

EFFECT OF TARGET TASK APPROACH ON STUDENTS' ACHIEVEMENT IN GEOMETRY IN PANKSHIN LOCAL GOVERNMENT AREA OF PLATEAU STATE, NIGERIA

Jonah, D.T. (MMAN, LMAN, Ph.D)^{1*}, Gakbish, J.G. (MMAN)² & Golji, G.G.²

¹ G.S.E Department, Federal College of Education (FCE), Pankshin
Plateau State, Nigeria | talijonah@gmail.com (08067140345),

² Mathematics Department, Federal College of Education (FCE), Pankshin
Plateau State, Nigeria

jgakbish@yahoo.com (08062992269)

Godfreygolji@Gmail.Com (08065541494)

Abstract

This paper investigates and compare the effect of the use of Target Task Approach with the conventional method of teaching Geometry at the Junior Secondary School level and to determine which strategy is more effective in teaching geometry as an aspect of mathematics. It is also aimed at investigating whether gender difference occur with the use of target task approach. The study employed Quasi- experimental design of non- randomized pre-test post-test control group design. A sample two hundred and forty-eight (248) JSS two students were drawn from the population of three thousand eight hundred and forty-five (3, 845) students in Pankshin Local Government Area. Two research questions were raised to guide the study and two null hypotheses were formulated and tested at 0. 05 level of significance. Data were collected using Geometry Achievement Test (GAT) and two set of lesson plan were developed for the experimental and control groups respectively. Research questions answered were answered using Analysis of Covariance (ANCOA) at 0.05 level of significance. The findings revealed Target Task approach was more effective in improving students' achievement than the conventional method. It was also established that the use of Target Task approach did not significantly differentiate between male and female students' achievement scores in geometry. Based the findings of the study, it was recommended that mathematics teachers should be encouraged to use Target Task approach in their mathematics teaching and learning among others.

Introduction

Mathematics education has been the most valuable tool for human development; it is clear that government recognized mathematics education as the greatest investment that the nation can make to bring about civilization, modernization and development (FRN, 2015). In order to realize this quality, education should be sustained and geared towards self-reliant and rapid

technological growth of the nation which hinge on science and technology that play vital roles in all facets of life for the development of the individual and the nation. Eriba (2007) stresses that technology can be viewed for the benefit of mankind, while mathematics is the language of both science and technology. Umar, (2017) observes that without mathematical orientation, is just like a building without a solid foundation. The author explains that mathematics is indispensable to science and technology in every man's activities.

In order to achieve the goal of education in the country, mathematics education needs to be effective in the practical teaching of the subject at all levels. The conventional methods of teaching mathematics have been found not to be effective in enabling students to learn mathematics at the secondary school level. This is evidenced by the continuous low students' achievement in internal and external mathematics examinations (Awondeyi 2004, Salim & Shaibu, 2020).

Research evidences show that secondary school students in Nigeria perform poorly in mathematics because the conventional methods are not motivating and inspiring (Ali, 2005, Abe, 2008 & Dogo, Kyeleve & kurumeh, 2018 & Balarbe, 2019). Despite the fact that mathematics is a core and compulsory subject at both primary and secondary school levels in Nigeria. Mathematics plays a vital role in the study of science, technology, and other mathematically based disciplines. This can confine that mathematics is the corner- stone of human and material development. Therefore, students' low achievement in mathematics is still detrimental to technological growth and the nation's progress (Apnebo, 2002, Obodo, 2004 & Yusuf, 2009). Despite the high position offered to mathematics in Nigeria education system as a compulsory subject, it is highly disheartening that approaches for teaching and learning of the subject at primary and secondary school levels are nothing to write home about.

Ironically, the subject which has assumed such prominence in the society is also that which is most closely related to high failure rate in our educational system and the society at large (Obodo, 2004). The academic achievement in mathematics and science education at the secondary school is assuming an unacceptable dimension in the country. Ochapa and Olanoye (2003), opine that the solution to the ugly situation of low achievement in mathematics is attributed to teaching technique factors of teachers. Kurumeh and Parah (2008) and Azuka (2006) also observe with emphasis on sex difference in mathematics especially geometry achievement of secondary

schools' students. The authors pointed out that gender difference exists in science and mathematics achievement has been linked to the way the subject is being taught.

Kurumeh, (2009) maintains that the inappropriate, inadequate, elitist and Eurocentric teaching techniques and approaches used by mathematics teachers are instrumental to the learner's inability to understand the basic quality of mathematical principles of computation or logical factors involved which leads to low achievement and lack of interest in mathematics. This suggests that the approvals of instruction that are regularly in use are ineffective and introductive to teaching and learning of mathematics. These techniques and approaches rather compound the problems of teaching and learning of the subject.

