A STUDY OF CAUSE OF FAILURE IN MATHEMATICS AT SECONDARY STAGE WITH SPECIAL REFERENCE TO PUNJAB STATE

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Abstract

Mathematics , the only subject which is used in every sphere of our lives. Mathematics is a fundamental pillar and mirror of civilization. Mathematics is important for Science and Science is important for technology which is very important in the world. However it cannot be learnt overnight. Understanding and practicing Mathematics regularly helps to make a firm base. Though it has a fascinating subject, but a very large fraction of students find the subject creepy. Realizing the importance of Mathematics, it has been given a unique position in any school curriculum. But, the achievement of students in Mathematics is low, though Mathematics occupied a place of importance all over the country. Why is there a little visible progress in achievement of students in Mathematics? The answer to this question will bring in light the factors causing failure in Mathematics at secondary stage. This paper attempts to evaluate te causes of failure in mathematics at secondary stage in Punjab.

INTRODUCTION

Education is something, which makes a man self-reliant and self-less. Education is a process, which does all round harmonious development of the individual to modify his behavior, attitude and thinking. Education means training for the country and love for the nation. It plays a tremendous role in economical and social development and national integration of country. It includes all the knowledge and experiences, acquired during infancy, childhood, adolescence youth manhood and old age any agency of education.

Education is the touchstone of the civilization and culture of the country. It is an integral part and basis of human life. Education is as old as human existence and shall continue to function as long as the human race lives. It is an essential human virtue and man becomes man through education. According to Pesto Lozzi, "Education is the natural harmonious and progressive development of man's innate power. Education is a process which does all round harmonious development of the individual to modify his behavior, attitude and thinking. Education means training for the country and love for the nation. It plays a tremendous role in economical and social development and national integration of country.

Education is the need of all people, so many attempts have made to give free and compulsory education to all children up to the age of 14 years but the output is not so much satisfactory. There are many children who drop out the school due to many reasons; one of the main reasons of dropout the school is failure in mathematics. Parents and society are responsible for this reason but for mathematic subject is an un-systematic, lengthy syllabus.

SECONDARY EDUCATION IN PUNJAB

Punjab School Education Board is the authority which is responsible for providing affiliation to all government schools in Punjab. The private schools are free to have affiliation from Punjab School Education Board (PSEB) or Central Board of Secondary Education (CBSE) or Indian Certificate of Secondary Education (ICSE) after obtaining a 'No Objection Certificate' from the Department of Education, Government of Punjab for VI to XII class. It is proposed by the government to have at least one senior secondary school for boys and girls at each block Head Quarter, to provide education in all subject areas i.e. Humanities, Science, Commerce and Vocational groups.

Punjab School Education Board is managing adarsh schools for providing quality education to the students belonging to the rural areas of the State.

DPI (Secondary Education) is the largest organization working for the development of Human Resources in Punjab by providing an opportunity for all round development of the younger generation. The department is not only providing academic and job oriented education but is also promoting cultural and sports activities among younger ones. Education for all is the mission of this organization. To achieve this aim, well equipped and well staffed schools have been opened in geographically isolated regions of the state. Provisions are made for facilitating economically weaker sections of the society. Department works with the concept that all children have the right to be educated. Private organizations are also welcomed to join hands with the department for spreading education.

The prime aim of the department is to provide education to the youth of the state to make them eligible for higher education as well as for job market and for self employment. New courses and new streams of education have been introduced in Punjab. Welfare of employees including the teaching staff, non-teaching staff and ministerial staff is one of the major aims of the department. Various welfare schemes like house building loans, vehicle loans, retirement benefits and pensions have been started. Employment to the next of kin on priority basis in case of death of an

employee, reservation of jobs for physically handicapped, grant of maternity leave are some of the efforts to fulfill this objective. Vocational subjects prepare students for the work place in class 11th and 12th. There are about 345 schools involved in providing vocational courses/trades of agriculture, commerce, home science and, engineering, general which are going on at +2 stages for the state of Punjab. Science, Social sciences, Languages (Punjabi, Hindi and English) and Mathematics are the main subjects which are being taught by students of Punjab at secondary stage. Computer education is introduced on a large scale.

