Relationship between Expectation, Enjoyment, Satisfaction, Usefulness and Intention of Learning Mathematics among Students in Colleges of Education, Northwest State, Nigeria

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Abstract
The low desire of students in Nigeria to accept mathematics as a course of study at tertiary institutions of learning become an issue that requires urgent attention of stake holder in education sector. Based on the Expectation Confirmation Model (ECM), the study examined the effect of the ECM constructs and perceived enjoyment on continuance intention of learning mathematics. A questionnaire tagged Mathematics Learning Intention (MLI) was adapted from previously validated instruments for identifying factors that influence colleges of education (COE) mathematics students' continuance intention of studying mathematics. Cronbach alpha reliability coefficient of 0.813 was obtained. Three hundred and sixty six (366) final year mathematics students of COE in the northwest zone in Nigeria were selected from 2761using Cochran formula but 339 have fully completed and returned the questionnaire. Data were collected through visit to all COEs by the researchers, and Structural Equation Modelling Partial Least Square (SEM-PLS) method was employed for data analysis. The findings revealed that the most important factor of the COE mathematics students' continuance intention is the believed of the usefulness of learning mathematics to their daily lives' activities. Satisfaction, confirmation of expectation and perceived enjoyment in learning mathematics also influence students' intention to continue studying mathematics.

Keywords: Mathematics, Colleges of Education, Expectation Confirmation Model, Continuance Intention, Partial Least Square (PLS).

Introduction

Mathematics learning is a continue process throughout one's life from childhood to adulthood due to its significant qualities and the development of individual's capability. The objective of teaching mathematics is to provide students with the mathematical knowledge and skills desired in everyday life to solve problems and develop plans based on a problem-solving approach. In recognition of its importance to the Nigerian Government, mathematics is a compulsory subject at primary and secondary school level in Nigeria, and a credit pass in the subject is pre-requisite for admission to study at Nigerian tertiary learning institutions (Federal Government of Nigeria, 2013).

Colleges of Education (COEs) in Nigeria are higher institutions that are burdened with the responsibility of training pre – service teachers in diverse courses including mathematics. COEs awards Nigeria Certificate in Education (NCE) to their students after minimum of three-year satisfactory training. teachers who have NCE are trained to teach in pre – primary and primary schools in Nigeria (Federal Government of Nigeria, 2013; Isiyaku, Ayub & Abdulkadir, 2015). The mission of Colleges of education in Nigeria is to produce well trained qualified NCE teachers worthy of character and learning through effective teaching, research and public service for the Basic Education system (NCCE, 2012).

In Expectation Confirmation model (ECM), confirmation expectation refers to the degree to which users' expectations are satisfied, based on experience of using the technology (Joo, Park, & Kyoung, 2017). In this study we conceptualized confirmation of expectations as the level to which learners actual experience in learning mathematics matched their initial expectations about learning mathematics. Research conducted related to confirmation of expectation in learning mathematics are the study of Udousoro (2011) where he conducted his study at secondary school level and his findings showed that 14 topics of mathematics at secondary school were classified as difficult based on interpretation of the students. Furthermore, a significant relationship has been identified between perceived and actual learning difficulties. Other studies that revealed the significant influence of confirmation of expectations on satisfaction are study conducted by Joo, Park, & Shin (2017) in their study they investigated continuance intention of using digital textbook and they collected their data using online questionnaire, findings have shown that confirmation of expectations has a positive effect on satisfaction. Study by Junjie, (2017), indicated that confirmation of expectations of the prior experience significantly influence satisfaction with prior learning experience. More so, the study carried out by Daneji, Ayub, and Khambari (2019). The result showed that satisfaction was affected significantly by confirmation of expectations. In above literature none of the study was conducted on COE students unlike the present study.

