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Effectiveness of Study Skills Training on Motivation and Academic Performance in Mathematics among Secondary School Students in Katsina State, Nigeria

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Abstract

This study investigated the Effect of Study skills Training on Motivation and Academic Performance in Mathematics among Secondary School Students in Katsina state, Nigeria. Two objectives with corresponding null hypotheses guided the study. Quasi-experimental design pre-test, post-test and control group was adopted for the study. The population consists of 17,257 students; the sample size of this study consists of 115 SSS II Science intact-class Students which were drawn from two public co-educational schools in Katsina Zonal Education Quality Assurance in Katsina State, Nigeria. Multi-stage sampling technique was adopted for the study; purposive sampling technique was used to select two schools for the study. The study consists of experimental group and control group. The instruments are Students' Mathematics Motivation Questionnaire (SMMQ) and Mathematics Academic Performance Test (MAPT). The reliability co-efficient of SMQ and MAPT are 0.75 and 0.78 respectively. ANCOVA was used to test the hypotheses at 0.05 level of significant. The finding revealed that there is significant difference between students taught Mathematics using study skills training and those taught using conventional strategies on Motivation in Mathematics and the finding revealed that there is significant difference between students taught using study skills training and those taught using conventional strategies on academic performance in Mathematics. The study concluded that study skills training are more effective than conventional method of teaching in improving students' motivation, enhancing students' academic performance when teaching the difficult concept of Mathematics.

Keywords: Academic Performance, Students' Motivation, Study Skills Training, Secondary School Students

Introduction

Mathematics is a fundamental part of human thought and logic, and integral to attempts at understanding the world and ourselves. The study of mathematics as a subject helps Senior Secondary Students in ordering, organizing and investigating their environment and contributes to individual self development through performance (Musa, & Adamu, 2019). Mathematics assist us to

develop critical thinking, problem-solving and logical reasoning skills that are essential for individuals' success in various fields of human endevours. Students' academic performance in mathematics varies across different nations due to the difference in the adopted teaching strategy as well as students' study skills. Therefore, there is a need for teachers and others stakeholder in the educational sector to pay proper attention to the teaching and learning of Mathematics (Onoshakpokaiye, 2021).

Academic performance is related to students' motivation, because motivation played central role in illuminating the understanding of student performance and played important role for all human endeavour. Motivation is a psychological construct which explains purposive or goal direct behaviour in human beings. According to Oyinvwi and Onunu, (2021) motivation as a psychological process which leads anyone to act in a way that helps him/her to fulfill unsatisfied needs. Motivation is a process of arousing action, sustaining activity in progress, regulating and directing pattern of activity through energy transformation within the tissues of the organism (Debasmita, 2023). Motivation as a concept introduced to implored individual in understanding of their behaviour as human beings. It is a psycho-physiological drives, initiated by some need, which prompt to an activity to satisfy individuals' need.

When individuals are motivated in learning, it is likely to be related with their study skills, according to Chukwu et al. (2022) which encompass a range of coordinated cognitive skills and procedures that enhance the effectiveness and efficiency of students learning. It is indicated that, study skills include the competencies associated with acquiring, recording, organizing, synthesizing, remembering and using information. Kerka (2017); Chukwu et al. (2022) opined that study skills are learning strategies that help students organize process and use information effectively. Students' study skills should not be overlooked since it contributes to their good academic performance in mathematics. Onoshakpokaiye, (2021) shows that students with effective study skills excel in their learning and also students who possess good study skills performed significantly better than those students with bad study skills in mathematics. Since, study skills help students to organize and process information, to remember what they have learned and conscious of their learning processes, it need to learned by student through the effort of teacher in a classroom organization.

It is suggested that study skills training are learning strategies that help students organize process and use information effectively (Kerka, 2017; Chukwu et al., 2022). Study skill training is a strategy that helps students improves their learning habits and skills, such as summarizing, outlining, self-questioning, and time management (Brown, 2019). Effective study skills must be comprised of specific tactics and/or strategies, which can consistently be drawn upon by the learner as a means of organization, retention, and processing of information (Amin et al., 2020). For instance, a study tactic could be a specific procedure, such as underlining, note-taking, and summarizing. Such techniques are often taught through instruction wherein the skill is presented, but not practiced; therefore, the flawed assumption that knowing study tactics equates to individuals' effective studying.

Therefore, study skills training must be taught, practiced and ingrained into habitual usage, which in turn improves confidence, work-ethic and inner students' motivation. The Study skills training program comprehensively tackled both the intellectual and non-intellectual aspects required academic proficient study skills (Dweck, 2005). The student meets one-on-one with a teacher in a classroom setting for instruction in basic study skills, which are then practiced, encouraged and refined throughout the course and training. The students are provided with information for practical study tactics and techniques, while also addressing a growth mindset through goal setting, motivation for academic improvement (Dweck, 2005).

