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Effects of Business Mathematics on students' performance in Financial Accounting in Federal College of Education, North Central States of Nigeria.

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Abstract: This study assessed the "Effects of Business Mathematics Grades on Students Performance in Financial Accounting in Federal Colleges of Education in North Central States of Nigeria". Three specific objectives were raised and 3 research questions were set to guide the study while the same number of hypotheses were formulated and analysed at 0.05 level of significance. Ex post facto research design was adopted and the population for the study comprised of 445 in 3 Federal Colleges of Education in North Central States of Nigeria. The sampled size consisted three hundred and twenty-seven (327) that obtained at least a pass in Business Mathematics. The study used students' profile of 2010-2011 in Business Mathematics and 2011-2012 of Financial Accounting. The data collected were analysed using frequencies, percentages and mean for the research questions. The data was analyzed using SPSS Statistics version 17.0 where P-value approach, short for probability. Paired sample t-test was used to test null hypotheses. The study revealed that both a pass and credit and above grades in Business Mathematics in NCE I have effect on students' performance in Financial Accounting in NCE II. With the conclusion that performance in Business Mathematics has significant effect on Financial Accounting, it was recommended among others that a pass in Business Mathematics should be required as prerequisite for students' enrolment into Financial Accounting in Colleges of Education to curtail observable poor performances in the course.
Keywords: Mathematics, Accounting and Financial Accounting.

INTRODUCTION

There is a general understanding among accounting teachers that those who have good grades in Mathematics at O'Level result will perform better than those who do not in Business Education. If this rationale proves to be correct, by the time the school selects applicants for the NCE (a three-year course leading to the NCE certificate), priority may have to be given to those students who have good grades in Mathematics. This may affect the course design, admission decisions, and the assignment of students in Colleges of Education. Financial Accounting is one of the business courses offered in the Department of Business Education students at NCE 2 while Business Mathematics is being offered at NCE 1 in the same department. As such, financial accounting not only exposes students to a system of recording and summarizing business transactions, importantly, it helps students interpret and analyze financial information which are crucial inputs in most business decisions. In many business programmes for non-accounting majors, however, accounting is considered to be a difficult subject to pass (Doran, Bouillon and Smith, 1991; Lane and Porch, 2002; Elias, 2005). Business Mathematics and Accounting are indispensable tools to the Business Education students and in any field of human endeavour. Business Mathematics, in particular, is the back bone of any Business Education success, hence virtually all admissions into tertiary institutions require a credit in Mathematics. Business Mathematics is being used by business enterprises to record and manage business operations. The National Commission for Colleges of Education (2008) requires a credit in Mathematics as one of

the conditions for the admission into the Business Education Department in Colleges of Education.

It is important to note that there is a lot of Mathematics calculations in Accounting. In view of this, Li Calzi and Basile (2010) say that the first link between Mathematics and Accounting dates back to simple calculations of a commercial nature, which merchants had to carry out daily in ancient times. This relationship was later enriched by the financial calculations needed by investors and bankers, which developed into a basic operation of arithmetic that is nowadays called accounting. Accounting is one of the core subjects in Business Education hence any student coming into the department must have a good knowledge of Mathematics. Business education is a vital part of our educational system that has provided a solid foundation of knowledge and skills for over a century (National Business Education Association, 2001). Looking at any NCE accounting course, one could conclude that the ability to solve Mathematics equations may be a requirement. Supporting this fact, Doucouliagos (1990) affirms that Mathematics has an important role to play in business education and in the world of business generally. The aim of this study, therefore, is to find out if Business Mathematics has any effect on students ability and their performances in Financial Accounting. Students here refer to the NCE 1 and 2 who have studied Business Mathematics and Financial Accounting in two consecutive years in Colleges of Education before going to their areas of specialization in Business Education. Since the minimum requirement into Business Education in any College of Education is at least a credit in Mathematics as stated in the minimum standards of the National Commission for Colleges of Education, (2008) before a student can secure admission, even those admitted through pre-NCE must meet up with this requirement before transiting into NCE 1.

