

Study on Mathematics score and other subjects at the HSLC and HSSLC (Science) candidates under MBSE in Mizoram (India) with special reference to Mathematics subject

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Abstract

Mathematics is considered as the hardest subject in school education all the time. Students always have a sense of fear and failure. Though many efforts were made to overcome this, score of candidates of High School Leaving Certificate (HSLC) and Higher Secondary School Leaving Certificate (HSSLC) Examinations under Mizoram Board of School Education (MBSE) showed that it is still the subject performed worst by the candidates in the Board examinations. The government and educational institutions including Mizoram University should plan for solving this issue in Mizoram. Research in Mathematics education should be given importance for the improvement of teaching and learning of mathematics. Adoption of ICT in Mathematics teaching and learning in a meaningful way may improve the performance of students in Mathematics subject in Mizoram.

Key words: Mathematics Education, Mean, Score, Secondary schools, Mizoram

1. Introduction

Mizoram is one of the state in India sandwiched between Bangladesh in the west and Myanmar in the east. It covers an area of 12,087 Sq. kms. It is bounded in the north by the state of Assam and Manipur. Mizoram was an excluded area during the British colonial period. After Indian independence in 1947, it was one of the districts of Assam state till it attained Union Territory (UT) in January 21, 1972. According to the 1971 census, the population of Mizoram was 3,32,390 with a literacy percentage of 53.79%. It attained statehood in February 20, 1987. As per 2011 census, its population is 10,91,014 and literacy percentage is 91.85% (Source : Mizoram Statistical Handbook, 2020).

1.1 Mathematics Education in India

Mathematics occupy an important position in the Indian education from time immemorial. The Indian sub-continent has long been recognized as extra ordinarily rich in mathematical heritage. Contribution of ancient India in Mathematics is also remarkable. Concept of zero also originated from India. Gandhiji propounded in 1937 the idea of basic education. Under the chairmanship of Dr Zakir Hussain, a committee recommended that 'Knowledge of Mathematics is an essential part of any curriculum'

Mathematics was made compulsory in school education by the Secondary Education Commission in 1952. The education Commission (1964-66) recommended that Mathematics should be compulsory subject in school education. The National Policy on Education, NPE-1986 suggested that "Mathematics should be visualized as a vehicle to train a child to think, reason, analyse and to articulate logically. Apart from being a specific subject, it should be treated as concomitant to any subject involving analysis and reasoning".

The National Curriculum Framework (NCF-2005) highlighted that Mathematics education is mainly focused on student's resources to think and reason, to visualize abstractions and to solve problems. The infrastructure challenge is associated with the provision of computer hardware and software and connection to each school. The NCF-2005 has given the vision for school mathematics education in India.

- ⇒ Students learn to enjoy mathematics instead of being afraid of it.
- ⇒ Mathematics is more than formulae and mechanical procedures.
- ⇒ Students see mathematics as something to talk about, to communicate with each other, discuss with each other, work together and solve major problems.
- ⇒ Students use abstractions to perceive relationships, to see structures, to reason out things, to argue the truth or false of statements.
- ⇒ Students understand the basic structure of mathematics: Arithmetic, algebra, geometry and trigonometry, the basic content areas of school mathematics, all offer a methodology for abstraction, structuration and generalization.
- ⇒ Teachers should engage students in class with the belief that everyone can learn mathematics.

The National Education Policy (NEP), 2020 also gave importance to Mathematics Education. Para 4.25 of NEP, 2020 stated that *"It is recognized that mathematics and mathematical thinking will be very important for India's future and India's leadership role in the numerous upcoming fields and professions that will involve artificial intelligence,*

machine learning, and data science, etc. Thus, mathematics and computational thinking will be given increased emphasis throughout the school years, starting with the foundational stage, through a variety of innovative methods, including the regular use of puzzles and games that make mathematical thinking more enjoyable and engaging. Activities involving coding will be introduced in Middle Stage”.

