Advances in Consumer Research
https://acr-journal.com/

Volume-2 | Issue-4 | August 2025

Original Researcher Article

Ordeals of Teaching Mathematics in Secondary Class: An Empirical Study

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Received: 20/07/2025
Revised: 12/08/2025
Accepted: 06/09/2025
Published: 13/09/2025

ABSTRACT

The teaching of Mathematics at the secondary level continues to pose significant challenges for both teachers and learners. Despite curriculum reforms, most students exhibit poor to average performance in Mathematics, with only a few attaining higher-order learning. This study aimed to examine the ordeals faced by secondary school Mathematics teachers in Aligarh District, Uttar Pradesh, with a focus on curriculum suitability, teaching methods and strategies, difficult areas of the curriculum, teaching materials and resources, and classroom interaction. A descriptive survey design with a quantitative approach was employed. Data were collected from 100 Mathematics teachers of Classes IX and X across 25 CBSE schools using a self-prepared and validated questionnaire (Cronbach's Alpha = 0.89). Findings revealed that a majority of teachers continue to rely on teacher-centered methods, particularly lecture-based instruction, with limited adoption of student-centered and activity-based approaches. Geometry was identified as the easiest topic to teach, while Algebra and Trigonometry were perceived as more difficult. Teachers reported challenges including student disinterest, insufficient consideration of individual learning differences, and inadequate curriculum alignment with learners' needs. The results highlight the need for curriculum refinement, innovative pedagogical strategies, learner-centered approaches, and continuous professional development of teachers to enhance the teaching-learning process in Mathematics. The study suggests that effective policy frameworks and structured training modules are crucial for equipping teachers with diverse strategies to make Mathematics learning more engaging and meaningful at the secondary level.

Keywords: Mathematics education, secondary school, teaching strategies, curriculum suitability, teacher challenges, learner-centered approaches.

INTRODUCTION

The teaching-learning of Mathematics has always been felt as a challenging task for Mathematics teachers right from the inception class to higher education in Mathematics. At Secondary Level the same hurdles are faced even today in the classrooms with poor to average scores in the attainments of learners except few learners who attain higher order learning due to their higher intelligence quotient which enables them to come up with the learning of Mathematics with stepwise clarity and comprehension of new concepts as delivered in the classrooms.

The learning of Mathematics by students is influenced by individual differences, since they learn and assimilate knowledge in various ways, as previously described. The same applies to teachers who employ diverse styles, methods, strategies, and interventions in teaching Mathematics in secondary classes.

Psychologically, there is a difference in individual style of teachers. The mathematics curriculum, content and methods need to be reviewed in context of each of the secondary class to infer the basic contents to be taught and its antecedent connectivity with the students' previous knowledge which is seldom practiced in our secondary classrooms. The teacher has a pivotal role to perform in the classrooms by helping his students realize that the contents taught in the classrooms are important for their lives and to create a chain of linkage between what the students know and what is going to be taught to them. The most detrimental aspect is that the curiosity, interests, and learning progress of students are consistently neglected in Mathematics class.

This research paper is based on a study in which a questionnaire was distributed to 100 secondary school teachers instructing Mathematics to students in Classes IX and X.

Need for Study

In view of the present state of the mathematics teaching in secondary classes, it is pertinent to conduct

such study to infer what really hinders the learners who in general are not performing well in their achievements in Mathematics and in particulars where do the teachers fail to bring forth expected competence in learning Mathematics in secondary classes.

REVIEW OF LITERATURE

The researcher has reviewed various research papers on the relevant topics of this research paper which are summarized below:

Theron, H., (2025) in a study identified key issues in South African mathematics education, such as insufficiently trained teachers, inadequate facilities, and lack of resources. The review concluded that South Africa could improve its mathematics performance by ensuring that all mathematics teachers are well-qualified, providing adequate resources, and fostering a conducive learning environment.

Vijayakumari, K. (2024) investigated the efficacy of the Art Integrated Information Processing Model (AIIPM), the Information Processing Model (IPM), and the conventional technique of teaching Mathematics in achieving optimal mathematical outputs. The results indicated that AIIPM effectively improves mathematical performance among secondary school students. The study offers useful insights indicating that an integrated strategy could enhance Mathematics teaching by fostering an inclusive and engaging learning environment.

Lumbantoruan, J. H., & Manalu, R. U. (2024) evaluated high school students' understanding of mathematics curriculum as the goal of the study. Students who utilized the module designed by teachers received an average score of 87.20, while those who do not use it received an average score of 65.51. The designed modules were interpreted by the study to greatly enhance students' learning results.

