

Upper secondary education in Mauritius: a case study

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This report forms part of a collection of six case studies commissioned by the Royal Society in 2017 examining upper-secondary education reform in different jurisdictions. The case studies are designed to give the reader an understanding of the trends in upper secondary curriculum reform and, in particular, the recent moves that certain jurisdictions have made towards a broader and more balanced curriculum.

These case studies were officially launched at the Royal Society's symposium *Broad and Balanced: What is the future for our post-16 curriculum?* on 17 October, 2017.

About the authors

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Abstract

This case study takes stock of the present post-16 STEM curriculum in Mauritius and analyses the participation and performance of students in STEM subjects as well as assessing the role of educators and policy makers in the present education system. Data were collected through survey questionnaires, interviews and secondary sources. They were then analysed quantitatively and qualitatively, and the findings have provided an insight of the nature of the existing post-16 curriculum on students' outcomes. The financial and practical implications of the curriculum model adopted were considered in the study. The results have indicated that there should be more emphasis on STEM subjects and existing policies will have to be reviewed to remedy the issues that have emerged from this study.

1 Introduction

The development of a country is primarily determined by the quality of the human resources, which is dependent on the level of knowledge, skills and attitudes. It is believed that a high quality of science and technology education provides the foundation for understanding the world through specific disciplines such as biology, chemistry, physics and mathematics. Carefully designed curricula at post-16 will enable students to develop scientific knowledge, methods, processes and uses of science and technology.

This case study focuses on the main features of the post-16 STEM (Science, Technology, Engineering, Mathematics) curriculum in Mauritius, the political and policy context behind its features, the scientific subjects and skills within it, its impact on student outcomes and the financial and practical implications involved. It should be highlighted that, according to relevant local institutions, similar studies have not been conducted in Mauritius to date.

1.1 The education system

The education sector in the Republic of Mauritius falls under the responsibility of the Ministry of Education and Human Resources, Tertiary Education and Scientific Research (MOEHRTESR). This Ministry is responsible for the pre-primary, primary, secondary and tertiary education sectors as well as for Special Education Needs (SEN), and Technical and Vocational Education and Training (TVET).

It is also the parent ministry for a number of parastatal bodies involved in the education sector. The main institutions pertinent to this case study are briefly mentioned below:

- (i) The Mauritius Institute of Education (MIE) provides training for the pre-primary, primary and secondary sectors of education, targeting all cadres, including teaching and management (MIE website). MIE has a pivotal role in the preparation of STEM curriculum materials for grades 3 to 9 but a more limited role for grades 10 to 13.
- (ii) The Mauritius Examinations Syndicate (MES) has as its main objective *inter alia* to organise and conduct examinations locally and co-operate with other examination bodies, engage in relevant research, and to promote the development of a sound system of examinations (MES website).
- (iii) The Rajiv Gandhi Science Centre (RGSC) is responsible for the promotion and popularisation of science among the population, specially for students, through a spectrum of activities. One of its roles is to advise the Ministry of Education on the short and long term science education plans in Mauritius (RGSC website).

The Mauritian education system has been based on the English model of 3+6+5+2 until the implementation of the Nine Years Continuous Basic Education (NYCBE) (Section 1.2) in January 2017.

The 3+6+5+2 model is displayed in Figure 1a below. It is structured with three years of pre-primary education (age 3-5 years), six years of primary education (age 5+ – 11 years), five years of secondary education leading to School Certificate (SC) examinations (age 12-16 years), and two years of optional further education leading to Higher School Certificate (HSC) examinations (age 17-18 years). Education is free and compulsory up to age 16. While there has been a complete reform of the system from grades 1 to 9 (presented in Section 1.2), the model in figure 1a is still valid for grades 10 to 13.

Science is compulsory up to age 14 (Grade 9). At Grade 10, students choose six core subjects including mathematics for SC examinations; science subjects are optional at this level. The SC and HSC syllabi, examinations and markings of examination papers are carried out by the University of Cambridge International Examinations (CIE), UK, jointly with the Mauritius Examinations Syndicate (MES). Despite various initiatives, science subjects are not popular among students both at SC and HSC levels, as indicated by the statistical analysis performed in this study (see Section 4 on Quantitative Findings).

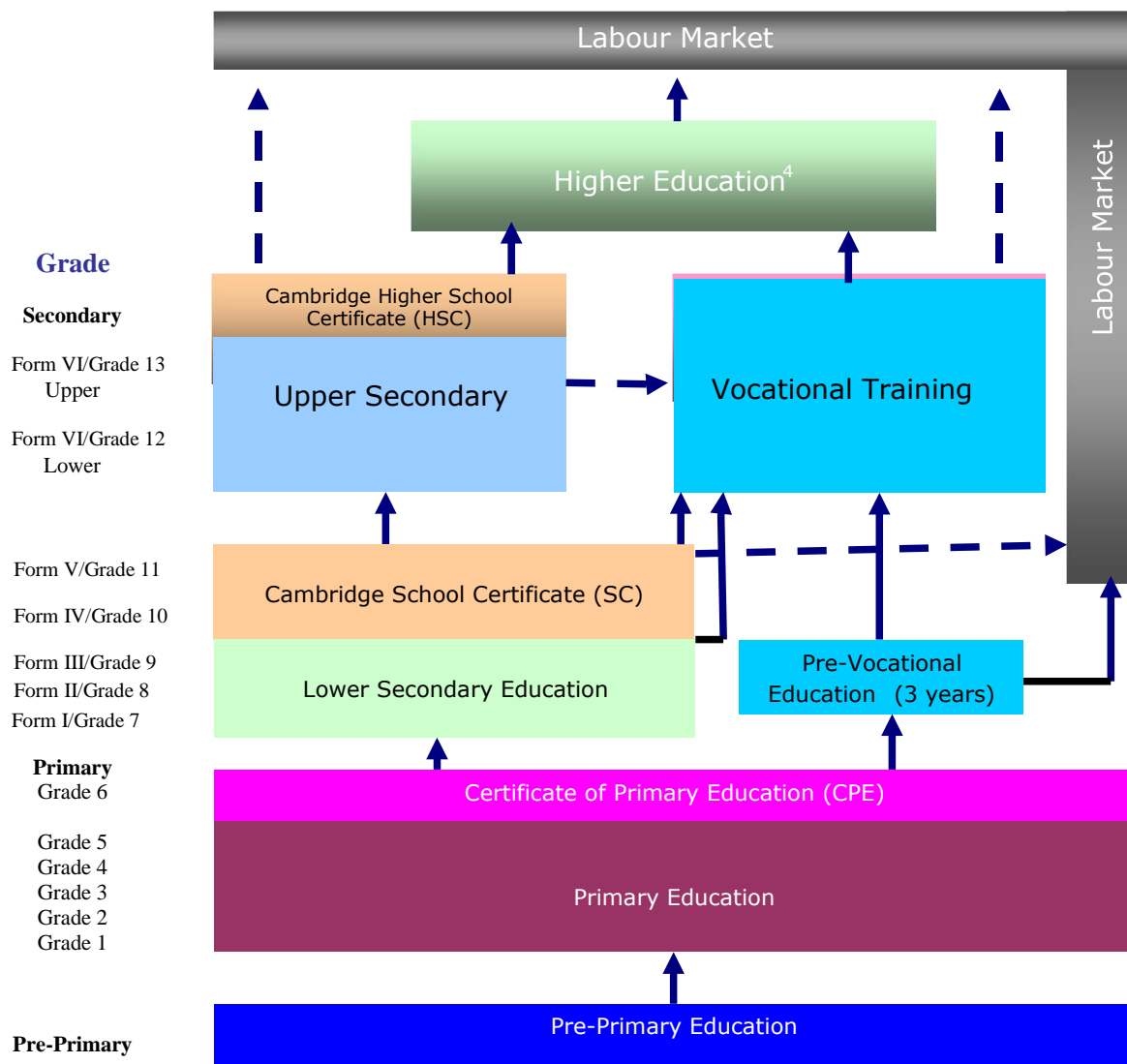


Figure 1a: The Mauritian Education system until 2016
(Credit: Education and Human Resources Strategy Plan 2008-2020)

1.2 The present educational reforms

Nine Years Continuous Basic Education (NYCBE, Inspiring Every Child, MOEHRTESR, 2016) is an educational reform that was introduced in 2017 to replace the former system of which, with its intense competition, resulted in a significant proportion of children not being adequately literate and numerate despite completing 6 years of primary schooling. An estimated 28% of students failed to complete their secondary education. This new model of the Mauritian education system is shown in figure 1b.

In a society increasingly dominated by an accelerating pace of technology-inspired change, and to meet the requirements of 21st century workforce, NYCBE aims to ensure that all children successfully complete the basic education cycle and then move on to secondary education via different pathways - general, vocational or technical - thus leading to tertiary education. It is also designed to equip students with relevant knowledge, skills and attitude, thus improving learning outcomes and guaranteeing success in future learning.