Statement of the Problem

The general assumption of teachers is that students with adequate requisite knowledge of Mathematics at the secondary school level should do well in Business Education courses, especially in areas such as Financial Accounting. This assumption underlies the admission requirement of a compulsory credit pass at least in O'level Mathematics before admission into Business Education at the College level. Penelope, James and George (2009) affirm that Mathematics skills are important for students to understand Financial Accounting systems and analysis. On the whole, it is observed that even with the requirement of a credit in Mathematics in place, performances of Business Education students in Financial Accounting still fall far below the expectation of this assumption as many students who are admitted into the programme most often still find it difficult to do well in Financial Accounting. Over the years, the researcher has discovered that some students with little knowledge in English Language are being affected in the performance of Financial Accounting since some of them complained that they got low marks in a test or examination as a result of not fully understanding the language of the task. In trying to resolve this dilemma, many works had concentrated on the effect of entry Mathematics grades in externally coordinated examinations such as West African School Certificate

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(WASC) and National Examination Council (NECO) to determine students' pre-requisite Mathematics skills. However, realities of recent discoveries, especially in the case of Nigeria, have come to cast aspersions on the use of such results as valid measures of competence nowadays that 'passing centres' and all manner of examination malpractices and certificate racketeering are phenomena. In this regard, the current study has moved away from examination results that are somewhat unverified to use records of internally coordinated examination results of NCE 1 Business Mathematics. This is expected to reflect an on-the-spot assessment of students' competence. It is observed that so far none of the scholars had discussed the effects of Business Mathematics grades on student performance in Financial Accounting in Federal Colleges of Education in North Central States of Nigeria.

Objectives of the Study

The general objective of the study is to determine the effects of Business Mathematics grades and students' performance in Financial Accounting in the three Federal Colleges of Education in North Central States of Nigeria.

The specific objectives of this study are to:

1) Ascertain the extent to which attainment of credit grade and above in Business Mathematics by students have effect on their performance in Financial Accounting offered in the department of Business Education in Federal Colleges of Education, North Central States of Nigeria.
2) Assess the extent to which attainment of pass grades in Business Mathematics have effect on students' performance in Financial Accounting offered in the department of Business Education in Federal Colleges of Education, North Central States of Nigeria.
3) Ascertain the extent to which attainment of fail grade in Business Mathematics by students have effect on their performance in Financial Accounting offered in the department of Business Education in Federal Colleges of Education, North Central States of Nigeria.

Research Questions

The following research questions were formulated to guide the study with special focus on Federal Colleges of Education, in North Central States of Nigeria:

1) To what extent does the attainment of credit grade and above in Business Mathematics have effect on students' performances in Financial Accounting in the department of Business Education?
2) To what extent does the attainment of pass grades in Business Mathematics have effect on students performances in Financial Accounting offered in the department of Business Education?
3) To what extent does the attainment of fail grade in Business Mathematics have effect on students performances in Financial Accounting offered in the department of Business Education?

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Research Hypotheses

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

Ho_1: Credit grade and above in Business Mathematics have no significant effect on the performances of students in Financial Accounting in the department of Business Education in Federal Colleges of Education, North Central States of Nigeria.

Ho_2: Pass grades in Business Mathematics have no significant effect on the performances of students in Financial Accounting offered in the department of Business Education in Federal Colleges of Education, North Central States of Nigeria.

Ho_3: Fail grade in Business Mathematics have no significant effect on the performances of students in Financial Accounting offered in the department of Business Education in Federal Colleges of Education, North Central States of Nigeria.

Literature Review

Theoretical Framework

There are many theories on learning but the researcher will examine the Theory of Hierarchy of Needs which is the most relevant to the work under study. The theory of Hierarchy of Needs propounded by Abraham Maslow in psychology in 1943 states that the least or basic need must be met before the next one can be satisfied. The basic assumption underlying the theory is that every need must be met before someone can reach the peak which is self actualization. This theory has to do with learning or acquiring skills. In line with this, someone can say that Financial Accounting is a skill subject which requires thorough practicing for any student who wants to excel in the career. It is also known as D-needs, meaning that these needs arise due to deprivation. Satisfying these lower-level needs is important in order to avoid unpleasant feelings of consequences. If each level of Maslow's hierarchy is examined, teachers can ensure that they have created a classroom space and climate that acknowledges and allows for physical, mental, and emotional needs to be met, while each student is additionally nurtured to grow to his or her self-actualized potential. Maslow's hierarchy of human needs identified six needs of human beings such as physiological needs, safety needs, love and belongingness, esteem needs, cognitive needs, aesthetic needs and finally self-actualisation. Self-actualisation is the top of the pyramid where all the needs of the human being are satisfied, and that person is operating at their absolute peak. The self-actualisation is the one that relevant to this research since this need is concerned with the human tendency for personal growth but this cannot be achieved without a full satisfactory of each level. Importantly, students must be aware of the benefits of being Business Educators in order to boost their performances in Financial Accounting. In conclusion, teachers should know that abnormality behaviours in students are often a reflection of unmet needs; therefore, teachers should develop a mechanism to detect their students' needs.

