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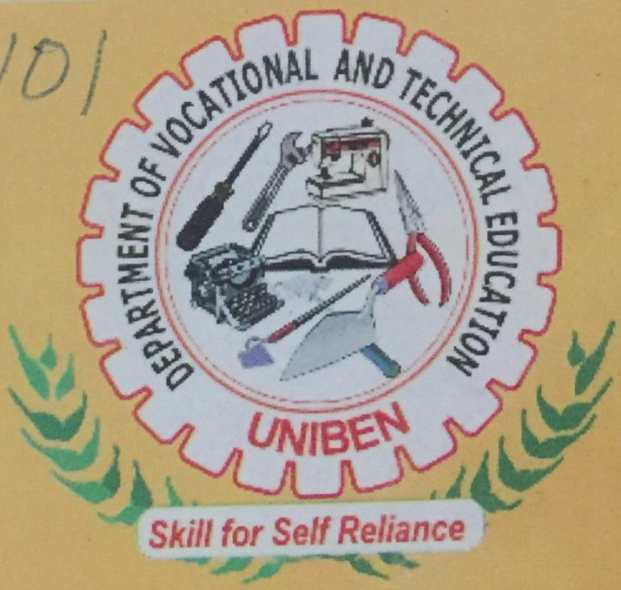

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CONTENTS

EFFECTS OF JIGSAW AND LECTURE BASED TECHNIQUES ON CLASS ATTENDANCE, PARTICIPATION AND PROFICIENCY OF UNDERGRADUATE STUDENTS IN BUSINESS MATHEMATICS IN NIGERIA

Adamu Ibrahim Ph.D & Jibril .A. Haruna
Department of Vocational and Technical Education
Ahmadu Bello University Zaria, Nigeria.
Email: adamugadabs@gmail.com or adamugadabs@yahoo.com
Phone Number: +2348036830544

and

Bashir A. Usman
Department of Science Education
Federal University of Technology Minna, Niger State

Abstract

The Study compared the effectiveness of two methods of teaching on Class Attendance, Participation and Proficiency of Undergraduate Students in Business Mathematics in Nigeria. Quasi experimental design was adopted in the study. The population of the study constitutes the 110 undergraduate students that offered business mathematics (VTEB 205) in 2011/2012 academic session in Ahmadu Bello University Zaria. The entire 110 students were used for the study. Scores obtained from attendance, participation and problem solving skills and performance were used for testing the four null hypotheses. The validity of the instruments used for this study was established by board examiners in department of vocational and technical education in Ahmadu Bello University, Zaria. Data obtained from the instruments were coded into Statistical Package for Social Sciences (SPSS) 18. The package was

used to run z-test for test of the hypotheses at p≤.05 level of significance. The study revealed among others that, students in Jigsaw technique were more regular and more skillful in business mathematics compared to their counterparts in conventional lecture method. It was recommended among others that, lecturers should develop a paradigm that shift from conventional lectures method which is teacher centered to jigsaw technique which is more of student centered.

Key words: Jigsaw Lectures, Attendance, Participation, Proficiency, Business Mathematics

Introduction

At undergraduate level, business mathematics is one of the core subjects to all business education students in Nigerian universities. Success of students in this area is critical as proficiency in the area serves as a portal that leads students' mastering of other core subjects such as Accounting, Element of Finance and Statistics. This therefore means that students with problem in the area have miss vital opportunities to gain essential skills that will help them develop their emotional disposition in the school. Handling this course at university level requires lecturer with considerable expertise in the subject matter and good teaching skills. This explains why Schoenfeld (2002) maintained that teacher that lack essential teaching skills will contribute to disenfranchisement of students in schools.

The emotional disposition of students which helps to build positive attitude and interest of students in a class depend on the strategy adopted by teacher. Scholars are of the opinion that strategies adopted by teacher will strengthen desirable actions and attitudes of students in teaching and learning environment. Commenting on this, Denise & Sally (2000) stated that strategy, curiosity and creativity of teacher have impact on disposition, interest and attitude that flourish students in the classroom. In line with this, Bertram and Pascal (2002) identified that disposition to learn, social competence and social & emotional well-being of students are the three core elements of effective learners. It then follows that teaching strategy promotes students

interest, attitude, interpersonal relationships, higher self-esteem, competencies and increases interaction among learners (Tinto, 1993). No wonder, Darling & Hammond (1995) posits that the quality of teaching strategy is the key to boost the success of students' attitude, interest and proficiency.