1.2 Development of Mathematics Education in Mizoram

Since mathematics form a part of education from elementary stage, the history of development of education means development of mathematics education. Education was introduced in Mizoram by Rev. J.H.Lorrain and Rev. F.W.Savidge, the pioneer Christian missionaries, who arrived Mizoram on 11th January, 1894. At that time there was no alphabet in Mizo language. The missionaries made A,AW,B – the Mizo alphabet and they started the first school in 1896. The first Lower Primary School Examination was held in June, 1903 in which 18 candidates appeared. The first Middle School Examination was conducted six year later in 1909 with 6 candidates. Till 1944, all the schools in Mizoram were maintained by the missionaries with their own funds. The first government Middle School was established in 1944 when the government of Assam took over the oldest existing missionary school. In the same way, the first government Primary School was established in 1947. The progress and expansion of Education in Mizoram was rather slow till 1950s. The first High School was opened in 1944 and which was taken over by Assam government in 1950. During the two decades from 1950-1970, there was rapid increase in the number of schools. According to the 2nd Report of the Committee on Estimates, Mizoram Assembly (1975-77) the two pioneer Missionaries started teaching at Aizawl in 1895, utilizing a Church Building built by themselves as a School that was the first regular teaching institution in Mizoram. Education spread and this resulted in the condemnation of the “Zawlbuk”, an informal system of education where young boys were taught about the Mizo culture. In fact, since having a job in the government began to have more importance, the Mizos began to favour schools where they could get government jobs. Primary schools have been steadily increasing in the land. There are some years where the number seems to go down but this is only because some privately owned schools often failed to report themselves to the Directorate. Even during these years enrolment was always on the increase.

Mathematics was included under Science umbrella in Mizoram (*Telephone Interview with former Director of Education, Dr. L.N.Tluanga on 15.9.2021, 11:36AM*). Prior to 1973, Science was taught in Middle schools as General Knowledge dealing mainly with Biological Sciences. Science subject was made optional in High Schools and only few students took Science in High Schools and Colleges. Science Education in its true sense began since 1973,

when the UNICEF assisted Science Education programme was launched after the Government of the Union Territory of Mizoram signed a bond with the Government of India accepting the introduction of Science in 50 Primary and 30 Middle Schools.

The Directorate of Education was established in 1972. A new and separate wing for Science promotion (Now called *Science and Mathematics Promotion Wing under SCERT*) was created in the Education Department in 1973. A Science Promotion Officer and Science Consultants were appointed to look after and manage the pilot project in Science and Mathematics Education. In line with the National Council for Educational Research and Training (NCERT), the UT Government of Mizoram established State Council for Education Research and Training (SCERT) under Education Directorate as a separate wing in 1980. An autonomous body called the Mizoram Board of School Education (MBSE) was established with an Act of the Mizoram Legislative Assembly in December, 1976. The MBSE conducted its first HSLC Examination in 1978. The then Chief Minister of Mizoram UT, Pu Ch. Chhunga, in his inaugural address of MBSE on 26.4.1977, stated the need for strengthening of Science and Mathematics as *"While I am sure that the Board will take special measure to improve teaching of Science and Mathematics in our schools, I would like to make a special point about it, as I have no doubt that the development schemes of Mizoram will be badly impaired unless more and more of school children get attracted to such studies"*. When the MBSE was established in December, 1976, it inherited the curriculum and syllabi of the Secondary Board of Assam. In October, 1977, the academic wing of MBSE started to develop its own curriculum and syllabi to suit the needs of Mizoram. Mathematics was made one of compulsory subject with name "General Mathematics" which was later changed to "Mathematics" from the year 1983.

1.3 Development of Higher Secondary Education in Mizoram

Mathematics education lies within Science streams. Higher Secondary Education, the stage that comes after matriculation, was not a part of the formal education ladder till the year 1996. This stage lasted for two academic years and was called the intermediate stage or pre university stage. It was attached to colleges and they also shared the same teachers. But as far back as in 1966, the Kothari Commission had already recommended the introduction of 10+2 education in schools. After the recommendations were accepted by the Government of India, it was decided that all the state governments should implement this by the fifth five year plan. Although some states were able to do that, Mizoram was one of the few states who could not. During this time, education at this level was taken care of by NEHU. But in the year 1995, NEHU decided to hand over the management of pre-university education to the respective states. Consequently, the Government of

Mizoram began to take actions in order to ensure continuity of education for the students within the state.

