Ajayi Crowther Journal of Pure and Applied Sciences (ACJPAS)
https://acjpas.acu.edu.ng

Ajayi Crowther J. Pure Appl. Sci. 2022, 1(1), pp.28-37
https://doi.org/10.56534/acjpas.2022.01.01.37

Article

Identification of Strategies for Studying Mathematics Textbooks among Senior Secondary School Students in Ife-East Local Government Area of Osun State

Efunwole, G. O.

Department of Science and Educational Technology, Faculty of Education, Ajayi Crowther University, Oyo, Nigeria.
go.efunwole@acu.edu.ng

* Correspondence: go.efunwole@acu.edu.ng

Article history: Received: Jul. 15, 2022 Revised: Sept. 2, 2022 Accepted: Sept. 7, 2022 Published: Dec. 14, 2022.

Abstract

The study aimed at finding out the protocols of studying mathematics textbooks; behavior towards studying mathematics textbooks and strategies employed by students in studying mathematics textbooks. The study employed descriptive survey design. A total of thirty-six (36) randomly sampled students and fourteen (14) teachers were used for the study. Two validated research instruments: eighteen (18) item questionnaire titled "Teachers' Questionnaire (TQ)"; and a twenty-two (22) item questionnaire titled "Students' Questionnaire (SQ)" were used to collect the data. The data was analyzed using tables and percentages. Results revealed that 14 teachers (100%) subscribed to "teaching students how to study mathematics textbooks bring about lively interactions among students and effective independent study by students; thereby leading to better achievement in mathematics evaluation". Few students do not know how to study mathematics textbook strategically because they neither take notes nor have the skill needed to study, since 21 (65.6%) of the student respondents do take note while studying; whereas 11 (34.4%) do not. Students do take mathematics study assignments as unique from other types of study, since 27 (84.4%) of the student respondents considered it unique; whereas 5 (15.6%) do not. Few students have not been able to imbibe studying behavior and strategy needed for mathematics textbooks, since 20 (62.5%) identified scanning as reading strategy but 12 (37.5) recognized it not. Based on the findings, it was recommended that study materials (textbooks, e-books, electronic boards, desktops in modern laboratories) on mathematics should be provided by school authorities and government; in-service training of teachers while more people should be encouraged to take-up teaching career in secondary school mathematics. Lastly, the time allocated to studying mathematics should be reviewed (increased).

Keywords: Strategies, Studying Mathematics, Textbooks, Senior Secondary School Students.

1. Introduction

The aim of every instructor in the classroom is to impart knowledge on the learner while the aspiration of a good learner is to imbibe knowledge as much as possible from the instructor during the teaching-learning process. One of the most appropriate ways by which learners could be assisted to acquire knowledge is to make the studying process a pleasurable activity through efficient strategies.

Learning mathematics through studying is a skill seldom taught in schools. Many people learn mathematics by learning, the way history is learnt and when mathematics is learned by rote, students miss important ideas. Students acquire mathematical knowledge through textbooks,

lecture notebooks, and audio-visuals such as Video Compact Disc (VCD) / Digital Video Disc (DVD). These ways of mathematical knowledge acquisition have specific strategies of doing them. In fact, mathematics should be learnt as an aid to thinking not as a replacement for it. Attempts have been made by researchers like Countryman [1], Johnson [2], Campbell and Schlumberger [3], Bruff [4], Simonson and Gouvea [5], Taylor [6], Clements [7], Thomas [8]; to provide efficient methods for studying mathematics and mathematics textbooks.

Teachers of mathematics frequently complain that students who have mastered fundamental concepts of mathematics are unable to solve problems concerned with those fundamental processes. Thus, the problem becomes primarily one of the inabilities to study effectively in the subject. Studies have shown the reasons for the students' under-achievements in mathematics which according to Clements [7] are related to lack of instrument and crude teaching strategy. Thomas [8] reported that students' difficulties in quadratic equations are related to poor understanding of graphical and symbolic solution of quadratic equations. Taylor [6] admitted that students simply memorize the procedures and formulas to solve quadratic equations, due to lack of understanding the concept of quadratic equations. The vocabulary of mathematics is more compact and exacting than in any other subject area. There is a precision of meaning, a succinctness of sentence structure and sequence of thought which must be understood. The variety of mathematics symbols must be understood, and as in the studying of word symbols, students must possess a thorough knowledge of mathematics concepts before full understanding can be gained on the material studied. The students must be able to merge mathematical language with the vernacular. This requires studying rate to be necessarily slower before full comprehension can be obtained.

