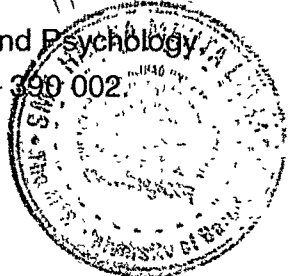


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Abstract

DEVELOPMENT OF A PROGRAMME FOR ENHANCING ACHIEVEMENT OF THE STUDENTS OF CLASS X IN MATHEMATICS

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INTRODUCTION

Education is the process of bringing desirable changes in learners, through a systematized process. It is meant for enabling the individual to perfect himself and lead a better, a more complete life, so that child can grow up to become a productive person in the society and lead a successful life. Education makes man a right thinker and a decision maker. Education also gives worth and self-esteem so that one can see himself as a valuable person. The secondary education, which serves as a bridge between primary and higher education, is expected, to prepare young persons between the age group of fourteen to eighteen in the world of work and to enter into higher education. Secondary schools provide students for universities and centres of higher education so, secondary education is very important. It is essential that secondary education should be of the higher quality. Mathematics is one of the greatest of all the sciences. It enters into all walks of the life. Mathematics is required for effective living, acquisition of important skills.

Modern age is an age of science and technology, advancement in technology, space, science, atomic research, commerce and trade are some of the factors which placed a special emphasis on the teaching of Mathematics at all levels of instruction; it may be primary, secondary or higher secondary. According to Bruner (1962) "Neglect of Mathematics does injury to all knowledge, as it has connection with all the other subjects. Knowledge of Mathematics is essential in solving social, economic and technical problems. Whenever quantitative facts and relationship have to be dealt with or whenever questions are faced that involve space and form, Mathematics has a good contribution to make. The significance of this contribution is steadily increasing. Mathematics has been considered as one of the greatest realms of human intellectual achievement. Mathematics is important not only for individual but also for the progress of the nation and human civilization. Thus, Mathematics is the synthesis of all sciences and all arts. Mathematics is the estate on which

other subjects are cultivated. In the present technological, electronic and computer dominated age no scientific and technological advancement can be made without Mathematics ”

Child starts learning of Mathematics from class first. Here major focus is on number system and basic operation on it. Algebra and geometry are informally introduced in class VI and VII, but in real sense it starts from class VIII and content included in class X is not free from concepts studied by them in previous classes. Therefore errors committed by students should be identified, remedial approach should be designed for enhancing achievement in Mathematics.

STATEMENT OF THE PROBLEM

“Development of a Programme for Enhancing Achievement of the Students of Class X in Mathematics”.

OBJECTIVES OF THE STUDY

- 1) To identify the students having low achievement in class IX in Mathematics in Baroda city.
- 2) To identify the factors related to low achievement of identified students.
- 3) To study the problems faced by the students who have low achievement in Mathematics.
- 4) To study the problems in teaching and learning Mathematics from teachers, parents and students.
- 5) To develop and tryout a programme to enhance achievement of students of class X in Mathematics.
- 6) To study the effectiveness of the programme in terms of achievement of the students of class X in Mathematics.

METHODOLOGY

In order to achieve the objectives of the present study, survey and experimentation were adopted and two types of data were collected – qualitative and quantitative. Situation analysis was made on the basis of collected data from students, teachers and parents. Experiment was conducted on the sample students to enhance their achievement in Mathematics.

SAMPLE

Seventy students were randomly selected as a sample from seven hundred and nineteen students who were low achievers i.e. who scored fifty or less than fifty marks in Mathematics based on their achievement in class IX.

