



A Study On The Implementation of Mathematics And Science As Optional Subjects In The Secondary School Leaving Certificate (SSLC) Examination Of The Meghalaya Board Of School Education

Dr. Bahunlang Tron¹

¹Asst. professor,

¹College of Teacher Education (PGT) Shillong

Abstract

Mathematics and science education are vital for preparing our young population to be actively engaged as responsible citizens who are creative and innovative with the ability to work collaboratively and be fully aware of and conversant with the complex challenges facing society. Mathematics and science education helps in developing the competencies for problem-solving and innovation, as well as analytical and critical thinking that are necessary to empower young citizens to lead a personally fulfilling, socially responsible and professionally-engaged lives. Effective mathematics and science education can inspire children and students to aspire to careers in science and other occupations and technological professions in which they can be creative and accomplished individuals. While considering the importance and utilitarian value of mathematics and science education, it is expected that these subjects viz. math and science are taught as compulsory subjects up to the secondary school stage. However, this is not the case in Meghalaya as these subjects are treated as optional subjects in the Secondary School Leaving Certificate (SSLC) Examination being conducted by the Meghalaya Board of School Education. Therefore, in this study an attempt has been made to find out the students' and teachers' opinion regarding the best 3 of 4 subjects and its impact on the performance of students in the math and science subjects.

Key words: *Science, Mathematics, MBOSE, best 3 out of 4 pattern, Secondary Education.*

I. INTRODUCTION

Mathematics is the enumerative and calculative part of human life and knowledge. It helps an individual to give an exact interpretation to his ideas and to reach at a certain conclusion. The importance of mathematics for human need is related to different aspects of his everyday life. Therefore, it has its varied utility value. There is a definite need of Mathematics in everybody's life that even the most ordinary citizen uses mathematical calculation when buying things from the market, while collecting wages or in paying the loan amount, etc. The application of mathematical concepts in all these daily activities indicates that some knowledge of Mathematics is essential to everybody whether one is a labourer, farmer, housewife, artisan, shopkeeper, vendor, salesman, clerk, accountant, driver, cleaner, tailor, washerman, etc. Thus, every sphere of human life is related to Mathematics.

There are varied reasons to also substantiate the notion that mathematics is an important part of school education. The two major reasons are that, firstly, mathematics provide a definite way of thinking and secondly, mathematics is considered the basis of all science. Since mathematics is considered an important subject at the school level, the following points may be considered to support the notion that Mathematics should be taught as a compulsory subject at the secondary school stage:

1. Mathematics is a discipline which is related to every aspect of human life, induces logical thinking, provides a definite way of thinking and is exact in its nature. So, how can it be difficult to us. Perhaps it is a pre-made terror by parents and others which affects the child's attitude towards Mathematics. Mathematics should be presented as a recreational activity for the child from very beginning. A mediocre student may also easily involve himself in mathematical activities.
2. The emphasis of our basic education is also on the learning of 3R's i.e., Reading, Writing and Arithmetic. The combination is not aimless but clearly reflects the needs of human life. It means that arithmetic is not in any way less important than other two types of learning which are considered basic for further education. In fact, there can be no true schooling without mathematics.

3. Secondary education is that foundation that prepares students for the challenges that they may face in the future by building their knowledge base and confidence. It empowers them with essential 21st-century skills that lead them towards their goals. This stage can serve the needs of both types of students, firstly for those who are going to discontinue their education and intend to join the work force by entering the different occupations after completing the secondary school stage and secondly, and secondly those who are going to join or pursue higher education.
4. It is also argued that every high school or secondary school student is not going to become an engineer, banker, accountant, and statistician and therefore the students of other inclinations study the mathematics only to pass the examination. But at an early stage it is difficult to know who is going to be an engineer, accountant, or banker. In fact, at the high school stage students should be provided with a broader course so that they are able to choose a suitable line for themselves. Thus, the deprivation of knowledge of mathematics at high school stage may narrow the choice of vocations for prospective students.

As mathematics is a compulsory subject at the secondary stage, access to quality mathematics education is the right of every child. In the context of universalization of education, the first question to ask is what mathematics can be offered in eight years of schooling that will stand every child in good stead rather than be a preparation for higher secondary education alone? Most of the skills taught in primary school mathematics are useful. However, a reorientation of the curriculum towards addressing the 'higher aims' mentioned above will make better use of the time that children spend in school in terms of the problem-solving and analytical skills that it builds, and in preparing children to better meet a wide variety of problems in life. Also, the tall shape of mathematics (where mastery of one topic is a prerequisite for the next) can be de-emphasised in favour of a broader-based curriculum with more topics that starts from the basics. This will serve the needs of different learners better. The National Curriculum Framework (2005) observed that children should learn to enjoy mathematics rather than fear it and children should see mathematics as something to talk about, to communicate through, to discuss among themselves, to work together on.