The probable effect of inability to study effectively in the subject is seen in the poor achievement, i.e. the results of student in the subject in both internal examinations conducted by the teacher and external examinations by the various examining bodies like West African Examination Council (WAEC) and National Examination Council (NECO), University Tertiary Matriculation Examination (UTME). It is on this note that this study identified strategies for studying mathematics textbook(s) in senior secondary schools, with a view to bring about excellent achievement in learning mathematics.

Statement of the Problem

Studying to learn mathematics is a skill that is seldom taught in Nigeria educational institutions, but mathematics as a discipline has its own language; which can be understood without much ado. The traditional teaching strategy usually employed by secondary school teachers is filled with too much talking and writing which makes students fear and have sort of phobia towards learning mathematics. The traditional teaching strategy is an instructional setting where teachers mainly use textbooks and solve problems on the chalkboard without actively engaging the students in the course of solving mathematical problems. While teachers are active, students are mainly passive and copy solutions provided by their teacher without responsibility for their own learning. This kind of teaching approach creates an idea in the mind of students that mathematics is a difficult subject and thus cannot perform better in the subject. Correspondingly, the passivity of students in this teaching and studying approach also makes Mathematics even more complicated as students cannot analyse questions and answer questions successfully on their own.

Purpose of the Study

The main purpose of this study was to identify strategies for studying mathematics textbooks among students in senior secondary schools in Ife-East Local Government Area. Specifically, the study aimed for the following:

i. to find out if mathematics studying protocols are taught to students in schools, i.e. teaching them how to study mathematics textbooks;
ii. to assess the studying behavior of students towards mathematics textbooks;
iii. to investigate if students study mathematics textbooks; and
iv. to examine how students study mathematics textbooks.

Research Questions

The following research questions guided the study:

i. do students know how to study mathematics textbooks?
ii. to what extent are students taught studying protocols for mathematics textbooks?
iii. what is the behavior of students towards studying mathematics textbooks?
iv. how do students look at studying assignment in mathematics textbooks?

Significance of the Study

Teaching students' approaches to studying mathematics textbooks will bring about improved performance among senior secondary school students. It will prepare and develop learning skill of students who want to pursue higher degree in mathematical sciences in tertiary institutions.

This study intended to motivate mathematics teachers in secondary schools to incorporate in their lesson notes teaching strategies on how to study mathematics textbooks to their pupils by discussing the results of the research with teachers in forums, during conference marking and as opportunities portend. There is also a dire need for improved studying methodology in the learning of mathematics so as to improve upon the low standard in mathematics currently witnessed in Nigerian secondary schools. Knowledge of the studying strategies in mathematics will hold students' attention in their studies; motivate them to learn more and surely it is a needed skill among mathematics students. This study will invariably lead to solving problems associated with poor performance in mathematics arising from incompetence in effectively studying the subject.

The study invariably will lead to solving problems associated with poor performance in mathematics emanating from poor strategies being employed by students in the course of studying their mathematics textbooks and lack of teaching materials for teachers.

2. Methodology

Survey research design was adopted for this study. A total of thirty-six (36) students were randomly selected for the study, fourteen (14) teachers were also randomly selected for the study. Two research instruments were used: eighteen-item questionnaire titled "Teachers' Questionnaire (TQ)" was used to elicit responses from the teachers and a twenty-two item questionnaire titled "Students' Questionnaire (SQ)" was also used to elicit responses from the students. The TQ was made up of four sections that had eighteen items. The distribution of the "TQ" items has the following functional area: personal and institutional data, requisite skill, teaching studying skill and feedback from the students. The "SQ" was made up of four sections that contained twenty-two items. The distribution of the SQ items has the following functional features or areas: personal and institutional data, studying strategies employed by students, assistance during difficult mathematical learning and finding out information in mathematics textbook. The questionnaire items for TQ and SQ were subjected to evaluation with regards to validity and reliability. The reliability coefficient calculated for "TQ" and "SQ" using Pearson's Product Moment Correlational Analysis were 0.86 and 0.76 respectively. The responses to the questionnaire administered to the teachers and students were analyzed using tables and percentages.

