

THE USE OF SELF-INSTRUCTION TECHNIQUE IN REDUCING LOW ACHIEVEMENT IN MATHEMATICS AMONG STUDENTS IN ANAMBRA STATE SECONDARY SCHOOLS

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Abstract

Mathematics is one of the basic requirements for admission into the National and State Universities and a core compulsory subject in our secondary school curriculum. Unfortunately, many students dread this subject and achieve low in it which in turn hinders their entry into tertiary institutions as and when due. This study sought to investigate the use of self-instruction technique (SIT) in reducing low achievement in Mathematics among secondary school students. The population of the study consists 3,082 low-achieving students in Mathematics drawn from senior secondary school 2 (SSS 2) students in Ogidi Education Zone of Anambra state school system. The sample for the study was 104 SSS2 low-achieving students in Mathematics. Two research questions and one hypothesis guided the study. An instrument known as Mathematics Achievement Test (MAT) with 30 items validated by experts was used to elicit responses from the respondents. Arithmetic mean and standard deviation were used in testing the hypothesis at 0.05 level of significance. Result revealed that self-instruction technique (SIT) is useful in reducing students low-achievement in Mathematics but is more effective in enhancing the Mathematics achievement of female low-achieving students than males. Based on the findings of the study, recommendations were made which include that the state government should organize orientation in form of in-service training for teachers already in the field on how to encourage students to use self-instruction technique to improve learning and mathematics teachers especially should review their teaching methods to include self-instruction technique (SIT) among others.

Keywords: Self-instruction technique, Reducing, low- achievement, Low achieving students.

Introduction

In Nigeria currently, mathematics is one of the core subjects needed for admission into tertiary institutions, proficiency in it therefore is seen as one of

the essential precursors to success in modern society for sustainable development since it is used in daily life. In mathematics, results recorded some years past both in internal and external examinations of both male and female students have not been highly commendable, for instance, in 2010 only 41.5% credited it (Rufa'i 2010, Uwaedia,2010) while in 2011, only 30.9% made five credits and above including English language and Mathematics (Onoja, 2011). Also, in 2017 only 17.13% passed English and Mathematics while in 2018 had 50% Nigeria students pass English and Mathematics (Adenipekun, 2017, 2018).

These results give impetus to the development of further research that seeks to characterize and understand different techniques which may influence student's performance in order to bring about an improvement in the failure rate in Mathematics. There are complexity of factors that may influence students performance that should be handled in order to bring improvement in the failure rate in Mathematics. However, high achievement in Mathematics is a function of many interrelated variables, one of which is good study habits. Study habits are regarded by several researchers as an important/key factor to be taken into account when attempting to understand and explain variability in student's achievement in Mathematics. When emphasizing the importance of individual experience, the contexts where students instruct themselves become important focal point.

Ordinarily, study habits are learning tendencies that enable students work privately. LoveToKnow (2018) stated that study habits are the behaviours used when preparing for tests or learning academic material. A person who waits until the very last night before an examination and then stays up all night trying to cram the information into his head is an example of someone with bad study habits. It can also mean regular practices a person performs to maximize his productivity, efficiency and retention in preparation for a particular evaluation (Deepkumar, 2020). Azikiwe (1998) described study habit as the adopted way and manner a student plans his private readings after classroom learning so as to attain mastery of the subjects, good study habit can be possessed through the possession of self-control/management strategies which self-instruction is a component. This technique is aimed at helping the student exert control over his behaviour.

Self-instructional training on the other hand is a cognitive-behavioural approach to self-control in which children are taught to use covert speech to modify their own behavior. Self-instruction is also a self-management strategy that contributes to individual self-determination skills (Wehmeyer Agran & Hughes 1998). It can help a consumer to self-manage existing skills as well as learn new skills. Here children learn to "talk themselves through" a task or

activity. They can also mimic the manner in which language is normally used to self-regulate in the process. An adult model performs a task while talking to himself out loud while the child performs the same task by following the model's instructions. The child performs the task while instructing himself aloud. The child also whispers the instructions to himself while doing the task. The goal of self-instruction therefore is to support a person to independently complete a task.