Perceived usefulness in learning mathematics is the extent to which learners believed that learning mathematics is important to their daily lives' activities and future ambitions. On the research related to perceived usefulness in learning mathematics are study of (Zogheib, Zogheib and Elsaheli, 2015; Guo, Marsh, Parker, Morin & Yeung, 2015; Mohamed and Waheed, 2011). Other researches that showed the influence of perceived usefulness on continuance intention to use MOOCS are Daneji et al, 2019; Wu and Chen (2017) where they report that the significant predictor of MOOC continuance intention was perceived usefulness. Furthermore, Studies on other IT continuance intention includes (Muqtadiroh, Herdiyanti, Wicaksono, and Usagawa, 2019; Daneji, Ayub, Jaafar, and Khambari, 2018; Shiue and Hsu, 2017) established that the greatest significant contributor to students' continuance intention was perceived usefulness. Satisfaction with learning mathematics refers to the students' perception of

happiness and achievement in learning mathematics. Research conducted on the influence of satisfaction on continuance intention includes studies by (Bagci and Celik, 2018; Rahman, Zamri and Leong, 2017; Shiue and Hsu (2017; Zogheib, et al, 2015) the results have shown that there is a significant relationship between satisfaction and intention to continue.

In this study perceived enjoyment in learning mathematics refers to as the fun and pleasure mathematics students derived in learning mathematics courses on its own right apart from anticipated benefit of studying mathematics. For the researches related with perceived enjoyment of learning mathematics are the studies by (Venter and De Wet, 2016; Venter, 2016) their study findings revealed that the constructs of fun, imagination, immersion, and sensation were the greatest significant constructs in the intention of continuous use. In addition, studies related to the influence of perceived enjoyment on continuance intention (Huang, 2019; Joo et al (2017; Kim, 2010; Lee (2010). Meanwhile, Continuance intention to use refers to the intention to repurchase technology or continue service use (Bhattacherjee, 2001). In this study, continuance intention to study mathematics refers to mathematics student's voluntary intention to continuously study mathematics in extracurricular activities as well as in regular classes. This research, would fill the current literature gap as it expands the application of the Expectancy Confirmation Model (ECM) from the IS domain to the area of mathematics learning continuant intention. It also used a model that combines ECM with perceived enjoyment. As most of the studies that used ECM were on e-learning so, the current study empirically used ECM to the study of mathematics. The study also used all colleges of education mathematics students in the northwest geopolitical zone in Nigeria as its scope. Therefore, the current study used ECM to Nigeria culture in the area of studying mathematics continuance intention in Nigeria.

Based on the ECM model, the proposed model of this study includes all the ECM constructs with regards to continuance intention and addition of perceived enjoyment of studying mathematics by colleges of education mathematics students. Fig. 1 depicted the relationships between the variables of the study

