

Usefulness of Instructional Materials on Academic Achievement in Mathematics among Higher Secondary School Students of Mayurbhanj District, Odisha

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ABSTRACT

The key rationales of the research work are to find the usefulness of instructional materials on academic achievement in mathematics among higher secondary school students. This study was conducted on 30 higher secondary school students studying in M.P.C. Higher Secondary School, Baripada, Mayurbhanj district, Odisha, India. An intervention programme was administered to investigate the effects of instructional materials on academic achievement in mathematics among higher secondary school students. The investigator adopted the experimental research design to explore the effects of instructional materials on the academic achievement in mathematics among students. For the collection of sample for this study purposive sampling technique was used. The findings of the study revealed that instructional materials enhance the academic achievement in mathematics among higher secondary school students and it helps the teacher to present the lesson effectively and efficiently, as students learn and retain the concepts better and for a longer period of time. Further, the use of instructional material improves both critical and analytical thinking of the learner. In addition to this, educational implications and recommendations were given on the basis of obtained findings of the study.

Keywords: Usefulness, Instructional materials, Academic achievement, Mathematics, Higher secondary school students.

I. INTRODUCTION

Mathematics is the fundamental subject for the development of scientific knowledge, intellectual growth, curiosity, creativity, logical

reasoning and critical thinking among students at different levels of their schooling. The knowledge of mathematics is necessary for pre-primary, primary, upper-primary, secondary, higher secondary and higher education as it inculcates various values among the learners. Academic achievement of students' is bank on the conceptual knowledge and understanding of mathematics in the teaching learning process. The process of teaching learning become more effective and captivate by the inclusion of instruction materials or teaching aids. Instructional materials like, audio, visual and audio-visual aids, TLMs, textbooks, charts, photographs, graphs, flashcards, maps, assistive ICT materials and other supportive study materials act as a medium between the teacher and the learner for delivering instructions in the classroom situation. Teaching aids serve as a motivator for the students in the teaching-learning process. Instructional materials are used to get the attention of the students and make the curriculum transaction more interesting for the pupils. Instructional materials provide assistance for both teacher and students to oblige teaching learning process an effective and successful by achieving the educational aims and objectives. Instructional materials are designed for either student without or with special needs (CWSNs). Instructional materials and its effect on student's leaning of mathematics continue to attract the attention of researches because of their association with students learning and academic achievement in mathematics.

II. LITERATURE REVIEW

Mayer (2010) ^[15] obtained that the visual materials play an important role in assisting

instruction in order to clarify define and explain the related teaching points. The utilization of improvised instructional materials promotes and enhances the effective teaching-learning process (Oladejo, Olosunde, Ojebisi & Isola, 2011) ^[16]. Further, Sharma (2012) ^[20] revealed that the effective use of instructional materials in the classroom draws the attention of students due to its multisensory experiences. Adalikwu & Iorkpilgh (2013) ^[1] conducted a study on the influence of instructional materials on academic performance of senior secondary school students in chemistry in Cross River state and obtained that students taught with instructional materials performed significantly better than those taught without instructional materials and also that the use of instructional materials generally improved students' understanding of concepts and led to high academic achievements. A study by Osamor & Odebisi (2019) ^[17] on effect of instructional materials on the academic achievement of biology students in senior secondary schools in Delta state revealed that the instructional materials in schools are inadequate and the instructional materials utilized in the teaching and learning of biology enables students make more achievements unlike situations where instructional material used is inadequate. Further, Bulama, Wamarihyel, Hauwa & Solomon (2021) ^[5] studied the effects of instructional materials on academic achievement in geography among secondary school students' in Nigeria and revealed that there is statistically significant difference in the students' academic achievement between students exposed to the use of instructional materials are used and those whom were not used in teaching geography in senior secondary schools. The result also showed that there is no statistically significant difference in academic achievements between boys and girls taught geography when instructional materials are used. Banerjee (2021) ^[3] conducted a study on the effect of instructional materials on achievement in science among senior secondary school students revealed that the instructional materials has significant effect on the achievement in science among senior secondary students.

III. RESEARCH PROBLEM

Instructional materials are utilized for demonstration, illustration, explanation and elaboration of content matter in the classroom which is synonymous with taking the learners to parts of the world they could experience the learning in the classroom situation by the assistance of teacher or special expertise. Students retain information for a long period of time if they taught through instructional materials in the classroom

transaction. Teaching aids develop a proper image in the mind of learner when the students see, observe, experience and experiment properly. Teaching aids furnish a concrete and complete example for conceptual learning and thinking of students. The teaching aids create interest of the lesson, increase the vocabulary skills and make learning more engagement. Teaching aids dispense direct experience to the students in the classroom situation. Instructional materials make tremendous effect on the lesson if intelligently used by the teacher in the teaching learning process. In the last decade, research works on the effects of instructional materials on achievements of students has become area of interest for the researchers. The purpose of this study is to find out the effects of instructional materials (teaching aids) among secondary learners with respect to their academic achievements in mathematics. Hence, the investigator has undertaken to study this topic. It is expected that the findings would be utilized by scholars, teachers, teacher-educators, students, researchers and educationists in future.