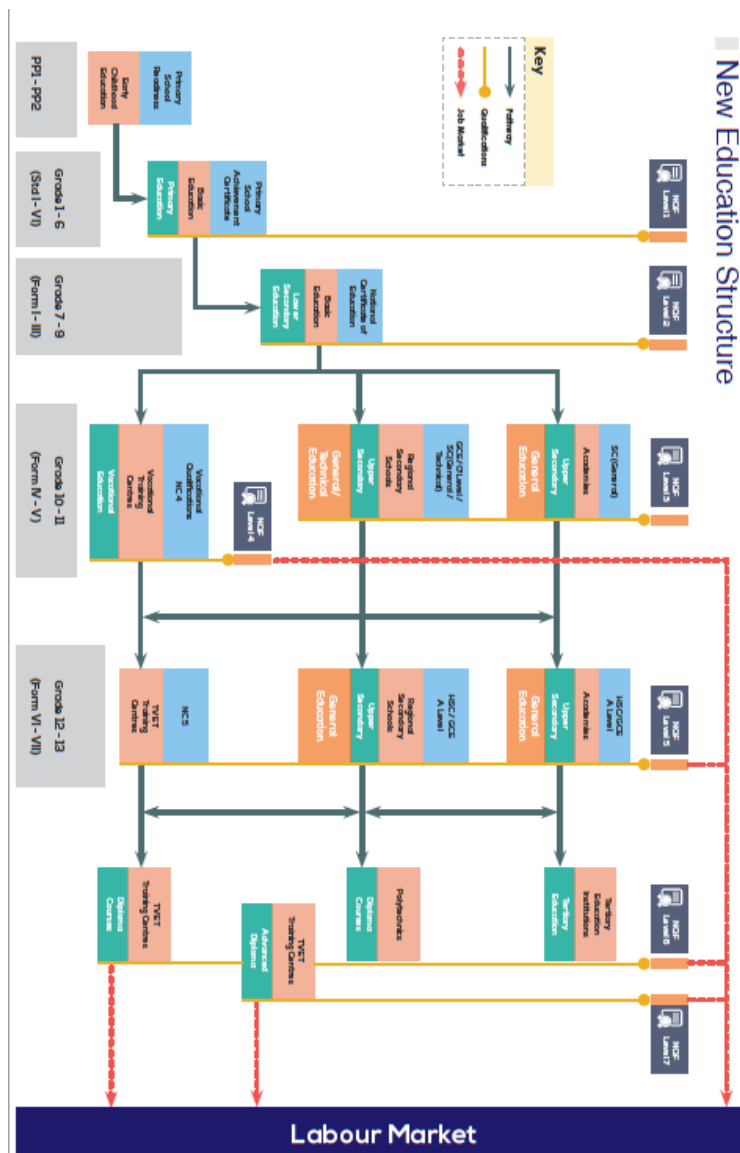


Figure 1b: The New Education Reform in Mauritius (as from January 2017)

NYCBE is built on six major pillars, namely Curriculum Change, Innovative Pedagogies, Meaningful Assessment, Continuous Professional Development, Conducive Learning Environment and System Governance and Accountability. The main concept of the reform is in line with Sustainable Development Goal - SDG 4 - which is about inclusive and equitable quality education for all and lifelong learning.

Since the Mauritian Education System is based on the English one, the above description clearly shows that it has a narrow-based post-16 curriculum designed and assessed by the Cambridge International Examinations (CIE) in collaboration with the Mauritius Examination Syndicate (MES). In a globalised world dominated by science and technology, there are clear incentives to change to a broader curriculum to equip the STEM learners with the necessary knowledge and skills to face the 21st century challenges.

2 Aims and objectives

The aim of this case study is to provide an insight into the existing post-16 STEM curriculum in the Mauritius.

The five main objectives of this case study are to:

- Identify the main features of the post-16 STEM curriculum in Mauritius
- Understand the political and policy context behind the features of the curriculum
- Analyse the scientific subjects and skills within the curriculum
- Study the impact of the broad nature of the curriculum on student outcomes
- Look into the financial and practical implications of the curriculum model adopted

3 Methodology

In order to meet the objectives set in the previous section, three concurrent methods of data collection were used, namely, semi-structured interviews, questionnaires and secondary data sources. Selective sampling was utilised by hand-picking the respondents on the basis of their expertise, the time-frame and resources available for this study. Relevant permissions were obtained from concerned authorities before proceeding with the study.

Semi-structured questionnaires were prepared (Appendix 1), customised, and administered to Senior Officials of the concerned organisations (MIE, MES, MOEHRTESR), as well as to educators and students attending a workshop organised by the RGSC. There were 100 students (83% boys and 17% girls) and 16 educators coming from 5 schools in four different zones. Details about the educators were not collected. The questionnaires consisted of a variety of multiple choice and open-ended questions to grasp maximum information relevant to the study. Google Forms were used to prepare and conduct all the surveys.

Concerning the information gathered from MIE, MES and MOEHETESR, face-to-face interviews were held upon appointment followed by survey through the questionnaires. In some instances, the interviews were recorded with the permission of the interviewees, then transcribed for further analysis. They were then compared with the notes taken in parallel in all the interviews, which lasted about one hour.

The forms for the survey questionnaires for educators and students were distributed to all, duly filled and collected on the same day. The process was carried out in an ethical way (Cresswell, 2003). The surveys and interviews were held in a very objective way to remove biases and errors. Things were seen from different perspectives and this allowed the researchers to corroborate the findings, thus, enhancing the validity of the data, (Abdullah J et al., 2000).

Secondary sources were also utilised during the study to provide an insight about the prevailing situation concerning STEM in Mauritius. The main sources have been from the MES, Statistics Mauritius (Statistics Mauritius website) and Education Cards (Education 2007, Education 2012, Education 2013, Education 2014, Education 2015).

The data were analysed both qualitatively and quantitatively using Google Forms and Microsoft Excel. Qualitative analysis was carried out by grouping the data under the transcribed data into appropriate categories.

4 Quantitative Analysis

To understand the situation in the post-16 STEM subjects, it is essential to understand the trends from lower grades, as this has a direct impact on the post-16 outcomes and beyond.

The total enrolment in the primary schools has gradually decreased from 122,312 in 1977 (Education Card, 2007) to 97,300 in 318 primary schools in 2016 (Education Statistics 2016). In 2015, 20,434 of school candidates sat for the Certificate of Primary Education (CPE) in the Republic of Mauritius with a net pass rate of 74.2%. The intakes in secondary schools have increased from 91,782 in the year 1977 to reach a peak of 124,971 in 2015 followed by a sharp decline to 120,944 in 2016.

4.1 Intake Trends in the Mauritian Education Sector - STEM

As described earlier, students make their choice of subjects in grade 9. They are encouraged to choose up to 8 subjects including core subjects of English language, French language and mathematics and a combination of other subjects.

Subjects are grouped in rigid clusters - science, technical, economics and humanities - depending on various factors, and students must choose only one cluster. Students are streamlined according to subjects and resources available at the schools; for example, if they opt for the technical stream, physics appears both as a science and as a technical subject alongside design and technology, whereas biology or chemistry are only available as science subjects in the science cluster. The inflexibility of the clusters thus limits their choice of subjects.

A sample of the options available for students is given below:

Core Subjects (To be done by All)	1. English	2. French	3. Mathematics
Options	Option 1	Option 2	
	Chemistry Biology Physics	Economics Business Studies Principle of Accounts	
Other Subjects	Add Maths OR Hinduism	Design and Communication OR Computer Studies	Hindi

Students are allowed to choose a minimum of 7 subjects and a maximum of 8 subjects (3 core + either option 1 or option 2 + one or two from other subjects).

The choice made at this level is already an indication of the course of study the students will pursue. The system narrows down from a maximum of 8 subjects at grades 10/11 to 5 subjects in grades 12/13.

4.1.1 Trends of Intakes at Grade 10/11

The mean number of candidates examined in SC in Grade 11 is 19,543 over the past decade are shown in Figure 2 below.