MEANING AND CONCEPT OF MATHEMATICS

Mathematics is one of the languages of human life and certainly no more marvelous languages were ever created by the mind of man. Mathematics cut short the lengthy statements through its symbols, is free from verbosity, help the expression of ideas in an exact form and enable to understand and appreciate precision, brevity, sharpness, logical beauty and mathematics.

Mathematics fulfils the educational values such as practical disciplinary cultural, intellectual, more; aesthetic, social vocational, inter-disciplinary etc. in order to realize the educational values and instructional objectives of mathematics, the subject must be practiced in class rooms by utilizing the service of traditional methods, educational innovations and technological advancements.

Out famous leader Pandit Jawaharlal Lal Nehru has expressed his view related to mathematical aspects as: "mathematics is supposed to be a dull subject, but is increasingly recognized that it is of high importance in scientific developments today. Indeed, mathematical research has evidenced the horizon of the human mind tenuously and has helped in the understanding, to some extent, of nature and the physical world. It is a vehicle of exact scientific thought".

Hence, mathematics, which is a science by any criterion and which right fully belongs to this group has not been accepted and emphasized as a sense. We can analyze that maths is a science of digits or numbers as well as it is an art of computing.

IMPORTANCE OF MATHEMATICS

Science and Mathematics have always been important areas of study for students both in elementary and secondary schools. As the 21st century draws closer, citizens of the whole world, have a greater need of high quality science and mathematics. According to Steen (1989) mathematics does not only empower people with the capacity to control their lives but also

provides science a firm foundation for effective theories, and also guarantees society a vigorous economy. Therefore, special attention is being paid to Mathematics and Science because these two subjects play a vital role in the development of any country.

Plato a famous thinker in the seventh book of his masterpiece, The Republic, stressed on the study of mathematics. Abdul Kalam, who was the 11th president of India from 2002 to 2007, a renowned scientist and engineer, insisted that Mathematics and science are useful in the real world. Mathematics and Science create the basis of our modern world and as long as our present generation continues to focus on Mathematics and Science, we can benefit the world.

In one of the dictionaries Mathematics is considered as the science of number and space while it is also defined as the science of measurement, quantity and magnitude. Bacon the famous essayist defined mathematics as a gate and key of the scientists. Napoleon the great warrior, once said that the progress and the improvement of Mathematics are linked with the prosperity of the state. It is agreed by Graeber and Weisman (1995) that Mathematics helps the individual to understand his/her environment and to give accurate account of the physical phenomena around him/her. Obe (1996) regards Mathematics as the master and servant of most disciplines and thus, a source of enlightenment and understanding of the universe. Setidisho (1996) agrees that no other subject forms a strong binding force among various branches of science as Mathematics, and without it, knowledge of the sciences often remains superficial.

It is a well known fact that mathematics has influenced on our everyday lives and contributed to the economic development of the country. The prosperity, industrial future of mankind can be changed with the proper use of latest researches in mathematics. Mathematics has contributed a lot to the development of various subjects. It has intensive application in the subjects like physical sciences, life and health sciences, social sciences, technical sciences, business and commerce, actuarial science and medicine. Knowledge of statistics is essential in order to understand information in newspapers and school books. The knowledge of mathematics is needed to calculate taxes, compare payment methods, and figure out loans and home budgets. Algebra helps to develop thinking and is necessary to study science, electronics, physics, commerce, medicine, accountancy, economics and other subjects. The contributions that mathematical knowledge and skills have made to economic, industrial and technological growth of modern world are quite obvious to almost everyone.

The importance of mathematics does not only lie in its contributions to scientific and technological development but also in its utility in day-to-day interactions at the market places,

transportations, business of all sorts by both literate and illiterate members of the society. Mathematics is needed in the world today much more than before since a lot of equipment based on digital development is going on and calculations are becoming much more complex.

The study of mathematics can satisfy a wide range of interests and abilities. It has been rightly said that Mathematics sharpens the minds of the people in the same way as some stone sharpens the tools. Mathematics helps in the development of intellectual power like power of imagination, observation, originality, creativity and systematic thinking and reasoning. Children get a lot of experience in problem solving. Problem solving ability is becoming increasingly important in the modern world. Problems in mathematics are well defined, and require children to think, and often to think creatively, to find a solution. It develops the imagination. It

Trains clear and logical thought. It is interesting and enjoyable. It is for health and well being to have an active mental health. Mathematics is a vital part of many games and puzzles which can contribute a lot for pursuing rich and rewarding intellectual pastimes.