In a quest to promote class attendance, participation and proficiency in a subject, growing evidence shows from scholars such as Day (2000) shows that, in order to sustain student energy, participation and enthusiasm for the work, teachers must maintain personal commitment to the job. He maintained that, teacher commitment to job will help increase students' proficiency in the learning process. Similarly, Kazemi (2012) reported that when students are exposed to Jigsaw strategy, it encourages them to become engaged in their learning, motivates them to learn a lot of materials quickly and inspires them to share information with peers. Research by Lucas (2000) has shown that jigsaw teaching strategy promote interest, attitudes and give room for students active participation in the class. Altıparmak & Nakipoğlu (2005), Avşar & Alkış (2007), Aydın (2009) Karakoyun (2010) and Efe (2011) all agreed to that jigsaw teaching method motivates students, enhance their academic achievements and help in developing in them positive attitudes towards the course. Recently Sare & Yasemin (2013) Mbacho & Johnson (2013), Wael (2014) among others reported that Jigsaw technique-based encourages students' participation and provide them with the opportunity to explain, explore and discuss each other's perspectives, which lead to greater understanding and mastery of the course. These prompted the researcher to investigate the effect of jigsaw teaching technique on attendance, participation and proficiency of students in business mathematics.

Statement of the problem

In Nigeria, business mathematics is one of the core subjects to all undergraduate in business education regardless of their area of specialization. Students in this programme must register and pass the course before graduation. To achieve this, a credit pass in mathematics at ordinary level is considered as one of the basic requirements for

candidates who applied for the programme at university level in the country. It is then hope that grades obtained in mathematics at ordinary level will help in building confidence and skills of business education students in accounting, element of finance and mathematics at university level.

Despite the strategy adopted to promote students' attitude and skills in business mathematics, comparative analysis revealed that the attitude of undergraduate students in the course is not as well as expected. In business mathematics class, students' attendance, attitude, participation and proficiency in the subject are not encouraging when compared to other courses in the programme. In an attempt to solve this problem, many researchers in the teaching profession have cited the importance o teaching methodology in a way to promote students interest, attitude and proficiency in their classrooms. Some scholars come to the point that in jigsaw teaching technique when students interact with each other to get out of a problematic situation of learning. These give the researchers the impetus to compare the effect of jigsaw and lecture based techniques on class attendance, participation and proficiency of undergraduate students in Business Mathematics in Nigeria

Objectives of the study

Specifically, the study wishes to:-

1. determine the difference in the mean attendance of undergraduate students taught business mathematics using jigsaw and those taught using conventional lecture method;

2. determine the difference in the mean participation of undergraduate students taught business mathematics using jigsaw technique and those taught using conventional lecture method;

3. determine the difference in the attitude of students towards business mathematics that taught were taught using jigsaw technique and those taught using conventional lecture method; and

4. determine the difference in the problem solving skills of undergraduate students that were taught business mathematics using jigsaw technique and those taught using conventional lecture method.

Null Hypotheses

The following null hypotheses were formulated and tested using z-test at significance level of 0.05

1. There is no significant difference in the mean attendance of undergraduate students taught business mathematics using jigsaw and those taught using conventional lecture method

2. There is no significant difference in the mean participation of undergraduate students taught business mathematics using jigsaw technique and those taught using conventional lecture method.

3. There is no significant difference in the attitude of undergraduate students towards business mathematics that were taught using jigsaw technique and those taught using conventional lecture method

4. There is no significant difference in the problem solving skills of undergraduate students that were taught business mathematics using jigsaw technique and those taught using conventional lecture method.

METHODOLOGY

Research Design

The study employed a quasi experimental design. The design implies the used of two groups (Jigsaw and Conventional lecture). The researchers used regular students in 2011/2012 academic session.

Population and Sample for the Study

The population for this study constitutes all students that offered business mathematics (VTEB 205) in 2011/2012 academic session in Ahmadu Bello University, Zaria which was 110. Although Glenn (2009) suggested that at precision level of ±5% for a population of 100, the sample size of 80 should be used. However, in order to enable the researchers get reasonable representation for the study, the entire 110 students were used for the study.

Instrument for Data Collection

Four instruments were used in this study. The instrument used to test null hypothesis one was students attendance register. Scores obtained from students' participation in classroom was used to test null hypothesis two. The researcher scored students for their confidence in the classroom interaction to test their attitude towards business mathematics in null hypothesis three, while scores obtained from the achievement test problem solving skills.

In order to ensure the content and construct validities of the instrument, draft copies were given to board examiners in department of vocational and technical education in Ahmadu Bello University, Zaria to assess the suitability of the instruments. Their professional recommendations were well integrated in the final copy. The reliability of the instrument used to determine problem solving skills was established through pilot study. The instruments were distributed to students who were not involved in the study but had taken the course in 2010/2011 academic session. The data collected from pilot study was subjected into Cronbach's alpha for the internal consistency reliability, the result revealed reliability coefficient of 0.78.