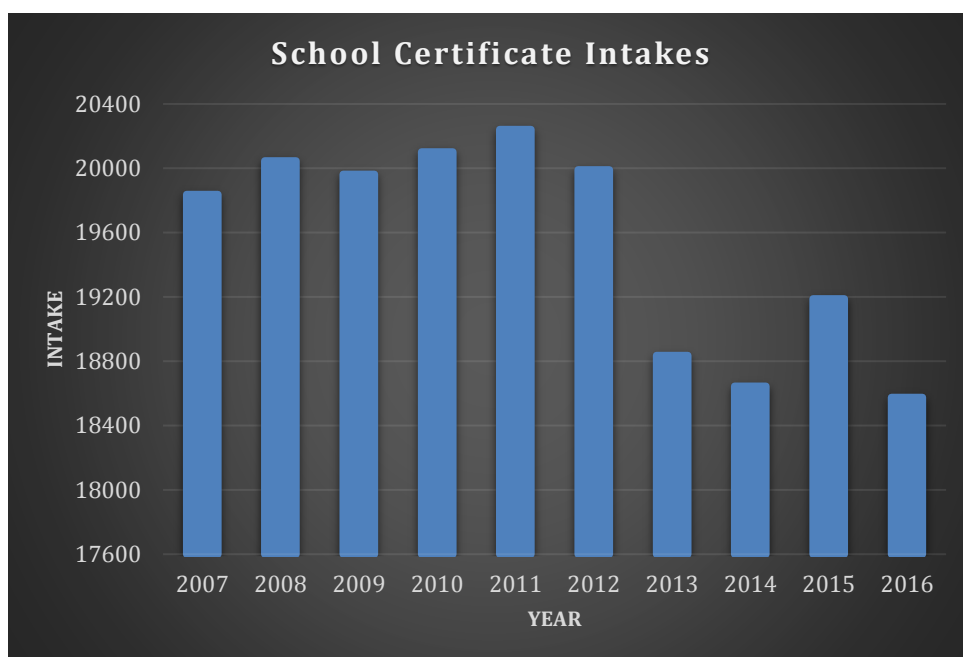


Figure 2: Intakes in Grade 10 from 2007 to 2016 (Source: MES 2017)

The variation in the above Bar Chart indicates a sharp fall in the years 2013-2014. The variations in the intake pattern presented in this section may be due to demographic changes. There is a correlation (excluding other factors such as repeat candidates, etc) between the birth rates in the period 1992 to 2000 (see table below) and the intakes indicated in Figure 2 above. In general, the intakes for SC for a specific year will follow the demographic pattern of children born about 15 years ago.

Birth rates in Mauritius 1992 - 2000

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000
Number of Births	22170	21667	21050	19824	20049	19331	18744	19543	19398

Source: Statistics Mauritius: Historical Series 2015- Population

As for the choice of subjects in STEM in Grade 10, mathematics is compulsory. The other subjects considered are biology, chemistry, and physics. The trends for the intake of STEM subjects is given in Figure 3 below:

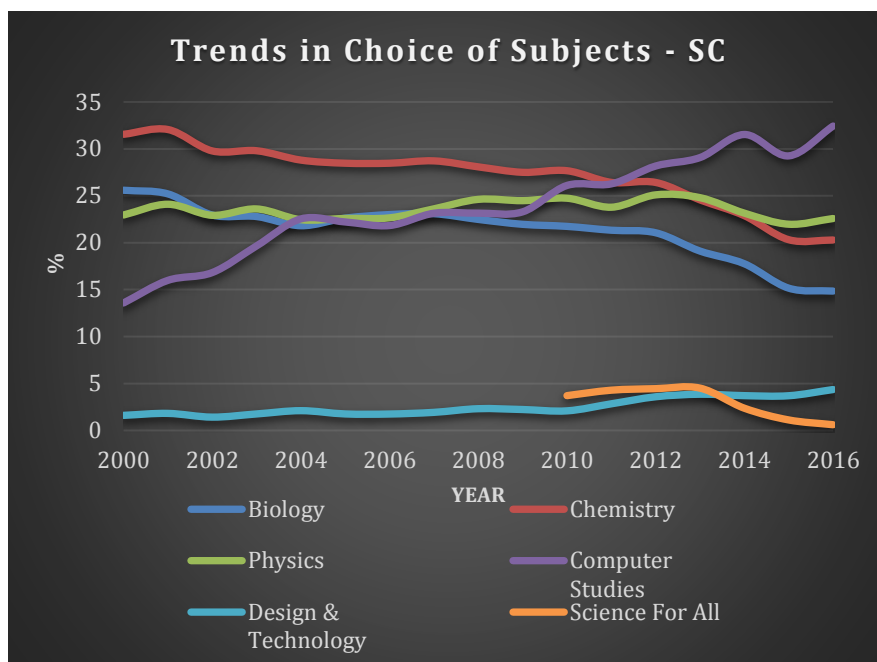


Figure 3: STEM Choice in Grade 10 from 2000 to 2016

Figure 3 shows declining intakes in chemistry and biology, but especially for biology. The only science subject which has remained stable is physics. With the introduction of computer studies and design & technology, other science subjects, namely chemistry and biology are becoming less attractive. The rate of popularity of approximately 1.5% *per annum* (p.a.) for computer studies is higher than for design & technology (less than 0.5% p.a.). It is interesting to observe how, in 2007, the intake for computer studies overtook that of biology, and then overtook chemistry, in 2011, to become the most popular choice besides mathematics, which is compulsory.

A new subject entitled 21st Century Science (Cambridge Outlook, Issue 5, 2008) was introduced in the SC Curriculum on a pilot basis in 2009. This subject was designed for students not studying science subjects and had as main objective to develop scientific literacy for our modern society driven by science and technology. The subject title changed to Science for All in 2012.

The syllabus (Cambridge O-Level Syllabus, Science for All, 2016) enables candidates to: recognise the impact of science and technology on everyday life; make informed decisions about issues and questions that involve science; understand and reflect on the information included in (or omitted from) media reports and other sources of information.

From Figure 3, it can be observed that there is a sharp decline and interest in this subject. Only 114 candidates took part in this examination in 2016 as compared to 745 when it was introduced. Presently only two private schools are offering Science for All. Feedback received from a face-to-face interview with Senior Officers of the Ministry of Education suggested this subject did not take off because: specialist teachers were reluctant to teach the integrated approach required by Science for All; there was a perception that it was a difficult subject; and there was a lack of resource and required infrastructure to support it.

4.1.2 Trends of Intakes at Grades 12/13

The choice of subjects for HSC depends on the combination offered in the specific schools and also on the performances of the candidates at SC level.

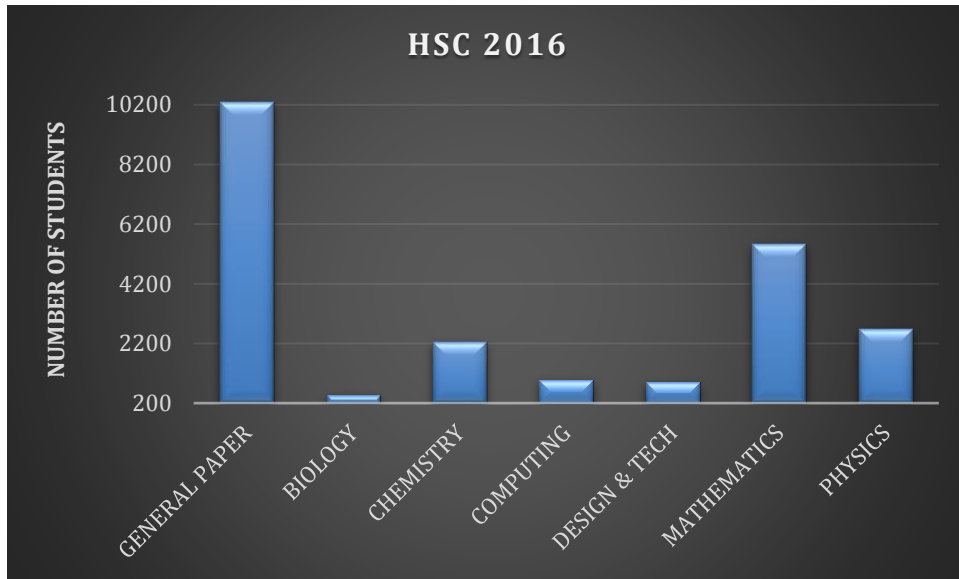


Figure 4: HSC Intake for STEM subjects 2016

Figure 4 indicates the number of students opting for the STEM subjects in 2016. The general paper (GP) is used as a benchmark as it is compulsory, and thus indicates the size of the cohort. At HSC, candidates must choose 3 principal subjects (e.g. mathematics, physics, chemistry) and one subject at subsidiary level. The general paper is compulsory. Biology is the least popular subject; mathematics is most popular.

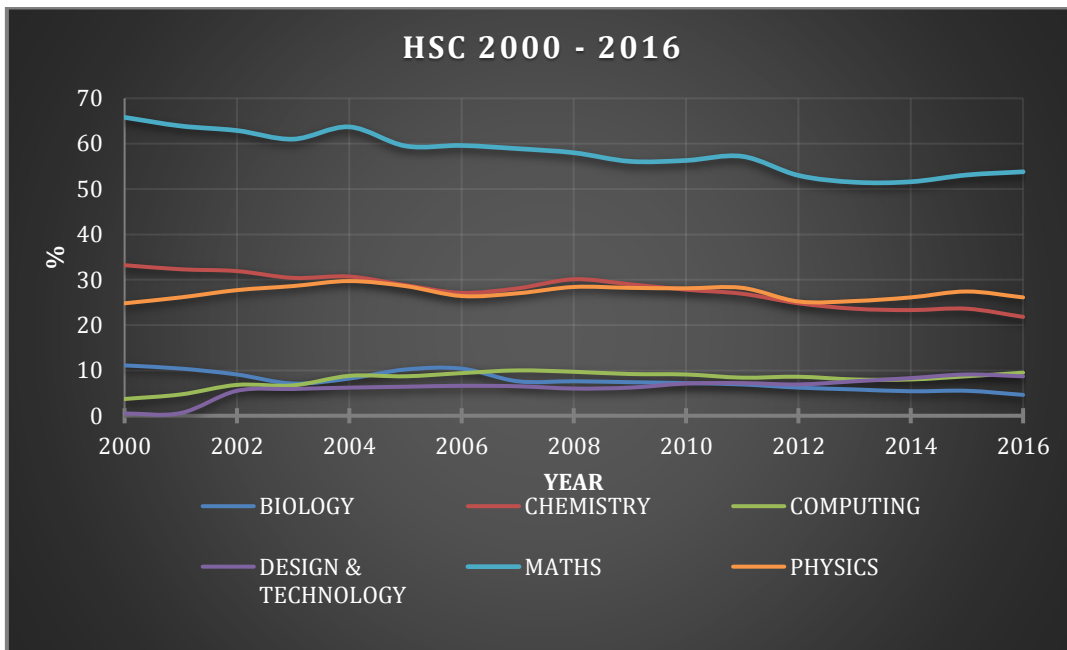


Figure 5: HSC trends in STEM subjects

The trends for intakes in STEM subjects are shown in Figure 5. There is a correlation in the trends in intakes at SC and HSC in science subjects. In-depth study is required to

further understand these trends. Computing and design & technology have been included as they are increasing in popularity and are seen as key competitor subjects to traditional STEM courses, and, as we saw from the trends in SC uptake, chemistry and biology in particular.