3. Analysis and Discussion of Results

The answers provided by the respondents to the questions raised for the study are as analyzed below:

Research Question One: Do the students know how to study mathematics textbook(s)?

Item 6, 9, 10, 11, 16 and 18 on the teachers' questionnaire were designed to collect information on this question and responses are as stated below:

Table 1: Know How to Study Mathematics Textbooks

Item	Response	Frequency	Percentage
6	Yes	10	71.4
	No	3	21.4
	Nil	1	7.2
	Total	14	100.0
9	Yes	14	100.0
	No	0	0
	Total	14	100.0
10	Yes	11	78.6
	No	3	21.4
	Total	14	100
11	Yes	14	100
	No	0	0
	Total	14	100.0
16	Yes	14	100.0
	No	0	0
	Total	14	100.0
18	Yes	13	92.9
	No	1	7.1
	Total	14	100.0

Item 6 revealed that 10 representing 71.4% of the teachers used for this study concluded that studying mathematics is a basic learning skill for students, while 3 representing 21.4% did not agree, and 1 representing (7.2%) did not indicate response.

Item 9 in the table above shows that all the teachers used in the inquiry which stood at 100% encourage their students to take notes that will make them study mathematics textbooks carefully, this shows that teaching / learning process is enhanced in mathematics learning.

Item 10 indicates that 11 (78.6%) of the teachers used for the investigation decided that they collect their students' notebook for grading and comment regularly whereas 3 standing for 21.4% did not. The result of item 11 revealed that 14 depicting 100% of the teachers used for the research suppose that they incite their students to use graded notebooks for review even though some of them do not collect these notebooks for grading regularly.

The outcome of item 16 showed that 14 denoting 100% of the teachers used for the investigation believe that teaching students how to study mathematics textbook(s) will encourage independent and lively interactions among students in the class. This is a good development for teaching of studying protocols of mathematics textbook(s) to students since all the teachers used in the research agree that students taught studying protocols of mathematics will know how to study mathematics textbook(s).

Item 18 showed that the consequence of the response of 13 picturing 92.9% of the teachers used for the investigation presented that the majority of the teachers see mathematics studying assignment as an aid towards improving students' understanding of concepts whereas one teacher which pictures 7.1% of the teacher used in the study does not see need for mathematics studying assignment. This justifies the assumption that students given mathematics studying assignment will have better understanding of mathematics textbook(s).

Research Question Two: To what extent are students taught studying protocols on how to study mathematics textbooks?

Items 5, 7, 8, 12, 13, 14, 15 and 17 on the teachers' questionnaire collected information on this question and responses are as stated below:

Table 2: Teaching of Studying Protocols on how to study Mathematics Textbook

Item	Response	Frequency	Percentage (%)
5	Yes	14	100.0
	No	0	0
	Total	14	100.0
7	Yes	08	57.1
	No	06	42.9
	Total	14	100.0
8	Yes	14	100.0
	No	0	0
	Total	14	100.0
12	Yes	10	71.4
	No	04	28.6
	Total	14	100.0
13	Yes	12	85.7
	No	02	14.3
	Total	14	100.0
14	Yes	10	71.4
	No	04	28.6
	Total	14	100.0
15	Yes	08	57.1
	No	06	42.9
	Total	14	100.0
17	Yes	11	78.6
	No	3	21.4
	Total	14	100.0

Item 5 in the table shows that 14 teacher respondents describing 100% of total number of teachers used in the research see it as important to teach students how to study mathematics. This indicates that students lack mathematics studying skills. Based on the teachers' perception, every teacher should be intimated that mathematics studying skill is a basic learning skill for students. There is need to teach appropriate mathematics studying protocols to students on how to study mathematics textbook(s) across educational strata.