MAJOR FINDINGS

Findings Based on Situation Analysis

- Ninety three percent students responded that they liked the subject mathematics.
- Sixty six percent students opined that they find it difficult to learn mathematics. Ninety one percent felt difficulty while learning mathematics in classroom. Difficulties were of following type – lack of concentration due to weak base, frequent transfer of teachers in the class, the method of explanation differs from teacher to teacher, speedy teaching, less practice in geometry, lack of proper guidance regarding preparation of the subject and less use of black board by the teachers.
- About fifty nine percent students did not like the teaching method of their teachers. Majority reasons for this were – teacher cannot make teaching interesting, teacher explains very quickly, teacher does not provide sufficient practice in the classroom, teacher does not explain the topic on the black-board.
- Fifty one percent students told that they are not participating in discussion in the classroom and forty three percent responded that they are not asking questions to their teachers if they don't understand any topic.
- Forty three percent students do not concentrate in the classroom and fifty one percent students felt boring in the period of mathematics.
- Forty one students responded that their teacher did not provide guidance about the homework given and forty eight percent students told that teacher does not draw any attention to the errors committed.
- Students' responses regarding the questions related to examination showed tension and fear of mathematics.
- Sixty five percent students opined that more practice was required; thirty five students opined that slow teaching helped them to learn better while thirty percent students opined that more and more time for practice helped them. Ninety six percent students opined that practice of necessary prerequisite helped them.
- Forty seven percent students opined that they lost their marks in definitions and in fill in the gaps while seventy percent students lost their marks in theorems, riders and constructions. Sixty one percent students opined that their handwriting also caused for not getting good marks. Forty one percent students opined that they did not cultivate good method of writing paper. Eighty seven percent students confessed that they could not recall and remember the things prepared. Sixty nine percent students opined that less practice of writing question paper at home was the cause of less marks in mathematics. Seventy nine percent students opined that less time was contributed for the subject was the reason of less marks. Fifty one percent students opined that they did not get good marks because teacher of mathematics was not good. Forty four students

confessed that the subject is tough therefore confidence is not developed while fifty one percent students opined that they did not know how to prepare the subject.

- Majority of the students opined following aspects were important to enhance the performance in mathematics – pattern of writing answer book, requirement to improve handwriting, to enhance concentration, recalling method, revision planning, goal setting, mini nap for relaxation, positive thinking, removing examination fear, hearing skill, speedy reading, writing and calculation, time management, how to study on the examination day, planning of three hours of examination, preparation of charts for important topics, examination tips, formation of good study habits.
- Seventy six percent parents responded that their child study mathematics regularly.
- Forty seven percent parents were unable to help their child in mathematics.
- The parents responded that their child did not sleep well on the day of examination, remained under tension till the paper was over. It clearly indicated that their child had examination fear.
- According to majority of teachers following type of help is needed to weak students who experienced difficulty in mathematics – providing additional help as and when needed, revision of each chapter, conducting unit test, providing remedial measures.
- Seventy six percent of teachers test the prerequisite knowledge for particular chapter not in a very planned manner, simply few questions were put before the class, while other teachers felt that no time is available for testing previous knowledge.
- All teachers responded that if the test was held after teaching each chapter and mistakes were corrected, definitely it was beneficial to the students who were getting fifty or less than fifty.
- Situation analysis clearly indicated that students are weak in basics and are not in clear prerequisite, teaching learning needs to be interesting. Motivation must be provided and study habits are needed to be cultivated.

Causes of Low Achievement:

Major causes for low achievement according to the students in mathematics were – learning difficulty in classroom teaching, difficulty in geometry and statistics, teachers speedy teaching, insufficient time for teaching and learning of Mathematics in time-table, inability to solve homework without other's help, examination fear for the subject mathematics, examination stress, inability to remember due to stress in the examination hall, lack of basic concepts which become a potential cause of difficulty in learning higher concepts, lack of concentration and attention at the time of learning, lack of repetition, insufficient time provided by the teacher to solve the examples in the classroom, problems in understanding theorems, riders, constructions, etc., difficulty in chapters like factors,

height and distance, area, volume, rational expressions, insufficient practice, lack of positive attitude for Mathematics, insufficient care for weak students by the teacher, lack of revision at the end of the year, negative attitude towards subject Mathematics, lack of inspiration from teachers and parents, lengthy syllabus, lack of proper speed in calculating sums, slow recalling, difficulty in objective type questions of Mathematics like definitions and fill in the blanks, lack of knowledge regarding how to prepare Mathematics, lack of good study habits, were major causes for low achievement.

According to parents, in mathematics – Confusion and difficulty in studying Mathematics at home, laziness in doing homework of Mathematics, lack of interest for Mathematics, confusion at the time of solving the examples at home and in the examination hall, parents were unable to help the students in the subject Mathematics, lack of guidance on the part of teachers for Mathematics, negative attitude of the child towards the subject Mathematics, were the major causes for low achievement.

Major causes for low achievement of the students in subject Mathematics according to the teachers – Dislike for the subject of Mathematics from the beginning, negative attitude of the students towards Mathematics, inferiority complex that Mathematics will not be understood, lack of enough practice, less attention to weak students in Mathematics, lack of explaining figures in geometry, theorems, definitions, students prepare riders without understanding the figures, lethargy in basic concepts like multiplication, division, square root, cube root, square, cube, canceling numbers in numerator and denominator, the attitude of scoring minimum marks to pass the examination.