While physics and mathematics are more or less stable, it is clear that chemistry and biology are on the decline. In fact, the above graphics indicate that biology is the least popular subject at HSC with only 472 candidates and 284 passes (MES Statistics, 2016).

4.1.3 Enrolment by Gender

There is a gender disparity in the enrolment of science subjects at SC and HSC levels.

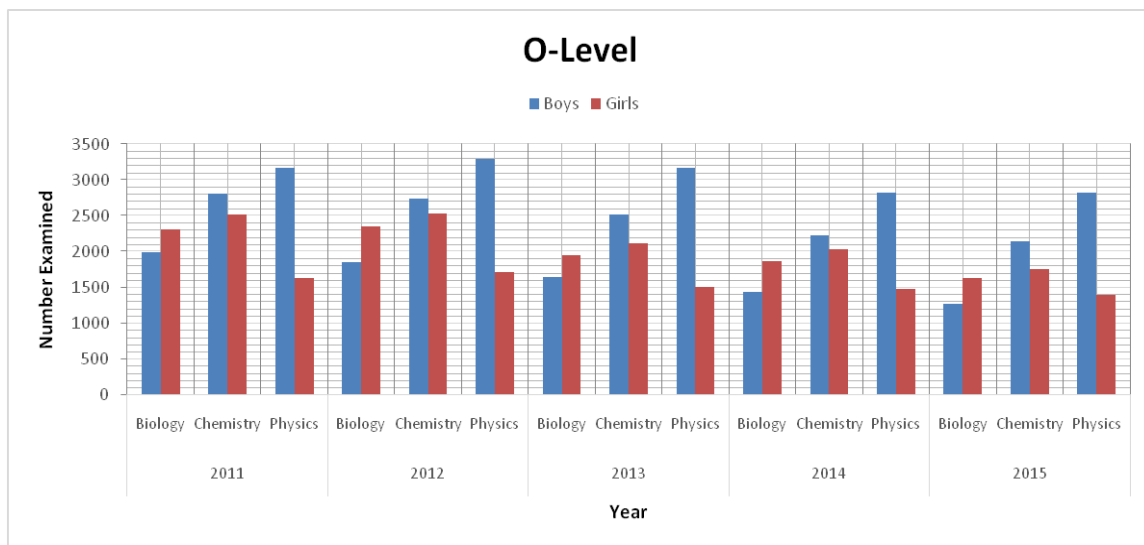


Figure 6: Intakes of Boys and Girls in STEM at Grade 10

As per the Figure 6, at SC level physics is extremely popular among boys as compared to girls; there is a comparable number of boys and girls who opt for chemistry; biology is more attractive to girls.

A different picture emerges for intakes of science subjects at HSC level as depicted in Figure 7. Physics is more popular with boys as compared to chemistry and biology, which are more popular with girls.

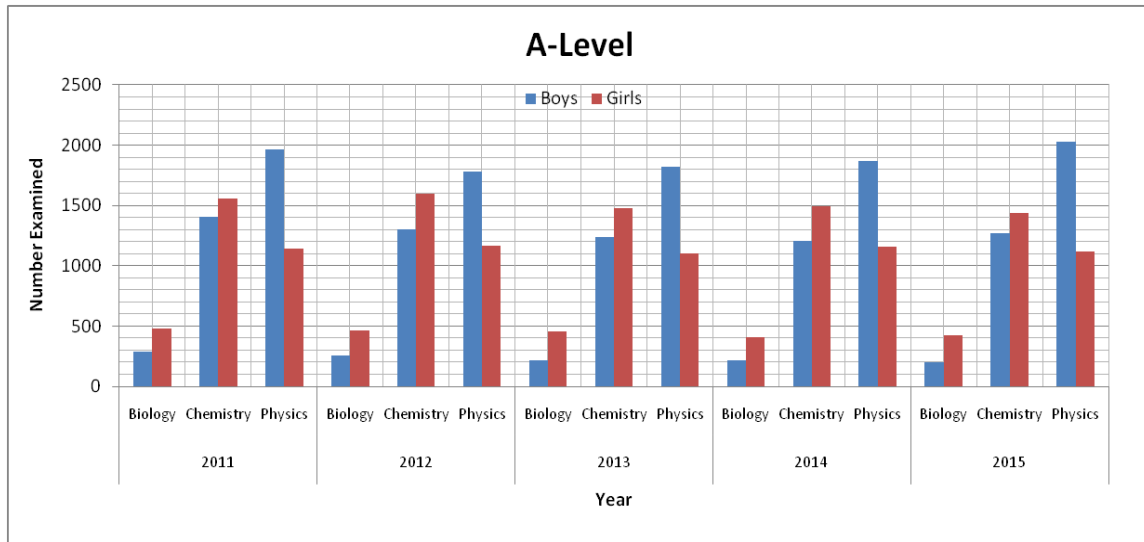


Figure 7: Intakes of Boys and Girls in STEM at Grade 12

The gender disparity in science subjects appears to reflect trends in many other countries. Further study is required to understand whether the gender disparity in the choice of science subjects is related to the same root causes observed elsewhere or whether there are gender issues unique to the Mauritius case.

4.1.4 Enrolment in the Tertiary Sector

The tertiary education sector is overseen by the Tertiary Education Commission (TEC).

As per the TEC website:

“The Tertiary Education Commission has as objects to promote, plan, develop and coordinate post-secondary education in Mauritius and to implement an overarching regulatory framework to achieve high international quality. It also has the responsibility to allocate government funds to the Tertiary Education Institutions under its purview and to ensure accountability and optimum use of resources. “

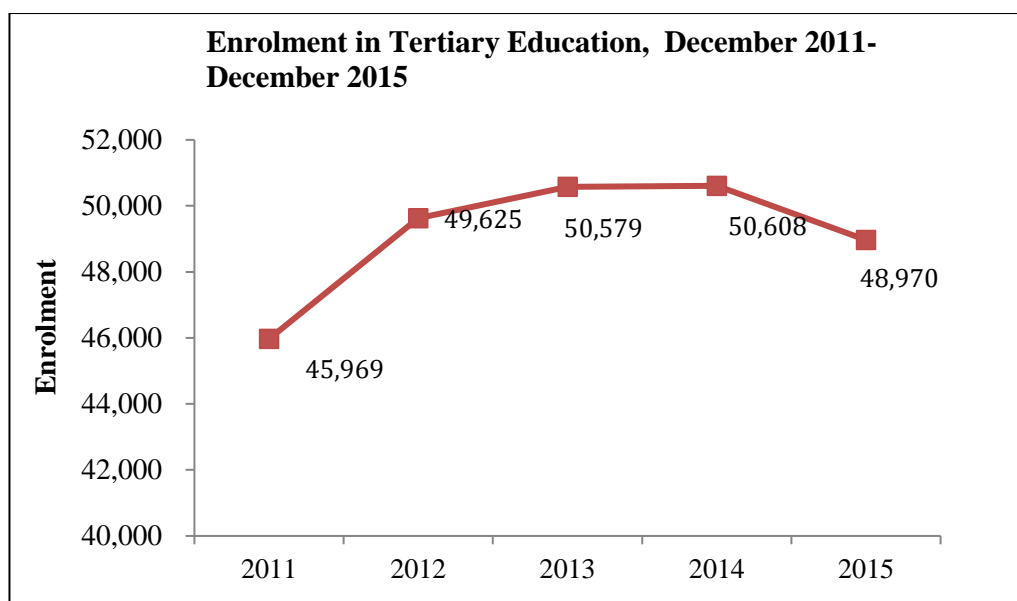


Figure 8: Trend in enrolment in the Tertiary Education Sector (Source; Statistics Mauritius)

Figure 8 shows the parabolic trend of the enrolment in the tertiary sector with a peak in 2014 when the enrolment was 50,608, and then a decrease to 48,970 in 2015. 44% of the students are enrolled in public-funded universities and 57.7% were female. (Education Card 2015. In this distribution, 31% are enrolled in science related courses (science, engineering, manufacturing & construction, agriculture, health & welfare).

