Enhancing Better Attitude and Achievement in Mathematics Teaching and Learning Through Task-oriented Approach

Akinwamide Comfort Oluwasesan
Mathematics Education
Bamidele Olumilua
University of Education, Science & Technology
Ikere, Ekiti, Ekiti State.
akinwamidec@gmail.com

Abstract

The study investigated the effects of Task-Oriented teaching strategy on the attitude and achievement of students in Mathematics in secondary schools. The study adopted quasi-experimental research design of the pre-test, post-test control group design. The population comprised all Senior Secondary School II students in public secondary schools in Ekiti State. The sample consisted of 160 Senior Secondary School students purposively selected from four public secondary schools in Ekiti State. Two hypotheses were generated. The instruments used to collect data were Mathematics Achievement Test (MAT) and Students' Attitude Towards Mathematics Questionnaire (SATMQ). The instruments were validated and the reliability coefficients of the instruments were 0.76 and 0.81 respectively. Hypotheses were tested at 0.05 level of significance using Analysis of Covariance (ANCOVA). The result of the study revealed that there was significant difference between the pre-test and post-test scores of the students in the experimental group, while the pre-test and post-test scores of the control group showed no significant difference. It was found that there was significant difference in the post-test of the experimental and control groups. The results showed that Task-Oriented strategy improves students' attitude towards Mathematics. It also enhances achievement in the learning of Mathematics than conventional strategy. Task-Oriented strategy was found to be highly effective in improving students' behaviour during Mathematics classes. Based on the findings of the study, it was recommended that, students should be given tasks and also be opportune to generate and solve tasks that will lead to the discovery of new ideas. Curriculum planners should encourage and support the implementation of Task-Oriented strategy of learning. Teachers should be encouraged to use Task-Oriented strategy during classroom interaction.

Keywords: Attitude, Achievement, Task-Oriented, Tasks

Introduction

Mathematics is significant in education and is paramount in the overall development of the citizenry because there is no area of life of which Mathematics is less significant. Balogun 2014) described Mathematics as the key to success, and that the importance and contributions of Mathematics to the modern culture of

science and technology state that without Mathematics, there is no science; without science, there is no modern technology and there is no modern society. Ehwarieme and Ogbogbo (2008) described Mathematics as a precision tool used bymankind in their search for a clear understanding of the physical world. Without Mathematics, we cannot survive scientifically, technologically, socially, politically and economically, therefore, it is the study of numbers, symbols, sizes, shapes, patterns, generalization, measurements, models, qualities, relationship and functions (Okafor & Adeleye 2011). Mathematics is at the central of human existence, it is being practiced either consciously or otherwise by every human being. Mathematics can be used in "Inventory Control Theory" to predict the next Re-order level, Lead time, Carrying cost and Shortage cost. These are purely commercial terms that reveal and support the fact that Mathematics is a tool in commerce.

Mathematics occupies an enviable position in our daily living- precepts in our domestic activities, the use of time and relationship with neighbours. Considering the innumerable benefits of Mathematics, all that it entails is to have full knowledge about it should be a priority. It is clear that a lot of challenges revolve round the teaching and learning of Mathematics in schools, these without doubt must have contributed to the students' poor performance in Mathematics at internal and external examinations yearly as observed by (Akinwamide, 2016). One could deduce that even the Primary schools are not left out of this appalling performance in Mathematics and when the foundation is weak, the whole building will be at the risk of collapsing. The failure in Mathematics according to Popoola (2013) has become a recurring decimal which may establish a kind of belief in the mind of some people in the society that, it is not possible for learners to perform excellently in the subject. This incessant failure in Mathematics has made the learners developed negative attitude towards the subject. Students are running away from Mathematics. This mentality is not only affecting secondary schools, it has been observed that science courses that involve Mathematics intertiary institutions have less candidates compared with science courses that involve less Mathematics. During an interaction with some set of students in the science class, the researcher asked a student about the choice of course she would like to combine for her JAMB. Her reply was "any science course that will not involve Mathematics". Another student said even if her Mathematics teacher will score her 80%, she is negatively biased against Mathematics. These revealed the mind-set of the students towards Mathematics. Negative attitude has effect on the achievement of the students in Mathematics at the secondary level (Farooq & Shah, 2016). For students to change their attitude towards Mathematics, teaching strategies of Mathematics teachers are strong determinants. In conventional strategy, the teacher does all the teaching while the students do all the listening (Popoola & Adewumi, 2013; Olojo, 2011), because learners are not actively involved, the class becomes boring, discouraging and less interesting. No thought provoking questions that lead a learner to critical thinking. In this paper, Task-Oriented strategy of teaching would be considered.