IV. OBJECTIVES OF THE STUDY

The objectives of the research work are:

- (1) To study the effects of instructional materials on academic achievement in mathematics among higher secondary school students,
- (2) To study the difference between pre-test and post-test achievement scores in mathematics among higher secondary school students.

V. HYPOTHESES OF THE STUDY

The hypotheses of the research work are:

- (1) There exist significant effects of instructional materials on academic achievement in mathematics among higher secondary school students,
- (2) There exists a significant difference between pre-test and post-test achievement scores in mathematics among higher secondary school students.

VI. DELIMITATION OF THE STUDY

The population of the study delimited to higher secondary school students only. The study delimited to 30 students as sample. The present study has been confined to the students of M.P.C. Higher Secondary School, Baripada, Mayurbhanj district, Odisha, India. The study is delimited to the students of the age group of 16-18 years only.

VII. METHODOLOGY

Taking into consideration the nature of study the investigator adopted the experimental research design to explore the effects of

instructional materials on the academic achievement in mathematics among higher secondary school students. In the present study, the population constituted out of higher secondary school students in Baripada block of Mayurbhanj, Odisha, India. For the collection of sample for this study purposive sampling technique was used. For the present study a total number of 30 students selected as sample by aforementioned sampling technique.

EXPERIMENTAL RESEARCH DESIGN

The present study is a pre-test and post-test experimental design. Teaching through instructional material is a 12-days designed intervention program for higher secondary school students which are provided before applying the pre-test on academic achievement in mathematics. After the intervention program is concluded, the achievement test on mathematics is administered again on a post-test survey.

VIII. TOOLS AND TECHNIQUES

The investigator used teaching through instructional material as an intervention programme for academic achievement in mathematics among higher secondary school students. Further, one achievement test developed by the investigator was used to collection of data from students. The investigator prepared an achievement test in mathematics for higher secondary school students. The test includes different types of questions like

multiple choice questions, fill up the blanks, match the following, true or false statement, and one-word answers. The test contains 40 questions representing 40 marks. Reliability of the test was calculated by Product Moment correlation method. The co-efficient of reliability calculated and come out to be 0.72. Hence the tools are highly reliable. The tools are checked by the language and subject expert to find out the content validity of the tools. According to the expert, the tools are valid and appropriate to measure the achievement level of students in mathematics. Every correct answer and wrong answer should be given one (1) mark and a zero (0) mark respectively. The minimum and maximum scores are 14 to 35.

IX. ANALYSIS AND INTERPRETATION

It is inferred from table-1 that means score of pre-test and post-test are 24.15 and 28.72 with standard deviation 7.02 and 5.12 respectively. The calculated t-value came out to be 2.89 which is more than standard table value at both levels of significance. This indicates there is a significant difference between pre-test and post-test scores of academic achievement in mathematics of higher secondary school students. Further, the mean score of post-test of academic achievement in mathematics is higher than the pre-test. Hence, it implies that instructional materials have significant effects on academic achievement in mathematics among higher secondary school students.