4.2 Performance Quality in STEM

In this section, the performances at SC and HSC are analysed for the STEM subjects.

4.2.1 SC results of STEM subjects

As per available information from the MES, the overall pass rate has constantly decreased from 77.8 % in 2009 to 72.5% in 2015.

The School Certificate results are graded from 1 to 9, where 1 & 2 are distinctions, 3 to 6 represent credits, 7-8 are passes, and 9 is a Fail.

Figure 9 depicts the distribution of grades at SC for main science subjects: biology, chemistry, mathematics and physics for the 2016 cohort.

Overall, the general tendency in all subjects follows a similar pattern. It can be observed that the performances of girls as compared to boys are marginally better, except for mathematics where they are comparable. There are less failures for girls in chemistry, biology and physics respectively. The quality of the results is of concern as the majority of the candidates have a credit of 5 or more. This is a general observation that few students achieve excellence while the majority obtain either passes or fails. This is more obvious in physics as shown by the high number of fails (grade 9). The dips observed in the graphs indicate that a low percentage of students obtain grades 4 to 5 as compared grades 1-3 or 6-9.

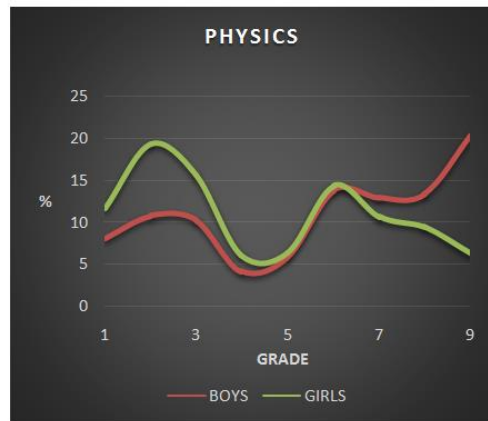
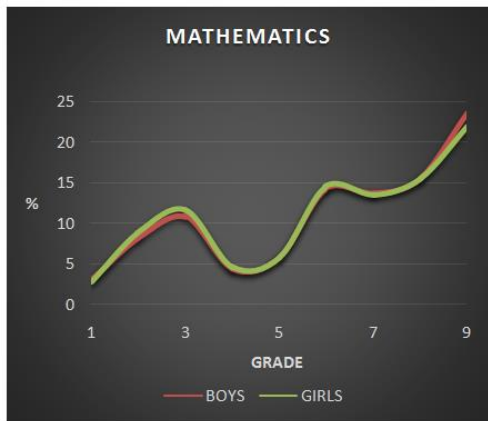
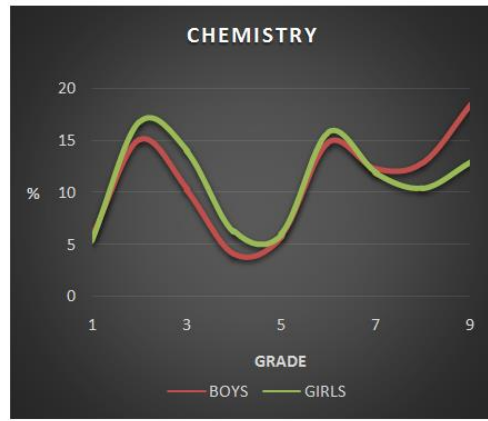
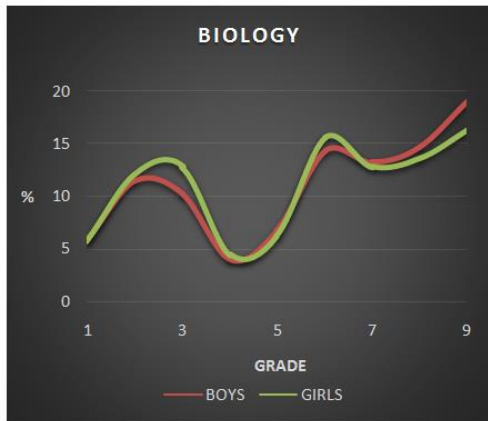


Figure 9: SC – Performance of boys and girls in STEM

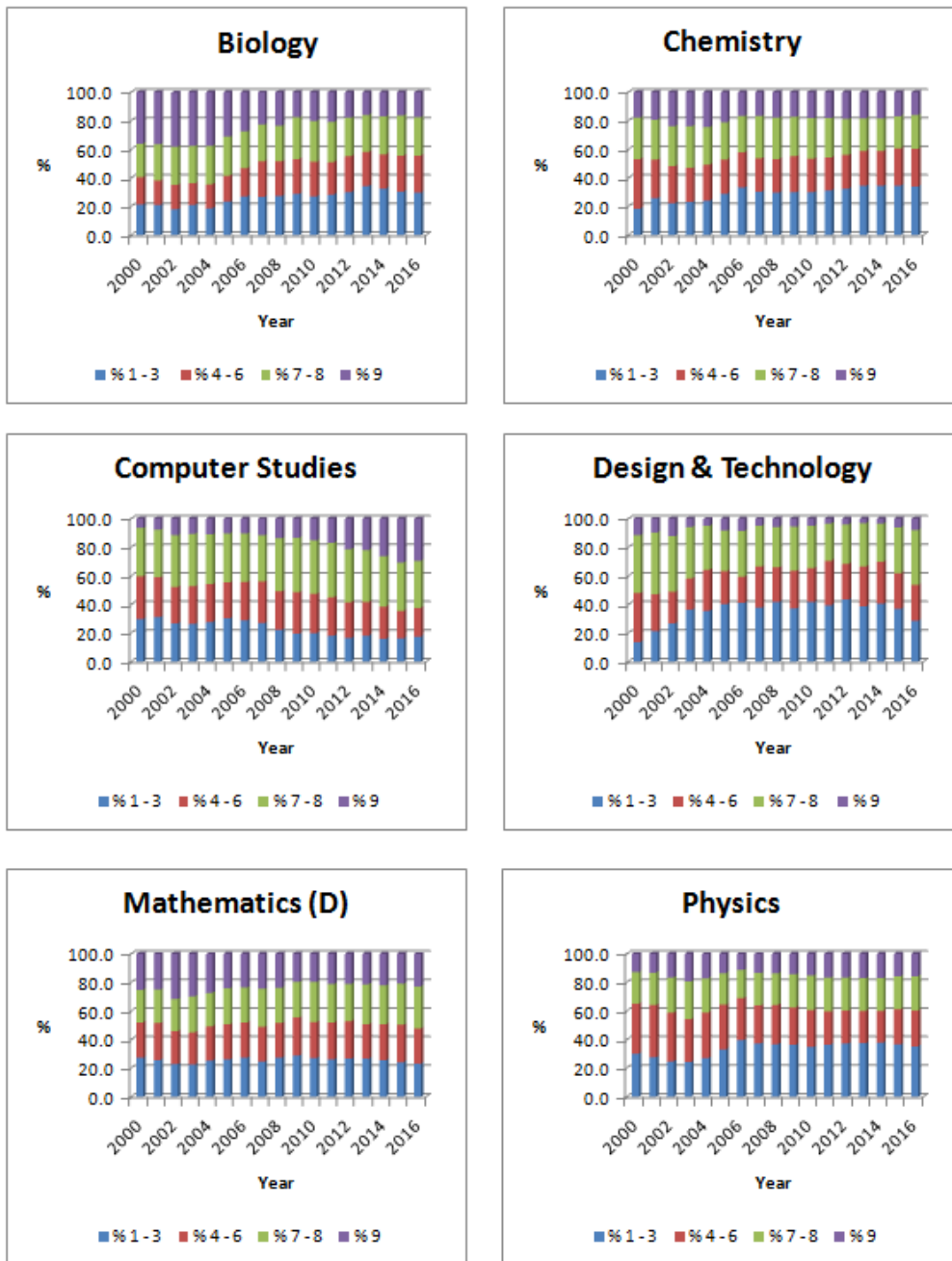


Figure 10: SC - Grade distributions in science subjects

Figure 10 represents the subject wise distribution of SC results from 2000 to 2016. With the objective of analysing the quality of SC the results have been grouped as follows: 1-3; 4-6; 7-8; & 9. Thus, the students excelling in the various subjects are having grades 1 to 3. The lowest rate of failures is found in design and technology.

Table 1: Mean SC result distribution 2000-2016

Subject	Percentage of students achieving the grades			
	Grade 1 - 3	Grade 4 - 6	Grade 7 - 8	Grade 9
2st Century Science	14.2	30.8	32.8	22.1
Additional Mathematics	23.9	27.9	18.3	29.9
Biology	26.2	21.6	26.7	25.5
Chemistry	29.2	25.2	26.6	19.1
Computer Studies	23	25.9	35.4	15.8
Design & Technology	35.3	25.9	32.3	6.5
Mathematics	25.7	24.8	25.8	23.7
Physics	33.6	28	23.2	15.2

The values in Table 1 show the average percentage of students that have achieved the grouped results from 2000 to 2016. About 26% of students achieve grades 1 -3 while over 47% obtain grade 7 or lower. Among the STEM subjects, the poorest results occur in biology, and the best results occur in design and technology, closely followed by physics.