Procedures for Data Collection

A novel policy and scores was allocated on students' attendance, participation and confidence in participation in the classroom. To have accurate records on these, the researchers personally recorded and handled all the documents. Instrument used to collect data for the test null hypothesis four was titled Jigsaw and problem solving skills (JPSS).

In collecting the data used for this test, the researchers taught course in line with the university approved course contents. At the end of the first semester, the diagnostic test was administered to students. The instrument which was invigilated and retrieved by the researchers and research assistant lasted for 2.15 hours. The scripts of the diagnostic test were marked using the drawn marking.

Data Analysis

Data collected was coded information was keypunched and verified by computer network personnel. The data were then analyzed by computer using the computer program language of the Statistical Package for the Social Sciences (SPSS) 18. The z-test analysis was used to test the four null hypotheses at $p \leq .05$ level of significance.

Findings

The result of test of null hypothesis one is presented in Table one

Hypothesis One: There is no significant difference in the mean attendance of undergraduate students taught business mathematics using jigsaw and those taught using conventional lecture method

Table 1: Z-test Analysis for difference in the attendance of students taught business mathematics using jigsaw and those taught using conventional lectures method

Teaching technique	N	Mean	Std. Dev	Df	z-test	z-crit	Sig. (2-tailed)
Jigsaw based technique	55	81.5	4.54	108	2.01	1.96	.001
Conventional lectures method	55	59.96	2.84				

The test of hypothesis in Table 1 revealed mean score of 81.5 with standard deviation of 4.54 for attendance of students taught business mathematics using jigsaw technique against 59.96 and 2.84 for those in

conventional lectures method. The z-test value was greater than the table value (2.01>1.96) while the P<0.05. The result of the analysis shows there is difference in the class attendance of undergraduate students that were taught using jigsaw based technique in business mathematics and those that were taught using conventional lectures method. Therefore the hypothesis was therefore not retained.

Hypothesis Two: There is no significant difference in the mean participation of undergraduate students taught business mathematics using jigsaw technique and those taught using conventional lecture method.

Table 2 present the z-test analysis used to test null hypothesis two

Table 2: T-test Analysis for difference in the participation of students taught business mathematics using jigsaw and those taught using conventional lecture method.

Teaching technique	N	Mean	Std. Dev	Df	z-test	z-crit	Sig. (2-tailed)
Jigsaw based technique	55	70.09	3.11	108	2.66	1.96	.000
Conventional lectures method	55	57,99	2.71				

Z-test analysis used in the test of null hypothesis two indicates the students who were taught using jigsaw technique had mean score of 70.09 against 57.99 for those in conventional lectures method with standard deviation of 3.11 and 2.71 respectively. The calculated z-value was 2.66 against 1.96 for critical value. The probability value was .000 found to be less that alpha value of 0.05. Based on the result, the analysis shows that difference exists in the participation of students that

were subjected to different teaching method. The null hypothesis two is therefore not accepted.

Hypothesis Three: There is no significant difference in the attitude of undergraduate taught business mathematics using jigsaw technique and those taught using conventional lecture method

Analysis of data used to determine the difference between the two groups of students in null hypothesis three is presented in Table 3

Table 3: Z-test Analysis for difference in the attitude of undergraduate students taught business mathematics using jigsaw technique and those taught using conventional lecture method

Teaching technique	N	Mean	Std. Dev	df	z-test	z-crit	Sig. (2-tailed)
Jigsaw based technique	55	76	2.54	108	1.98	1.96	.001
Conventional lectures method	55	57.1	2.12				

Z-test analysis was used for test of differences that exist between undergraduate students taught using jigsaw and those taught using conventional teaching technique. The result is presented in Table 3 revealed mean score of jigsaw to be 78 and that of conventional lecturers' method was 57.1 with standard deviation of 2.54 and 2.12 respectively. Z-cal was 1.98 greater that z-crit of 1.96. The probability value stood at .001 < 0.05. Therefore the null hypothesis was therefore rejected, hence significant difference exits in the attitude of the two groups towards business mathematics.

Hypothesis Four: There is no significant difference in the problem solving skills of undergraduate students that were taught

business mathematics using jigsaw technique and those taught using conventional lecture method.

Z-test analysis for test of null Hypothesis five is presented in Table five.

Table 4: Z-test Analysis in the problem solving skills of BES taught BM using JT and those taught using CLM.

Teaching technique	N	Mean	Std. Dev	df	z-test	z-crit	Sig. (2-tailed)
Jigsaw based technique	55	87.10	2.99	108	3.11	1.96	.000
Conventional lectures method	55	59.75	2.51				

The result is presented in Table 4 revealed the mean score of the Jigsaw group to be 87.10 and that of Conventional lectures was 59.75 with standard deviation of 2.99 and 2.51 respectively. Z-cal was 3.11 found to be greater that z-crit of 1.96. The probability value stood at .000 < 0.05. Therefore the hypothesis which states that there is no significant difference in the problem solving skills of undergraduate students taught business mathematics using jigsaw technique and those taught using conventional lecture method was rejected.