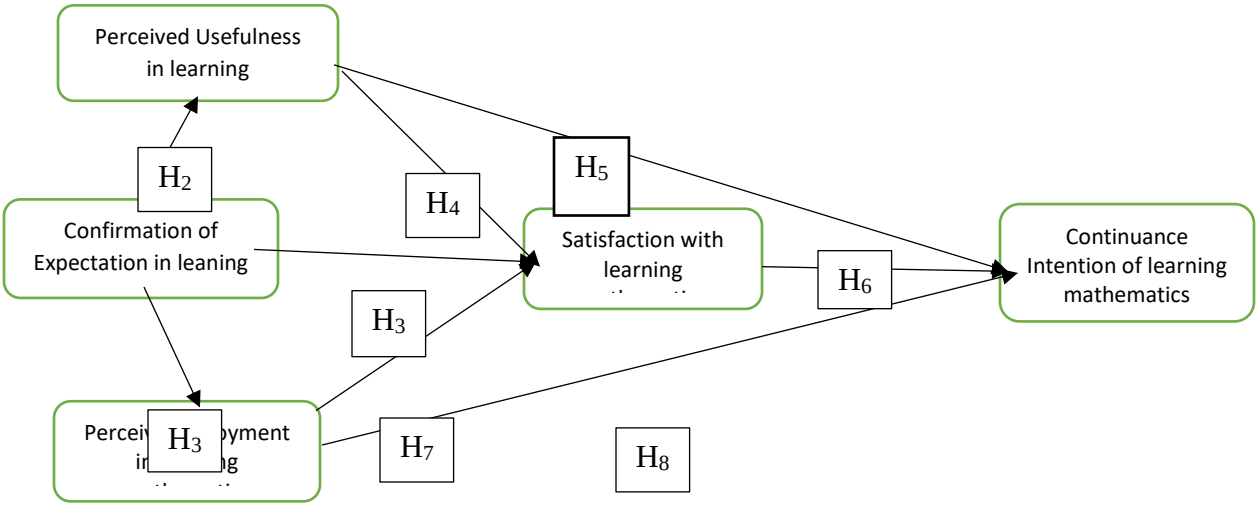

Figure 1: Proposed Research Model

Confirmation denotes to the relationship between the perceptions of IS usage and its actual performance of the users (Bhattacherjee, 2001). ECM theorizes that the degree of confirmation by IS consumers has a strong influence on their perceived usefulness and satisfaction with IS (Zhou, 2017). Many studies have shown a clear strong relationship between users' expectation on their perceived usefulness and satisfaction (Joo et al, 2017; Junjie, 2017; Oghuma et al, 2016; Mobarhan, Bahru, Rahman, & Bahru 2015; Eveleth, Baker-eveleth, & Stone 2015; Stone & Baker-eveleth 2013; Bhattacherjee, 2001; Oliver, 1980). When students believe that learning of mathematics is very useful to their daily lives activities and that the actual learning experience of mathematics corresponds to or exceeds their initial expectations of learning mathematics, the confirmation that occurs leads to learners' satisfaction. (Oghuma et al., 2016; Ayub, Yunus, Mohmad, Salim & Suleiman, 2017). This is because the expected benefit of the learning mathematics by NCE mathematics are realized. Hence, NCE mathematics students will compare their real mathematics learning experience with their initial expectations of learning mathematics. They will be pleased with the mathematics learning, if their assumption becomes true.

Perceived Usefulness is described as "the extent to which persons are confident that using a specific technology can enhanced his or her work performance" (Davis, 1989). In previous literature, perceived usefulness was indicated to be a strong determining factor of the continuance intentions (Daneji et al, 2018; Wu & Chen, 2017; Junjie, 2017; Joo et al, 2017; Eveleth et al, 2015; Mobarhan et al, 2015). Also perceived usefulness showed strong influence on the users' satisfaction (Junjie, 2017; Joo et al, 2017; Stone & Baker Eveleth, 2013Almahamid & Rub, 2011; Bhattacharjee, 2001; Chiou, Ayub, & Luan, 2010). This means that if students feel that learning mathematics is very useful to them, they will be more pleased (satisfied) with it and will prefer to continue studying mathematics.

One of the vital principles in ECM is satisfaction. It's recognized as feedback of individual after utilizing an Information system. As regards to the ECM, the continuing intention of users to use IS was affected by their satisfaction with earlier experience and perceived usefulness of IS (Bhattacherjee, 2001). Satisfaction is one of ECM's important ideas. After using an IS it is known as the user response (Deneji et al, 2019). Regarding the ECM, the intention of persons to continue to use information system is influenced by the level of satisfaction with previous experience and perceived usefulness of IS (Bhattacherjee, 2001). Past studies have recognized the association between user satisfaction and their continuance intention of a particular IS (Junjie, 2017; Joo et al, 2017; Eveleth et al, 2015; Ayub, Bakar & Ismail, 2015; Lee, 2010; Thong, Hong, & Tam, 2006). There is a likelihood that when students are contented with their mathematics learning experience their intention will be to continue studying mathematics.

Perceived enjoyment is the extent to which executing a specified job is pleasant on its own right, apart from any likely performance consequences (Xu, Peak, & Prybutok, 2015). Perceived enjoyment is viewed as ''the degree to which an action of utilizing a particular technology is perceived to be pleasant on its own, apart from any anticipated reward as a result of working with the technology" (Lee, 2010). Numerous researches have indicated that perceived enjoyment, was a major construct affecting continuance intention (Joo et al, 2017; Oghuma et al, 2016; Kim, 2010; Thong et al., 2006). Similarly, perceived enjoyment had a significant effect on individuals' satisfaction (Joo et al, 2017; Oghuma et al, 2016; Almahamid & Rub, 2011; Bakar, Ayub, Luan & Tarmizi, 2010). Therefore, students with strong feelings of enjoyment in mathematics learning are expected to continue to

study mathematics to any level. For the purpose of this study perceived enjoyment construct was added to ECM to emphasize the importance of motivation in learning mathematics, and was described as learners' (students) perceptions on the extent to which curiosity, pleasure, and engagement was drawn after studying mathematics.