Presently the consistent low achievement of secondary school students in mathematics has been an issue of concern to parents, teachers, government and education stake holders. It is therefore desirable to investigate a better strategy at the secondary school level as recommended and encouraged by Agwagah (2008) and Kurumeh, (2009) for teachers to use practical applicable project and activity-based teaching approaches which can led them to meaningful understanding capable of arousing and sustaining students' interest. Parents and other stake holders in the education sector wondered if mathematics is gender sensitive (male and female biased). Nasrudeen, Busurat and Debo, (2019) posit that the gender difference in achievement in science and mathematics have been linked to the way the subjects are taught. This is because students' enrolment in mathematics courses and its related disciplines have fewer number of female than male. However, all students at the secondary school should study mathematics.

It is in this note that the study tries to investigate whether the use of Target Task Approach (APP) of teaching secondary school mathematics could improve students' achievement in geometry. Geometry is an integral part of mathematics that deals with the measurement of plane figures and solid shapes, with the use of Target Task as a teaching approach of learning geometry. It could be made lively and meaningful or capable of improving students' achievement. This is because all students would be involved and actively participated in the learning process.

Target Task as a teaching approach in this study refers to an approach where a teacher gives difficult problems to the learners by giving them some worked examples or easier problems that give hints or clue to the presented task or problem. Momoh (2009) observes that Target Task Approach of teaching mathematics is a teaching approach where a major problem (target task)

is poised to the students to tackle with which they students may or may not be able to tackle immediately but an easier problem is given first to be solved which gives a clue to the solution of the problem. This approach offered students opportunity to know more about reality, to see and think mathematically themselves to arrive at meaningful learning and clear understanding towards proper application for better achievement.

Statement of the Problem

The problem of low achievement of secondary school students in internal and external mathematics examinations in Nigeria is a matter of concern. This state of affairs may be due to some uninspiring and poor quality of teaching the subject. The researcher strongly feels that the use of inappropriate teaching strategies constitute a clog in the wheel of students' achievement in geometry therefore Target Task could improve students' achievement in mathematics particularly in Geometry and to determine whether gender difference exist among students. Hence the problem of this study put in a question form is what would the use of Target Task approach to bring into the improvement of students' achievement in geometry?

Purpose of the Study

The main purpose of study was to investigate whether there would be improvement on students achievement taught geometry using Target Task approach and those taught with conventional method. Specifically the delineated purposes of the study were to:

1. investigate the difference between the mean achievement scores of students taught geometry with Target Task approach and conventional method.
2. examine the difference between mean achievement scores of male and female students taught geometry with the Target Task approach.

Research Questions

The following two research questions were raised to guide the study.

1. What is the difference between the mean achievement scores of students taught geometry with Target Task approach and the conventional method?
2. What is the difference between the mean achievement scores of male and female students taught geometry with the Target Task approach?

Hypotheses

The researcher formulated the following two null hypotheses which were tested at 0.05 level of significance.

1. There is no significant difference between the mean achievement scores of students taught geometry using Target Task approach and those taught with conventional method.
2. There is no significant difference between male and female students' mean achievement scores when taught geometry with Target Task approach.

Methodology

The research design used was the quasi-experimental, non-randomized control group pre-test, post-test design. The population of the study consisted of 3,845 JSS two students in 18 government and government grand aided secondary schools in Pankshin Local Government Area. A sample of 248 JSS two students from four schools using intact classes of Junior secondary two schools were randomly assigned to experimental and control groups.

The instrument used for data collection was the Geometry Achievement Test (GAT) and two sets of lesson plans. The GAT was constructed by the researcher with the reliability co-efficient of 0.96. The pre-GAT was reshuffled to obtain post-test with the same content. Both the pre-GAT and post-GAT measured students' academic achievement before and after the experiment. The few sets of lesson plans were based on Target Task learning and conventional approaches. The statistical tool used to answer the research questions was the descriptive statistics of mean and standard deviations. While the null hypotheses were tested using the Analysis of Covariance (ANCOVA) at 0.05 level of significance.

Results and Discussion

The results of the study were presented in tabular form according to the research questions and the null hypotheses that were raised and formulated respectively at 0.05 level of significance as shown below.

Research Question 1. What is the difference between the mean achievement scores of students taught geometry using Target Task approach and those with the conventional method?