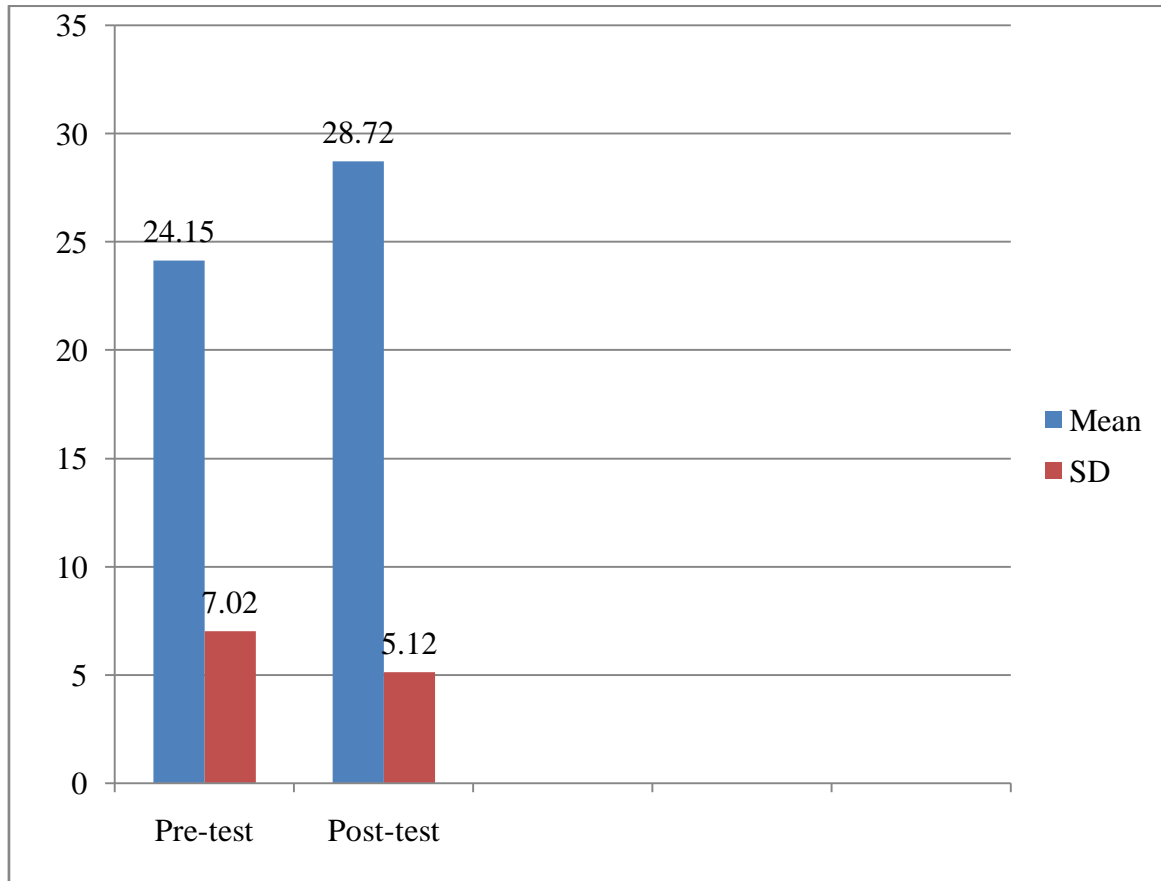
Table-1

(Significant of difference between pre-test and post-test scores of academic achievement in mathematics among higher secondary school students)

Sl. No	Test	No. of Samples (N)	Mean (M)	SD	SED	t-ratio	Level of Significance
1	Pre-test	30	24.15	7.02	1.58	2.89	Significant at both level i.e. 0.05 and 0.01
2	Post-test	30	28.72	5.12			

(Degree of freedom = 29, at 0.05 level = 2.04, at 0.01 level = 2.76)

The mean and Standard Deviation (SD) of pre-test and post-test scores of academic achievement in mathematics among higher secondary school students are depicted in the above table is represented by the bar graph.



(Figure-1, pre-test and post-test scores of academic achievement in mathematics among higher secondary school students)

X. FINDINGS AND EDUCATIONAL IMPLICATIONS

Every study provides some meaningful information and knowledge to the related field and this study also has some systematic, organized and meaningful information. There is a significant difference between the pre-test and post-test scores of mathematics achievement of higher secondary school students. Further, the mean score of post-test on mathematics is higher than the pre-test. So it indicates that instructional materials have significant effects on academic achievement in mathematics among higher secondary school students.

There are several educational implications of instructional materials on mathematics and its effects on academic achievement of the study such as:

- (1) Higher secondary learners are more confident and curious towards their learning in mathematics;
- (2) Teacher should present content matter to students by the help of instructional materials

like TLMs, teaching aids, textbooks, charts, photographs, graphs, flashcards, maps, assistive ICT materials, other supportive study materials which focused on concepts, theories, ideas and events that are purposeful and applicable in teaching-learning process among secondary learners;

- (3) Learner should provided more focus on the development of problem solving ability to apply them in the real life situation so that they can have a peace and successful career in the future.

XI. RECOMMENDATIONS

The recommendations of the research work are:

- (1) In this study, the investigator conducted an experimental research on usefulness of instructional materials on mathematics achievement among higher secondary school students; it is advised to conduct research on other areas like science, language and social science for better generalization.

- (2) In this study, the sample was delimited to Mayurbhanj district only; it is advised to explore the sample in other districts of Odisha as well as other states of India.
- (3) It is suggested that the alike type of research work may be administered on primary, upper-primary and secondary school students also.
- (4) The study can be conducted on various types of schools i.e. private school, tribal school, girl's school and co-education school.

XII. CONCLUSION

Based on the results of research work it was concluded that the instructional materials are crucial tools for higher secondary schools students in the teaching-learning of mathematics. It helps the teacher to present the lesson effectively and efficiently, as students learn and retain the concepts better and for a longer duration. The use of instructional material improves both critical and analytical thinking of the learner. It also dispenses assistance to the students for finer understanding of abstract concepts through visual representations. Therefore, teachers should be well trained through in-service training to maximize the benefits of using these aids. The curriculum should be designed such that there are options to activity based learning through instructional material in the teaching learning process that can enhance the student's academic achievement.

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