Mathematics and science are mandatory subjects in school syllabus. Without the knowledge of science and mathematics, the doors of almost every form of useful occupation are closed for a 13 student. Kothari Education Commission (1964-66) remarked that Science and Mathematics should be taught on a compulsory basis to all pupils as a part of general education during the first ten years of schooling. In addition, there should be provisions of special courses in these subjects at the secondary stage, for students of more than average ability. Hence, making student to learn mathematics is unquestionable because of its great impact on society. Realizing the importance of mathematics, the study of mathematics has been included in the school as a compulsory subject up to secondary level. It is expected that learning about concepts and processes of mathematics lead to inculcation of rational outlook, clear and logical thought and mathematical attitude. The importance of mathematics is twofold. It is important in the advancement of science and understanding of the working of universe. It is important for personal advancement both mentally and in the work place. It prepares the learners to study the interaction between physical, biological and social factors of the environment. Educationists view learning of mathematics is very essential as it is the base of science for the improvement in the quality of life i.e. it provides better health, improved agricultural production, efficient good preservation; faster means of communication and better quality of clothing etc.

REVIEW OF RELATED LITERATURE

Review of literature is a very important aspect of any research. A literature review is a description of the literature relevant to a particular field or topic. Every piece of ongoing research needs to be connected with the work which has been done already. The review of literature is needed to attain an overall relevance and purpose. It tells the reader about aspects that have already established or concluded by other researchers. It is a link between the research proposed and the studies already done. A careful review of the research journals, books, dissertations, theses and other sources of information on the problem to be investigated is one of the important steps in the planning of any research study. It is also important to highlight differences in opinions, contradictory evidence and the different explanations given for their conclusions.

Adaval et al. (1961) tried to find out the possible causes of failure in high school examination and to suggest ways and means to eradicate them. The sample comprised of eighty girls and 116 boys who had failed in the examination conducted by the Board of High School and Intermediate education, Uttar Pradesh. The study revealed that the majority of the students were below average in intelligence.

Rao (1965) investigated the factors related to scholastic achievement. He found that intelligence; study habits and school attitude were significantly related to the prediction of scholastic achievement. The multiple correlations co-efficient between achievement scores of the intelligence, study habits and attitude towards school was quite high. The three independent variables namely intelligence, study habits and school attitude were significantly related to the prediction of scholastic achievement while the socio-economic status was not.

perior intelligence. Kaur (1974) studied the causes of low achievement of 9th class students. 100 students who were low achievers (boys and girls), 100 parents and 100 teachers were taken as a sample. The study revealed the opinion of the parents, teachers and the students. The main cause of low achievement of 9th class students in order of priority are ill health, lack of interest in studies, lack of facilities at home, shortage 74 of food, participation in sports and poor educational environment. Low academic achievement is related to home than to the school or any other factors. The male and female teachers do not differ significantly with regard to the causes of low achievement.

Noah and Eckstein (1974) conducted an international study of school achievement. It was concluded that the home background of children as measured by father's education and occupation, mother's education and number of books in the home stands out, as an internationally strong variable. Few of the directly school related variables such as sex of teacher, teachers' experience and training, size of school, quality of home work and type of curriculum come through as important in all the nations tested.

Mishra (1977) studied the educational backwardness in science and mathematics at delta level in Varanasi district. He took a sample of 1060 students of class VIII and found that in all 23.58% students were educationally backward in science and mathematics. The general level of achievement in mathematics is same among boys and girls both in urban and rural areas. Inferior intellectual potential was the important cause of educational backwardness.