The continuance intention is the goal of the ECM model. The intention to continue the use of an information system is established (Bhattacherjee, 2001). The proposed ECM was based on the concept that continuance intention of studying mathematics would be determined by the satisfaction with learning mathematics and perceived usefulness in learning mathematics. More so, perceived usefulness in learning mathematics together with confirmation of expectations in learning mathematics influenced satisfaction with learning mathematics. When learners' start enjoying learning mathematics, psychological motivations can rise which may have an influence on the learners' decision of continuance learning mathematics. As such, an individual would probably have the intention to continue studying mathematics if learning mathematics is appreciated by government and communities at all levels. Continuance intention of studying mathematics stand as the dependent variable of the current study as shown in Fig. 1.

Convergent validity is a set of indicators that gather to assess a single construct (Kline, 2015). Construct validity was evaluated based on the standards that the indicator's (construct's) estimated coefficient was significant on its recommended fundamental construct factor. The researchers evaluated the measurement model using the three criteria as recommended by Fornell and Lacker (1981), namely:

1. All indicator factor loadings (k) should be significant and exceed 0.5 (Awang, 2015; Hair et al., 2017).
2. Construct reliabilities (CR) of each construct should be greater than or equal to 0.7 (Byrne, 2013; Awang, 2015).
3. Average variance extracted (AVE) by each construct should exceed the variance due to measurement error for the construct (e.g., AVE should exceed 0.5) (Fornell & Larcker, 1981; Awang, 2015).

When the measuring model is suitable, the next thing would be to test the validity of the structural model. The structural model is validated using various statistical methods like path coefficient (β), coefficient of determination (R^2), predictive relevance (Q^2) and effect size (f^2). The researchers then investigated the structural model to authenticate the hypotheses based on the path coefficients and coefficient of determination (R^2) values (Chin, 2010). The coefficient of determination (R^2) values was employed to measure the capability of the model to clarify the variance in the endogenous variable. The direct relationships were used to evaluate the statistical significance of the hypotheses. According to Chin (2010), the structural model describes a theoretical model with a collection of structural equations to evaluate the inner path model. In this analysis, the basic criteria used for evaluating the structural model among others were: path coefficient (β), coefficient of determination (R^2) for endogenous variable, (Henseler et al, 2014; Chin 2010; Tenenhaus, Vinzi, Chatelin & Lauro, 2005; Gotz et al. 2010). The purpose of this study is to test the fitness of the proposed model in examining factors influencing continuance intention of studying mathematics among NCE mathematics students of COEs.

Objectives of the Study

The following specific objectives were formulated for the study:

1. To investigate the direct relationship between confirmation of expectation and perceived usefulness of learning mathematics.
2. To determine the direct relationship between confirmation of expectation and perceived enjoyment in learning mathematics.
3. To investigate the direct relationship between confirmation of expectation and satisfaction with learning mathematics.
4. To investigate the direct relationship between perceived usefulness in learning mathematics and Satisfaction with learning mathematics.
5. To investigate the direct relationship between perceived usefulness in learning mathematics and continuance intention of learning mathematics.
6. To investigate the direct relationship between satisfaction with learning mathematics and continuance intention of learning mathematics among NCE mathematics students.
7. To determine the direct relationship between perceived enjoyment in learning mathematics and satisfaction with learning mathematics among NCE mathematics students.
8. To investigate the direct relationship between perceived enjoyment in learning mathematics and continuance intention of learning mathematics among NCE mathematics students in the northwest, Nigeria.

Hypotheses

1. There is no significant relationship between confirmation of expectation and perceived usefulness in learning mathematics.
2. There is no significant relationship between confirmation of expectation and perceived enjoyment in learning mathematics.
3. There is no significant relationship between confirmation of expectation and satisfaction with learning mathematics.
4. There is no significant relationship between perceived usefulness and satisfaction with learning mathematics.
5. There is no significant relationship between perceived usefulness in mathematics learning and continuance Intention of learning mathematics.
6. There is no significant relationship between satisfaction with learning mathematics and continuance Intention of learning mathematics.
7. There is no significant relationship between perceived enjoyment in learning mathematics and satisfaction with learning mathematics.
8. There is no significant relationship between perceived enjoyment in learning mathematics and continuance Intention of learning mathematics.