In addition, it should be noted that study skills training can improve students' study habits, it may also lead to better scores and academic performance improves gradually (Musa & Adamu, 2019). Study skills training are teachings or tutorials given to students in different areas of learning in order to help them adopt appropriate ways of studying for academic excellence (Israel & Bahago 2020). According to Chukwu et al. (2022) study skills training as teachings given to students in order to help them utilize a process of thinking which includes the steps of recognizing, recalling, and executing particular steps in acquiring study skills. Scholars Oladunmoye et al. (2023); Ihianakuihiomen (2022) asserts that study skills training helps students prepare, plan, select, comprehend points when reading, ask and answer questions, review, recite, and recall what has been learned, acquire greater confidence to prepare for tests and examinations. Therefore, when low achieving students are trained in study skills, they become exposed to different

learning materials which will in turn help them adopt appropriate studying, become competent and confident learners, thereby making learning interesting and as well attaining academic excellence.

Researcher such as Jolly and Sethi (2024) revealed that there was significant difference effect of study skills training on academic motivation among students. Hossein and Marjan (2014) revealed a positive significant effect of motivation on mathematics performance as regard to study skills. Also, Johnry et al. (2022) Students' motivations have direct effects on mathematics academic performance. The study of Oladunmoye et al. (2023) revealed that study skills training group scored higher than the control group. Michael et al. (2020) show that there was significant effect of study skills on academic performance of students. Study skills training are techniques that can be learned to aid students to learn better in a given learning environment. There are a variety of different study skills for the purpose of this research study that will be used by student to improve their learning abilities. These skills include: Goal-setting and Motivational skills, Organizing and processing information skills, Study habits and planning skill, Mathematic abilities working skills, Concentration and memory training skills, Note-taking skills, Test/Exam-taking abilities, Homework/Assignment strategies and Time management skills (Israel & Bahago, 2020). The essence of training students in study skills is to help students identify appropriate skills to be use in every learning mathematical process, as mathematics is important in all sciences such as engineering, technology, medical science, humanity disciplines and scientific disciplines.

Statement of the Problem

The quality and effectiveness of mathematics teaching and learning has been major challenges in educational system. Various factors have been identified such as poor motivation, low academic performance, poor communication skills, emotional instability, poor teacher's instructional strategies and ineffective classroom managements in secondary schools in Katsina State (Usman, et al. (2023). Poor motivation can be interpreted as an uncaring attitude toward what one supposed to do; it has been experienced by everyone, including students. It's a situation where a student does not want to learn due to the difficulty in following the lesson procedures delivered by the teacher. Poor motivating students have deficient level of passion and enthusiasm in doing an academic task (Sasson, 2019). The reasons why students become

unmotivated are due to the teacher being unclear in delivering the lesson, having low self-confidence, dissatisfaction while learning and personal problems from students. According to Moreira-Morales and García-Loor (2024); Zambuk (2021) asserted lack of motivation is a contributing factor to secondary school student failure in most subjects. Therefore, unless students are well motivated in learning using study skills and have strong confidence of the educational system else teaching and learning might not happen. Therefore, rise in levels of students' motivation may lead to better academic performance which might be guaranteed for the achievement of educational goals. Hence it is against this background that, the researcher study investigated the effect of Study Skills Training on motivation and academic performance in Mathematics among Senior Secondary School students' in Katsina State, Nigeria.

Table 1: Summary of Study Skills Training for Eight weeks

Sessions	Summary of the content of the sessions
First week	Creating rapport, Introduction of Study skills training, administer of pre-test
	Goal-setting and Motivational skills: encourage the students to set achievable goals, self-motivation in learning Mathematics
Second week	Organizing and processing information skills: encouraged students to organize their own learning information and contribute to the class discussions.
Third week	Study habits and planning skill: encouraged students to demonstrate planning skills and study habits in learning Mathematics concepts.
Fourth week	Concentration, memory training skills and Note-taking skills: student to always concentrate, proper training of memory through in Mathematic note-taking
Fifth week	Time management skills. students to be time manager in organizing learning material in Mathematics class
Sixth week	Homework/Assignment strategies: encouraged students to ask questions and engage in homework/assignment in Mathematics.
Seventh week	Mathematical abilities and Test/Exam-taking abilities: solving problems and implore test/examination on topic taught.
Eighth week	Study skills evaluation. Examined learner, reflection, feedback, post-test

Sources: Researchers' Design Model, (2025)

Objectives of the Study

The objectives of the study are to:

1. examine the effect of study skills training on motivation among secondary school students in Katsina state.