According to the Minutes of the Meeting held in the Office Chamber of the Hon'ble Minister of Education, on 7th July 1995, with regards to higher secondary education, it was decided that colleges duly affiliated to NEHU may continue to function as usual with the change that the existing pre university courses will henceforth come under the purview of +2 system of education. It was also decided that the Department would prepare a phased programme for the purpose. Following this meeting, The Education and Human Resources Department, Government of Mizoram released an Office Memorandum on 2nd August 1995 with a list of high schools to be converted to higher secondary schools in the first three phases from 1995 to 1998 academic sessions. Out of the 26 schools where were selected, only 9 higher secondary schools were chosen to offer Science Education. But as shown by the data offered by the Statistics Cell, Directorate of School Education, as on September 2009, a total of 27 schools were offering science as a subject of study. However, districts like Lawngtlai and Mamit were still without higher secondary schools offering sciences as a subject. This made it clear that science and mathematics education, as one went up the academic ladder, became less accessible to students. (Zohmingliani, 2016).

1.4 Development of Higher Education related to Mathematics in Mizoram

In 1958, the first higher institution in Mizoram, Pachhunga University College was opened at Aizawl and the college introduced Science and Mathematics stream from the year 1973. At present, other five colleges introduced Science and Mathematics stream – Lunglei Govt. College in the year 1973, Kolasib Govt. College in 1987, Champhai Govt. College in 1997, Serchhip Govt College in 1998 and Zirtiri Residential Science College in 2000.

Mizoram University was created by an Act of Parliament (No. 8 of 2000) and it became functional from 2nd July, 2001. Under Mizoram University, the Department of Mathematics and Computer Science came into existence in the year 2006 with the intake of first batch of Post Graduate students in July, 2007.

1.5 Initiative to promote Mathematics Education in Mizoram

In Mizoram, a number of efforts have been made for the improvement of mathematics education. One outstanding evidence is the creation of Mizoram Mathematics Society (MMS). This society takes up a number of programmes for the advancement of Mathematics Education. They have the following objectives:

- a) To uplift the backwardness of mathematics subject.
- b) To find people who possess a good talent in mathematics and to help them for further studies as well as to guide them.
- c) To organize programmes like Seminars, Conferences, etc. to promote the study of mathematics subject.
- d) To uplift mathematics subject among the Mizos.

For the implementation of these objectives, the MMS has been organizing mathematics competition for various levels in education. They give cash awards and certificates to the meritorious students who did well in this mathematics competition. The main aim is to help the students to overcome the problems in mathematics education and make progress in it.

On the government side, Science and Technology Cell was created under Planning Department in the Year 1986, this Cell was now upgraded to Mizoram Science Technology and Innovation Council(MISTIC). The department promoted Science and Mathematics Education through its Science popularization scheme and special scholarship scheme from class XI onwards up to Master degree. It also extend financial support to society working for the upliftment of Science and Mathematics.

2. Rationale of the study

Mathematics education is a vital concern although only limited research is available for studying this topic particularly in Mizoram. It is the root of all sciences and technical education, and it also has its own merit in real life. However there is general opinion even among the intellectual circle in Mizoram that Mathematics subject is the backlog for many students to succeed in academic convincing themselves that one can succeed in life without Mathematics at the secondary level. The 63rd meeting of the Syllabus and Textbook Committee of MBSE held on 5th July, 2011 in its resolution No SC:63:2011:06 decided that two levels i.e. Group A and Group B be introduced in the classes IX and X, whereby only those students who opt for Group A Mathematics would be eligible for Science stream when pursuing higher studies. This was felt important because there are a number of students failing in the subject or who barely managed to make through HSLC, but never have any link with Mathematics for their further studies. In short, there are many successful persons who still dread the subject.