Based on the SC, the students are enrolled in Lower VI if they have at least 3 credits. The Ministry of Education is presently considering revising the eligibility requirements to at least 5 credits to improve the quality of the HSC cohort.

4.2.2 HSC Results of STEM subjects

In Figure 11, the performances trend in the STEM subjects over the past decade are presented.

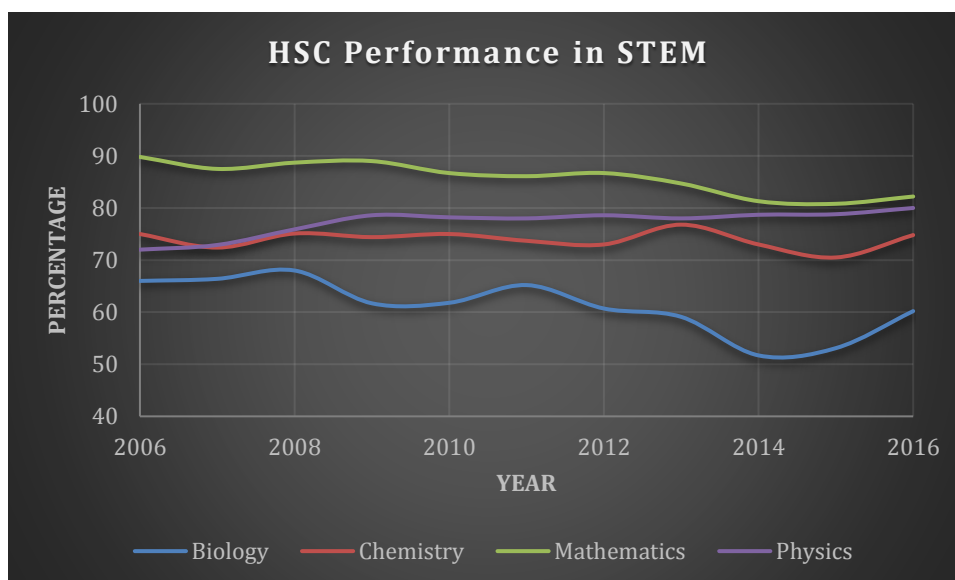


Figure 11: HSC performance trends in STEM

It can be observed that the percentage of passes in mathematics, chemistry and physics are stable at about 80% whereas biology has seen a decline and fluctuates around 60% (although, as the least popular subject, biology has a very small cohort, which may account for the larger fluctuations).

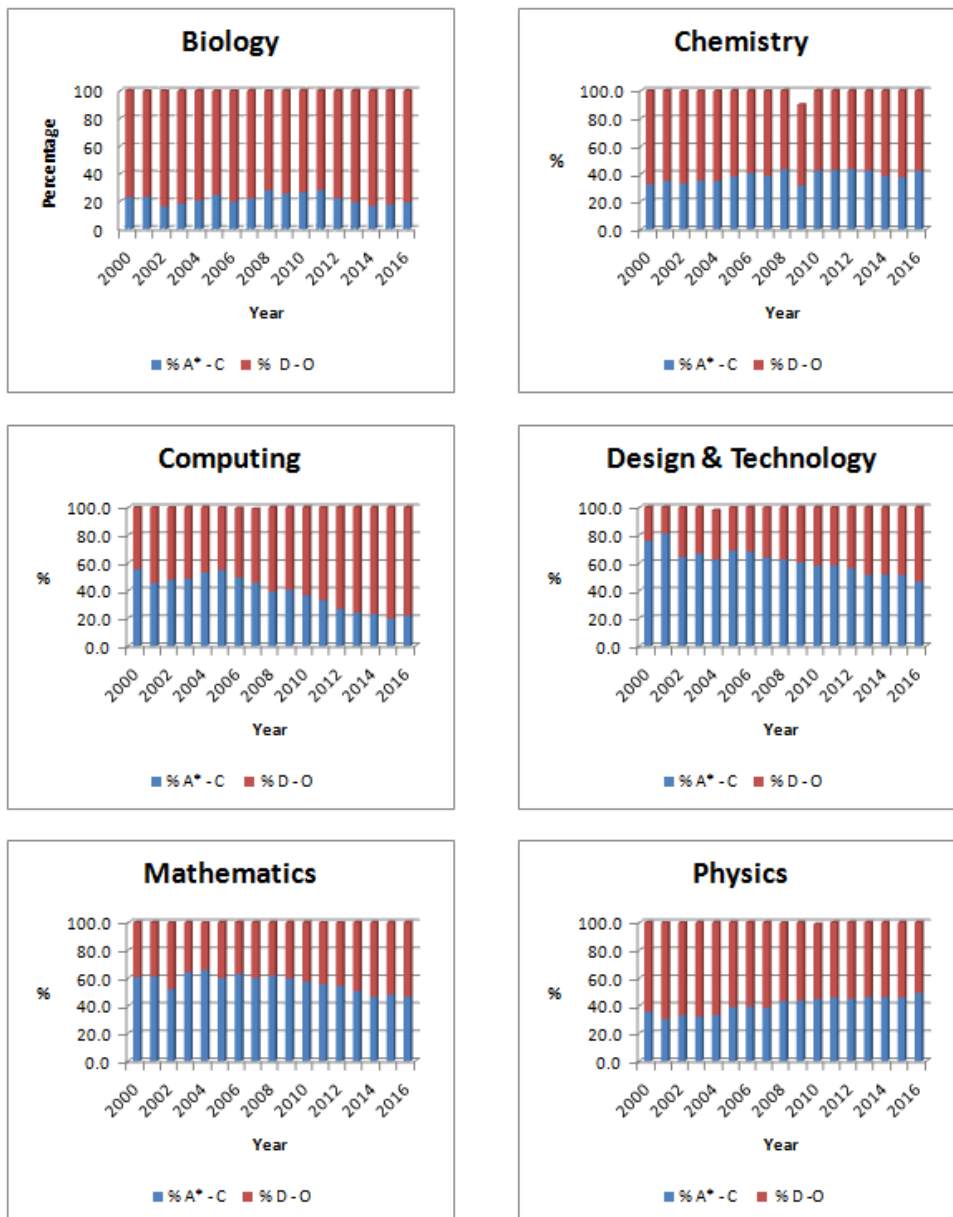


Figure 12: HSC grade distribution in STEM 2000-2016

In Figure 12, the subject-wise distribution of HSC results is shown from 2000 to 2016. HSC results are graded as A* for excellent; A to E passed with decreasing degree of excellence, U for ungraded and O for ordinary level pass. To evaluate the quality of HSC results the grades have been grouped as follows: Grade A* to Grade C are considered good results, then Grade D to Grade O poor results.

Table 2: Mean HSC result distribution 2000-2016

Subject	% students achieving the grades	
	Grade A* - C	Grade D - O
Biology	22	78
Chemistry	38.3	61.3
Computing	39.1	60.8
Design & Technology	61.6	38.3
Mathematics	56.9	43.1
Physics	40.7	59.2

The data in Table 2 indicates the quality of results in HSC STEM subjects over the period 2000 to 2016. The average of good results was 43% (A* - C) as compared to poor results which is about 57%. Subject wise analysis indicates that the poorest results are obtained in biology while the best occurs in design and technology closely followed by mathematics.

Comparing the quality of results for SC and HSC, we can deduce that there is a direct correlation between the performance and SC and that at HSC. Further study is required to verify this hypothesis.

In the existing system in Mauritius, students compete for scholarships at HSC level. This influences the students' choice for subjects which are more scoring (Appendix 1g).

5 Qualitative Analysis

As described in Section 3, surveys and interviews were carried out using purposive sampling. The results of the studies are presented in this section to meet the objectives set in Section 2.

5.1 Survey among Students

The questionnaire administered is given in Appendix 1a. The responses obtained from the students are summarised in Appendix 1b.

It is observed that most students surveyed found chemistry and biology difficult as compared to mathematics and physics. They were inspired to study science for several reasons including "understanding of the environment", "importance in everyday life." It was also noted that science teaching was deemed too teacher-oriented and there was a lack of demonstrations and practicals. They stated that practicals helped them to understand science better. It was interesting to remark that most students used ICT tools as source of information.

5.2 Survey among Educators

A sample questionnaire is given in Appendix 1c. The summary of responses is given in Appendix 1d.

Most educators admitted that they used textbooks as a main teaching method. They also stated that they use activity-based methods and integrated ICT in the teaching process. Teachers stated that they had access to a wide range of resources and participated in a number of activities to keep abreast of the latest trends in their subject areas and they also advise students on the choice of subjects.

Though students are inspired by science, the quality of the teaching may impact adversely on their choices and performances. It is also questionable whether educators are putting into practice active methods of teaching in the classroom.

5.3 Summary of interviews with relevant institutions

5.3.1 Mauritius Institute of Education

A meeting was held with the Director and Staff of MIE conversant with STEM. Several issues were raised about the science education system in Mauritius. This was followed by a questionnaire (Appendix 1e) circulated to all those present in the meeting. The outcomes of this survey are summarised in Appendix 1f.