Concept of Accounting and Financial Accounting

Accounting is concerned with accurate numerical measurement of precisely defined operational concepts. Accounting is the system a company uses to measure its financial

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performance by noting and classifying all the transactions like sales, purchases, assets, and liabilities in a manner that adheres to certain accepted standard formats. It helps to evaluate a company's past performance, present condition, and future prospects. Hellmuth (1991) opined that accounting course uses a system of debits and credits as the basis for decision-making purposes. Throughout the NCE Accounting course, students use logic and problem-solving skills to gather and analyze data. In his view much of this analysis is centered on various Mathematics calculations accounting course draws on and reinforces one's Mathematics skills.

Roberts (1997) stated that Accounting is nothing more than the utilization of basic algebra applications. In view of this, students in accounting course will utilize addition, subtraction, multiplication, and division. They may also perform fractions, ratios, and percentages calculations during first and second-year of NCE Accounting course. According to him, Accounting students use these algebraic applications to analyze and solve financial problems that simulate the real world. Guest (2006) defined accounting as an art of recording, classifying, summarizing in a significant manner in terms of monetary transactions and events which are in a part of at least in financial statement and there result thereof. In view of this, Revaihi (2008) defined Accounting as a systematic practice of identifying, recording, measuring, classifying, summarizing, interpreting and communicating the financial transactions in terms of money of a business firm or an individual following a set of rules and regulations. He emphasized that the function is basically carried to maintain record of the business; evaluate the performance of a business; know the financial position of the business firm; control business activity effectively and to provide business information to the stake holders of the entity.

Azik (2010) asserted that Accounting is the process of recording business transactions in a systemic form so that the financial position of the business can be communicated to the users of such accounting information. In his view, Accounting is the language of business and an integral aspect of all business activities. Mastery of fundamental accounting concepts, skills, and competencies is essential to making informed business decisions. Fareed (2010) argued that Accounting is very much connected with our personal lives in so far as it is in respect of every business. We all with intent or unknowingly generate accounting ideas in a way when we plan what we will do with money. We need to plan how much money will be spent whilst how much of it will be kept back. This activity is called budget and we all are familiar with this concept - which is universally acceptable, that money must be spent cautiously. The same is true of a business. It is therefore imperative for a business to know about the inflow and out-flow of economic resources and their results. Thus, Accounting is the very need of a business to provide the information which is useful for sound economic decision making process and owing to the diversification between ownership and management. From the above definitions, it can be concluded that Accounting is a systematic way of recording financial transactions especially in monetary terms that makes it easier to take meaningful decision or for decision making of any organization or individual's business.

Kalbers (2003) defined Financial Accounting has "the branch of accounting that focuses on the general purpose reports on financial position and results of operations known as financial statements". He added that these statements provide a continuous quantified in monetary terms of economic resources and obligation of a business enterprise and of economic activities that change theses resources and obligations".Accounting Coach (2010) viewed Financial Accounting as a specialized branch of accounting that keeps track of a company's financial transactions. Using standardized guidelines, the transactions are recorded, summarized, and presented in a financial report or financial statement such as an income statement or a balance sheet.

Concept of Business Mathematics

Business mathematics is mathematics used by commercial enterprises to record and manage business operations. Business mathematics, sometimes called commercial math or consumer math, is a group of practical subjects used in commerce and everyday life. https://en.wikipedia.org/wiki/Business-mathematics. Business and mathematics go hand in hand this is because business deals with money and money encompasses everything in itself. There is a need for everyone to manage money as some point or the other to take decisions which requires everyone to know mathematics. Business mathematics is used by commercial enterprises to record and manage business operations. Commercial organizations use mathematics in accounting, inventory management, marketing, sales forecasting, and financial analysis. Business mathematics also includes statistics and provides solution to business problems. https://www.educba.com/what-is-business-mathematics/