This is a strategy of teaching in which teacher gives tasks to students in stages and also allows the learners to generate problems and solve them. It gives

room for critical thinking and sharing among the students. It promotes the discovery of new ideas and self-confidence. It encourages interaction among the learners and between the learners and the instructor. Teacher acts as a facilitator.

Statement of the Problem

The report from WAEC statistical data and the observation of the researcher as a Mathematics teacher in some of the secondary schools in Ekiti State revealed the poor performance of students in Mathematics over the years till date. Among many reasons that could be attributed to this include the problem of teaching strategy. The researcher personal experience showed that Mathematics teachers are used to conventional chalk and talk strategy of teaching such as competitive and individualistic strategies that are of low profit. It has also been observed that students demonstrate laziness due to the lack of commitment on the part of some Mathematics teachers in giving tasks to the students and also leading them on how to generate more tasks and solve them. Some few teachers that ventured into giving of tasks are not painstaking in allowing students to think, they will supply the solutions without giving the learners the opportunity of critical thinking on how to solve the problems.

Purpose of the Study

The purpose of the study was to investigate the effects of Task-Oriented teaching strategy on students' attitude and achievement in Mathematics in secondary schools. This was to determine the extent to which the application of Task-Oriented strategy would improve attitude and enhance better achievement of students in Mathematics. The study compared the outcomesof the effects of Task-Oriented teaching strategy on students with another set of students that were taught conventionally.

Research Hypotheses

The following hypotheses were tested for the study:

1. There will be no significant difference between the attitude scores of students in Mathematics in the experimental and control groups after treatment.
2. There will be no significant difference between the achievement scores of students in Mathematics in the experimental and control groups after treatment.

Methodology

The population for the study consisted of all Senior Secondary School II students in Ekiti State. This study adopted quasi-experimental of pre-test, post-test, control group design. In the design, the effects of the independent variable on the dependent variables were examined. 160 Senior Secondary School II students of equal sex representation were purposively selected out of four selected public

secondary schools in Ekiti State. The schools were randomly selected out of two LGAs selected using simple random technique. Attitude and achievement of the students that were used for the study were established by pre-tests conducted on both the experimental and the control groups while post-tests after the treatment were used to measure change in attitude and achievement in the two groups. The experimental group was exposed to treatment, using Task-Oriented teaching strategy while the control group was exposed to conventional strategy of teaching. Data collected were analysed using Analysis of Covariance (ANCOVA).

Two self-developed instruments were used for data collection, namely (i) Mathematics Achievement Test (MAT) and (ii) Students' Attitude towards Mathematics Questionnaire (SATMQ). Mathematics Achievement Test (MAT) contained two sections: A and B. *Section A* solicited for demographic variables while, *section B* contained 40 multiple choice objective questions. The SATMQ has two sections: A and B. *Section A* contained the student's Bio data while *section B* contained 40 items of which the student made choices which revealed his/her disposition to Mathematics.

Results

Hypothesis 1: There is no significant difference between the attitude score of students exposed to Task-Oriented strategy and those in the Control group Attitudinal mean score of students in the Task-Oriented and control groups were compared for statistical significance using Analysis of Covariance (ANCOVA) at 0.05 level. The result is presented in Table 1

Table 1:
ANCOVA of students' attitude in Task-Oriented and Control Groups

groups	*SS*	*Df*	*MS*	F_{cal}	F_{table}
Corrected model	4890.086	2	2445.043	9.570	3.00
Covariate(pretest)	1845.061	1	1845.061	7.221	3.84
Group	3099.026	1	3099.026	12.129	3.84
Error	40113.814	157	255.502		
Corrected total	45003.900	159			
Total	1497376.000	160			

P<0.05

SS = Sum of Squares, DF=DegreeofFreedom, MS=Mean Squares F= calculated value.

