previous experience does not significantly relate to attitude towards Business Mathematics.
2. There is no significant relationship between learning environment and attitude towards Business Mathematics.
3. Anxiety does not significantly relate with attitude towards Business Mathematics.
4. Previous experience, learning environment and anxiety do not significantly jointly predict attitude towards Business Mathematics.

Methodology

The study adopted a descriptive survey research design. The study seeks to determine the

53

OLUWAKEMI ALADENUSI,

PREVIOUS EXPERIENCE, LEARNING ENVIRONMENT AND ANXIETY AS PREDICTORS OF ATTITUDE TOWARDS BUSINESS
MATHEMATICS IN COLLEGES OF EDUCATION IN LAGOS STATE

54

relationship existing between previous experience, learning environment, anxiety and attitude towards Business Mathematics among students in colleges of education in Lagos State. The population of the study comprised all the full-time students who had taken Business Mathematics in the Colleges of Education in Lagos State. There are three public Colleges of Education in Lagos State. They include; Adeniran Ogunsanya College of Education, Otto/Ijanikin, Federal College of Education (Tech), Akoka and Michael Otedola College of Primary Education, Epe. The population was 1086 full time undergraduate across the three institutions. The sample for the study was 311 students. Proportionate to size sampling technique was used to select participants for the study. The distribution of the participants across the institution is displayed in Table 1.

Table 1: Distribution of Participants across the three Colleges of Education in Lagos State

Colleges of Education	Population	Proportionate to Size
A	350	100
B	380	109
C	356	102
Total	1086	311

A researcher developed instrument titled Business Mathematics Attitudinal Questionnaire (BMAQ) was used to collect the needed data. The BMAQ had five sub-sections. The first section was used to collect the personal information of the participants and it contains information such as institution, gender and level. The other four sections were used to collect information on previous experience, learning environment, anxiety and attitude towards Mathematics. The previous knowledge contained eight statements while learning environment had 10 statements. Anxiety and attitude towards Mathematics had eight and 10 statements respectively. The likert-type rating scale was used to rate the responses of the participants. It had four rates namely, Strongly Agreed (as SA), Agreed (as A), Disagreed (as D) and Strongly Disagreed (as SD). The BMAQ was content validated by colleagues in the field of Measurement and Evaluation, Department of Educational Psychology, Federal College of Education (Tech), Akoka. In addition, a study was conducted with 30 participants in a private College of Education in Lagos State to test the reliability of the BMAQ. The BMAQ was conducted twice with an interval of 2 weeks. The reliability coefficient of 0.71 was derived using test retest reliability coefficient.

The BMAQ was administered by the researchers with the help of two research assistants who were trained for the administration, collation and scoring of the instrument. The BMAQ were administered and collected on the spot. The scores collated from the PDQ were analysed using Pearson Product Moment Correlation Coefficient (PPMC) and Multiple Regression Analysis. The Statistical Package for Social Sciences (SPSS) was the computer application used to aid the analysis. The hypotheses were tested at 0.05 level of significance.

Results

Table 2

Correlation Matrix

		Attitude towards Business Mathematics	Previous Experience	Learning Environment	Anxiety
Pearson Correlation	Attitude towards Business Mathematics	1	-0.018	0.156	-0.035
	Previous Experience	-0.018	1	0.028	0.119
	Learning Environment	0.156	0.028	1	-0.092
	Anxiety	-0.035	0.119	-0.092	1
Sig. (1-tailed)	Attitude towards Business Mathematics		0.375	0.003	0.272
	Previous Experience	0.375		0.309	0.018
	Learning Environment	0.003	0.309		0.052
	Anxiety	0.272	0.018	0.052	
N	Attitude towards Business Mathematics	311	311	311	311
	Previous Experience	311	311	311	311
	Learning Environment	311	311	311	311
	Anxiety	311	311	311	311

Hypothesis One: Previous experience does not significantly relate to attitude towards Business Mathematics.

Table 2 shows the descriptive and inferential statistics of variables previous knowledge and attitude towards Business Mathematics. A correlation coefficient of -0.018 was derived as a relationship between previous knowledge and attitude towards Business Mathematics. This shows a negative relationship, which means that students'previous knowledgevaries inversely when related with their attitude towards Business Mathematics.In addition, the correlation coefficient of $p = 0.375$was found to be insignificant since it is greater than $p = 0.05$. As a result, the null hypothesis was retained and it was concluded that previous experience does not significantly relate to attitude towards Business Mathematics.