Arifin, A., et al. (2024) explored the complex connections between secondary school student academic achievement, teacher professional development, and classroom environment. It revealed significant positive relationships between student academic achievement and teacher professional development. In secondary education, the study offered subtle insights to support professional development programs, instructional methods, and educational policy.

Karim, S., & Zoker, E. M. (2023) examined the challenges associated with technology integration. The study offered a comprehensive examination of the investigation of individual practices and the perspectives of math teachers regarding the incorporation of technology into instruction.

Vale, I., & Barbosa, A. (2023) studied an active learning experience that included paper folding, a gallery walk, and a math trail. The results support the use of active learning strategies as a useful method of teaching and learning.

Saleh Alabdulaziz, M. (2023) investigated the potential of escape rooms as an active methodological approach in mathematics education. Using an Escape Room in mathematics instruction can improve learning achievement, anxiety, motivation, and autonomy. Therefore, escape rooms may be a more effective way to teach mathematics than traditional approaches.

Based on reviews, the researcher has identified six areas which were included in the present study as the key components of the research objectives and the questionnaire, i.e., Suitability of Curriculum, Teaching Methods and Strategies, Difficult Part of the Curriculum, Teaching Materials and Resources and Interaction in the Classroom.

Objectives of the Study

- ✓ The following objectives were set for the present study:
- ✓ To study the Methodology of Teaching adopted by Mathematics Teachers in teaching Secondary Class.
- ✓ Studying the components which are important on the part of teachers in Teaching-learning Mathematics in Secondary Class (IX and X).

Research Questions

The following components of teaching Mathematics in Secondary Class consisted of research questions in the form of statements made to collect data from teachers for this research study:

- Suitability of Curriculum
- Teaching Methods and Strategies
- Difficult Part of the Curriculum
- Teaching Materials and Resources
- Interaction in the Classroom

METHODOLOGY

This research study is based on Descriptive method using quantitative approach.

Research Design

This research has employed a descriptive survey design using self-prepared tool which was served to teachers.

Population and Sampling

The population of the study contained of all the teachers teaching Mathematics in Class IX and X in the Aligarh District of Uttar Pradesh which was further limited to CBSE Schools only. In total 100 teachers were randomly selected from 25 schools. The researcher selected 76 male and 24 female teachers across 25 schools as selected in the sample by random sampling method. Out of 100 teachers, 23 teachers possessed more than 15 years of experience, 37 teachers had more than 10 years of experience but less than 15 years, 18 teachers had more than 5 years

teaching experience but less than 10 years teaching experience and 22 teachers had less than 5 years of experience. Out of 100 teachers, 76 teachers were post-graduates in mathematics, and 24 teachers were only graduates in mathematics. In total 89 teachers possessed B.Ed. Degree.

Tool Used

A self-prepared Questionnaire was constructed for teachers' data on teaching-learning of Mathematics. The tool was scrutinized by experts, and the ambiguous items were removed from the First Draft having 35 items to validate the items. Finally, 25 items were considered as part of the Questionnaire. The reliability of the tool was tested using Cronbach Alpha, which was found to be 0.89, which can be considered as highly reliable. The First Part consisted of general information about the responding teachers; second part consisted of statements with 3 options in which teachers had to select only one option as his/her choice or response. The Third Part consisted of 15 items based on statements with 5 options from the teachers who were enquired to choose only one choice as their response.

Data Collection and Analysis

The researcher personally visited the respective schools and met the selected teachers with due permission of the School Authority and served the Questionnaire, after it is duly filled in, the researcher collected the same after the stipulated duration.

The data was analyzed and synthesized to infer the findings based on each of the statements given in the Questionnaire.

Findings and Interpretations

The results and findings of the present study as given in Part II and III of the Questionnaire are summarized below:

RESULTS AND FINDINGS OF PART II:

As to Statement No.1 regarding the Curriculum,30% of the teachers said that the mathematics curriculum is based on students' needs, 65% of the teachers responded that mathematics curriculum is subject centric and 5% of the teachers understood that they have no idea about mathematics curriculum. For Statement No. 2 on Teaching Styles,55% of the teachers said that they are using teacher centered methods in classroom teaching while only 14% said that they employ student centered teaching learning methods in their teaching. 31% said that they employ both types of teaching styles in teaching. In response to Statement No. 3 on preferred strategies, 62% of the teachers chose Lecture method as most employed method in teaching, 30% of the teachers employ project method while 8% of the teachers use collaborative method. On guiding students as given in Statement No. 4, 64% of the teachers said that they explain mathematical topics using textbooks and examples and help them solve problems. 28% of the teachers contracted that they discuss topics with the students and encourage them to solve different problems while 8% of teachers said that they give lectures to the students and instruct them to solve other problems in the textbooks. On the easiest topic of teaching Mathematics as asked in Statement No.5, 25% of the teachers agreed that algebra is easy to teach, 51% asserted that Geometry is the easiest and 24% said that trigonometry is easy to teach. As per Statement No.6, regarding difficult topics, 48% of the teachers agreed that algebra is difficult to teach, 11% asserted that Geometry is most difficult and 41% said that trigonometry is difficult to teach.