Empirical Studies

The following researchers' works are reviewed in order to serve as a basis for this present work. Gallo and Johnson (2008) were interested in determining what factors influence a student's ability to apply basic Mathematics knowledge in applied settings. They did so by administering a two part Mathematics examination to 696 students enrolled in various economics courses ranging from principles to upper level applied courses. This first part of the examination contained a set of 15 multiple choice questions designed to test basic Mathematics skills that students should have mastered in high school or in a college algebra class. In the second part of the examination, students were given a series of three problems containing practical uses of basic Mathematics knowledge. The scores on the two parts allowed the researchers to directly correlate a student's basic Mathematics aptitude with their ability to solve simple applications of Mathematics. The results indicated that students who took advanced Mathematics courses performed significantly better on the test, while the effect was negative for students who had only taken algebra. It is important to mention that there was a positive correlation between the performance on test one and the Mathematics courses students took which could be reducing the positive impact of Mathematics courses on student performance. Therefore, a credit in

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Mathematics is justified in this case and it is equally expected of students in Federal Colleges of Education to do well in Financial Accounting.

This study established the need for high level performance in Mathematics before the knowledge can be appropriately put to use in applied cases such as in Financial Accounting. The population of the researchers was adequate with the instrument employed but failed to give the sample size of the study. However, this work has benefitted from the literature review of the study. Likewise, Yunker, Yunker and Krull (2009) conducted a study on "The Influence of Mathematics Ability on Performance in Principles of Accounting". The study sought to determine the effect of Mathematics skill on academic success in accounting in two ways. First, their intention is to statistically estimate the *incremental* effect of Mathematics ability on performance in principles of accounting, holding constant other important determinants. Mathematics ability is obviously correlated with general intellectual ability. The methodology of this research was empirical. At the beginning of the semester, students were given Mathematics pre-test. The test items covered certain areas especially relevant to accounting. After the end of the semester, each student's performance on the Mathematics pre-test (overall and in each area) was matched with his/her overall performance in the principles of accounting course. Regression analysis of the data indicates that: (1) the positive effect of Mathematics skills on accounting performance is strongly significant; (2) controlling for the student's general ability and other key factors bearing on accounting performance, the measured incremental effect of Mathematics skill on performance is quite small; (3) in numerical terms, the measured incremental effect of the different branches of Mathematics on accounting performance is very similar.

The Mathematics pre-test instrument was administered unannounced on the first day of class in all sections of Principles of Accounting I and II at a regional Midwestern public university at the beginning of the fall semester, 2005. Virtually all students enrolled in the Principles sequence took the test, for which 25 minutes was allowed. Within two weeks of taking the pre-test, each student respondent received a personalized feedback report containing a list of the questions together with the respective correct answers and percentages of respondents answering correctly. Although this study added to literature review of this study, but it has only replicated the conclusion of other works cited earlier establishing a correlation between knowledge of Mathematics and Financial Accounting skills. However, the present study seeks to ascertain whether Business Mathematics offered in NCE 1 has any significant effect on students' performance in Financial Accounting that is offered subsequently in NCE 2. To this effect, the current study is targeted at NCE 1 and 2 where Business Mathematics and Financial Accounting are actually offered. It is, however, worthy to note that virtually all the works had concentrated on students supposed entry behavior in Mathematics without ascertaining the authenticity of such claimed behavior as expressed in the students' entry certificate requirement such as the O'level certificate. More so, none has been able to actually ascertain continuity and relevance of this claimed Mathematics background. The

foregoing are the gaps noted which this study has closed by deploring to consider Business Mathematics at the NCE 1 level as a pre-requisite knowledge to Financial Accounting in NCE II.