Although the Education Commission, 1964 recommended that Mathematics should be taught as a compulsory subject of general education up to class X, experiences and data have shown that the majority of students normally failed in this subject. This frustrates not only students but also parents. Many educationists feel that Mathematics should be

compulsory up to class VIII, while some opine that there should be two types of Mathematics courses at secondary level, and these courses should be need-based. Central Board of Secondary Education(CBSE) has decided to introduce two levels of examination in Mathematics for the students who are going to appear in the Board examination for the academic session ending March 2020 onwards. One will be known as **Mathematics - Standard** for the existing level of examination, and the other will be known as **Mathematics - Basic** for the easier level of the exam (for students who do not want to study Math in future).

NCERT (2006) identified that there is a sense of fear and failure regarding mathematics among a majority of children and there is lack of support in the teaching of mathematics. The paper stated "By Class III or IV, many children start seeing themselves as unable to cope with the demands made by mathematics. In high school, among children who fail only in one or two subjects in year-end examinations and hence are detained, the maximum numbers fail in mathematics. This statistic pursues us right through to Class X, which is when the Indian state issues a certificate of education to a student. The largest numbers of Board Exam failures also happen in mathematics".

Zohmingliani, L and Lalremmawii, C (2020) found out that secondary school students performance in Mathematics has been consistently poor and suggested that more research needs to be taken up for finding out the problems of students with regards to Mathematics, more efforts be given for the development of mathematics education and the state government needs to pay special attention for the development of mathematics education.

So, it is a great concern to the society as a whole to improve the teaching-learning of Mathematics to achieve better result and better understanding of the mathematical concept.

Because of these, urgent steps need to be taken in order to improve mathematics education in Mizoram. Due to this, it is important to find out the performance of students at secondary level, which is the end of comprehensive education where official data were maintained by the MBSE. Therefore the Investigator considers the study the performance of HSLC and HSSLC(Science) candidates in mathematics and other subjects. Practical and feasible suggestion for improvement of Mathematics Education is also the immediate need in school education in Mizoram.

The findings of the present research work are expected to be of much value to all stakeholders of education, especially secondary education. These data will be of extreme importance to teachers, policy makers, administrators, examination boards and syllabus framers alike.

2.1 Research Questions

In order to have a reliable solution to the problem stated, the following questions emerge that need urgent answers:

1. What is the performance of secondary schools students in mathematics compared to other subjects in HSLC Examinations conducted by MBSE?
2. What is the performance of secondary schools students in mathematics compared to other subjects in HSSLC (Science) Examinations conducted by MBSE?

2.2 Objectives

In order to shed light on the research questions, the following objective may be stated:

1. To study the comparative performance of students in mathematics and other subjects in HSLC Examinations conducted by Mizoram Board of School Education (MBSE) since inception (1978-2021).
2. To study the comparative performance of students in mathematics and other science subjects in HSSLC (Science) Examinations conducted by Mizoram Board of School Education (MBSE) for the last twelve years, i.e. from 2009 to 2021.

2.3 Methodology

The present research is mainly descriptive in nature. Quantitative approaches have been applied. In this study the researcher want to prove the general concept that performance in Mathematics is worst compared to other subjects. For this, percentage and mean of the score of each subject was calculated using excel softwares for each examinations.

2.4 Population and sample

No sampling was done in this study. The result of HSLC examination from 1978 to 2021 was obtained from the MBSE office for the first objective.

For the second objective, the result of the last twelve years HSSLC(Science) examination from 2009 to 2021 was obtained from MBSE office.