Researchers such as Ugochukwu (2010), Neetu (2016) and Nnaji (2018) believed that every child is educable. To them, developing necessary skills, attitudes, good study patterns and methods (habits) can pave way for a student to achieve high academically. To achieve means to succeed in reaching a particular goal, status or standard, especially by making an effort for a long time while achievement means a thing that somebody has done successfully, especially using their own effort and skill (Hornby, 2000).

On the other hand, students low academic achievement on the examination can be defined as low or weakness of the student's mark under the normal average in a study subject level as a result of a variety of reasons, including those related to the student himself, or those related to family, social and academic environment (Al-Zaubani & Bani Younes, 2015). Low achievement according to (Mark, 2006) is moderately associated with socioeconomic background, indigenous status and relationships with gender, region, ethnicity, family type and state differ in reading and mathematics. Low achievement substantially reduces the chances of school completion and university entrance of students in this group.

Operationally therefore, low achievement as used in the study is inability of any student to perform well academically within or above the standard pass mark while low-achieving students in mathematics are those who cannot meet up with the bench mark for crediting mathematics.

Consequently, upon this fact, the researchers are inspired to conduct a more intensive examination on why some students both male and female despite the fact that almost everything is provided and the environment is relatively controlled still fail mathematics. The researchers therefore believe that academic achievement may have something to do with a kind of mind set or may be attitude towards good study habit. Hence the application of self-instruction technique as a good study habit that produces positive academic performance as a measure to handle the problem.

Two research questions and a hypothesis guided the study:

- What is the effect of self-instruction technique (SIT) in reducing students low- achievement in Mathematics when compared with those in the control group?

- What is the effect of self-instruction technique (SIT) on achievement of male and female low- achieving students in Mathematics?
- There is no significant difference in the achievement scores of males and female low-achieving students exposed to self-instruction technique (SIT) in mathematics.

Method

The study employed quasi-experimental research design that involved the use of experimental group and control group. Many quasi-experimental methods are available but the one employed in this study is the randomized pretest-posttest control group design. The pretest and posttest instruments were administered to all experimental and control groups before the treatment began. Only the experimental group was given treatment while the control group was conventionally counselled by their School Guidance Counsellors. A post-test was administered to both the experimental and control group at the end of the experiment.

The instrument used for data collection was Mathematics Achievement Test (MAT) which was validated by three senior experts from other zones not used for the study. The instrument served two purposes. It was administered before the experiment as pretest on both the experimental and control groups. The MAT was re-arranged and re-administered on both experimental and control groups as posttest. The re-ordering of the items in the posttest was done to reduce the incidence of participants realizing that they were being re-tested. The instrument (MAT) had thirty (30) items. Each response option has one correct answer. The scripts were later marked by the mathematics teachers after the participants chose their own correct answers. The researchers finally collated their scores which were used for the analysis.

Furthermore, the data collected were summarized and analyzed using Arithmetic mean and standard deviation to answer the research questions and analysis of covariance (ANCOVA) to test the null hypothesis at 0.05 level of significance.

Results

Table 1: Pretest and Posttest Mean Scores of Students Who Received Self-Instruction Technique (SIT) and those in the Control Group

Source of Variation	N	Pretest Mean	Posttest Mean	Loss Mean	Remark
Self-Instruction Technique	52	10.16	23.90	13.29	More Effective
Control Group	52	10.23	16.23	6.00	

Table 1 shows that with pretest mean score of 10.16 and posttest mean score of 23.90 with gained mean 13.29 for the students treated with the self-Instruction Technique (SIT) as against pretest mean score of 10.23 and posttest score of 16.23 with gained mean of 6.00 for the students in the control group; self-instruction technique is more effective.

Table 2: The Effect of Self-Instruction Technique (SIT) on Pretest and Posttest Mean Scores of Male and Female Students who received Self-Instruction Technique (SIT)

Source of Variation	N	Pretest Mean	Posttest Mean	Loss Mean	Remark
Male	26	10.19	22.81	12.62	Effect
Female	26	11.04	25.00	13.96	More Effective

Table 2 reveals that with gained mean score of 13.91 for the female against 12.62 for males, Self-Instruction Technique (SIT) is more effective on the female low-achieving students than males.