Findings Based on Prerequisite Test and Unit Test

Mean of prerequisite tests showed poor performance of the students for prerequisite knowledge of previous standards. Performance of unit tests in respect of mean showed that teaching learning through developed programme enhanced their achievement to some extent. Counselling programme also reduced their teaching learning hurdles and enhanced their confidence and interest. Error analysis as well as remedial measures also helped the students to enhance their achievement to some extent.

Findings Based on Pre-Test, Pilot-Test and Post-Test

The performance of the students has increased from mean of 39.17 in class IX (pre-test) to mean of 50.83 in Pilot Test. Thus, there is observed difference of 11.66. The mean achievement of pre-test (Class IX) was 39.17 and that of post-test (Final achievement test of class X) was 61.33. Thus, there is observed difference of 22.16.

Major Errors Committed by Students in Various Tests

- Students could not find values of powers and indices due to insufficient knowledge and were not able to write values of trigonometric functions due to confusion between values.
- Students could not find range of logarithmic function due to insufficient knowledge of rules of logarithm.
- Students found it difficult to find values involving surds due to insufficient knowledge of their operations.
- The students could not find LCM of algebraic expression due to lack of clarity between HCF and LCM.
- Students were unable to solve examples as were lacking in knowledge of multiplication and division in subjects like factors expansion, height and distance, theorems and particularly in statistics.
- The students could not factorize due to insufficient knowledge of recognition of method to be applied particularly.
- The students could not simplify simple rational expressions due to inability to express them with some denominators.
- The students could not simplify due to their inability to cancel factors in same numerator and denominator in addition or subtraction and also in multiplication and division to invert expression in the topic rational expressions.
- The students could not factorize cyclic expressions due to inability to make proper groupings, to expand – inability to use proper formula and to recognition different types of factors.
- The students could not find simple ratio due to inability to cancel common numbers in numerator and denominator, were not able to find proper value of square root involving algebraic expression due to insufficient knowledge of powers and indices and also could not take common from bracket with perfect square due to inability to square and take common.
- The students could not find proper value due to inability to apply proper properties of proportion and were not able to simplify using powers and indices.
- The students could not factorize quadratic expression due to inability to recognize proper method and were not able to expand middle term due to not having proper confidence of finding it by doing multiplication.
- Students could not write the formula of perimeter and area of a rectangle and also could not find the area of right angled triangle due to lack of knowledge that one of the two sides making right angle is base and another is altitude and also were not able to convert equations and equal value roots as due to lack of knowledge.

- The students could not fill in the blanks due to improper knowledge of different trigonometric ratios and relation between them and were not able to answer sums involving fractions due to lack of knowledge of simplifying fractions, squaring quadratic surds, complementary angle and supplementary angle.
- The students could not solve the problems on height and distance due to inability to understand the problem and were not able to draw figures in a correct way and also were not able to use \sin , \tan , \cos , etc. in a proper way.
- In finding mean, the students were not clear about how to form tables? What is required in the table? What should be taken as assumed mean? e.g. In finding mean, table requires class, frequency, mid value.
- In finding median, the students could not find cumulative frequency due to insufficient knowledge of cumulative frequency due to inability to find median class.
- The students could not write all steps of theorem properly due to insufficient basic knowledge of geometry like theorems and postulates taught in previous standards 8 and 9. Students could not attempt riders as were lacking in knowledge, understanding problem in concepts of medians, congruent and similar triangles, equilateral triangles, alternate angles, corresponding angles, interior angles, vertically opposite angles, different points of concurrence, area i.e. centroid, isosceles triangle and parallel lines or basic proportion theorem.
- The concepts of chord, diameter, their relation, radius, were not clear to the students. The different properties of chord and circle application of Pythagoras were not clear, so the students could not calculate length of chord or diameter or distance between chords. Expression of circle in set language was not clear due to lack of understanding of what is a circle?
- The students find it difficult to apply Pythagoras theorem to evaluate one side when the other two sides of a right angled triangle are given.
- The properties of arc and relation with angles were not clear, so they could not give proper measure of an angle inscribed in a semicircle and were unable to write theorem on semicircle because the fundamentals were not clear like line segment joining the midpoints of two sides of a triangle is parallel to the third and transversal of parallel lines form congruent corresponding angles.
- The students had no clear concept of tangent and properties of chord so they were unable to find length of chord touching inner concentric circle. The concept of cyclic quadrilateral and the property – opposite angles of a cyclic quadrilateral and supplementary were also not clear.