MIE has a leading role in preparing STEM curriculum for grades 7 to 9, but STEM subjects are not addressed in depth. It should be noted that there is a lack of proper communication among the subject areas at MIE related to STEM while preparing the curriculum. This tends to lead to a compartmentalisation in developing curriculum thus impacting on STEM as a holistic learning area.

Teachers are trained in the delivery of the STEM curriculum through innovative pedagogical skills such as inquiry-based approach. Many educators are still to be trained as it is a matter of choice from the educator whether he/she wishes to be trained, unlike the primary sector where training is compulsory. These changes in the STEM curriculum at grades 7 to 9 are likely to influence the choice of subjects at post-grade 9 level, and it is expected that more students will learn science. There was a mixed feeling with regards to the question of resources. Finally, MIE has a limited role and influence on the SC/HSC level though it forms part of the Advisory committee at the MES.

5.3.2 Mauritius Examination Syndicate

An interview was held with the Director and Deputy Director of MES and the objectives of the institution in the education landscape of Mauritius was explained. Information from the interview has been integrated into the various sections of this document.

One important role of MES is the planning and organisation of national examinations at various milestones in the educational sector, starting with the newly introduced PSAC at end of Grade 6, for which MES prepares the examination papers in line with the curriculum and textbooks prepared by MIE. At the end of one year compulsory pre-primary education, the primary school readiness programme is applied to facilitate entry to Grade 1. Science assessment occurs in grades 4/5. At Grade 9 a national examination called the National Certificate of Education (NCE) is held and the outcomes of the examination will serve for progression of students to upper secondary and

orientation to either general or technical or vocational education (Inspiring every child, 2016).

At Grades 11 and 13, MES jointly with CIE organise the SC and HSC examinations for all students in Mauritius. Presently, the Government is paying the examination fees for SC and HSC subject to certain conditions that the candidates must abide to. MES is fully responsible for the timetabling (in-line with requirements of CIE). Most markings are done in UK and the results are published through MES.

MES also has an important role in the compilation of relevant statistics for all examinations.

5.3.3 Ministry of Education and Human Resources, Tertiary Education and Scientific Research

At the Ministry of Education and Human Resources, Tertiary Education and Scientific Research, an interview was held with the Director Curriculum & Evaluation and Human Resource Development, and Director of Quality Assurance.

The information was grouped into five main categories and the main highlights in each category are summarised in Appendix 1g.

As per the policy of the ministry, there is unhealthy competition as the system is too academic and there is less emphasis on the rounded development of the individual. The present system is results-oriented in that educators and students see attaining good results as the clear primary objective. The reason is that a limited number of scholarships (Laureateship) for further studies are awarded to top achievers based on the aggregate HSC results. This prevailing culture has also encouraged mushrooming of private tuition without any control by authorities.

However, it is aligning with international trends as per the UNESCO agenda. At the primary level, there is a broad curriculum with a holistic approach being implemented as mentioned earlier. In order to ensure the successful implementation of the NYCBE there will be continuous monitoring and assessment of the system. With the new reform, there will be a need for more human resources in the education sector alongside continuous professional development, physical resources, and adequate financial support.

With regards to science subjects and skills within the STEM curriculum, there is an alternative to practical examination at SC and this may impact on the delivery of the STEM curriculum at classroom level. Practical work has been reported by many researchers - such as Wellington (2000); Wellington and Irsen, 2008; Millar (2009) - to be one of the distinctive features of science teaching and one of the key expectations of pupils' learning. The interview and survey data showed that the introduction of alternative to practical examination at SC level has raised some concern about the development of scientific enquiry processes and skills in the students. Educators tend to be more concerned about covering the theoretical aspects of the STEM curriculum and practical skills which are not being assessed are given less importance.

6 Discussion and Conclusion

This study has illuminated a number of aspects about issues concerning the post-16 STEM curriculum in Mauritius. Though the study was carried out in a limited time frame, it involved, and included evidence from, the major stakeholders in the Mauritian education system.

As indicated in Section 4.1, there is a decline in the intake of some STEM subjects after grade 9, more particularly for biology. The number of students opting for STEM subjects at HSC level depends on the combination of subjects offered in the schools and the performances of the candidates at SC level.

An important factor for the low intake of STEM subjects after the compulsory level is that those subjects are presented along other subjects such as enterprise education, travel and tourism, computer studies, design and technology, which students find more attractive, despite guidance from their educators to choose science. It would be advisable that the Ministry comes up with policies that would encourage more students to choose STEM subjects. One way of solving the problem is to make computer studies a core subject and thus reduce the competition with other STEM subjects. Another alternative is to make science compulsory up to Grade 11 as is the case in many countries.

The SC results presented in Section 4.2.1 and Figure 6 about the grade distribution in science subjects show that few students achieve excellent results, while the majority of students obtain either passes or fails. There is a general tendency for girls to perform marginally better than boys. The HSC results in STEM subjects show a similar trend in the SC. Observing, measuring, inferring, classifying, predicting and communicating are some of the skills fundamental to STEM education (Millar, 2009; Wellington and Irsen, 2008). In the past, practical skills were assessed through exam-based science investigations. However, according to the MES, this created administrative problems such as leakage and it was replaced by an alternative to the practical examination paper in science subjects. An alternative to the practical paper at SC level seems to be one of the factors responsible for the poor performance of students in STEM at HSC level. Interviews with senior officers and students have indicated that educators do not involve their students in practical investigative activities in order to develop their various scientific skills that are required in STEM subjects. Further research is required to understand the relationship between the performance at SC and that at HSC.

From feedback obtained from the students, as summarised in Section 5, there is a perception that chemistry and biology are difficult subjects compared to mathematics and physics. Though students are inspired to choose science, they found the teaching method boring, too teacher-oriented and with a lack of investigative work. The educators (Section 5.2) have supported the view that, while textbooks are the main resources for teaching, they do incorporate ICT tools and group work in their pedagogy. Additional avenues could be explored to evaluate the teaching strategies through a more in depth study.

With regards to human resources (Section 5.5), the interviews data from MIE academic staff and MES officers revealed that there is a need for more investment to recruit additional STEM educators and provide continuous professional development so that educators can keep abreast of the latest trends in STEM education. Substantial investment is also required in infrastructural facilities as well as physical resources to improve the status of STEM subjects. Mauritius aims at becoming a knowledge hub and

a high income economy in the region and, thus, improving scientific literacy and a highly skill workforce is seen as a national imperative (Foreign Affairs, 2017). This is in line with the rationales set in the NYCBE educational reform.

As mentioned in Section 5.4, MES has a pivotal role jointly with CIE in the organisation of examinations at SC and HSC levels. According to feedback received from MIE, there should have been intensive debates on what should be taught and to what extent academics can teach a concept and be given the freedom to remove certain sections and reinforce others based on the current trends. It is advisable for the MES to ensure that the STEM syllabi are being regularly reviewed by CIE to adapt to the local context in line with the technological developments taking place in Mauritius. It is also advisable that there is continuous assessment of the practical sessions at Grades 10-11 so that students' performance could be improved at HSC.

A laudable initiative of the Ministry of Education is the broadening of the curriculum up to grade 9 through the NYCBE. It would have been more beneficial if the broadening of the STEM curriculum could be carried out from grade 10 to 13, thus preparing the individuals to function more effectively in the globalised and technologically-evolving society. Since the NYCBE has only been recently implemented, a complete picture of the impact of the broad nature of the curriculum on students' outcomes can only be obtained after a complete cycle. However, the Ministry of Education will be carrying out continuous monitoring and assessment of the system to ensure quality at all grades.

With the new reform, there is a need for training of existing educators and recruitment of more educators at all levels. This also requires additional physical resources (equipment infrastructure). In this context, the Budget for 2017/2018 for the education sector has been increased to Rs 16.6 Billion to ensure the successful implementation of NYCBE.

The above-mentioned reasons explain why the impact of the broad nature of the curriculum on students' outcomes and the financial aspects could not be investigated further.

Nevertheless, this study makes a distinctive contribution to STEM and post-16 curriculum in Mauritius. Relevant institutions such as the MIE, MES, RSGC and the MoEHRTESSR should work hand in hand so that the changes and implementation of the post-16 STEM curriculum prepares students for the workforce.

7 Acknowledgements

This case study was carried out by Dr A. K. Maulloo and Dr J. Naugah at the Rajiv Gandhi Science Centre and was commissioned by the Royal Society, UK. It addressed the issues about the post-16 STEM curriculum and aimed at pulling together evidence from the Mauritian education system. This project would not have been possible without the joint effort and contribution of various stakeholders, namely the Ministry of Education and Human Resources, Tertiary Education and Scientific Research, Mauritius Institute of Education, Mauritius Examinations Syndicate, educators and students from the secondary schools. We thank them all as well as the staff of the RGSC for their contribution. We are grateful to the Royal Society for giving us this opportunity and for providing their support in this research.

