



EFFECT OF GAME TEACHING METHOD ON STUDENTS' MATHEMATICS RETENTION IN ABOH-MBAISE LOCAL GOVERNMENT AREA, IMO STATE

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ABSTRACT: *The study examined effect of game teaching method on students' retention in algebra (quadratic equation) in Aboh-Mbaise Local Government Area, Imo State. The specific objective was to determine the difference in retention scores of students taught quadratic equation using game teaching method and expository method. Quasi-experimental design was adopted in the study. Purposive sampling technique was used to select 120 students comprising 70 males and 50 females in four schools in Aboh Mbaise Imo State. The instrument used for collecting of data was Quadratic Equation Retention Test (QERT). Instrument was administered to before treatment (pre-test) and administered again after treatment in a alternated form after two weeks (delayed test/ retention test). The reliability coefficient of the instruments was established using Pearson's product moment correlation. which resulted to 0.63. This value indicated that the instrument used for data collection was reliable. Data collected were analyzed using mean and standard deviation. The study found that students taught the concept of quadratic equation using game teaching method have high retention of the concept that those taught with expository method the study recommended that; in order to improve on the retentive capacity of the learners in mathematics game teaching method should be utilized in teaching certain concepts in mathematics especially algebra.*

KEYWORDS: Game-Based Learning, Teaching Method, Mathematics Retention, Nigeria

INTRODUCTION

The mathematics, science and technology standard are the driving force for our educational system today. To stay aligned with the educational standards, teachers must be able to teach Mathematics using various techniques and alternative strategies to reach the learners. This differs from the predominant traditional method of teaching mathematics which consists of memorization of formulae. In the 21st century classroom, a mathematics teacher must integrate technology and non-traditional strategies when teaching mathematics to meet the requirement of the Federal and State government educational standards.

However, despite this important role of mathematics, it still remains one of the subjects in which many students at all levels of school system persistently perform poorly (Ale, 2003; Obodo, 2004; Buhari, 2006; and Ifamuyiwa, 2007). In fact, in 2015 May/June West African Senior Secondary Certificate Examination (WASSCE) results released in August 11, 2015; the national chief examiner of WAEC reported that 61% of all candidates for the examination failed mathematics/English. The 39% that are said to pass include all grades of pass and credit. Some researchers including Moore and Norman (2002), Obioma (2004) and Enuokoha (2005) have observed that some mathematics teachers strike fear into students by the



uninspiring ways they teach their students. Ogwuchi (2002) observed that the teaching of mathematics is characterized by rote memory of basic mathematical processes and abstract presentation of facts and principles.

This poor state of mathematics education in Nigeria is giving a lot of concern to mathematicians and mathematics educators. Although efforts are being made by government, researchers, Mathematics Association of Nigeria (MAN) among many other groups to improve Mathematics Education in Nigeria, achievement in the subject continues to be poor year after year. However, some studies attributed the poor achievement of students in mathematics mostly to the teaching approaches adopted by mathematics teachers in presenting instructions.

Bonwell and Eison (2003) Active learning is a combination of instructions which involves teachers giving directives and students observing, recording, verifying as well as applying the ideas and facts in solving mathematical problems. Game method is kind of active learning approach which efficiently engages learners socially and intellectually on class work. A game is a situation in which two or more participants (the players) confront one another in pursuit of certain conflicting objective. An instructional game is a structured activity with set rules for play in which two or more students interact to reach dearly designed instructional objectives (Brown, 1997). Mathematical games help to satisfy the love of meeting a challenge. For instance, in playing a game a player thinks of his moves and also anticipates the moves of the opponent as well. This can lead to formulating rules for the number of moves needed to win a game or inventing similar games or modifying rules in an existing game. In summary, the five points on concept of games are: The players, the playground, rules of the games, referee and the spectator.

Alemu (2010) in a study conducted in Oromia, Ethiopia examined on the use of active learning approaches in mathematics education at universities. He found that instructional strategy was relevant to the understanding of Mathematics concepts by students. Jerome Bruner's an American great psychologist has made interesting and significant contributions to the course of intellectual development. His major proponent today is known as discovery learning. Bruner emphasizes addition to cognitive structure which a child acquires as he moves from the inactive mode to the symbolic mode. The symbolic mode goes beyond action and imagery and uses of languages. It allows the individual to engage in reflexive thinking to consider propositions as well as concrete examples and to arrange concepts in a hierarchical manner. Game teaching method facilitates learner's ability to critically reason solutions to problems in order to prove superiority to another.

The West African Examination Council (WAEC) chief examiner's reports (2016) have consistently drawn attention to poor performance of students in certain mathematics topics in West African Senior School Certificate Examination (WASSCE) such areas of weakness are in areas of Geometry, Mensuration, algebra, Statistics and Probability.