2. examine the effect of study skills training in improving academic performance in mathematics among secondary school students in Katsina state.

Research Hypotheses

The following hypotheses were formulated for the research:

H_{O1}: There is no significant differential effect of study skills training on motivation among secondary school students in Katsina state.

H_{O2}: There is no significant differential effect of study skills training in improving academic performance in mathematics among secondary school students in Katsina state.

Methodology

The study adopted a quasi- experimental research design of pre-test, post-test type and control group design. The research adopted 2x2x2 factorial design for the study, experimental group (EG) taught using the Study skills training while the control group (CG) was taught by using the conventional method where the teacher delivered the teaching and led the students in understanding the lessons in the classroom. The choice of the design is because the researcher does not intend to distort the normal academic activities of the sampled schools. The population of the study is the entire students of senior secondary school students in Katsina Zonal Education Quality Assurance, (KZEQA) Katsina state which comprising the total of one hundred and fifty-one (115) students, the experimental group was 76 and control group was 39 SSS II science students.

The multi-stage sampling technique was adopted to draw twenty-three (23) secondary schools sample across four stages. At stage one, schools in the three (3) local government areas were adequate coverage. At stage two, purposive sampling technique was used to select two mixed senior secondary school for the study. Purposive sampling technique was used to select two schools of which they are (SSS II) Science intact-class from the total number of schools in the zone. The justification for the selection of these two senior secondary schools was to enable the researchers to carry out their research for effective and efficient result. At stage three, two mixed senior secondary school were

assigned to the groups. At final stage, the participants were identified as intact-class of SSS II science students

The participants were drawn from two intact classes in two selected from two different co-educational senior secondary schools in KZEQA. The experimental group (EG) has a total number of 76 students, while exposed to training while the control group (CG) has a total number of 39 students.

Experimental Procedure

These diagrams illustrate the design on Students' Motivation and Academic Performance as represented in the following figures:

Group A (EG) Study Skills Training $O_1 \longrightarrow X_1 \longrightarrow O_2$

Group B (CG) Conventional Teaching Method $O_1 \longrightarrow X_0 \longrightarrow O_2$

EG= Experimental Group - exposed to SST, $\mathbf{X_1}$= Study Skills Training (SST)

CG = Control Group - exposed to CTM, $\mathbf{X_0}$= Conventional Teaching Method (CTM)

$\mathbf{O_1}$ = Pre-test $\mathbf{O_2}$ = Post-test

Three research instruments were used for this study. The instrument, were tagged Students' Mathematics Motivation Questionnaire (SMMQ) and Mathematics Academic Performance Test (MAPT). Students' Mathematics Motivation Questionnaire (SSMQ) which consists of twenty (20) items and was adapted from Fiorellaet al. (2021) for the purpose of this study. It's consists of 20 items on Mathematics Motivation Questionnaires which was used to measures individual's level of motivation in mathematics and how it influence their academic pursuit. The questionnaire was based on a four-point Likert type Scale ranging from Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). MAT consists of 25-item multiple choice questions with four options adapted from West African Senior School Certificate Examination (WASSCE) to serve as pretest to ascertain equivalence of ability of subject and as post-test to determine the effect of the treatment on students' academic performance based on algebraic and quadratic equation. To ascertain the validity of the instrument, the instrument was given

to two expert from the Department of Science Education (Mathematics Lecturer) and Department Educational Psychology and Counselling, Federal University, Dutsin-ma, Katsina state, to establish the face and content validity of instrument, also to correctness of questions and options. They evaluated the instrument for its validity for accuracy and clarity of the test items for the study. To ascertain the reliability of instrument, it was administered to a group of 25 SSS II students of intact (Science) class of in a school outside the scope of the study. The scores were subjected to Split-half Statistical Analysis, the reliability co-efficient of SMMQ and MAPT are 0.75 and 0.78 respectively.

The study involved two groups a pre-test was administered to two classes were assigned to groups (Experimental group and Control group). This enabled the researcher determine the performance status of the subjects before treatment. The study was conducted in three phases: pre-experimental activities, experiment proper and post-experimental activities: The first phase consists of administering the pre-tests of motivation questionnaire and mathematics test-items on students, after securing permission from the school principal. In the second phase, the experimental group was exposed to (trigonometric ratios) and the control group to the conventional teaching method. The final phase of the study was the administration of the post-tests. The same assessment procedure was used for both groups and ensures objectivity in the conduct of the study. Both groups were taught using appropriate lesson plan. Post tests were administered to both groups after the completion of treatment. The instruments for data collection for this study were administered to the students before and the treatment. After treatment, a post-test was administered to all the subjects in both groups. Scores obtained at this stage served as pre-test scores. To determine if significant difference exists between the pre-test and post-test mean scores of each group, the Analysis of Covariance (ANCOVA) was employed for the research study. All the hypotheses were tested at 0.5 level of significance.