Mayuri and Suneeta (1999) designed a study to find out the effect of selected familial factors on the academic achievement of school children. The sample comprised of 120 children of IX and X standards drawn purposively from ten schools, recognised by the State Education Board, Andhra Pradesh and distributed across the different zones of the Hyderabad city. The parents of the children too formed the sample of the study. Interview schedules for the children and separate questionnaire for the parents were developed and administered to the respondents. The results indicated that the parental factors, namely father's occupation and parental contributions were found to have significant effect on academic achievement of children. High achievers generally seem to come from families where there are few children, a nuclear type of family, and average to higher educational qualifications among parents, mothers' mostly full-time housewives and a middle class socio economic status. Father's occupation was the only factor that showed positive and significant correlation at 5% level of confidence for achievement in English language, the other correlations being either negative or close to zero. None of the family contributing factors including the parental 76 contributing factors were significant for achievement in Mathematics. However, parental contribution at home as well as father's occupation had a prominent role to play in the achievement in Science subject, with other factors making no relative contribution.

Hui-Ling (2001) conducted a cross-national study of factors influencing mathematics achievement for eighth grade students. The purpose of the study was to determine the internal factor structure of the six latent variables investigated, including home environment, peer influences, school environment, educational aspirations, and attitudes towards mathematics and study habits and to examine the effects of these variables on mathematics achievement as measured by Third International Mathematics and Science Study. The TIMSS mathematics achievement test and the student background questionnaire for eighth grade students were used to achieve the purposes.14651 eighth grade students were taken as sample(2920 students from the Republic of South Korea,4644 students from Singapore and 7087 students from the United States). The study reported different factor structures and different influences on mathematics achievement across the three selected countries. Home environment, attitude towards mathematics and educational aspiration emerged as the more important and consistent predictors of mathematics achievement for the three countries. The other three variables have mixed effects on mathematics achievement.

Poor academic performance according to Aremu (2003) is a performance that is adjudged by the examinee and some other significant as falling below an expected standard. The investigator selected 500 students (250 males and 250 females) from senior secondary schools in Ibadan, Oyo State of Nigeria. Parental involvement was found as a necessary predictor for academic achievement. Aremu and Sokan (2003) submit that the search for the causations of poor academic achievement is unending and some of the factors they put forward are: motivational orientation, self-esteem/self-efficacy, emotional problems, study habits, teacher consultation and poor interpersonal relationships.

X Ma and Jiangming Xu (2004) aimed to determine the causal ordering between mathematics anxiety and mathematics achievement. Results of structural equation modeling showed that, across the entire junior and senior high school, prior low mathematics achievement significantly related to later high mathematics anxiety, but prior high mathematics anxiety hardly related to later low mathematics achievement. Mathematics achievement was more reliably stable from year to year than mathematics anxiety. There were statistically significant gender differences in the causal ordering between mathematics anxiety and mathematics achievement. Prior low mathematics achievement significantly related to later high mathematics anxiety for boys across the entire junior and senior high school but for girls at critical transition points only. Mathematics 78 anxieties were more reliably stable from year to year among girls than among boys.

Wachira (2005) studied the factors related to the individual, family and school contexts on the mathematics achievement and attitude of low SES students. These factors were viewed as potential predictors of mathematics achievement and attitude. The set of predictors included demographic, psychological and contextual factors related to school and family. Family factors were represented by perceived parental involvement in the child's academics and parental aspirations for the child. Psychological factors included self-efficacy beliefs, students' educational expectations and future aspirations and efforts in mathematics. Mathematics achievement was measured by scores on the NELS standardised achievement test while student attitudes were measured by student interest in mathematics. Study was longitudinal and sample was drawn from students who participated in the first and second up rounds of National Education Longitudinal Study of 1988-2000. Correlational and multiple regression analyses were used to examine the relationship among these factors and students achievement and attitudes in mathematics. The best predictor of mathematics achievement is prior achievement in mathematics. Therefore other predictors that were significant were educational expectations and future aspirations; classroom environment and class achievement level but these explained a notably small proportion of the variance. Significant predictors of students' Attitudes were self-

efficacy beliefs, educational expectations and future aspirations and perceived teacher emphasis on the importance of mathematics.

Andile and Moses (2006) studied about the factors that contribute to poor performance in mathematics and physical science by using a non-experimental, exploratory and descriptive method. Learners' and educators' views were also taken. Participants were purposefully selected from seven schools with poor pass rates in 79 District 3 of Tshwane North. Focused group interviews with ten Grade 11 learners from each school were used as a means to collect data. In addition, one-on-one semi structured interviews were conducted with ten educators from the participating schools. Results indicated that two factors were identifiable. The first identified to have a direct influence related to teaching strategies, content knowledge, motivation, laboratory use, and non-completion of the syllabus in a year. The second factor, associated with indirect influences, was attributed to the role played by parents in their children's education, and general language usage together with its understanding in the two subjects.