Purpose of the Study

The key purpose of this study is to examine the effect of Games strategies on Senior Secondary students' retention in mathematics. The study specifically sought to:

1. Determine the difference in the retention scores of students taught the concept of quadratic equation using game and expository method?



2. Determine the difference in the retention of male and female students taught with game and expository method?

Research Question

The following research questions were formulated to guide the study:

1. What is the difference in the retention scores of students taught the concept of quadratic equation using game and expository method?
2. What is the difference in the retention of male and female students taught with game and expository method?

Hypotheses

- There is no significant difference in the retention scores of students taught the concept of quadratic equation using game and expository method.
- There is no significant difference between in the retention of male and female students taught with game and expository method

METHODOLOGY

The research design adopted for this study is quasi-experimental. It implies intact classes in non-randomized pre-test, post-test control group design. The population of this study comprised 850 senior secondary school one (SSS1) students in Aboh Mbaise Local Government Area in Imo State. Simple random sample was used to select 4 secondary schools among the ten senior secondary schools in Aboh Mbaise Local Government Area in Imo State. Two intact SS1 Classes in each of the sampled schools were used for the study. One hundred and twenty (120) Senior Secondary School One (SSS1) students (male and female) for 2016/2017 academic session. Fifty (50) student formed the experimental group in which thirty (30) were male and twenty (20) were female. The control group comprised of 70 students. The instrument used for data collection was Retention Test in Quadratic Equation (RTQE). The research instrument contained 20 multiple choice questions. Each item had four (4) options A, B, C, and D with only one correct answer after validation. The questions were drawn mostly from past WASSCE, NECO and UTME Examination question papers. The draft of the instrument was submitted for validation to two (2) lecturers in the department of science education and the researcher's supervisor, Rivers State University. To further strengthen the research instrument, cronbach alpha was used to determine the reliability coefficient of the instrument, which resulted to 0.66. The coefficient value obtained guaranteed the reliability of the instruments since it is of a high degree. Each correct answer was scored five (5) marks and incorrect answer zero (0) mark. This gave the maximum score of one hundred percent (100%) and minimum score of zero percent (0%). The lesson packages prepared by the researcher were used in the teaching of quadratic Equation based on the two (2) instructional strategies used. The packages contained the same concepts, but with different instructional approaches with respect to experimental group. RTQE was administered to both groups to obtain their level of achievement before treatment was given to both groups. The instrument was then reshuffled and re-administered to students after two



weeks. This is sometimes called delayed test. The data collected were analysed using descriptive statistics (mean and standard deviation). Hypotheses were tested at 0.05 level of significance.

RESULT

Research Question 1: What is the difference in the retention scores of students taught the concept of quadratic equation using game and expository method?

Table 1: Mean and Standard Deviation of Students' Pre-test and Retention test scores by instructional strategies.

Teaching Method	N	Pre – test		Post-test		Gain in Mean
		\bar{X}	SD	\bar{X}	SD	
Game	50	20.08	13.30	71.00	19.36	50.92
Expository/lecture	70	19.40	9.75	45.73	16.96	26.33
Total	120	19.68	11.23	56.38	17.96	36.58

Source: Field Survey, 2019.

The results of data analysis in Table 1 showed that the mean gain (retention test scores pre-test scores means difference) for students taught quadratic equation with game is 50.92. The mean gain of students in the expository strategy is 26.33. This showed that the students taught with game had better retention than their counterparts who were taught using expository/lecture method. This implies that game facilitate retention better than expository/lecture strategy.

Research Question 2: What is the difference in the retention scores of male and female students taught with game and expository method?

Table 2: Mean and Standard Deviation of Students' Pre-test and Retention test Scores by gender and treatment.

Teaching Method	Male						Female					
	Pre-test			Retention-test			Pre-test			Retention		
	N	\bar{X}	SD	\bar{X}	SD	Mean Gain	N	\bar{X}	SD	\bar{X}	SD	Mean Gain
Game	30	19.80	14.86	71.50	19.16	51.70	20	20.50	10.97	71.00	19.65	50.50
Expository/lecture	32	19.09	11.12	46.00	16.96	26.91	38	19.67	8.60	45.50	17.18	25.83
Total	62	19.43	12.93	58.34	17.89	38.91	58	19.97	9.42	58.25	18.03	34.34

Source: Field Survey, 2019.



In the Table 2, the mean gain (i.e Retention-test – pre-test mean difference) for male students taught with games is 51.70 while that of their female counterpart is 50.50. The mean gain for the male students in the expository learning is 26.91 while the female in the same group has the mean gain of 25.83.