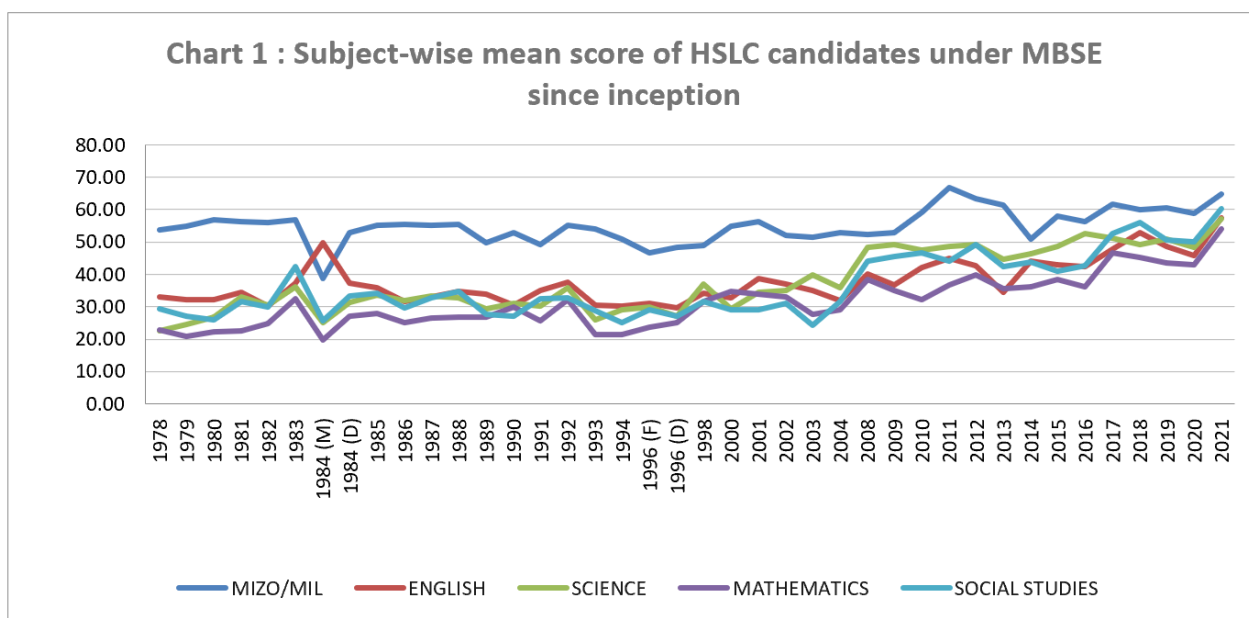
2.5 Data collection

Mark score of each and every candidate was requested by the researcher to MBSE authority. The MBSE authority agreed to provide the score of each candidates, excluding personal details like names, Roll No, Date of birth etc. Soft copy of the data in excel format were send to the researcher through email.

3. Data Analysis

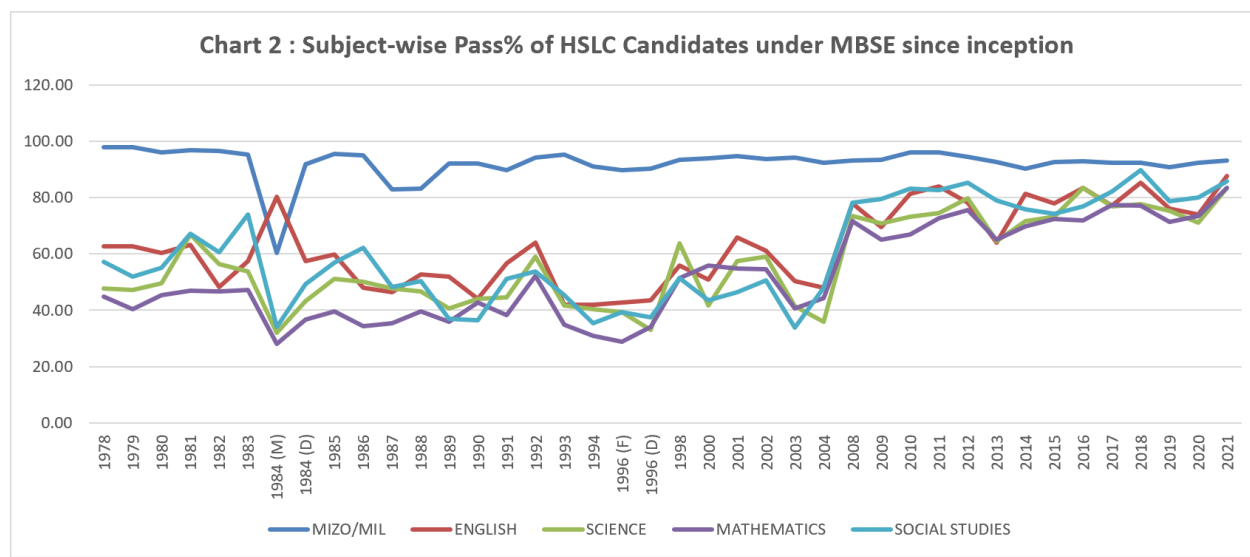
3.1 Subject-wise performance of students in HSLC Examinations