Source: Author's computation

Table 1 shows that F_{cal} (12.129) is greater than F_{table} (3.84) at 0.05 level of significance. The null hypothesis is rejected. This implies that there is significant difference between the attitude scores of students exposed to Task-Oriented strategy

and those in Control group. Multiple Classification Analysis (MCA) was used to determine the effect of treatment on students' adjusted mean scores of subjects. The result is shown in Table2.

Table 2: Multiple Classification Analysis (MCA) of students' attitude in Task-Oriented and control groups.

Grand Mean= 95.28					
Variable+ Category	*N*	*Adjusted Devn*	*Eta*	*Adjusted for Independent+ Covariate*	*Beta*
Task-Oriented	80	4.36	.26	3.89	.20
Control	80	-4.37		-4.41	
Multiple R Multiple R^2					.199 .040

N= Number of Sample per Group

Table 2 shows that, with a ground mean of 95.28, students exposed to Task-Oriented strategy had higher adjusted score of 99.17(95.28+3.89) than those not exposed, 90.87(95.28+(-4.41). It implies that the use of Task-Oriented instructional strategy improved students' attitude towards Mathematics.

Hypothesis 2: There is no significant difference between the achievement scores of students exposed to Task-Oriented strategy and those in Control group

In order to test the hypothesis, achievement scores of students exposed to Task-Oriented strategy and those in Control groups were compared for statistical significance using Analysis of Covariance (ANCOVA) at 0.05 level. The result is presented in Table 3.

***Table 3:* ANCOVA of students' Achievement in Task-Oriented and Control Groups.**

Source	*SS*	*df*	*MS*	F_{cal}	F_{table}
Corrected model	13275.810	2	6637.905	224.159	3.00
Covariate(pretest)	135.185	1	135.185	4.565	3.84
Group	13013.370	1	13013.370	439.455	3.84
Error	4649.165	157	29.613		
Corrected total	17924.975	159			
Total	103580.000	160			

*P<0.05

SS=Sum of Squares, DF=DegreeofFreedom, MS=Mean Squares F=calculated value.

Source: Author's computation

Table 3 shows that F_{cal} (439.455) is greater than F_{tab} (3.84) at 0.05 level of significance. The null hypothesis is rejected. This implies that there is significant difference between the achievement scores of students exposed to Task-Oriented strategy and those in Control group. The result of Multiple Classification Analysis (MCA) is presented in table 4.

Table 4: Multiple Classification Analysis (MCA) of students' Achievement in Mathematics by treatment

Grand Mean=23.14					
Variable +Category	***N***	***Unadjusted Devn***	***Eta***	***Adjusted for independent + Covariate***	***Beta***
Task-Oriented	80	9.06	.26	9.01	.20
Control	80	-9.07		-9.02	
Multiple R^2					.040
Multiple R					.199

N= Number of Sample per Group

The result in Table 4 reveals that students' exposed to Task–Oriented strategy had adjusted mean score of 32.15 (23.14+9.01) while those in Control group obtained an adjusted mean score of 14.12(24.14+(-9.02). This implies that Task-Oriented strategy of teaching is a veritable instructional strategy for enhancing students' achievement in Mathematics.

Discussion

The findings of this study revealed that students' attitude and achievement in Mathematics were improved upon their exposure to treatment.After treatment, students in experimental group had a higher level of performance compared with their counterparts in the control group. It was found out that, there was significant difference in the post-test achievement scores of the students in experimental and control group. The results of this research work ,revealed the positive change in the attitude of students exposed to Task-0oriented strategy. This is in agreement with the findings of Popoola (2007), Akinsola and Animasahun (2007) at different times that there was significant positive change in the attitude of students in Mathematics as a result of the strategy used by the teachers. This could have been as a result of the opportunity given to the learners to generate and solve tasks on their own that would have fetched them self-confidence and critical thinking in Mathematics new ideas. This is in accordance with the findings of Alfeieri etal (2011) who submitted that ability to solve problems in Mathematics by self-discovery of facts increases positive attitude towards Mathematics.

Task-Oriented Strategy of learning enhances students' performance in Mathematics, that is, Task-Oriented strategy of teaching is a veritable instructional strategy for enhancing students' achievement in Mathematics. This is in measure with the conclusion of Tandogan and Orhan (2007) in their findings which concluded that implementation of Task-Oriented strategy had positive effects on students' achievement in sciences generally as it affects students' conceptual development positively and keeps their misconceptions at the lowest level. Students' successful experience in managing their own knowledge also helps them solve Mathematical problems well and this foster improvement in their achievement.