Methodology

The target population of this research study includes the 2,761 NCE III mathematics students (non- graduate mathematics students) from 12 Colleges of Education in the Northwestern geo – political zone in Nigeria during 2019/2020 sessions. Out of the 12 colleges of education 5 are federal government owned colleges of education with a population of 890 NCE III mathematics

students, while the remaining 7 are states government owned colleges of education with a population of 1871 NCE III mathematics students. 366 NCEIII mathematics students were selected as the sample for this study using Cochran formula. The proportionate stratified random sampling taking process was applied to all colleges of education in the study area. In order to maximize resonance from each sample. Since the population of this study consists of NCE III mathematics students of 12 different colleges of education, naturally the selected students' characteristics are considered as the sample that would represent the entire colleges of education population, which could be generalized to all of them. Data were gathered from 339 final year NCE mathematics students (NCE III) that fully completed the questionnaire.

A questionnaire survey tagged Mathematics Learning Intention (MLI) was administered to collect relevant information from NCE mathematics combination students through personal visit to all the colleges and distributed the questionnaire to the randomly selected students who show interest to participate voluntarily and respond to the instrument. All measurement statements in the questionnaire were adapted from the previous studies. The questionnaire was adapted from different authors after written permission was granted by the original authors of the instruments. It was then given to expert for validation after amendments were made. A pilot test was conducted prior to the actual study and the Cronbach's alpha value of the pilot study revealed acceptable value of 0.813. The questions for confirmation of expectation, continuance intention and satisfaction are from Roca, Chiu and Martinez (2006) and Bhattacharjee (2001). Perceived enjoyment and usefulness came from Vadecandelaere, Speybroeck, vanlaar, De Fraine and Van Damme (2012). The instrument has of two segments. The first section consists of five questions with regards to the background information of the respondents with two closed ended questions (name of institution and gender) and three open ended questions such as age of the respondent, state of institution and respondents 'course of study. The second section consisted of 36 questions to measure the five constructs of the study. Four of the five variables in the second section of this questionnaire were rated using a 5-point Likert scale, labeled as 1 (strongly disagree), 2 (disagree), 3 (somewhat agree), 4 (agree) and 5 (strongly agree). Whereas the remaining one construct in the second section of this questionnaire was tested by five-point Likert scale labeled as 1 (very dissatisfied), 2 (dissatisfied), 3 (somewhat satisfied), 4 (satisfied) and 5 (very satisfied). The criterion mean value (Acceptable value) of each construct in the questionnaire was measure using PLS-SEM Fornell and Lacker criterion of Average variance extracted (AVE) should exceed 0.5, factor loading should also 0.5 and construct reliability must be at least 0.7 for each construct.

In analyzing the information, Partial Least Square (PLS - SEM) was employed to examine the relations stated in the proposed study model. A two-step technique was then adopted as suggested by Anderson and Gerbing (1988). First, the fitness and the construct validity of the proposed measurement model was evaluated by measuring the reliability, convergent, and discriminant validity. The next step done was examining the structural model to investigate the strength and the direction of the relationships hypothesized in the research model followed this, PLS - SEM was employed in this study because of its capability to evaluate a series of interrelationships among latent constructs together with in a model (Awang, 2015). The reliability of the data was measured by Cronbach's alpha to measure the internal consistency. Cronbach's alpha (α) values of each construct are showed and each of the Cronbach's alpha is above the recommended value 0.7 (Hair, Black, Babin, & Anderson, 2017). The result specifies that variables in this study have a high internal reliability. In addition, the composite reliabilities of constructs ranged from 0.911 to 0.974, and the Average Variance Extracted (AVE), values are between the ranges of

0.564 to 0.841, this was higher than the variance due to measurement error. Therefore, all the three criteria for convergent reliability and validity were satisfied. The item factor loading, the composite reliability (CR) of each construct and the average variance extracted (AVE) satisfied the recommended threshold values.

Table 1: Construct Reliability & Validity

Variables	Cronbach's Alpha	Composite Reliability	AVE
Enjoyment	0.907	0.928	0.684
Expectation	0.969	0.974	0.841
Intention	0.887	0.911	0.564
Satisfaction	0.913	0.93	0.626
Usefulness	0.887	0.912	0.599

Discriminant validity evaluates the level to which a construct and its indicator is different from another construct and its indicator. The correlation of indicators in any two variables in a model should be lower than the square root of the average variance extracted (AVE) of indicators within its variables (Fornell and Larcker. 1981). In another word, the square root of the variance extracted within the construct and its items should be higher than the correlations between the construct and any other construct in the model, satisfying Fornell and Larcker (1981) criteria for discriminant validity.