While considering Science education, the Kothari Commission (1964-66) stated that science education must become an integral part of school education; and ultimately some study of science should become a part of all courses in the humanities and social sciences at the university stage, even as the teaching of science can be enriched by the inclusion of some elements of the humanities and social sciences. The quality of science teaching has also to be raised considerably to achieve its proper objectives and purposes, namely, to promote an ever-deepening understanding of basic principles, to develop problem-solving and analytical skills and the ability to apply them to the problems of the material environment and social living, and to promote the spirit of enquiry and experimentation. Only then can a scientific outlook become part of our way of life and culture.

II. RATIONALE

The future of every country depends on scientific and technological development. The distinction between the developed, under developing and developing countries is based on their achievement in the field of science. India is a developing nation. Her future very much depends on the progress in the field of science, and in the present scientific age, our lifestyle and fulfilment of our day-to-day requirements are fully dependent upon the use of advanced scientific and mathematical knowledge in various fields. It is in the fitness of things that Mathematics and Science teaching should be given special attention, not only at the stage of higher education but also at the stage of Secondary and Primary Education. Therefore, there should be provision of quality Mathematics and Science education in our schools. Since the year 2013, the Meghalaya Board of School Education has come up with a new pattern of examination, 'Best 3 out of 4' pattern applicable in the Secondary School Leaving Certificate (SSLC) Examination. In this pattern, a student can opt for best three out of four subjects apart from English and Modern Indian Language (MIL), which are compulsory. Under this scheme of examination, a candidate (student) is required to pass in English and Additional English or Indian Language and any three subjects out of the four subjects viz. Science and Technology, Mathematics, Social Studies and Health or Computer Education (MBOSE, 2011). The scheme of examination will indeed reduce the number of failures as subjects like mathematics and science which are normally considered difficult by students are no longer compulsory subjects. While considering the importance of science and mathematics education, the scheme perhaps may not help at promoting school science and mathematics education. This concept has therefore caused students to take the course of study of Mathematics and Science lightly thereby putting in less effort to clear these subjects in the examination, leaving a very low percentage of students eligible to opt for science and mathematics education at the higher education level. Since the implementation of the 'best 3 out of 4 pattern' has been implemented, no research has been taken up to analyse its effectiveness, hence the need for this present research.

III. OBJECTIVES

The present study is conceived with the following aims and objectives:

1. To identify the reasons leading to the considerations of Mathematics and Science as optional subjects.
2. To identify the problems faced by the students in Mathematics and Science.
3. To assess the consequence of the system and its influence on students.
4. To offer suggestion to create students' interests towards Mathematics and Science education and improve performance in the examination.

IV. METHODOLOGY

The present study is based on the data obtained from students of the four sample schools comprising of 160 students and 20 teachers drawn from various secondary schools of Shillong. Random sampling method was adopted to draw the student sample while the teachers' sample was drawn through purposive sampling method. The tools used for present study comprised of two sets of self-prepared questionnaires, one set for students and one set for teachers.

V. MAJOR FINDINGS

After thorough analysis and interpretation, the following findings of the study are put forth:

1. It is found that 92.5% of the students like subjects i.e., Mathematics and Science and shows positive attitude towards these subjects thereby indicating that majority of students like Mathematics and Science.
2. It is also found that 52.5% of the students like Mathematics and Science because they know that they require them for professional studies and 37.5% of the students just find these subjects as an interesting subject, while the other 10% students like these subjects because of the teacher.
3. Based on the data collected it is seen that 72.5% of the students find Mathematics and Science as difficult subjects, while 5% of the students find these subjects as very difficult and 22.5% of the students find these subjects easy to understand.
4. The study also found that 90% of the students do not consider Mathematics and Science as dull and boring.
5. Based on the data collected it is found that more than half of the students i.e., 53% of the students have the fear of these subjects during the exams and 47 % of the students do not have the fear of these subjects during the examination time and attributed the reason to regular study and thorough preparation
6. The study also revealed that 57.5% of the student fear Mathematics and Science because of the various formulas, theories, and the principles.
7. The study also revealed that 62.5% of the students do not fully grasp the concepts of Mathematics and Science taught by their teacher in the class.
8. It is also found that 52.5 % of the students says that the duration allotted (40-45 mins) to the teacher to explain concepts is not is not enough for them to understand the topic.
9. The study also revealed that 87.5% of the students go for private tuition to get additional help for the subjects.
10. Based on the data collected it was observed that 85% of the students just memorize the rules and formulae, while 15% of the students tried to understand the rules and formulae for related calculations in Mathematics and Science.
11. The study also revealed that only a small percentage that is 10% students obtained first division in the annual examination with distinction marks in Mathematics and Science.
12. From the study it is also found that 67.5% of the students are happy that Mathematics and Science were made optional and about 32.5% of the students are not supportive to the adopted pattern of examination that Mathematics and Science are being made optional.
13. Based on the data collected it was observed that 65% of the students are aware of the different career opportunities that they can opt for in their further studies.
14. From the data collected 90% of the students agreed that the pattern of examination will benefit the students who are weak in mathematics or science, as this system will give them the opportunity to clear the board examination without having to clear the exam paper of Mathematics or Science.
15. The study revealed that 75% of the teachers found the course content of Mathematics and Science to be vast and condensed.
16. The study also showed that 95% of the teachers feel that the students have the fear of these subjects, as they feel that these subjects are tough consider the subjects as the most difficult.
17. 75% of the teachers found the syllabus of Mathematics and Science prescribed by the MBOSE, to be lengthy.
18. The study showed that 60% of the teachers agreed that the method of teaching of the teacher can also affect the interest of the students towards these subjects. 60% of the teachers agreed that a teacher can affect the students' attitude towards the subjects.
19. The study also revealed that there is a change in the performance of the students since the implementation of the new pattern of examination.
20. The study also revealed that according to 70% of the teachers, students who are weak in Mathematics and Science have the biggest advantage because they can pass the secondary school leaving certificate (SSLC) examination. The teachers expressed that student who are weak in Science and Mathematics can concentrate more on the other subjects.
21. The study also showed that almost all the teachers expressed that this pattern has done more harm than good to the students. While on one hand, the overall pass percentage has increased, on the other hand results showed a decline in the percentage of students who passed the examination with Science or Mathematics vis-a vis resulting in the decline of students opting for technical courses.