Item 7 shows that 8 (57.1%) of the teacher respondents agreed that their students have access to study materials on mathematics, while 6 (42.9%) registered their disagreement with the item.. This is a considerable percentage which requires that provision for study materials on mathematics should be provided in schools.

Item 8 shows that 14 representing 100% of teacher respondents used in the survey concluded that they arouse their students' interest to study mathematics textbook(s). This is in consonant with the aim of the study that appropriate mathematics studying protocols can be taught to students on how to study mathematics textbooks across educational strata.

Item 12 shows that 10 depicting 71.4% of the teacher respondents used in the study do give mathematics studying assignment while 4 representing 28.6% do not. This can be attributed to larger class population of students in the schools covered where teachers who do not give studying assignment attributed it to the population of students in mathematics class.

Item 13 reveal that 12 denoting 85.7% of the teacher respondents require students to bring questions to class after a studying assignment but 2 representing 14.3% do not.
Item 14 indicates that 10 representing 71.4% of teacher respondents do assign section(s) to be study from mathematics textbooks whereas 4 describing 28.6% of teacher respondents do not. This

supports the aim of the study that appropriate mathematics studying protocols are taught to students on how to study mathematics textbook(s) across educational strata.

Item 15 shows that eight expressing 57.1% of teachers used in the study reveals that teachers devote part of their mathematics lessons to help their students learn to study mathematics textbook(s) whereas 6 representing 42.9% do not. It was discovered not on the side of the teachers to devote part of their lesson for teaching mathematics studying protocols to students.

Item 17 indicates that 11 typifying 78.6% of teachers used in the study shows that the majority of teachers agreed that mathematics studying assignment can serve a similar role to lengthy problem-solving assignment, whereas 3 depicting 21.4% of the teacher respondents support the traditional idea that mathematics involves problem solving, and not studying of mathematics textbook(s).

Research Question Three: What is the studying behaviour of students towards mathematics textbooks?

Items 3,4,6,7,11,19,20 and 21 on the students' questionnaire were used to collect information on this question and their responses are stated below:

Item	Response	Frequency	Percentage (%)
3	Yes	27	84.4
	No	05	15.6
	Total	32	100.0
4	Yes	24	75.0
	No	08	25.0
	Total	32	100.0
6	Yes	27	84.4
	No	05	15.6
	Total	32	100.0
7	Yes	20	62.5
	No	12	37.5
	Total	32	100.0
11	Yes	30	93.8
	No	02	6.2
	Total	32	100.0
9	Yes	22	68.0
	No	10	31.2
	Total	32	100.0
20	Yes	17	53.1
	No	15	46.9
	Total	32	100.0
21	Yes	21	65.6
	No	11	34.4
	Total	32	100.0

The result of item 3 shows that 27 (84.4%) of the student respondents consider studying of mathematics to be unique, that is, it is different from other types of study; whereas 5 (15.6%) do not. This is a good development for mathematics literacy because the students are aware that studying of mathematics is a special type of study.

Item 4 shows that 24 (75%) of the student respondents set aside time to study mathematics textbook(s), whereas 8 (25%) do not. This reveals that a higher percentage of students do study their mathematics textbook(s).

Responses to item 6 of the student respondents' questionnaire reveals that 27 (84.4%) students study their mathematics textbook(s) whenever they have difficulty in learning mathematics concepts, whereas 5 (15.6%) do not bother to do anything whenever they have difficulty in learning mathematics concepts.

Item 7 shows 20 (62.5%) identify scanning through mathematics textbook(s) as a strategy for studying mathematics textbook(s) whereas 12 (37.5%) do not. This implies that scanning as an identified strategy of studying mathematics textbook(s) should be taught to students' since about one-third of the students' total population do not recognize the importance of methodical approach towards mathematical learning through studying. This will affect their performance in various examinations and choice of career from science and engineering related courses to more of humanities related courses, which will not augur well for further industrialization and breakthroughs in fields of sciences and engineering in Nigeria as a nation.