The MBSE conducted its first HSLC Examination in 1978. Mathematics subject was included from the beginning with subject name “General Mathematics” with 100 as full marks and 30 as pass mark. From 1983, the name of the subject was changed to “Mathematics” with 150 as full marks and 53 as pass marks. MBSE changed scheme of examinations as and when it feels necessary, during the study period where full marks and pass marks were also affected. In all examination where full marks is not 100, the researcher converted the score of each candidates out of 100 and so, the score of all the year under study are calculated out of 100. To find mean score, all the score in each subject were sum up using Excel softwares and then divided by number of candidates appeared in the examination to obtained the mean score. Pass percentage in each subject was calculated by counting number of pass in each subject as per pass marks of the subject and using number of candidates appeared in that examination.



From chart 1, it can be seen that out of 40 HSLC Examination conducted by MBSE, the mean score of HSLC candidates is lowest compared to other subjects in 35 examinations, and in another five examination, mean marks of Social Studies is lowest.

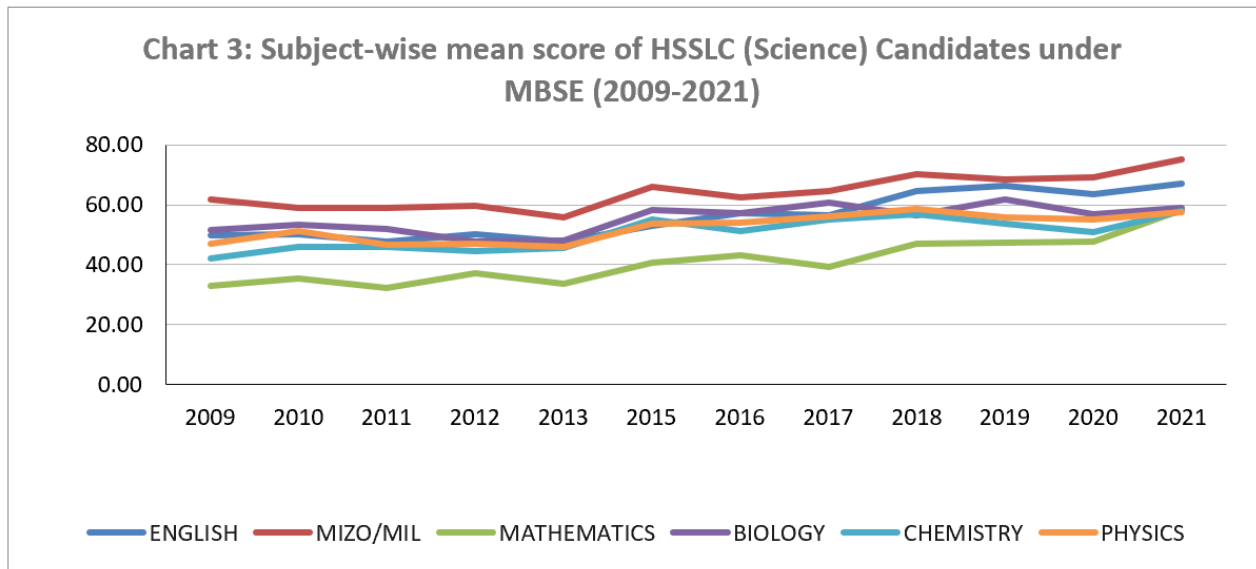
This shows that Mathematics score of the candidates is lowest in almost all the HSLC Examination conducted so far.



From chart 2, it can be seen that out of 40 HSLC Examination conducted by MBSE, the pass percentage of HSLC candidates in Mathematics subject is lowest compared to other subjects in most examination, Social studies and Science subject pass percentage is also lowest in few year.