Table 2: Fornell and Lacker

Variables	Enjoyment	Expectation	Intention	Satisfaction	Usefulness
Enjoyment	**0.827**				
Expectation	0.189	**0.917**			
Intention	0.292	0.254	**0.751**		
Satisfaction	0.317	0.345	0.435	**0.791**	
Usefulness	0.200	0.182	0.446	0.331	**0.774**

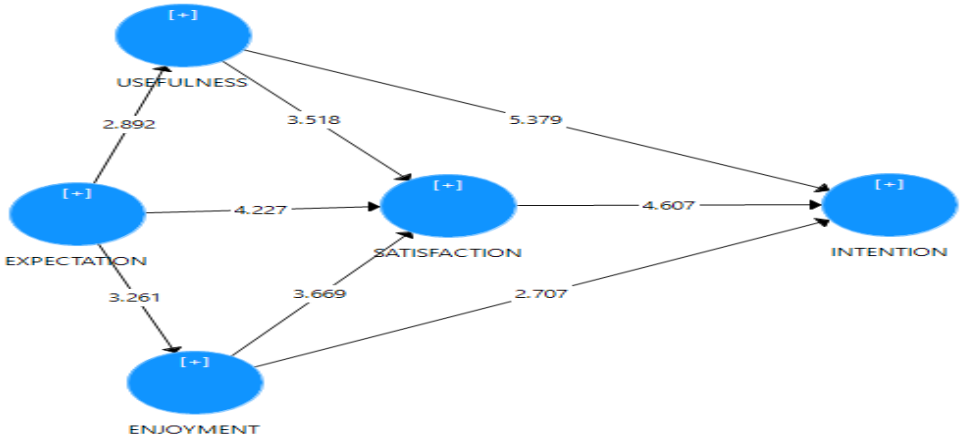

Figure 2: Structural model

Results

The direct relationship between the variables in the path model are shown in Table 3 below.

Table 3: Path Coefficient

V ariables	Original Sample (O)	Sample Mean (M)	Standard Deviation	T Statistics	P Values	Decision
Expectation -> Usefulness	0.182	0.188	0.063	2.892	0.004	Significant
Expectation -> Enjoyment	0.189	0.193	0.058	3.261	0.001	Significant
Expectation -> satisfaction	0.26	0.264	0.062	4.227	0.000	significant
Usefulness -> Satisfaction	0.24	0.241	0.068	3.518	0.000	Significant
Usefulness -> Intention	0.325	0.327	0.060	5.379	0.000	Significant
Satisfaction -> Intention	0.284	0.285	0.062	4.607	0.000	Significant
Enjoyment -> Satisfaction	0.22	0.221	0.060	3.669	0.000	Significant
Enjoyment -> Intention	0.137	0.137	0.051	2.707	0.007	Significant

Hypothesis 1

There is no significant relationship between confirmation of expectation and perceived usefulness in learning mathematics

With regard to hypotheses H_{O1} on relationship between confirmation of expectation and perceived usefulness in learning mathematics, the hypothesis one was rejected since the T-statistics value is much higher than the P- value ($\beta = 0.182$, $T = 2.892$, $P < 0.05$) meaning that there is a significant relationship between confirmation of expectation and perceived usefulness in learning mathematics.

Hypothesis 2
There is no significant relationship between confirmation of expectation and perceived enjoyment in learning mathematics.

The null hypothesis two was rejected because the *T-statistic* value is greater than P-value (β = 0.189, T = 3.261, $P < 0.05$). This implies that there exists a significant relationship between confirmation of expectation and perceived usefulness in learning mathematics

Hypothesis 3
There is no significant relationship between confirmation of expectation and satisfaction with learning mathematics.
The result of the analysis revealed that the null hypothesis three was rejected since the T-statistic value is greater than P-value (β = 0.260, T = 4.227, $P < 0.05$). This mean that there is significant relationship between confirmation of expectation and satisfaction with learning mathematics.

Hypothesis 4
There is no significant relationship between perceived usefulness and satisfaction with learning mathematics.

The null hypothesis four formulated was rejected because T-statistics value is greater than P-value (β = 0.240, T = 3.518, $P < 0.05$) meaning that perceived usefulness has direct relation with the satisfaction with learning mathematics

Hypothesis 5
There is no significant relationship between perceived usefulness and continuance intention of learning mathematics.