Item 11 shows that students identified looking into their mathematics textbooks for definition and formulas as an aid to quick learning of mathematics formulas and definitions from mathematics textbook(s) since about 30 (93.8%) assuredly do so, whereas a very insignificant percentage 2 (6.2%) do not look into mathematics textbook(s) for formulas and definitions.

Item 9 show that 22 representing 68.8% of the student respondents do use index to know that every word means in their mathematics textbook(s), whereas 10 (31.2%) do not. These students who do not use index to find out what every word means would not have foreknowledge of it from their background. Therefore, they could not have identified it as a strategy for reading mathematics textbook(s).

Item 20 reveals that 17 (53.1%) of the student respondents use appendices to know what every word means, whereas 15 (46.9%) do not. This higher percentage of students who do use appendices to know what every word means shows that they have no foreknowledge of it from their various background with serious implication for manpower development and training; if students who are almost graduating from post-primary schools have not such knowledge of identifying strategy for reading mathematics textbook(s). this will create a serious gap when they will be gaining admission to institutions of higher learning, there will be serious deficiency in their studying skill for effective mastery of higher concepts in institution of higher learning.

The outcome of item 21 reveals that 21 (65.6%) of the student respondents use glossary to know what every word means, whereas 11 (34.4%) do not use it.

Research Question Four: How do students look at studying assignment of mathematics textbooks? Items 8, 9, 10, 12, 13, 14, 15, 16, 17, 18 and 22 on the students' questionnaire collected information on research question four, and responses analyzed as follows / stated below:

Item	Response	Frequency	Percentage (%)
8	Yes	22	68.8
	No	10	31.2
	Total	32	100.0
9	Yes	29	90.6
	No	03	9.4
	Total	32	100.0
10	Yes	31	96.9
	No	01	3.1
	Total	32	100.0
12	Yes	21	65.6
	No	11	34.4
	Total	32	100.0
13	Yes	16	50.0
	No	16	50.0

	Total	32	100.0
14	Yes	25	78.1
	No	07	21.9
	Total	32	100.0
15	Yes	24	75.0
	No	08	25.0
	Total	32	100.0
16	Yes	29	90.6
	No	03	9.4
	Total	32	100.0
17	Yes	30	93.8
	No	02	6.2
	Total	32	100.0
18	Yes	22	68.8
	No	10	31.2
	Total	32	100.0
22	Yes	28	87.5
	No	04	12.5
	Total	32	100.0

Item 8 reveals that 22 (68.8%) of the student respondents gain full understanding of what they study after the first studying assignment in their mathematics textbook(s) whereas 10 (31.2%) do not.
Item 9 shows that 29 (90.6%) of the student respondents gain full understanding after the second studying assignments in their mathematics textbook(s), whereas 3 (9.4%) do not. Students need to be aware that mathematics studying assignment requires slow reading.

Item 10 shows that higher percentage of the student respondents 31 (96.9%) indicates that they gain full understanding of what they study after the third studying assignments in their mathematics textbook(s), which shows that students should be encouraged to be persistent and consistent in learning mathematics studying assignment. A lower percentage of the student respondents 1 (3.1%) fails to gain full understanding after the third studying assignment.

Result of item 12 shows that 21 (65.6%) of the student respondents do take notes as they are studying through their mathematics textbook(s) while 11 (34.4%) do not.
Item 13 shows that 16 student respondents representing 50% of total number of students used in the research do study pictures and graphs to unveil meaning of subject contents but half of the students do not know it, which indicate a serious implication for mathematics education.

Item 14 shows that 25 (78.1%) of the student respondents pay attention to meaning of words as used in a mathematics context than in everyday use, whereas 7 (21.9%) do not. This shows that greater percentage of the students have a good studying approach to mathematics with respect to the use of dictionary.

Item 15 revealed that 24 (75%) of student respondents used for the study indicate that they consult their teachers on confusing ideas in their mathematics textbook(s) while 8 (25%) do not.
Item 16 revealed that 29 (90.6%) of student respondents used for the study indicate that they seek assistance from other mathematics teacher on confusing idea in their mathematics textbook(s) whereas 3 (9.4%) do not. It also showed that some students prefer another mathematics teacher to their subject teacher when it comes to seeking assistance on areas of difficulty.