Table 3: ANCOVA on the Mean Achievement Scores of Male and Female Students Treated with Self-Instruction Technique (SIT)

Source of Variation	SS	df	MS	Cal.f	Crit.f	P > 0.05
Corrected Model	151.839	2	75.920			
Intercept	1138.978	1	1138.978			
Pretest Scores	89.358	1	89.358			
Gender	40.480	1	40.480	12.50	4.04	S
Error	158.680	49	3.238			
Residual	1310023.000	52				
Corrected Total	310.519	51				

In table 3, it was observed that 0.05 level of significance, 1df numerator and 51df denominator, the calculated F12.50 is greater than the critical F4.04. Therefore, the null hypothesis is rejected. This proves that the effect of self-instruction technique (SIT) in enhancing male and female students' achievement in mathematics differ significantly.

Discussion

The study showed a reasonable increase in the achievement of students in the experimental group. This indicated that application of self-instruction technique is more effective in reducing students low-achievement in Mathematics. One can therefore conclude from the findings that self-

instruction technique has the ability to reduce student's low achievement in Mathematics. The use of self-instruction technique by students is therefore justified since it can help in understanding and retention. This is in line with the findings of Good and Brophy (1985) who found out that modelling combined with verbalized self-instruction can be helpful with low-achieving students' academic performance. The finding also collaborated with Mastropieri and Allen-Bronaugh (2012) who demonstrated a self-talk procedure which consisted of positive, neutral and negative statements. Oral and visual representations of poor self-talk which affect performance were also presented to evoke awareness of student's maladaptive styles of thinking in learning Mathematics.

In addition, the study also indicated that self-instruction technique (SIT) is effective on both male and female low-achieving students. The result further indicated that self-instruction technique is more effective on the female low-achieving students than males. However, experience has shown that by natural disposition/inclination of female gender, that they tend to be more patient, committed and persistence on task than male gender. These virtues might have affected the result of this findings. The findings of this study support Parks (2005) who found that girls outperform boys not just in England but also in other countries. To him, the relative under performance of boys is a matter of serious concern. The outcome of this study is also consistent with the views of Cassen and Kingdom (2007) who contended that nearly half of all low-achievers are white British males and that boys outnumber girls as low-achievers by 20% but the gender gap is larger for some ethnic groups.

Moreso, the null hypothesis in table 3 showed that the effect of self-instruction technique in reducing male and female students' low achievements in Mathematics differ significantly. The difference could be attributed to the elevated levels of interest and motivation shown more by the female students than the male during the experiment.

This findings agreed with the observation of Kitsantas, Winsler and Huie (2008) who found out that there were significant gender difference in student cumulative high school grade point average (GPA) and college GPA in the sophomore year where female ($M= 3.41$) had earned a higher school GPA than males ($M= 3.24$), $t(135)= 2.84$, $P < .01$ and attained cumulative college GPAS at the end of their sophomore year, $t(118)= 2.65$, $P < .01$ (females, $M= 3.03$; Males, $M= 2.79$). These findings support prior research that generally show gender differences in achievement and motivation beliefs, where females tend to fall along the stereotypical lines of having elevated levels of motivation and achievement in language arts (Hyde & Durik, 2005).

Conclusion

This study concludes that self-instruction technique when properly applied by students could help to enhance achievement in mathematics. The technique could form a basis for in-service training and counselling services to remedy study habit deficiency and enhance achievement in Mathematics and even in other areas of study. In short, self-instruction technique has sufficient proof to warrant its use as a dependable technique to enhance achievement on low-achieving students Mathematics.

Recommendation

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

1. The state government should organize orientation programmes for teachers already in the field either during staff forum, workshops and seminars on how to encourage students to use self-instruction technique to improve learning. In such programme, the services of an expert should be sought for teaching and demonstration of self-instruction technique (SIT) and its training sequences (steps) using the self-instructional module. This may help teachers to be motivated, inspired, stimulated and lead to self-improvement and acquaintance for appropriate implementation in the classroom. Hence, a great deal of learning may take place if students are trained to use their thinking abilities from simple to complex learning environments. This can only be done by teachers who are trained well and have mastered their teaching methods including reviewing them occasionally.
2. Teachers especially Mathematics teachers should review their teaching methods to include self-instruction technique (SIT) during their impartation of knowledge to the students. This may help build confidence in them early enough and remove phobia that some students normally have in some subjects especially Mathematics.
3. Relevant state and even federal government agencies and organized bodies interested in the education of the child should fund researches in the development of standardized instructional programmes like self-instruction technique (SIT) for teaching and learning-strategies at all levels to be enhanced.

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