METHODOLOGY

The research design adopted for this study was ex post facto research design. This design was employed to determine the effects of performance in Business Mathematics on students' performance in Financial Accounting from existing data in three Federal Colleges of Education in North-Central States of Nigeria. Ex post facto research design is ideal for this work because students' profile records was used which could not be manipulated by the researcher. This is line with Simon and Goes (2013) who stated that ex post facto design is ideal for conducting social research when it is not possible or acceptable for the researcher to manipulate the characteristics of human participants. It is a substitute for true experimental research or quasi experimental research and can be used to test hypothesis about cause and effect. The population of this study was made up of all the NCE 2 students' profile in Business Education Department in all the three Federal Colleges of Education in the North Central States of Nigeria for the 2011–2012 sessions. The population of the study was 445 students made up of both males and females. Krece and Morgan (1970) recommended a sample size of at least two hundred and fifty-four should be considered for a population of seven hundred and fifty which is about 34%. However, for a wider coverage and generalization of the findings the researcher used four hundred and forty-three (443) respondents made up of NCE 2 Business Education students from the population of four hundred and forty-five (445) students from three Federal Colleges of Education in North Central States in Nigeria represented the sample. The sample size consists of all the students who wrote both subjects. This method was used to avoid any element of bias in the choice of the sample population for the study. The measuring instrument that was used in this study were the NCE 1 Business Mathematics and Financial Accounting NCE 2 records from the departments of Business Education in three Federal Colleges of Education in North Central States of Nigeria for 2010-2011 and 2011/2012 sessions. Secondary data on performance in Business Mathematics and Financial Accounting were collected on ordinal scale, that is A, B, C, D, E and F with percentage scores (see Table 3.2). The highest grade was A while the lowest grade was F. These grades were coded into their numerical equivalents i.e. 5 (70-100), 4 (60-69), 3 (50-59), 2 (45-49), 1(40-44) and (0 – 39) F respectively from A to F. All the data were analysed in stages, descriptive statistics of frequency counts and middle point was used for Business Mathematics and Financial Accounting grades data of respondents. Each student scores of first and second semesters in both subjects were summed up and divided by 2 in order to find the average score. Also, frequency, percentage scores, mean scores, range were used for answering research questions in order to compare the two subjects means and level of percentages of passing or failing. Instrument used for null hypotheses was t-statistics test. T–test was used for testing null hypotheses one to four since it was a test of effect. Nworgu, (1991) affirms this that t-test proves to be one of the most effective methods of comparing two group means. All the null hypotheses

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were tested at 0.05 level of significance. The data was analyzed using SPSS Statistics version 17.0 where P-value approach, short for probability. Instead of comparing t-scores as in classical approach, the researcher compared probabilities. Paired sample t-test was used to test null hypotheses 1 to 3 while independent t-test was employed for null hypotheses three and four to test for gender difference in the mean scores of the students in department of Business Education in Federal Colleges of Education, North Central States of Nigeria.

Decision rule: If the mean grade of Business Mathematics is equal or greater than that of Financial Accounting, it was concluded that Business Mathematics has positive effect on Financial Accounting; on the other it has negative effect. That is, it is related and not related respectively. On the basis of making scientific decision, (0.05) was used as the level of significance. In testing the Ho, the null hypothesis is being rejected when the p-value is less than the level of significance (0.05) and accepted when greater than the level of significance

Data Analysis

Research Question 1: *To what extent does the attainment of credit grade and above in Business Mathematics have effect on students' performance in Financial Accounting in the department of Business Education in Colleges of Education in the north central zone of Nigeria?*

This research question attempted to determine the effect of credit grade and above in Business Mathematics on performances of students in Financial Accounting in Federal Colleges of Education North Central States, Nigeria. Summary of the responses to research question is shown in Table 4.2.1

Table 4.2.1: Frequencies, percentages and means of students' performances in Business Mathematics and Financial Accounting at credit grade and above

Scores/grades	*Frequencies*		*Percentages*		*Means*	
	Bus. Maths	*Fin Acc*	*Business Maths(%)*	*Financial Acc(%)*	*Business Maths*	*Fin Acc*
70- 100	9	22	4.8	11.9		
60 -69	43	36	23.2	19.4		
50 – 59	133	52	72.0	28.1	57.54	52.69
45 – 49	-	26	-	14.1		
40 – 44	-	23	-	12.4		
0 – 39	-	26	-	14.1		
Total	**185**	**185**	**100**	**100**		

Source: Field study, 2013

Table 4.2.1 shows that 9 respondents representing 4.8% had 70 – 100 scores in Business Mathematics while 22 respondents representing 11.9% had 70 – 100 scores in Financial Accounting, 43 respondents representing 23.2 % had 60 – 69 scores in Business Mathematics while 36 respondents representing 19.4% had 60 – 99 scores in Financial Accounting, 133 respondents representing 72% had 50 – 59 scores in Business

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Mathematics while 52 respondents representing 28.1% had 50 – 59 scores in Financial Accounting, 46 respondents representing 14.1% had 45 – 49 in Financial Accounting, 23 respondents representing 12.4% had 40 – 44 in Financial Accounting other 26 respondents representing 14.1% had 0 – 39 in Financial Accounting. The mean scores in Business Mathematics and Financial Accounting stood at 57.54 and 52.69 respectively. It was concluded that credit grade and above in Business Mathematics have positive effect on students' performance in Financial Accounting since the mean of Business Mathematics was greater than Financial Accounting.