Item 17 revealed that 30 (93.8%) of student respondents used in the research prefer seeking assistance from their mates on difficult areas in their mathematics textbook(s), whereas 2 (6.2%) do not. This showed that cooperative learning method of teaching is highly beneficial and should be encouraged among students, by secondary school teachers.

Item 18 showed that 22 (68.8%) of the student respondents seek assistance from their senior on confusing ideas in their mathematics textbook(s), while 10 (31.2%) seek not.
Item 22 reveals that 28 (87.5%) use table of contents to know more about a particular topic which they have difficulties in and 4 (12.5%) do not use it.

Findings

From this study, the following findings were recorded:

i. few students do not know how to study mathematics textbooks because they do not take note while reading;
ii. teacher's experience stands as a strong determinant factor in assessing students' attitude towards studying strategy employed for mathematics textbooks; few teachers as well do not evaluate their students' notebooks periodically.
iii. few students have not been able to identify strategy they can employ in studying mathematics textbooks, they study only when encountering difficulty and not as a habit.
iv. students do not take studying assignment seriously because they fail to schedule time to study. Students that study mathematics textbooks put in a persistent and consistent effort.

4. Conclusion

Based on findings from the study, the following conclusions were made:

i. students do not know how to study mathematics textbooks because they do not take note while reading;
ii. teacher's experience is a strong determinant factor in assessing students' attitude towards studying strategy employed for mathematics textbook(s);
iii. teachers' do not evaluate their students' notebooks periodically;
iv. students' fail to identify studying strategy employable in studying mathematics textbook(s);
v. students' do not make study of mathematics a habit, but to pass examinations;
vi. students' that study mathematics textbook(s) gave it a persistent and consistent approach.

5. Recommendations

Based on findings from the study and conclusions made, the following are recommended:

i. study material on how to learn and teach mathematics studying protocols should be made available to the students and teachers by school authorities and government;
ii. more time should be allocated to study of mathematics textbook(s) in secondary schools;
iii. more people should be wooed to take teaching career in mathematics at secondary school level via better incentives.

Funding: Not applicable.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable
Acknowledgments: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Countryman, J. (1992). Writing to Learn Mathematics. Portsmouth NH: Heinemann.
2. Johnson, M. (1999). "ReadingMathematics". http://www.central.edu/homepages/millsm/ReadingMath.html
3. Campbell, A.E. & Schlumberger, A. (2001). "Promoting Reading Strategies for Developmental Mathematics Textbooks". http://www.umkc.edu/cad/nade/nadedocs/97conpap/accpap97.htm
4. Bruff, D. (2007). "Tips for Reading Your Mathematics Textbook". Preceptor in Mathematics, Harvard University.
5. Simonson, S. & Gouvea, F. (2007). "How to Read Mathematics". http://www.central.edu/homepages/millm/ReadingMaths.html

6. Taylor, M. A. (2019). Effects of classroom instruction on students understanding of quadratic equation aspect of mathematics. Journal of mathematics education and practice 18 (1), 47-77.
7. Clements, M. O. (2020). Quadratic equation representations and graphic calculates: procedural and conceptual interactions. In J. Bobis., B. Perry., and M. Mitchelmore (Eds.), numeracy and beyond. Proceedings of the 24th conference for the mathematics Education Research Group of Australasia. Sydney: MERGA, 257-264.
8. Thomas, O.O. (2021). Designing a package to minimize errors in Physics quadratic equation lessons in Nigeria secondary schools. Research Journal of Applied sciences 1(2), 135-158.

Cite article as:
Efunwole, G. O. (2022). Identification of Strategies for Studying Mathematics Textbooks among Senior Secondary School Students in Ife-East Local Government Area of Osun State. Ajayi Crowther J. Pure Appl. Sci. 2022, 1(1), 28-37. doi.: https://doi.org/10.56534/acjpas.2022.01.01.37