In response to StatementNo.7, the analysis reveals that 67% of the teachers employ lecture methods to teach algebra, 13% use demonstration methods while 20% use discussion methods. In response to Statement No. 8, the analysis reveals that 12% of the teachers employ lecture methods to teach Geometry, 76% use demonstration method and 12% said that they use discussion method to teach Geometry. The response on statement 9 shows 12% teachers use lecture method to teach Trigonometry, 54% use demonstration method and 34% use discussion method. Regarding difficulties in teaching Mathematics as given in Statement 10, most of the teachers responded that Students are disinterested in Mathematics Class.

Results and Findings of Part III:

Part III of the Questionnaire was developed as Likert Scale comprising of 15 statements. The responses received on 5- point scale were analyzed for results and inferences.

Based on findings, it is depicted that 71% of teachers are of the view that mathematics curriculum is according to the needs of the students. Further, 54% agree that the topics in the mathematics curriculum are according to the understanding level of the students. Whether learners enjoy Mathematics, it was revealed that 57% students enjoy it. About using a particular method, 72% of the teachers strongly agreed that one method is not sufficient to teach Mathematics. Most of the teachers vouched for learning by doing method as one of best methods of teaching mathematics with a result of69% of teachers giving positive response. About good rapport between the teacher and taught, the responses revealed that 23% of the teachers strongly agree, 42% agreed that good relationship between the teacher and taught is essential for learning while 13% strongly disagree and 17% disagree with the fact that good relationship between the teacher and taught is essential for learning, 5% of the teachers were undecided in their response. About students' inquisitiveness to ask questions in the class, the responses revealed that 9% of the teachers strongly agree, 46% agree that students should be permitted to ask questions in the class while 15% strongly disagree and 28% disagree with the fact that students should be allowed to ask questions in the class. 2% of the teachers were undecided in their response. In relation to individual differences among the students, the responses revealed that 31% of the teachers strongly

agree, 32% agree that Individual differences among the students should be paid attention while 13% strongly disagree and 23% disagree with the fact that Individual differences among the students should be paid attention while 1% of the teachers were undecided in their response. In response to the statement that students learn faster when concept of a problem is explained with diagram, the responses revealed that 13% of the teachers strongly agree, 46% agree that Student learn fast when concept of a problem is explained with diagram while 9% strongly disagree and 28% disagree while 4% of the teachers were undecided in their response. In response to the statement that Boys learn mathematical concepts more easily than Girls, analysis of the responses revealed that 2% of the teachers strongly agree, 12% agree, 31% strongly disagree and 52% disagree on the statement. In relation to the statement that Girls are less interested in Mathematics, the results revealed that 1% of the teachers strongly agree, 31% agree, 12% strongly disagree and 47% disagree on the statement. The result on the statement that boys are better at drawing mathematical diagrams than girls revealed that 3% of the teachers strongly agree, 11% agree that Boys are better, 19% strongly disagree and 62% disagree. In relation to students not grasping a concept is the fault of the teacher, the result revealed that 9% of the teachers strongly agree, 33% agree, 11% strongly disagree and 39% disagree with the statement. On sufficient time to complete Mathematics Curriculum, the responses revealed that 23% of the teachers strongly agree, 47% agree, 12% strongly disagree and 13% disagree whereas 5% of the teachers were undecided in their response. On consideration of learning style of students, the responses revealed that 23% of the teachers strongly agree, 46% agree, 5% strongly disagree and 18% disagree whereas 5% of the teachers were undecided in their response.

CONCLUSION

Based on the results, findings and interpretations as given above it can be concluded that Mathematics remains a difficult and challenging task for teachers wherein teachers differ on varied components of teaching Mathematics in secondary class in relation to Suitability of Curriculum, Teaching Methods and Strategies, Difficult Part of the Curriculum, Teaching Materials and Resources and Interaction in the Classroom. This demands a comprehensive further study and research on each of the six components undertaken in this study for an elaborated findings and interpretations for policy frame on the need of inducting refined contents or curriculum, new strategies and developing teaching materials for Mathematics teachers and also learner centered approaches which in synchronization with training modules for teachers may be mandated for effective teaching-learning of mathematics in secondary class.

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