Research Question 2: *To what extent does the attainment of pass grades in Business Mathematics have effect on students performances in Financial Accounting offered in the department of Business Education?*

This research question attempted to determine the effects of pass grades in Business Mathematics on performances of students in Financial Accounting in Federal Colleges of Education North Central States, Nigeria. Summary of the responses to research question is shown in table 4.2.2

Table 4.2.2: Frequencies, percentages and means of students' performances in Business Mathematics and Financial accounting at pass grades

Scores/grades	*Frequencies*		*Percentages*		*Means*	
	Bus. Mathematics	*Financial Acc*	*Business Mathematics(%)*	*Financial Acc(%)*	*Business Mathematics*	*Fin Acc*
70 – 100		-				
60 - 69	-	6	-	4.2		
50 – 59	-	24	-	16.9		
45 - 49	56	24	39.7	16.9	43.80	41.94
40 – 44	86	34	60.3	24.0		
0 – 37	-	54	-	38.0		
Total	**142**	**142**	**100**	**100**		

Source: field study, 2013

Table 4.2.2 shows that 6 respondents representing 4.2% had 60 -69 scores in Financial Accounting while none in this category in Business Mathematics, 24 respondents representing 16.9% had 50 – 59 scores in Financial Accounting while none in this category in Business Mathematics, 56 respondents representing 39.7% had 45 – 49 in Business Mathematics while 24 respondents representing 16.9% had 45 – 49 in Financial Accounting, 86 respondents representing 60.3% had 40 – 44 in Business Mathematics while 34 respondents representing 24% had 40 – 44 in Financial Accounting. Also, Business Mathematics had 43.80 mean score while Financial Accounting had 41.94. Therefore, pass grades in Business Mathematics was considered to have positive effect on the students' performance in Financial Accounting in Federal Colleges of Education in North Central States of Nigeria with mean scores of 43.80 and 41.94 respectively.

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Research Question 3: *To what extent does the attainment of fail grade in Business Mathematics have effect on students' performance in Financial Accounting in the department of Business Education in Colleges of Education in the north central zone of Nigeria?*

This research question attempted to determine the effect of students' fail grade in Business Mathematics on their performance in Financial Accounting in Federal Colleges of Education North Central States, Nigeria. Summary of the responses to research question is shown in Table 4.2.3

Table 4.2.3: Frequencies, percentages and means of students' performances in Business Mathematics and Financial Accounting at fail grade

Scores/grades	*Frequencies*		*Percentages*		*Means*	
	Bus. Maths	*Fin Acc*	*Business Maths(%)*	*Financial Acc(%)*	*Business Maths*	*Fin Acc*
70- 100	-	2	-	1.5		
60 -69	-	4	-	2.9		
50 – 59	-	12	-	8.8	32.06	39.21
45 – 49	-	17	-	12.5		
40 – 44	-	39	-	28.7		
0 – 39	136	62	100	45.6		
Total	**136**	**136**	**100**	**100**		

Source: Field study, 2013

Table 4.2.3 shows that136 students representing 100% failed Business mathematics with their scores ranging from 0-39 as against 2 respondents representing 1.5% with scores ranging from70-100 in Financial Accounting. 4 respondents representing 2.9% had 60 – 69 scores in Financial Accounting, 12 respondents representing 8.8% had 50 – 59, 17 respondents representing 12.5% had 45 – 49 in Financial Accounting, 39 respondents representing 28.7% had 40 – 44 and 62 students representing 45.6% also failed Financial Accounting with their scores ranging 0-39. The mean score of fail grade in Business mathematics stood at 32.06 while that of Financial Accounting was 39.21. By this result, fail grade in Business Mathematics was considered as having negative effect on performance in Financial Accounting as the mean scores of the two are on fail grade rating.

