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An Investigation In To the Problems Relating to Teaching - Learning Mathematics at Secondary Level

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INTRODUCTION

The over all development of a nation depends on the proper utilization of its nat-raasl well as human resources. The opinion of the Planning Commission in the **7th** Five Year Plan (1985-90) may be mentioned in this context: "Human resourcesdevelopment has necessarily to be assigned a key role in any development strategy, particularly in a country with a large population. Trained and educated on sound lines, a large population can itself become an asset in accelerating economicgrowth and in ensuring social change in desired directions. Education develops basic skills and abilities and fosters a value system conducive to, and in support of national development goalsboth long term and immediate."

Human resource development is the development of all sections of people in the society. Harbison and Myers defme it as " the process of increasing the knowledge, skill and the capacities of all the people in a society."

Indian Education Commission (1964-66) states: Education ought to be related to life, needs and aspirations of the people so as to be a powerful instrument of social, economic and cultural transformation. Education is the process by which an individual is enabled to function according to the expectations of the society as well as according to his capabilities. Locke (1969) states " Plants are developed by cultivation and men by education." To Pestalozi" It is natural, harmonious and progressive development of man's innate powers." Rousseau recognizes education **as** " **A** process of development. It is the natural development of humanity, the spontaneous development of all our innate nature and faculties." Education in recent years has been regarded as the greatest and most effective instrument of human resource development. The Ministry of Education in India has been re- christened as the Ministry of Human Resource Development. From this discussion it is clear that education leads to the over all personality development (spiritual, moral, cultural, social, mental and economic). Therefore education is a must for any country for its development and it has no alternative.

IMPORTANCE OF MATHEMATICS IN HUMAN LIFE.

Mathematics has always been regarded as a tool for sharpening the intellect. For this purpose one has to think systematically, logically and precisely. As we move into the 21" century, there is consensus among the experts about the necessity for all students to have string mathematical ability. Majority of eminent educationists of the past as well as of the present, including Herbert, Froebel, Pestolozzi, Dr. Maria Montissori, Sri. T. P. Nunn etc. have advocated the importance of mathematics. In their opinion, the intellectual and cultural development of a person is not possible without the study of mathematics. There has been explosion of knowledge in every field of human endeavour including science and technology. Extension research in science and technology resulting in several discoveries and inventions has changed the face of human society by providing things that make modern life happier and more comfortable than ever before. At the root of all these, we can not ignore the role of mathematics. Mathematics is the mother of sciences and as Compte (1964) has rightly said "All scientific education which does not comnlence with mathematics is, of necessity, defective at its foundation". Hence it is imperative that our educational environment provides opportui~ities to all students to do worthwhile and purposeful mathematical work.

PLACE OF MATHEMATICS IN SECONDARY SCHOOL CURRICULUM.

Matl~ematicsoccupies an important place in the school curriculum. It has been its inseparable part of school curriculum ever since the beginning of formal education and it continues to be so. Its curriculum has undergone various changes from time to time in accordance with the changing needs of the society. Realising its social relevance, the Education Commission set up in 1964 recommended that Mathematics should be taught as a compulsory subject of general

education upto class X. Since general education envisages Mathematics for all, the selection of content should be relevant to the practical needs of every day life.

Many students **find** mathematics a difficult subject. Even most of the teachers express difficulty in understanding some of the newly introduced topics in the mathematics curriculum. At this stage, a great deal of clear thinking and careful planning is necessay in which school teachers, university professors, educational administrators and even the general public have a significant role to play. Our object should be not to change the curt.iculum; but to improve it significantly. The way the students learn school mathematics and the habits they form now while learning it, will, to some extent, determine the future pattern of intellectual activity in the countery.

TEACHING OF MATKEMATICS AT SECONDARY SCHOOL LEVEL

It is generally felt that improvement in the teaching process is of paramount importance. Mathenlatics should not be taught as a set of isolated facts and fom~ulas. It has to be taught as a science in which the relationship of facts is as important as the facts themselves and wherein facts are arranged in sequences. The teachers have to learn mathematics as an organised structure, otherwise they would themselves teach it as a mass of unrelated facts. They have to learn each fact as it is related to the whole. The big ideas have to be stressed. The teachers have to know not only the contents of the new mathematics, they have to know something of the spirit, the nature, the abstractions and the generalizations of mathematics. They luve to know substantially more than what they are expected to teach. They have to have greater insight into mathematics than what they are expected to cominunicate to their children.