Conclusion

Based on the findings, it was concluded that Task-Oriented strategy was effective for the teaching of Mathematics, because the group exposed to treatment had a change in attitude and better achievement.

Task-Oriented strategy enhanced positive attitude of students towards Mathematics. This would have being as a result of students having opportunity to bring out new ideas on their own as a result of critical thought that was allowed. The idea of 'active teacher, passive students' that characterised traditional strategy was relegated as students were allowed to generate tasks and gain new facts on their own. Task-Oriented strategy could be used for effective teaching and learning of Mathematics.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Mathematics teachers should use Task-Oriented teaching strategy in the teaching and learning of Mathematics.
2. Students should be given opportunity to generate tasks and solve them on theirown.
3. The curriculum planners should add the use of Task-Oriented teaching strategy to the content of the curriculum.

References

Akinwamide C. O (2016). Effects of Collaborative and Task-Oriented Teaching Strategies on Students' Attitude and Achievement in Secondary School Mathematics. M.Ed thesis. Ekiti State University, Ado Ekiti, Ekiti State.

Akinsola .M.K. & AnimasahunI.A.(2007). The effects of Simulation-Games Environment on Students Achievement in Mathematics. *The Turkish Online Journal of Education Technology*, 6 (3)113-119. Turkey.

Alfeieri, L. Brooks,P.J. Aldrich, N.J., & Tenenbaum, H.R (2011). Does Discovery-based Instruction Enhance Learning?. *Journal of Educational Psychology*, 103(1), 1-18.doi:10.1037/,0021017

Allan, M. (2012). Scientific advisory committee. *Society of Mathematical Biology annual meeting*. July.

Balogun E.A.(2014). Determinants of Mathematics Continuous Assessment Practice in Senior Secondary Schools in South West Nigeria. Ph. D thesis. Ekiti State University, Ado Ekiti, Ekiti State

Boaler, J. (1998). Open and closed Mathematics: Student experiences and understandings. *Journal for Research on Mathematics Education*. 29(1): 41-62.

Ehwariame .B. & Ogbogbo. G. (2008). Relevance of Tertiary Mathematics and Education Reforms Towards Technological Advancement in Nigeria. *Annual Conference Proceedings of Mathematical Association of Nigeria(MAN)*, 33(1)168.

Farooq. M.S &Shah. S.Z.U (2016). Students' Attitude Towards Mathematics. (Downloaded Dec 2nd, 2016)

Gregory, A.; Allen, J.P.; Mikami, A. V.; Hafen, C. A. and Pianta, R. C. (2014). Effects of a professional development program on behavioural engagement of students. *Journal Psychology in the School*. 51: 143-163.

Kyeong .S (2003). *Solving Mathematics problem*. ww.jstor.org/stable/3482750.

Moursund, G. (2012). Improving elementary school Mathematics education. Eugene. Wikipedia.org/David_Moursund_Books.

Okafor .A.A & Adeleye T.T. (2011). Mathematics as a tool for rebranding Nigeria: Implication for Post Basic Education. *Journal of Mathematics Association of Nigeria*. 36(152-159.) School of Science, Federal Colleges Education.

Popoola .A .A(2014). Effects of Play Way Strategy on the Numeracy Skills of Early Basic Education School Pupils in Ekiti State Nigeria. *Mediterranean Journal of Social Sciences* MCSER Publishing, Rome-Italy. *popabiodun2013@gmail.com*

Popoola, A. A. (2007). Gender issues in Mathematics among secondary school students. Annual National Conference of Mathematical Association of Nigeria. Ilorin: Unilorin Press. 44—50.

Popoola, A.A. & Adewumi,A.J (2013).Comparative Effectiveness of Cooperative and individualistic Learning Strategies on Students' Achievement in Mathematics. *Journal of Teacher Perspective*. 7(3):676-683. Cross River University of Technology, Calabar, Nigeria.

Tandogan, R. O & Orhan.A.(2007). Effects of Problem-Based Active Learning in Science Education on Students' Academic Achievement, Attitude and Concept Learning. Online Submission, *Eurasia Journal of Mathematics, Science & Technology Education* 3 (1), 71-81.