The null hypothesis five formulated was rejected because the path coefficient between perceived usefulness and continuance intention of learning mathematics was (β = 0.325, T = 5.379, $P < 0.05$). This means that there exists a significant relationship between perceived usefulness and continuance intention of learning mathematics by NCE mathematics students of colleges of education in Nigeria.

Hypothesis 6
There is no significant relationship between satisfaction with learning mathematics and continuance intention of learning mathematics. With regard to null hypotheses H_{O6} relating to the non-direct significant relationship between satisfaction with learning mathematics and continuance intention of learning mathematics was rejected. Therefore, the alternative hypothesis was retained meaning there exists a direct significant relationship between satisfaction with learning mathematics and continuance intention of learning mathematics since the path coefficient value was (β = 0.284, T = 4.607, $P < 0.05$).
Hypothesis 7
There is no significant relationship between perceived enjoyment and satisfaction with learning mathematics.

More so, for the null hypothesis (H_{O7}), saying 'There is no significant relationship between perceived enjoyment and satisfaction with learning mathematics'. The hypothesis was rejected since the path coefficient between perceived enjoyment in learning mathematics and satisfaction with learning mathematics was ($\beta = 0.220$, $T = 3.669$, $P < 0.05$). Meaning that there is significant relationship between perceived enjoyment in learning mathematics and satisfaction with learning mathematics. Therefore, the null hypothesis stated earlier is now rejected.

Hypothesis 8
There is no significant relationship between perceived enjoyment in learning mathematics and continuance intention of learning mathematics.

Lastly, the null hypothesis H_{O8}. The null hypothesis 8 related to the relationship between perceived enjoyment and continuance intention of learning mathematics was rejected, since the path coefficient between perceived enjoyment in learning mathematics and continuance intention of learning mathematics was ($\beta = 0.137$, $T = 2.707$, $P < 0.05$).

All the hypotheses tested in this study were tested at 95% confidence level ($\alpha = 0.05$). From the result of the analysis relationship of perceived usefulness in learning mathematics and continuance intention of learning mathematics was higher than that of the remaining variables, the next to it was satisfaction with learning mathematics and continuance intention of learning mathematics However, the influence of perceived enjoyment did play a least significant part in affecting continuance intention of learning mathematics. (Refers table 3)

Discussion of Findings

In this study, researchers applied the concept of the ECM and perceived enjoyment to examine continuance intention of learning mathematics by mathematics students of colleges of education in the northern part of Nigeria (northwest in particular). First, the findings of this study exposed that perceived usefulness in learning mathematics is the major predictor of colleges of education mathematics students' continuance intention of learning mathematics, followed by satisfaction with learning mathematics. These findings is in line with the past studies (Daneji et al, 2018; Wu & Chen, 2017; Junjie, 2017; Joo et al, 2017; Eveleth et al, 2015; Mobarhan et al, 2015). Hence, perceived usefulness and satisfaction are the key constructs in explaining students' intention to continued studying mathematics

Secondly, the findings revealed that confirmation of expectations and perceived usefulness in learning mathematics of the COE mathematics students were main determinants of their satisfaction level with learning mathematics, and this confirmation of expectation of learning mathematics also had a significant effect on perceived usefulness in learning mathematics, as well as the important influence on satisfaction. Therefore, findings of this study strongly supported the ECM (Bhattacherjee, 2001). It is also in agreement with past studies (Daneji et al, 2019; Muqtadiroh et al, 2019; Joo et al, 2017; Junjie, 2017; Stone and Baker-Eveleth (2013)

Third, the findings of this study confirmed relationships between perceived enjoyment in learning mathematics and continuance intention to learn mathematics These findings are similar to those of other studies examining the influence of enjoyment on continuance intention (Huang 2019; Venter De-Wet, 2016; Venter (2016; Kim, 2010; Lee, 2010). R^2 value (Coefficient of