Discussion of the findings

The result of test of null hypothesis one revealed that students taught using Jigsaw technique were more regular in the class compare to their counterparts taught using traditional teaching method. This finding collaborate with that of Felder (1997) who maintained that student grades are improved, they show longer retention of information, transfer information better to other courses and disciplines and have better class attendance when jigsaw teaching technique is employed. Solomon, Watson, & Battistich (2002) reported that jigsaw technique has positive effects on interpersonal attitudes, behaviors, values,

class attendance and skills. In the same lane, Tsay, Miranda (2010) observed that jigsaw teaching technique increase attendance, time on task, enjoyment of school and classes, motivation, and independence of students.

Another finding of the study shows that students taught using jigsaw participate in classroom more their counterparts taught using conventional lecture method. The result is in agreement with Bligh (1972) who reported that, collaborative learning fosters a higher level of students' participation in classroom activities. According to Kulick & Kulick (1979), in cooperative learning structures students' critical thinking skills increase, their retention of information and interest in the subject matter improves, develops a very positive attitude because their self esteem is enhanced. He stressed that these creates a positive cycle of good performance building higher self esteem which in turn leads to more participation and interest in the subject. Ibe (2009) who reported that, implementation of metacognitive instruction through think pair share strategy is effective on classroom participation and science achievement of students. Jayapraba & Kanmanim (2012) who reported that there is high level of students' participation in learning activities.

The third finding of the study revealed that jigsaw teaching technique promote students attitude towards business mathematics than their counterparts taught using conventional lectures method. The result is consistent with that of Serrao, Ferreira, & Diniz de Sousa (2000) and Sanchez, Zimmerman, & Ye, (2004) which show that good teaching technique develops more positive attitudes towards a subject. According to Eshun (2004) positive attitudes of students in class is attributed to teaching method adopted. He stressed that, good teaching technique is desirable since they may influence one's willingness to learn and also the benefits one can derive from instruction. The study of Aunola, eskinen and Nurmi (2006) also shows that teacher goals of motivating students may influence through the methods and strategies they adopted in the class.

Fraser and Kahle (2007) maintained that teaching strategies at school accounted for a significant amount of variance in student attitudes and, furthermore, that class ethos had a significant impact on

the attitudes and proficiency of students in class. In addition, Mohamed and Waheed (2011) when reviewing literature aimed at understanding attitudes and the influences on their development in relation to differences between students identified that teacher, and teaching technique play a vital role in influencing student attitudes, proficiency, achievement, anxiety, self-efficacy and self-concept, motivation, and experiences at school.

The result of the fourth hypothesis revealed students in jigsaw technique have better in problem solving skills compare to those in conventional lecture method. This finding is similar with that of Felder (1997) who reported that jigsaw teaching technique creates a higher level of conceptual understanding that promotes critical and problem solving skills of students. Parker (1985), Slavin (1990) Coppola & Lawton (1995) and Gillies (2006) observed that cooperative learning approach helps students learn many things from each other as well as it encourages them to discuss on a topic and make some evaluations on it. The study of Bowen (2000), Levine (2001), Prince (2004, Eilks (2005), Gillies (2006), Hennessy & Evans (2006) and Prichard, Bizo, Stratford, (2006) reported that, cooperative learning can be defined as an approach in which students help each other with an academic issue for a common purpose forming small groups both in and outside the classroom, in which they gain self-confidence, develop their communicative skills, strengthen their problem solving and critical thinking abilities, and participate in teaching-learning process actively.

Conclusion

The study established that teaching technique has some implications on attitude and interest proficiency of undergraduate students towards business mathematics. In this context, the attendance, attitude and proficiency of students taught business mathematics using jigsaw technique was significant and high. Based on this, the researchers therefore concluded that teaching strategies adopted the lecturers has impact on attitude and interest proficiency of students in a course.

Recommendations

Based on the outcome of the study, the researchers recommended that:-

1. it is substantial for business mathematics lecturers to learn how to use jigsaw teaching technique and adopt it classroom. Adopting the method will help to improve the attitude and proficiency of students in the class.

2. business mathematics lecturers should develop a paradigm that shift from conventional lectures method to jigsaw technique which enable students to contribute in the teaching and learning exercise.

3. business mathematics, lecturers should encourage students to actively participate in classroom activities.

4. business mathematics period should be increased as adopting jigsaw teaching technique is time consuming.

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