Hypothesis Two: There is no significant relationship between learning environment and attitude towards Business Mathematics.

Table 2 shows that descriptive and inferential statistics of the variables learning environment and attitude towards Business Mathematics. A correlation coefficient of 0.156 was observed as the relationship between learning environment and attitude towards Business Mathematics. A correlation coefficient of 0.156 shows a direct or positive relationship between learning environment and attitude towards Business Mathematics. This means that as learning environment positively relate with or increases learners' attitude towards Business Mathematics. To determine the significance of the $p = 0.003$was found to be less than $p = 0.05$. As a result, the null hypothesis

was rejected and it was concluded that there is significant relationship between learning environment and attitude towards Business Mathematics.

Hypothesis Three: Anxiety does not significantly relate with attitude towards Business Mathematics.

Table 2 shows the descriptive and inferential statistics of variables anxiety and attitude towards Business Mathematics. A correlation coefficient of -0.035 was derived as a relationship between anxiety and attitude towards Business Mathematics. This shows a negative relationship, which means that as anxiety increases, attitude towards Business Mathematics decreases. Conversely, as anxiety decreases, attitude towards Business Mathematics increases. Besides, the correlation coefficient of p = 0.272was found to be insignificant since it is greater than p = 0.05. Consequently, the null hypothesis was retained and it was concluded that anxiety does not significantly relate with attitude towards Business Mathematics.

Hypothesis Four: Previous experience, learning environment and anxiety do not significantly jointly predict attitude towards Business Mathematics.

Table 3

Model Summary on Attitude towards Business Mathematics

Model	R	R Square	Adjusted R Square
1	.159[a]	.025	.016

a. Predictors: (Constant), Anxiety, Learning Environment, Previous Experience

Observation from Table 3 shows that the quality of prediction of the students' attitude towards Business Mathematics as represented by R value is 15.9%. In addition, the coefficient of determination which shows the proportion of the variance of Social Competence (i.e. dependent variable) as is explained by previous knowledge, learning environment and anxiety (i.e. the independent variables) is 2.5%.

Table 4

ANOVA on Attitude towards Business Mathematics

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	292.912	3	97.637	2.653	.049[b]
	Residual	11297.525	307	36.800		
	Total	11590.437	310			

a. Dependent Variable: Attitude towards Business Mathematics

b. Predictors: (Constant), Anxiety, Learning Environment, Previous Experience

Table 4 shows that F-calculated value of 2.65 was derived as the overall regression model. The calculated value was observed to be greater than the critical value of 3 and 307 degrees of freedom at 0.05 level of significance. Thus, the null hypothesis was rejected and it was concluded that previous experience, learning environment and anxiety do significantly jointly predict attitude towards Business Mathematics.

Table 5

Coefficient Analysis on Attitude towards Business Mathematics

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	25.451	4.592		5.542	.000
	Previous Experience	-.038	.107	-.020	-.359	.720
	Learning Environment	.265	.097	.155	2.742	.006
	Anxiety	-.034	.108	-.018	-.313	.755

a. Dependent Variable: Attitude towards Business Mathematics

Evidence from Table 5 shows that students' attitude towards Business Mathematics negatively varies relatively with previous knowledge (-0.038) and anxiety (-0.034). However, a positive relationship existed between students' attitude towards Business Mathematics and learning environment (0.265). Besides, learning environment (0.006) was found to be significant when related with students' attitude towards Business Mathematics.

Discussion of Findings

The study revealed an inverse relationship between previous experience and learners' attitude towards business mathematics. This may be as a result of the students experiencing different practice of teaching when compared with their primary and junior schools where all learners offer the same quantity and types of subjects. Besides, the relationship existing between the two variables were found to be insignificant. This finding aligns with the observation of Korbel (2015) who observed the importance of learners' background to Mathematical literacy. Besides, Rittle-Johnson, Star and Durkin (2009) during their study of the importance of prior knowledge when comparing examples and its influences on conceptual and procedural knowledge of equation solving, reported that learners need sufficient prior knowledge in a domain before they can benefit from comparing alternative solution methods.In addition, Bringula,Basa, Cruz and Rodrigo(2015) conducted an experimental study on learner-interface interactions in a learning-by-teaching intelligent tutoring system. The researcher concluded that learners may demonstrate or omit a skill, depending on their prior knowledge on identifying the terms of equations and the next step in solving equations.Hailikari (2009) also reported that prior knowledge was more predictive of student achievement than were othervariables (such as self-beliefs)during the assessment of University

57

OLUWAKEMI ALADENUSI,

PREVIOUS EXPERIENCE, LEARNING ENVIRONMENT AND ANXIETY AS PREDICTORS OF ATTITUDE TOWARDS BUSINESS
MATHEMATICS IN COLLEGES OF EDUCATION IN LAGOS STATE

58

students' prior knowledge. However, the researcher observed a strongcorrelation between academic self-beliefs and prior knowledge performance.