Table 1: Summary of Mean Achievement Scores and Standard Deviations of Students According to Groups

Group	N	Pre-Test		Post-Test		Mean Gain
		SD		SD		
Experimental	120	12.36	2.19	57.98	13.52	45.62
Control	128	12.55	2.52	36.68	9.73	24.13
Mean Difference		0.19		21.30		21.49

Key: X=Mean Score, SD= Standard Deviation

From Table 1: Results showed that the post-test mean achievement score of students in the experimental group exposed to Target Task approach is 57.98 with standard deviation of 13.52 while the mean achievement score in the control group is 36.68 with standard deviation of 9.73. The mean gain which is the difference between the pre-test and post-test means of the experimental is higher $45.62 > 24.13$. This revealed also that there is a positive difference of 21.49 between the post-test mean scores of the two groups in favour of the students taught using the Target Task approach. This implies that students taught with Target Task approach achieved higher than their counter parts in the conventional group

Research Question 2. What is the mean difference between the mean achievement scores of male and female students taught geometry using the Target Task approach?

Table 2: Mean achievement Scores and Standard Deviations of Male and Female Students Taught Geometry using the Target Task Approach

Group	N	Pre-Test		Post-Test		Mean Gain
		SD		SD		
Male	60	11.93	2.32	59.42	13.63	47.49
Female	60	12.78	1.98	56.55	13.38	43.77
Mean Difference		0.85		2.87		2.72

Key: =Mean Score, SD= Standard Deviation

From Table 2, results revealed that the post-test mean achievement scores of the female students taught task approach is 56.55 with standard deviation of 13.38. The mean gain which is

the difference between the pre-test and post-test scores of male students of 47.49 and that of female students of 43.77. The difference between post-test mean scores of two sexes is 2.87. The implication is that there is difference between the mean achievement scores of male and female students taught with target task approach in favour of male students.

Hypothesis 1. There is no significant difference between the mean achievement scores of students taught geometry using target task approach and those taught using conventional method.

Table 3: Summary of Two-way Analysis of Covariance (ANCOVA) of students Achievement in Geometry.

Sources of Variation	Sum of Squares	DF	Mean square	F-Sig.
Corrected model	28911.719	4	7227.930	53.261 .000
Intercept	26149.461	1	26149.461	192.688 .000
Pre-test	215.302	1	215.302	1.586 .209
Group	25869.144	1	25869.144	190.622 .000
Gender	591.677	1	591.677	4.360 .038
Group Gender	19.347	1	19.347	143 .706
Error	32877.244	243	135.709	
Total	609439.000	248		
Corrected Total	61888.964	247		

From Table 3: the results of the main effects on the academic achievement of students taught with Target Task approach and those taught with conventional method indicated by F1.243 at 190.622 is significant at $P < 0.05$. This result affirms that there is a significant difference between the achievement scores of students taught with Target Task approach achieved higher in the post-test scores than those taught with the conventional method.

On gender factor, there is significant at $P < 0.05$ which is also evident that there is significant difference between the mean achievement scores of male and female students taught geometry

using Target Task approach. Therefore, the null hypothesis of no significant difference is rejected.

Hypothesis 2: There is no significant difference between the mean achievement scores of male and female students taught geometry using target task approach

Reference to table 3. It is revealed that gender factor is significant at $p < 0.05$ which is evident with $F_{1,243}$ at 4.360. The implication is that, there is significant difference between the mean achievement scores of male and female students taught geometry using Target Task approach. Hence, the hypothesis of no significant difference is rejected while the alternative hypothesis of significant difference of male and female students taught geometry using Target Task is retained

Discussion of Findings

This study compared the effectiveness of Target Task approach with the conventional method which was aimed at determining whether target task approach was more effective in improving students' achievement in geometry than the conventional method. The findings of the study indicated that there was a significant difference between mean achievements scores of students taught with Target Task approach and those taught with conventional method. There was a significant difference between the mean achievement scores of male and female students taught geometry using target task approach. This implies that there was significant difference between the mean achievement scores of male and female students taught geometry with target task approach in favour of male students. These findings is similar with findings of Eriba, (2007) and Dogo, Kyeleve and Kurumeh, (2018) who found out that inspiring approaches to teaching mathematics enhance students achievement in the subject and raised the male students' achievement than their female counterparts. Therefore, the study revealed that there is significant difference between the mean achievement scores of students taught geometry using target tasks approach and those taught with conventional method in favour of the Experimental group, since the result revealed that Target Task approach of teaching mathematics improve students achievement depends on the approach of teaching.

Conclusion

It is evident from the findings of this study that the use of Target Task approach would provide a good way for students to learn mathematics. Target Task approach enhances students' achievement in learning geometry concepts. Since students' achievement in learning geometry

concepts is the main thrust of teaching and learning of mathematics, there is the need to pay attention to the use of Target Task approach as a teaching strategy. If Target Task approach as proposed in this study is adopted in mathematics teaching and learning it would boost the students' academic achievement and skills acquisition, problems solving ability and development of the right type of attitude towards mathematics.