Hypotheses

Hypothesis One: There is no significance difference in the retention scores of students taught the concept of quadratic equation using game and taught those using expository method.

Table 2 Summary of Analysis of Covariance (ANCOVA) of Students' Retention and Pre-test Scores Classified by instructional Strategies.

Sources of variance	Df	Sum of Squares	Mean squares	Fcal	Fcrit	Level of Significance
Between Groups	1	3817.17	3817.17	15.23	3.92	S
Within Groups	118	29575	250.64			
Total	119	33393.13	4067.81			

Source: Field Survey, 2019.

Table 3, the computed F-ratio is greater than the F-critical, thus, we reject the null hypothesis two. This implied that there exists significant difference between the retention of mathematics students taught quadratic equation using the two methods. Thus, instructional strategies have significant relationship with students' retention in mathematics

Hypothesis Two: There is no significant difference between the retention score of male and female students taught the concept of quadratic equation using game and expository method.

Table 4: Summary of ANCOVA on Students Retention Scores Classified by gender

Sources of variance	Df	Sum of Squares	Mean Squares	Fcal	Fcrit	Significance
Between Groups	3	1830.60	610.20	2.39	2.68	NS
Within Groups	116	29575.96	254.97			
Total	119	31406.56	865.17			

Source: Field Survey, 2019.

In Table 4, the calculated F-ratio is less than the critical F-ration, thus we accept the null hypothesis four. This implied that, there is no significant difference in the retention scores of male and female students taught quadratic equation by the two strategies. Hence, instructional strategies have no gender discrimination.



DISCUSSION OF FINDINGS

The result showed that students taught using game retained the concept better than those taught using expository/lecture method. This may be because the game helped the students to concentrate on the concept being taught and stimulates their interest in the teaching and learning process. The results of this study is in line with the view of previous researchers such as Awodeyi (1999) and Adeniran (1994) who indicated that students taught using active learning with games cover more materials, retain information long and enjoy the class more than their counterpart. Thus, there is better retention on the students taught using game than expository.

The result of the analysis showed that there is no significant difference between the retention of male and female students taught using active learning with games and expository method. This could be so because any appropriate teaching strategy should be able to help both male and female students to learn and remember facts, apply skills, comprehend concepts, analyze and synthesize principles which are cognitive, effective and social aspect of learning mathematics (Adeniran, 1994).

CONCLUSION

Based on the findings of this study, it is hereby concluded that game enhances students' retention in quadratic equation better than the use of expository\lecture method.

RECOMMENDATION

The following recommendations were made based on the findings of the study;

- Teachers should be encouraged to employ some local games to motivate, stimulate and sustain students' interest thereby enhancing cognitive retention in mathematics.
- In order to improve on the retentive capacity of the learners in mathematics game teaching method should be utilized in teaching certain concepts in mathematics especially algebra.
- Government should establish, equip and fund mathematics resources centers in each educational zone. This will ensure that teachers can go to these centers and learn how to use these games in teaching mathematics concepts.



REFERENCES

- Adeniran T. (1994). The Comparative Effects of Simulation and Games. *Journal of International Multidisciplinary* (1): 11-13.
- Awodeyi, A. F. (2000). The Effects of Teacher-Classroom Variables on Students Achievement in Mathematics. *International Journal of Educational Development (IJED)*, 2(2) 10-13
- Bonwell C. C. & Eison, J. A. (2003). Active Learning: Creating Excitement in the Classroom. Available at *w.w.w.gwu.edup.evichive* retrieved on 20th March, 2013.
- Brown, B. L. (1997). New Learning Strategies for Generation, *Eric Digest* 184, 41,-52.
- Buhari, M. A. (2006). Factors Influencing Students' Performance in Mathematics. *The Mathematics Teachers*, 75 (6), 442-444.
- Chief Examiner Report (2016). West African Examination Council Report.
- Ifamuyiwa, S. A. (2007). Problems Facing Mathematics Teaching and Learning in Nigeria. *Journal of Curricular Studies*, 6(1), 51-55. Bvg.
- Moore, A. A. and Norman, T. M. (2002). *Programme Evaluation in Education*. Onitsha; AwkaMeds.Pub.
- Obioma, G. O. (2004). Sex and Environment as Factors in Secondary Schools Mathematics Achievement. *ABACUS: Journal of Mathematics Association of Nigeria, (MAN)* 15(1), 33-39.
- Obodo, G. C. (2004). Principles and Practice of Mathematics Education in Nigeria, Enugu: Floxtone Press, pp 8-14.
- Ogwuche, J. (2012). Age and Sex as Correlates of Logical Reasoning in Mathematical Ration and Proportion Task. M.Ed. Thesis University of Nigeria, Nsukka.