As regard the relationship between learning environment and attitude of learners towards Business Mathematics, the study found out that as learners' impression of the learning environment directly relates with their attitude towards learning Business Mathematics. The classroom environment/setting, seating arrangement, teachers' activities during lectures were all observed to affect the attitude of learners during Business Mathematics. This observation aligns with the finding of Davadas and Lay (2018) during their study of factors affecting students' attitude toward Mathematics. The researchers observed that teacher affective support and classroom instruction predict attitude towards Mathematics more than parental influences.In a different dimension, Vandecandelaere, et al. (2012) investigated the association between students' perception of the learning environment andthree aspects of their Mathematics attitude, which are 'Mathematics academic self-concept', 'enjoyment ofMathematics' and 'perceived value of Mathematics' using multilevel analysis on a sample of 4354eighth grade students in 228 classes in 119 schools in Flanders (Belgium). The outcome of the study indicated that the learningenvironment plays a significant role in the enjoyment of Mathematics. This while, the Mathematicsacademic self-concept and the perceived value of Mathematics are insensitive for aspects in the learningenvironment.

Anxiety was observed to vary inversely with the learners' attitude towards Business Mathematics. This attest to the feelings of learners during Mathematics exercises as not aiding the achievement in Mathematics. Though, when tested statistically, anxiety does not have a noteworthy effect on achievement. This varies with the findings of Kuku and Oladesu (2019); Aladenusi (2019) and Siebers (2015) during their separate studies on relationship between Mathematics and Anxiety. Siebers (2015) observed that learners with high Mathematics anxiety tend to have low achievement in Mathematics during a study of the relationship between math anxiety and student achievement of Middle school students. Kuku and Oladesu (2019) in their experimental study of controlling anxiety towards Mathematics reported that frequently testing learner in Mathematics will moderate anxiety in learners and improve achievement in Mathematics.

Previous experience, learning environment and anxiety were found to significantly jointly predict attitude towards Business Mathematics. While students' attitude towards Business Mathematics negatively varies relatively with previous knowledge and anxiety; a positive relationship was observed between students' attitude towards Business Mathematics and learning environment. The learners in Business Mathematics may have been taught using methods that emphasizes Mathematics concepts being employed to solve business challenges and the teacher may have

allayed their previous notions about Mathematics. However, of the three variables, namely, previous experience, learning environment and anxiety, it was only learners' learning environment that was observed to significantly relate with students' attitude towards Business Mathematics. This finding is in tandem with the report of Mazana, Montero and Casmir (2019) that observed that the factorsinfluencing the students' liking or disliking of Mathematics constituted student's aptitudeattribute, instructional and social psychological environmental factors such as teacher didactic strategies, institutionalresources. Also, Vandecandelaere, et al. (2012) reported that learning environment plays a significant role in the enjoyment of Mathematics during their multilevel analysis on a sample of 4354eighth grade students in 228 classes in 119 schools in Flanders (Belgium). In addition, Davadas and Lay (2018) in their study of the factors affecting students' attitude towards Mathematics found out that teacher affective support andclassroom instruction were better predictors of learners' attitude towards Mathematics more than parentalinfluences.

Conclusion

In the course to seek the predictors of colleges of education students' attitude towards Business Mathematics, the study focused on previous experience, anxiety and learning environment. It was observed that each of previous experience of learners with Mathematics during their pre-tertiary education and anxiety varies negatively with their attitude towards Business Mathematics. However, these relationships were observed to be insignificant. The study noted that learning environment and attitude of learners towards Business Mathematics were directly significant. Besides, the study observed that these predictors (that is, previous experience, anxiety and learning environment) jointly predicted students' attitude in Business Mathematics. Learning environment was the only independent variable that significantly predicted the attitude of students towards Business Mathematics.