Research hypotheses

This section showed the summary of the test of the five research hypotheses formulated for the study. Details of the responses from students' profile that constitute the respondents for the study from three Federal Colleges of Education in North Central States of Nigeria.

Hypothesis one

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Credit grade and above in Business Mathematics have no significant effect on performance of students in Financial Accounting in the department of Business Education in Federal Colleges of Education, North Central States of Nigeria.

This research hypothesis attempted to determine effect of credit grade and above in Business Mathematics on performance of students in Financial Accounting in Federal Colleges of Education North Central States, Nigeria. To analyse this, paired sample t-test was used to test this hypothesis 1. The summary is as presented in Table 4.

Table 4 Paired Samples t-test on the effect of students' performances in Business Mathematics and Financial Accounting at credit grade and above

Variables	*N*	*Mean*	*SD*	*t-cal*	*t-crit*	*df*	*P-value*
Business Mathematics/ML	165	57.52	6.83				
				7.57	1.96	164	0.001
Performance in Financial Accounting	165	52.11	13.08				

Source: Field Study, 2013

From Table 4.3.1, the mean of Business Mathematics was 57.52 and the standard deviation stands at 6.83 as against the mean of 52.11 and standard deviation of 13.08 for students' performance in Financial Accounting. The t-calculated was 7.58 and the t-critical stands at 1.96. This is also seen in probability value of 0.001 less than the alpha level of 0.05 (0.001 < 0.05). This means that the null hypothesis that states that credit grades and above in Business Mathematics have no significant effect on performances of students in Financial Accounting in the department of Business Education in Federal Colleges of Education, North Central States of Nigeria is therefore rejected. These implied that credit grade and above in Business Mathematics have significant effect on performances of the students in Financial Accounting.

Hypothesis two

Pass grades in Business Mathematics have no significant effect on the performance of students in Financial Accounting offered in the department of Business Education in Federal Colleges of Education, North Central States of Nigeria.

This research hypothesis attempted to determine the effect of pass grades in Business Mathematics on performances of students in Financial Accounting in Federal Colleges of Education North Central States, Nigeria. The summary is as presented in Table 4.3.2

Table 5: Paired Samples t-test on the significant effect of students' performances in Business Mathematics and Financial Accounting at pass grades

Variables	*N*	*Mean*	*SD*	*t-cal*	*t-crit*	*Df*	*P-value*
Business Mathematics/PL	142	43.81	3.06				
				3.67	1.96	141	0.037
Performance in Financial Accounting	142	41.92	10.30				

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Source: Field Study, 2013

Table 5 reveals that the mean of Business Mathematics was 43.81 and the standard deviation stood at 3.06 as against the mean of 41.92 and standard deviation of 10.30 for students' performance in Financial Accounting. The t-calculated is 3.67 and the t-critical stood at 1.96. This is also seen in probability value of 0.037 less than the alpha level of 0.05 (0.037 < 0.05). This means that the null hypothesis that states that pass grades in Business Mathematics have no significant effect on performances of students in Financial Accounting offered in the department of Business Education in Federal Colleges of Education, North Central States of Nigeria is therefore rejected. The result of paired sample t-test above clearly indicates that there is a significant effect in the mean score of students obtained in Business Mathematics at pass level and their general performances in Financial Accounting. This implied that pass grades in Business Mathematics have significant effect on performances of students in Financial Accounting.

Hypothesis Three

Fail grade in Business Mathematics have no significant effect on the performances of students in Financial Accounting in the department of Business Education in Federal Colleges of Education, North Central States of Nigeria.

This research hypothesis attempted to determine the significant effect of fail grade in Business Mathematics and students performances in Financial Accounting in Federal Colleges of Education North Central States, Nigeria. To analyse this, paired sample t-test was used to test this hypothesis 3. The summary is as presented in Table 4.3.3.