Results

Hypothesis One

There is no significant differential effect of study skills training on motivation among secondary school students in Katsina state.

Table 2: ANCOVA of Motivation scores of Experimental Group 2 and Control Group

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2281.764[a]	2	1140.882	139.257	.020
Intercept	239.994	1	239.994	237.226	.000
Motivation Pretest	121.002	1	121.002	2.002	.096
Treatment 2	281.706	1	281.706	278.457	.004
Error	83.996	83	1.012		
Total	33613.000	86			
Corrected Total	415.304	85			

a. R Squared = .697 (Adjusted R Squared = .674)

Table 2 shows the ANOVA analysis of pre-test score of experimental group 2 and control group, F-value obtained is {F (1, 83) = 278.457; $p < .05$}. Since the p-value of .004 is less than the alpha level of .05; it also revealed that (R^2 = .697) 69.7% of variance in post-test scores can be explained by the treatment. The Adjusted R^2 = .674, indicating a high and indicates a strong explanatory power of the intervention and other factors. It can therefore revealed, that to a large extent, SST was effective in improving the motivation of students toward learning Mathematics. Therefore, the null hypothesis was rejected; this indicates that there was significant effect of study skills training on motivation among secondary school students in Katsina state.

Hypothesis Two

There is no significant differential effect of study skills training in improving academic performance in mathematics among secondary school students in Katsina state.

Table 3: ANCOVA of Academic performance scores of Experimental Group 2 and Control Group

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2739.322[a]	2	1369.661	43.321	.090
Intercept	2214.804	1	2214.804	61.419	.500
Academic PerfPretest	482.768	1	482.768	13.387	.008
Treatment 2	1315.650	1	1315.650	18.214	.020
Error	3038.630	83	36.061		
Total	353609.000	86			
Corrected Total	52207.507	85			

a. R Squared = .578 (Adjusted R Squared = .716)

Table 3, shows the ANOVA analysis of pre-test score of experimental group 2 and control group, F-value obtained is {F (1, 83) = 18.214; p < .05}. Since the p-value of .020 is less than the alpha level of .05; it also revealed that (R^2 = .578) 57.8% of variance in post-test scores can be explained by the treatment. The Adjusted R^2 = .716, indicating a high and indicates a strong explanatory power of the intervention and other factors. It can therefore revealed, that to a large extent, SST was effective in improving the academic performance of students toward learning Mathematics. Therefore, the null hypothesis was rejected; this indicates that there was significant effect of academic performance among secondary school students in Katsina state.

Discussion

The findings of hypothesis one shows the effectiveness of study skills training in improving motivation among secondary school students in Katsina state. The findings of this study corroborate with Jolly and Sethi, (2024) whom the results revealed that there was significant difference effect of academic motivation on study skills among students. The finding also agree with that of Hossein and Marjan (2014) who results also revealed a positive significant effect of motivation on mathematics performance as regard to study skills.

The finding of hypothesis two shows the effectiveness of mindfulness training in improving academic performance among secondary school students in Katsina state. The finding of the study is in line with Oladunmoye et al. (2023) who result revealed that study skills training group scored higher than the control group. The finding also agree with that of Michael et al. (2020) whom result of the study revealed that the experimental group that was given study skills training performed higher than that of the control group there was significant effect of study skills on academic performance of students. In contrary, the finding of this study was not in line with the views of Huy et al. (2022) whom found no differences in study skills on the academic performance across the two groups. This study also agreed with the Elger (2007) theory of performance on the core components of a performance as identity, learning skills, knowledge, context, personal factors and fixed factors.

Conclusion

Based on the findings, it was concluded that study skills training was more effective than conventional method of teaching in enhancing students' academic motivation when teaching the difficult concept of mathematics.

However, study skills training of teaching was found effective in enhancing student motivation and academic performance.

Recommendations

Based on the findings and the conclusions reached, the following recommendations were made:

1. Teachers of Mathematics should make effective use of study skills training in the teaching of mathematics as it improves students' academic motivation and learning

2. Seminars, conferences and workshops should be organized by the government for Mathematic teachers for more enlightenment on effective utilization of study skills training strategy.

3. Educational policy makers such as National Education Research Development Council (NERDC), Curriculum planners and Ministry of Education, should incorporate the use study skills training strategy in the curriculum.

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