Recommendations

Following the findings from this study, it is recommended that learner-centered approach/teaching and activities such as group work, creative activities, and business project involving Mathematical manipulation as well as frequent testing during lectures should be encouraged. This will help moderate the anxiety and their perception about learning Mathematics and its application in business as well as promote attitude towards learning Mathematics. Also, adequate provision should be made in teaching Mathematics at pre-tertiary institutions in adopting methods that will promote the interest and attitude of learners. Through, regular continuous professional development exercise for teachers at primary and secondary schools with the aim of improving their knowledge of teaching and relating Mathematical concept to learners immediate as well as day to day activities. This will aid the acquisition of new experiences in the learners' future educational endeavors.

References

Alade, O. M., & Kuku, O. O. (2017). Impact of frequency of testing on study habit and achievement in mathematics among secondary school students in Ogun State, Nigeria. *Journal of Educational Research and Practice, 7*(1), 1-18.

Alade, O. M., Kuku, O. O., & Folorunsho, O. A. (2020). Impact of computer application package on achievement in mathematics among secondary school students in Education District I, Lagos State, Nigeria. *International Journal for Innovative Technology Integration in Educational (IJITIE), 4*(1), 26-34.

Aladenusi, O (2019). *Mode of Item Delivery, Test Item Response Types and Level of Test Anxiety as Factors in Score Validity and Reliability*. Doctoral Thesis, Olabisi Onabanjo University, Ago-Iwoye, Ogun State, Nigeria.

Bringula, R. P., Basa, R. S., Cruz, C. D., &Rodrigo, M. T. (2015). Effects of prior knowledge in mathematics on learner-interface interactions in a learning-by-teaching intelligent tutoring system. *Journal of Educational Computing, 54*(4), https://doi.org/10.1177/0735633115622213

Chiu, T. K. F. (2016). *Prior Knowledge and Mathematics Different Order Thinking Skills in Multimedia Learning.* Retrieved from https://www.researchgate.net/publication/297736781

Davadas, S. D., & Lay, Y. F. (2018). Factors Affecting Students' Attitude toward Mathematics: A Structural Equation Modeling Approach. *EURASIA Journal of Mathematics, Science and Technology Education, 14*(1), 517-529. DOI: 10.12973/ejmste/80356

Hailikari, T. (2009). *Assessing university students' prior knowledge: Implications for theory and practice*. Doctoral Thesis, Department of Education, University of Helsinki.

Korbel, P. (2015). *Students' experience of mathematics and how they affect further engagement with mathematics*. Doctoral Thesis, School of Mathematical Science, Faculty of Engineering, Mathematical and Computer Sciences, University of Adelaide

Kuku, O. O. (2019). Effectiveness of frequency of testing on students' study habits in mathematics among senior secondary school students in Ogun State, Nigeria. *UNILAG Journal of Humanities, 7*(2), 179-192.

Kuku, O. O., & Oladesu, E. O. (2019). Effectiveness of frequency of testing on anxiety towards mathematics among secondary school students in Ogun State, Nigeria. *Nigerian Journal of Educational Research & Evaluation, 18*(1), 23-24.

Mazana, M. Y., Montero, C. S., &Casmir, R. O. (2019). Investigating Students' Attitude towards Learning Mathematics. *International Electronic Journal of Mathematics Education, 14*(1), 207-231. https://doi.org/10.29333/iejme/3997

Recber, S., Isiksal, M., & Koç, Y. (2018). Investigating self-efficacy, anxiety, attitudes and mathematics achievement regarding gender and school type. *Anales De Psicología, 34*(1), 41-51 http://dx.doi.org/10.6018/analesps.34.1.229571

Rittle-Johnson, B., Star, J. R., & Durkin, K. (2009). The importance of prior knowledge when comparing examples: Influences on conceptual and procedural knowledge of equation solving. *Journal of Educational Psychology, 101*(4), 836-852.

Siebers, W. M. (2015). *The relationship between math anxiety and student achievement of Middle school students*. Doctoral Thesis, School of Education, Colorado State University, Fort Collins, Colorado

Vandecandelaere, M., Speybroeck, S., Vanlaar, G., De Fraine, B., &Van Damme, J. (2012). Learning environment and students' mathematics attitude. *Studies in Educational Evaluation, 38*, 107–120.

Yang, X. (2013). Senior secondary students' perceptions of mathematics classroom learning environmentsin China and their attitudes towards mathematics. *The Mathematics Educator, 15*(1), 66-80.

Zimbardo, P. G., & Leippe, M. R. (1991). *The psychology of attitude change and social influence*. McGraw-Hill.