Determination) is the most regularly applied measure for evaluating the structural model and the coefficient is a measure of the predictive accuracy of the model. The coefficient signifies the amount of variance in the dependent latent variable explained by all the independent variables linked to the dependent variable. The value of R^2 ranges between 0 and 1. The R^2 values of dependent variables are 0.239 for satisfaction and 0.309 for continuance intention. The model explains 23.9% of the variation in satisfaction with the influence of confirmation of expectations, perceived usefulness and perceived enjoyment being statistically significant this shows moderate level of acceptance (Cohen 1988). The value 23.9% represent the predictive accuracy of the influence of confirmation of expectation, perceived enjoyment and perceived usefulness in studying mathematics in improving NCE mathematics students' level of satisfaction toward studying mathematics. Therefore, hypotheses 3, 4, and 7 (H_3, H_4, and H_7) are supported. Meaning that NCE mathematics students' satisfaction is influence by perceived usefulness, confirmation of expectation and perceived enjoyment. The implication of this finding is that, mathematics students of colleges of education consider usefulness of mathematics more important in determining their satisfaction with studying mathematics, on their intention to continue to study mathematics. Compared to the confirmation of expectation and enjoyment they derived in studying mathematics. Finally, 30.9% of the variation in continuance intention was explained by perceived usefulness, perceived enjoyment and satisfaction with learning mathematics, which are statistically significant. In another word, 30.9% stand for the amount of variance in the continuance intention of studying mathematics explained by the three hypotheses that are linked to it. Although the combined effect of the exogenous variables to the continuance intention of studying mathematics by NCE mathematics students is 30.9% it shows the moderate level of acceptance (Cohen, 1988). Therefore, hypotheses, H_5, H_6 and H_7 are supported.

Conclusion

This study is quite informative for authorities of tertiary institutions (Colleges of education) in Nigeria and across the world. It has revealed how to effectively deal with the issue of students' continuance intention in learning mathematics among colleges of education and has immensely contributed to knowledge. It has supported the contributions of extant research and has added value to Expectation Confirmation Model (ECM). Based on the findings of this study the researchers proffer the following recommendations

Recommendations

1. The finding of this hypothesis is an indication that Colleges of Education mathematics curriculum met the expectations of NCE mathematics students. Therefore, colleges of education mathematics lecturers should help their students by exploring the content of NCE minimum standard as it will make student to understand the usefulness of learning mathematics beyond classrooms.
2. Mathematics students of Colleges of Education expectations of mathematics curriculum are met that is why they indicated that they are enjoying learning mathematics. Therefore, government of should try and prove all the facilities that will make learning mathematics enjoyable so that the fear of studying by many students will be reduce.
3. Government of Nigeria should put a priority on anything that will make NCE mathematics students of colleges of education feel satisfied with their learning (studying) of mathematics because if NCE mathematics students perceived that their expectations about learning mathematics are confirmed

then their level of satisfaction with the learning mathematics would improve significantly as this will lead to end the problem of shortage of qualified mathematics teachers at the basic education level.

4. The belief of the usefulness of studying mathematics NCE mathematics students had helped them feel satisfied with the way they are learning mathematics, which in turn leads to their intention of continuing their education in mathematics. So, parents, guidance and mathematics teachers right from primary should help the government in educating students on the importance of mathematics to their daily life activities.
5. Government of Nigeria should make adequate provision of employing these students, considering the fact that NCE mathematics students are qualified mathematics teachers trained to teach at the basic level of education which is the foundation of education in Nigeria. Once good education is attended at the basic level of education, it is expected that the students will perform very well. Based on their belief that mathematics is very important to their future life and the problem of low interest and enrolment of students into mathematics courses at universities in Nigeria will be over.
6. The Nigerian government and all stakeholders in education, should maintain and improve those factors that have made NCE mathematics students to be satisfied with their learning mathematics at colleges of education. For the reason that supporting these satisfied mathematics students to continue their education in mathematics since they have indicated that their satisfaction with studying NCE mathematics make them intend to continue their education in mathematics. As this will help Nigeria's government create a stable, powerful, and self-reliant nation and build a land full of bright opportunities for its entire citizen, which are all goals of nation building.
7. The government of Nigeria and other stakeholders in education should try to put in place all those resources (facilities) that make studying mathematics enjoyable such as computers, internet service, mathematics software, mathematics laboratory, and a conducive atmosphere for studying mathematics and improve the facilities where they are available. Since enjoyment leads to satisfaction and satisfaction lead to continuance intention.
8. Parents/guidance should support these highly motivated mathematics students of colleges of education to continuing their education in mathematics, considering the status of mathematics, as a compulsory subject to all students from primary to secondary schools. Therefore, government should provide special scholarship for any NCE mathematics student that is willing to continue his/her education in mathematics.

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