It can be seen that on **an** average three to four problems are taught in a normal class period. More than two-thirds of the problems taught are completely solved and the teacher writes synthetic solutions on the blackboard. Most of the remaining incomplete problems are left initiated or partially solved due to lack of time or other external factors, Mention sl~ouldb e made of just a few teachers who leave some problems, strategicaIly, unsolved leaving the rest of the work to students to do so in the classroom. The students are expected to apply these rules to nulnerous examples and they have to go on applying these rules till they are completely 'brainwashed' and forget their initial objections to the rules.

By and large, it can be generalised that the comprehensive teacher behaviour in a niathematics class room has been that of presenting solutions to problems by themselves giving little or no scope for the students to attempt to learn any skill individually or independeiltly. The usual 'class work', in solving problems froin the given mathematics textbook exercises is very much minimal.

PROBLEMS OF STUDENTS AND TEACHERS LN MATHEMATICS EDUCATION.

The observation of a classroom reveals pathetic conditions prevailing in the field. Most of the schools lack even basic infrastructural facilities like Mathematics laborato~yl workroom. The present educational system loaded with rhetorical teaching lessons and examination oriented values, gives the teacher no scope for fostering creativity, In the mass education system, that prevails now a days, their enrgies are spent to maintain discipline in the classroom and to finish the syllabus in time.

To enable the teachers to handle tlie difficult topics effectively, they must be provided with self- learning materials like teachers' handbooks etc. To help students understand the nlore abstract concepts easily and meaningfully, the schools must be provided with necessary audio- visual aids like models, charts, and different types of boards etc.

But contraly to these components, no teacher's guides are available in mathematics. Individual teachers are left completely to fend for themselves. They even do not read the textbooks. Textbooks are used for their collection of problems. Teachers know some standard techniques for solving standard type problems. They repeat them year after year. The concepts are never emphasized. One more problem expressed by the mathematics teachers of secondary schools is that their students are not thorough with primary level mathematics. They lack even the knowledge of four fundamental operations, etc. What are the causes for these problems? How to overcome these problems? How to achieve the objectives of teaching mathematics effectively at secondary school level'? etc, are the areas to be investigated.

ATTITUDES OF STUDENTS AND TEACHERS TOWARDS MATHEMATICS EDUCATION

It is sad to observe that even today, the educational system in India remains essentially examination oriented. Under this system, learners do not receive mathematics education. They mostly prepare themselves for passing examinations. Such a situation not only damages the purpose of all education but also proves ruinous for niathematical education. Learners memorise important results and proofs in order to be able to reproduce them in examinations. The result is that success in examinations has beconie the all-important objective of mathematical education. If we want to make mathen~atical education more meaningful, this situation will have to be changed and the entire system of education will have to be reviewed and reoriented. The progress and improvement of Scientific method and Mathematics are linked to the prosperity of the whole human civilisation.

To arouse and maintain the interest of the students in Mathematics, therefore, the elements of curiosity, motivation, imagination, novelty, originality, newness and usefulness are required. Actually, interest is a motivating force that arouses, sustains and regulates concentrated effort. It is a dynamic system of human personality in action; and is responsible for the penistent and consistent behaviour of an individual. Sawherey and Telford define interest as "favo.urable attitude towards objects." In the structural sense interest is **an** element or item in an individual's make up, either congenial or acquired, because of which he tends to have the feeling of 'worth-wliileness' in connection with certain objects or matters relating to particular subject or a particular field of knowledge, particularly scientific method and Mathematics. Mathematics is not merely a 'product', but a process. It is not only a 'knowledge'; it is an activity also. Its 'static' part is important, its 'dynamic' part is even more vital. Not only mathematical facts are to be taught, methods of arriving at these facts are also to be communicated. All these require a rethinking about the goals of mathematics education.

THE PRESENT STUDY

The observations made in the foregoing pages demand an indepth study of the lield of mathematics education. The discussion reveals that k~iowledge of lnathematics is inevitable for hunian beings. It also reveals that there are major drawbacks in the study of ~iiatheniatics at the secondary school stage. Accordingly the investigator is interested in collecting all the relevant literature available on mathenlatics education including the research already done in this field, to get sufficient insight for suggesting remedial measures to overcome the deficiencies in the present system and to suggest suitable strategies to improve the situation. Further, the researcher is also interested in procuring empirical evidence on the basis of the opinions or attitudes obtained from the students and teachers of mathematics in secondary schools toanalyse whether their views are in line with the insight obtained by the researcher. The exact problem with its objectives will be listed out only after getting a thorough review of related literature.

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