Table 4.3.3 Paired Samples t-test on the effect of students' performances in Business Mathematics and Financial Accounting at fail grade

Variables	*N*	*Mean*	*SD*	*t-cal*	*t-crit*	*df*	*P-value*
Business Mathematics/FL	136	32.06	4.70				
				7.03	1.96	135	0.000
Performance in Financial Accounting	136	39.21	11.52				

Source: Field Study, 2013

From Table 4.3.3, the mean of Business Mathematics was 32.06 and the standard deviation stood at 4.70 as against the mean of 39.21 and standard deviation of 11.52 for students' performance in Financial Accounting. The t-calculated was 7.03 and the t-critical stood at 1.96. This is also seen in the observed probability value of 0.000 less than the fixed alpha level of 0.05 (0.000< 0.05). This means that the null hypothesis that states that fail grades in Business Mathematics have no significant effect on the performances of students in Financial Accounting in the department of Business Education in Federal Colleges of Education, North Central States of Nigeria was therefore rejected. This implied that fail grades in Business Mathematics have significant effect on the performance of the students in Financial Accounting because majority of those that failed

in Business Mathematics also failed in Financial Accounting. The mean difference was 7.15 which showed that the difference is statistically significant to reject the hypothesis.

DISCUSSION OF MAJOR FINDINGS

Based on the research questions and hypotheses analyzed, the following are the major findings as stated and discussed.

1) Those with credit grades and above in Business Mathematics performed equally good in Financial Accounting with mean scores of 57.53 and 52.69 respectively which is positive. This has revealed that Business Mathematics has positive effect on students performance in Financial Accounting with p-value of 0.001<0.05.
2) Students' who had pass grades in Business Mathematics also performed averagely in Financial Accounting in Federal Colleges of Education in North Central States of Nigeria with mean scores of 43.80 and 41.94 respectively which is positive. This reveals that Business Mathematics has positive effect on students' performance in Financial Accounting with p-value of 0.037 <0.05.
3) Students who failed Business Mathematics performed poorly in Financial Accounting in the three Federal Colleges of Education in North Central States of Nigeria with mean scores of 32.05 and 36.33 respectively which is negative. This reveals that poor performances in Business Mathematics also have negative effect on students performances in Financial Accounting with p-value of 0.000<0.05.

On the whole, research questions one, two and three and hypotheses one, two and three ascertain the extent to which attainment of credit/pass/fail grades in Business Mathematics by students have significant effects on performances in Financial Accounting in the department of Business Education in Federal Colleges of Education North Central States of Nigeria. It was revealed that credit or pass grades in Business Mathematics have positive significant effect on performance in Financial Accounting in Federal Colleges of Education North Central States of Nigeria. In like manner, fail grade equally have significant negative effect on performance in Financial Accounting in Federal Colleges of Education North Central States of Nigeria. Gist (1996) supports this finding that mathematics/algebra/calculus performance of students relate to success in introductory accounting classes. The study reveals that students who had received a grade of "C" or better in calculus did better than other students in an introductory level accounting course. Likewise, Williams (2009) affirms this finding by supporting the existence of a relationship between ability in high school algebra course and the success in high school introductory accounting course. To him, there is a relationship between the students' performance in Mathematics and Financial Accounting at secondary schools. Other related studies on the same area include Suleiman and Mohezar (2006) study on Master of Business Administration students. They utilized just correlation analysis. Work experience, gender, age, and ethnicity were concluded as not significant in academic performance.

CONCLUSION

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Based on the findings of this study, it was concluded that performances in Business Mathematics either at pass, credit or fail grades have significant effects on Financial Accounting. Also, this effects are considered largely none gender discriminatory especially on the consideration of the effect at credit grade level and above. Since the study has revealed that those students that are not performing well in Business Mathematics will equally not do well in Financial Accounting, it can be concluded that there will be increased pressure of change of options from accounting option to others. This can lead to overall poor performance of students and possible increasing drop-out rate. It can also lead to poor enrolment of students in accounting option which will result into insufficiency in the number of accounting teachers in the society.

RECOMMENDATIONS

Based on the findings and conclusion of the study, the following recommendations are made:

1) To avoid mass failure in Financial Accounting, students must pass Business Mathematics at NCE 1 before proceeding to NCE 2 Financial Accounting. This implies that a pass in Business Mathematics in NCE I should be made a prerequisite for students' enrolment into Financial Accounting course in NCE II.
2) Business Mathematics should be introduced at secondary school level for commercial students in order to prepare them for task ahead in the department of Business Education. This could be incorporated into the curriculum of secondary school as it is done in Further Mathematics to prepare science oriented students.
3) Candidate opting to read Business Education in Colleges of Education should be required to write Business Mathematics as against general Mathematics as presently the case. This may further guarantee content relevance.

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