Recommendations

The following recommendations are hereby made based on the findings of the study.

1. A conducive learning atmosphere should be provided for all categories of learners of mathematics.
2. Students of different ability levels should be given the opportunity to effectively benefit from appropriate teaching and learning strategies such as the Target Task approach.
3. Mathematics teachers should be encouraged to used Target Task approach of teaching and learning to improve the academic achievement of students.
4. Seminars and workshops should be organized for mathematics teachers in primary and secondary schools to apply Target Task approach in mathematics classrooms.
5. Mathematics teachers should endeavour to give male and female students equal attention and opportunities during teaching and learning processes as enshrined in Target Task Approach.

References

- Abe, J. (2008). A decade of primary school mathematics in the former western Nigeria. *Ife Journal of education*, 1(3); 20-25.
- Agwagah, U. V. (2008). Mathematics beyond calculation aesthetic values. *Abacus: The Journal of the Mathematical Association of Nigeria (MAN)* 33(1), 70-79.
- Ali, A. (2005). Content competence in mathematics attained by grade 11 teachers in teaching primary school mathematics. *Journal of Science Teachers Association of Nigeria (STAN)*, 1(2); 28-43
- Apnebo, E. Y. (2002). The secondary school mathematics and its implication: The technological advancement in African context. *The proceedings of the 43th Annual National Conference of the Science Teachers Association of Nigeria (STAN)*, Pp. 354-356.
- Awonkeyi, A. I. (2004). Mathematics for sustainable development: Implication and illustrations for secondary education. *Abacus: The Journal of Mathematics Association of Nigeria (MAN)*, 29(1); 49-58.
- Azuka, B. F. (2006). Active learning in mathematics classroom: Implication to secondary mathematics and universal basic education (UBE). *The proceedings of Annual National Conference of Mathematical Association of Nigeria*, Pp. 181-187.
- Balarbe, B. (2019). Effectives of action learning instruction on performance in 3- dimensional geometry among secondary school students in Zaria, Kaduna state Nigeria. *The Proceedings of the 56th Annual National Conference of the Mathematical Association of Nigeria (MAN)*, Pp. 81-86.
- Dogo, D., Kyeleve, J. I. & Kurumeh, M. S. (2018). Effect of Two modes of lesson study on senior secondary school students' achievement in Algebra in Kafanchan education zone of Kaduna state, Nigeria. *Abacus: The Journal of the Mathematical Association of Nigeria (MAN)*, 43(1); 263-272.
- Eriba, J.O. (2007). Science, technology and mathematics education: A tool for meeting the millennium development goals in Nigeria. *Oju Journal of Science, Technology and Mathematics Education (STME)*, 1(2); 1-5.
- Federal Republic of Nigeria (FRN) (2015). National Policy on Education NERDC, Abuja.\
- Kurumeh, M. S. & Parah, M. F (2001). Innovative teaching approaches of mathematics education in the 21st century. Makurdi, Azaben Press
- Momoh, S. O. (2009). Effect of the training workshop for mathematics teachers in junior secondary classes on students achieve in Kogi State. *Abacus: The Journal of Mathematical Association of Nigeria (MAN)*, 34(1); 140-145.
- Narudeem, A.M., Busurat A.A. & Debo, S. A, (2019). Effects of peer mentoring strategy on students performance in mathematics at senior secondary schools in Lagos state,

- Nigeria. *Abacus: the Journal of the mathematical Association of Nigeria (MAN)*, 44(1); 131-135.
- Obodo, G.C. (2004). Principles and practice of mathematics education in Nigeria: A secondary perspective. Enugu Fortone Press Ltd.
- Ochepa, J. A. & Lanoye, R. D. Relationships of students' attitudes towards mathematics career preference and teachers performance (MAN). *Abacus: The Journal of the mathematical Association of Nigeria*, 28(1); 45-51.
- Salami, B. S. & Shaibu, G. (2020). Effects of problem solving instructional strategy on students' achievement in geometry in Gwale Local Government Area secondary schools, Kano, Kano state, Nigeria. *Abacus: The Journal of the Mathematical Association of Nigeria(MAN)*, 45(1); 31-43.
- Umar, I. O. (2017). Effect of science- technology society instruction on performance in Trigonometry among secondary school students in Nasarawa education zone, Nasarawa, state. Unpublished Masters' dissertation, Faculty of Education, ABU Zaria.
- Yusuf, I. I. (2009). Strategy for effective teaching and learning of calculus in senior secondary schools. *Abacus: The Journal of the mathematical Association of Nigeria (MAN)*, 34(1); 19-24.