Karimi and Venkatesan (2009) in their paper have shown the relationship between Mathematics anxiety, Mathematics performance and Academic hardiness in high school students. The sample comprised 284 (144 males and 140 females) 10th grade high school students from Karnataka state. Pearson correlation analysis and two independent samples T-test are used to analyze the data. The results have revealed that mathematics anxiety has significant negative correlation with mathematics performance but no significant correlation is detected with academic hardiness. It is also found that the gender differences in mathematics anxiety are significant, whereas no significant differences are detected between boys and girls in mathematics performance and academic hardiness. Many students 82 who suffer from mathematics anxiety have little confidence in their ability to do mathematics and tend to take the minimum numbers of required mathematics courses, which has greatly limited their career choice options (Garry 2005). Mathematics anxiety is the outcome of low self-esteem and the fear of failure. It causes problems for processing the incoming information as well as the previously learned information for problem solving. Such students tend to avoid mathematics whenever or wherever possible.

Kitsantas et al. (2010) in their study assessed the role of mathematics self-efficacy on high school student achievement using three different analytical approaches. The data were extracted from the 2003 OECD Program for International Student Assessment (PISA) (OECD, 2005) to examine these relationships. Findings showed that regardless of method of analysis, self-efficacy is an important predictor of math achievement even after controlling for demographic characteristics of students and schools. The sample consists of 5,456 students from 274 schools which are chosen through a multi-stage stratified random sampling procedure. The association of

ethnicity with socioeconomic status and math self-efficacy was found to be negative which suggests that White students have relatively high scores on socioeconomic status and math self-efficacy as compared to their Black and Hispanic counterparts. Finally, the positive correlation between socioeconomic status and math self-efficacy suggests that a student with high score on socioeconomic status is likely to have a high score on math self-efficacy and vice versa.

Asikhia (2010) examined the perception of students and teachers on the causes of poor academic performance among secondary school students in Ogun State, Nigeria. Subjects for the study were one hundred and thirty-five (135) students and fifty (50) teachers randomly drawn from five secondary schools in Odogbolu Local Government Area of Ogun State. Questionnaire was used to collect relevant data for the study. Percentages and chi-square were 83 used to analyze the research questions. Teachers believe that students' poor academic performance is not influenced by teachers' qualification while students perceived that teacher's qualification do affect their academic performance. The difference in their perceptions could be because students have high expectations for teachers that should teach them and therefore believe that any teacher that does not meet up to such expectations will not aid their academic performance.

OBJECTIVES OF THE STUDY

1. To identify the low achievers in Mathematics in secondary schools.

2. To study intelligence, academic achievement motivation, attitude towards mathematics and socio-economic status of the subjects having low achievement in mathematics.

3. To compare intelligence, academic achievement motivation, attitude towards mathematics and socio- economic status of low achievers in mathematics in relation to their gender, locale and type of school.

4. To enlist causes of low achievement in mathematics of the students as perceived by the low achievers in mathematics, their teachers and their parents.

CONCLUSION

The study of literature review reaffirms that poor achievement of failure in mathematics are caused by problems and difficulties that include personal problems(student's ability and attitude), psychological (emotional) problems, instructional problems(teacher's strategies in

teaching and attitudes), family problems(financial & relationship), peer problems(adjustment to classmates &board mates) and co curricular activities.

Mathematics is a way of thinking, a way of organizing a logical proof, and a powerful way of communicating that forms a crucial discipline of teaching-learning programs. Hence, the learning environment should be structured in a way that it fosters and nurtures the unique capabilities of students.

FUTURE SCOPE OF THE STUDY

From the foregoing reviews, objectives and conclusions following is the future scope of this study:

1. This study will help the students to overcome their failure in learning mathematics.
2. It provides an opportunity to mathematics teacher to prepare intervention lesson plans that meet the needs, abilities and interests of the low achievers in the subject.

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