VI. SUGGESTIONS

In the light of the above findings, the investigator put forth the following suggestions:

- a) Since majority of the students like Mathematics and Science and finds it interesting, students should therefore be given more time to practise and learn these subjects so that the fear of failure during the examination will be minimised.
- b) Students should be encouraged to clarify their doubts in case they do not understand the topic that are taught in the class.
- c) Teachers should put in more efforts in their teachings by adopting diverse methods of teaching especially the student-centred methods of teaching.
- d) The teacher should have interest in the subjects and should also be able to create similar interest among students towards the subjects.
- e) The school and the teachers should take the responsibility to create awareness among students of the different career options that the students can opt with Mathematics and Science as their subjects.
- f) The subject textbooks should be attractive and the language should be simple and clear. Care should be taken to systematically include the content in proper sequence. The textbooks should have good and clear pictures and diagrams with interesting examples etc.
- g) The setting of question papers should be improved whereby more weightage should be given to easy questions so that students who are weak in the subjects can pass in the exams. This will in turn create interest in students to learn Mathematics and Science.

VII. CONCLUSION

Optional subjects provide students the opportunity to choose the subjects according to their interest and ability. In general, the optional subjects are not compulsory for the students to pass in the examination, thereby causing students to put in less or no effort at all in studying these subjects. Since mathematics and Science are considered as difficult subjects by most students, making these subjects optional would cause the board examination to be a kind of a cake walk exercise as students have to put in less effort to pass the examination. The step taken by the Meghalaya Board of School Education has simplified the way that student can learn and pass examinations. Instead of encouraging and providing opportunities to students to be more competitive, the pattern of examination has caused the students to adopt the easy way by opting out of the difficult subjects.

Further, making Mathematics and Science as optional subjects has discouraged and even barred students from taking them as their major subjects at the degree level. This can have long term repercussions, in terms of meeting the requirements of future recruitment in the schools. Further, the declining number of students opting for the science stream can also affect the future of the society as this can result in a decline in the number of medical and technological professionals such as doctors, engineers, nurses, scientists, statisticians, physicists, zoologists, biologists, mathematicians, architects, etc., who play a vital role in the development of the society. Since mathematics and science are the main subjects for these careers, therefore a balance is required to be adopted in the school examination pattern and proper guidance should be provided to students with high aptitude in math and science such that their interest can be inclined towards Science and Mathematics.

References

- [1] Draft Education Policy. (2013). Retrieved January 18, 2015, from Department of Education, Government of Meghalaya: http://megeducation.gov.in/circulars/2013/Draft_Education_Policy_2013.pdf
- [2] NCERT. (2005). National Curriculum Framework. National Council of Educational Research and Training.
- [3] NCERT. (2005). National Curriculum Framework 2005. NCERT. Retrieved from <http://www.ncert.nic.in/rightside/links/pdf/framework/english/nf2005.pdf>
- [4] NCERT. (2006). Position Paper National Focus Group on Teaching of Science. National Council of Educational Research and Training. Retrieved from <http://epathshala.nic.in/wp-content/doc/NCF/Pdf/science.pdf>
- [5] NPE 1986, Programme of Action 1992 retrieved from https://www.education.gov.in/sites/upload_files/mhrd/files/upload_document/npe.pdf
- [6] Kothari Commission Report (1964-66) retrieved from <http://www.academics-india.com/Kothari%20Commission%20Report.pdf>
- [7] Pandey, R. (2020). *Development Of Indian System Of Education*. Shri Vinod Pustak Mandir (SVPM).
- [8] Sharma, R. C., & Shukla, C. S. (2002). *Modern Science Teaching*. New Delhi: Dhanpat Rai Publishing Company.
- [9] Yadav, S. R. (2005). *Teaching of Mathematics*. New Delhi: Vinod Pustak Mandir.