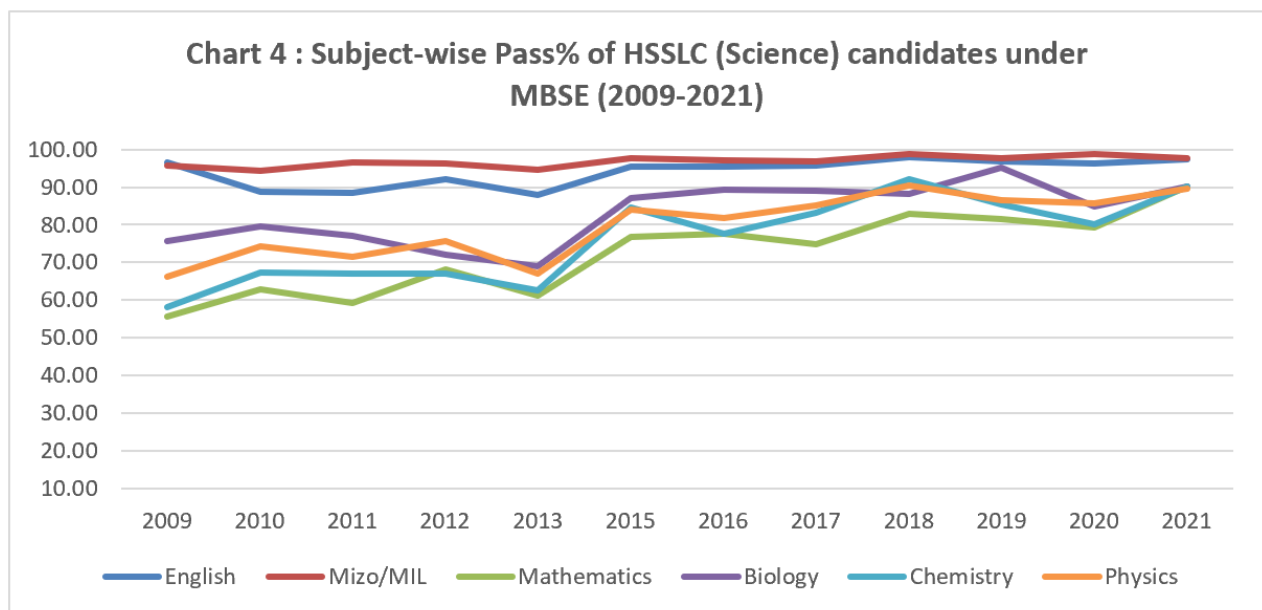
3.2 Subject-wise performance of students in HSSLC(science) Examinations

The score of candidates in HSSLC(Science) was obtained from MBSE. To find mean score, all the score in each subject were sum up using Excel softwares and then divided by number of candidates appeared in the exam to obtained the mean score. Pass percentage in each subject was calculated by counting number of pass in each subject as per pass marks of the subject and using number of candidates appeared in that particular subject.



From chart 3, it can be seen that out of 12 HSSLC (Science) Examination conducted by MBSE, the mean score of candidates is lowest compared to other subjects in all the examinations, except one year.

This shows that Mathematics score of the candidates is lowest in almost all the HSSLC (Science) Examination conducted so far.



From chart 4, it can be seen that out of the last 12 HSSLC(Science) Examination conducted by MBSE, the pass percentage of candidates in Mathematics is lowest compared to other subjects in almost all the examination.

4. Discussion :

From the above study, it is found out that performance of candidates of HSLC and HSSLC(Science) is lowest in Mathematics subject compared to all other subjects. So, deep study is needed for finding the reasons and to find the ways for improving the teaching and learning of Mathematics, so that students may score better, and know the concept of the subject. There is very few research in mathematics education in Mizoram and so the government of Mizoram and the higher institutions in Mizoram, including the Mizoram University should have a specific plan to address this issue for the benefit of teachers and students in general. Appropriate adoption of ICT in teaching and learning Mathematics will be one of many alternatives to improve mathematics education in Mizoram.

5. Conclusion :

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