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LIST OF ACRONYMS

B.Ed	Bachelor of Education
CIE	Cambridge International Examinations
CPE	Certificate of Primary Education
GP	General Paper
HND	Higher National Diploma
HSC	Higher School Certificate
ICT	Information and Communication Technology
MES	Mauritius Examinations Syndicate
MIE	Mauritius Institute of Education
MITD	Mauritius Institute of Technology and Development
MoEHRTESR	Ministry of Education and Human Resources, Tertiary Education and Scientific Research
NCE	National Certificate of Education
NCF	National Curriculum Framework
NQF	National Qualification Framework
NYCBE	Nine Year Continuous Basic Education
NYS	Nine Year Schooling
PGCE	Postgraduate Certificate in Education
PSAC	Primary School Achievement Certificate
RGSC	Rajiv Gandhi Science Centre
SC	School Certificate
SEN	Special Education Needs
STEM	Science, Technology, Engineering and Mathematics
TEC	Tertiary Education Commission
TVET	Technical and Vocational Education and Training
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organisation

APPENDICES

Appendix 1a

Case Study on Post 16 STEM Curriculum

The Rajiv Gandhi Science Centre is conducting a study on Post-16 STEM Curriculum in Mauritius. Thank you for providing your feedback so that we can take stock of the situation.

Students

1 Gender

Mark only one oval.

Male

Female

2. Name of the School?

3. How do you find the 'A' Level syllabus in Chemistry

Mark only one oval.

1 2 3 4 5

Easy Very Difficult

4. How do you find the 'A' Level syllabus in Biology

Mark only one oval.

1 2 3 4 5

Easy Very Difficult

5. How do you find the 'A' Level syllabus in Physics

Mark only one oval.

1 2 3 4 5

Easy Very Difficult

6. How do you find the 'A' Level syllabus in Mathematics

Mark only one oval.

1 2 3 4 5

Easy Very Difficult

7. What inspired you to choose science subjects

8. What do you think of the teaching methods used during the science lessons?

Tick all that apply.

- Boring
- Too much teacher-oriented
- Lack of demonstrations/practicals
- Very interesting
- Very interactive
- Full of practical sessions
- Others

9. Would you prefer your teacher to give notes instead of doing activities?

Mark only one oval.

- Yes
- No

10. Do you enjoy practical works?

Mark only one oval.

- Yes
- No

11. How does practical help you in understanding the theory?

12. Do you have access to other resources apart from your textbooks?

Mark only one oval.

- Yes
- No

13. If YES what are those resources?

Tick all that apply.

- Books
- Newspapers
- ICT
- Other: _____

14. Do you do group work in your subjects?

Mark only one oval.

- Yes
- No

15. Do you wish to go for higher education in science?

Mark only one oval.

- Yes
- No
- Maybe

Thank you

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Appendix 1b
Summary of responses for students

- (i) The level of difficulty of HSC STEM Syllabus is shown in Table 3. About 45% of students stated that chemistry and biology are difficult. 91.3 % found Mathematics easy while 86.9% stated that physics was easy. The results in a 5-point scale has been clustered into 2-point scale, with 1 to 3 as easy, and 4-5as difficult.

Table 3: Difficulty of science subjects - HSC

Subject	Percentage	
	Easy	Difficult
Biology	54.5	45.5
Chemistry	54.5	45.4
Mathematics	91.3	8.6
Physics	86.9	13

- (ii) Inspiration to choose science subjects

The respondents' views are given in Table 4. It can be deduced that the students are aware of the positive aspects of science.

Table 4: Inspiration for Science

<ul style="list-style-type: none"> • Discoveries • Fascinating Research Process • About research which can ease people in everyday life • Inventions • Understanding and discovering my environment • The fact that science is concerned with our everyday life and that science can make things a lot easier • Science is fun • Passion • get to discover new things
--

- (iii) Opinion about teaching methods

Respondents were provided with several options as indicated in Table 5

Table 5: Feedback from students on teaching methods

Opinion	Percentage
Boring	34.8
Too much teacher-oriented	21.7
Lack of demonstrations/practicals	43.5
Very interesting	21.7
Very interactive	13
Full of practical sessions	8.7
Others	17.4

- (iv) 61.9% of the respondents preferred that their teachers do not give notes.
- (v) 95.7 % of respondents enjoyed practical works.
- (vi) The responses from students about the relevance of practicals to understand theory is summarised Table 6 and they show the students' preferences for practical works.

Table 6: Relevance of doing practicals

<ul style="list-style-type: none"> • Understand better & easier • It makes you more familiar with the way how the apparatus, experiments work • We get to do it ourselves • It enables to have a better understanding of the topic, how it works • Help to understand the notes more when reading the notes • It makes what we learn as theory as a demo to more understand • By seeing the experiments, we understand the concept behind the theory better • Visualising the concepts & theories we have been taught • Practical help to study the visual aspects of science theory • They make us more creative. To imagine things in other dimensions. • I can refer to my chapters according to my practicals • Easy to remember
--

- (vii) 73.9% have access to resources apart from text books, and the access to the various media is shown in Table 7.

Table 7: Access to media

Media	%
ICT	83.3
Newspapers	33.3
Books	66.7

- (viii) 52.3% do not do group works.
- (ix) As to whether the students would pursue higher education, 45% were positive, 39.1% negative while the remaining 17.4% were undecided.

Appendix 1c

Case Study on Post 16 STEM Curriculum

The Rajiv Gandhi Science Centre is conducting a study on Post-16 STEM Curriculum in Mauritius. Thank you for providing your feedback so that we can take stock of the situation.

Educators

1 Gender

Mark only one oval.

Male

Female

2 Name of the Institution you work

3 What is your area of specialisation?

4 Do you teach and do activities for the Post -16 syllabus (Form 5 onwards)

Mark only one oval.

Yes

No

Other: _____

5 What teaching methods do you use to teach your subject

Tick all that apply.

Textbooks

Activity-based methods

Group work

6 How do you integrate ICT in your teaching process?

7 How do you keep abreast with latest trends in your subject area?

8 Do you advise your students in the choice of subjects?

Mark only one oval.

Yes

No

9 Do you attend workshops/meetings in your subject area?

Mark only one oval.

Yes

No

THANK YOU

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Appendix 1d

Summary of responses for students

- (i) Most of the respondents were either physics or chemistry educators. Only a few were biology teachers. 94% of them were involved in post-16 curriculum.
- (ii) The teaching methods used are summarised in Table 8. Educators stated that they rely mostly on textbooks for teaching.

Table 8: Teaching methods used by educators

Method	Percentage
Textbooks	93.8
Activity-Based Methods	87.5
Group Work	68.8

- (iii) The integration of ICT in the teaching process is summarised in Table 9.

Table 9: Use of ICT

<ul style="list-style-type: none"> • Demonstration • Use of sensors and dataloggers • Getting questions on the Internet • YouTube videos related to science • Use of PowerPoint & MS Word • Use of video to explain experiments that cannot be demonstrated in lab • Use clips to show models to clarify laws • Research Work & Projects using Internet 	<ul style="list-style-type: none"> • LCD Projection of computer simulation of physics experiments • Browsing the Internet to get more info on - certain topics – • Following certain teaching sessions on the Internet • Notes are sent by email (more efficient & save time). Spend more time on activities • Use of simulations such as PHET • Use of pictures and reading materials from the Internet • Showing videos, animations • Make use of projector
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- (iv) The summary of responses from the teachers to the mode of keeping abreast with latest trends in their subject area is shown in Table 10.

*Table 10:
Keeping
abreast in
subject area*

<ul style="list-style-type: none"> • Internet (at home and school) • Interaction with CIE's site for Educators and by email • Reading, Research, Media • Participating in CIE Forum • Reading New books • Working past exam papers • Research on the Net • New Methods of Teaching • Talks, workshops & Peer discussion • CIE Site for Educators
--

- Read Science Magazine
- Syllabus review
- Through Forums and blogs checking
- society/association websites

- (v) 93.8% of the respondents stated that they would advise students on the choice of subjects and that they all attend workshops/meetings in their subject area.

Appendix 1e

Case Study of STEM Curriculum in Mauritius

The Royal Society has commissioned a case study on the post-16 STEM curriculum in Mauritius. This study will give an insight of the present system and will help to pave the way forward for the future labour market in line with Vision 2030 of Government.

1. **Email address***

Interview with the Mauritius Institute of Education (MIE)

2 **What is the role of MIE in the preparation of the STEM curriculum at all levels (Grades 1 to 9)?**

3 **What is the role of MIE in the preparation of the STEM curriculum from Grades 10 to 13?**

4 **What is the role of MIE in the delivery of the STEM Curriculum at SC and HSC levels?**

5 Are there any changes in the pedagogy of the Science curriculum to encourage students to take up science after the compulsory level

6 What change do you expect with the 9-year schooling after the compulsory level (Grade 9)?

7 What resources are used? Are the resources adequate at MIE for teacher training?

8 Are the resources adequate for the teaching of science in schools?

9 How is the teacher training in STEM evolving with the introduction of the 9-year schooling?

10 Has MIE any role/influence/contribution in the Cambridge examinations at O-Level & A-Level?

11 Has any studies been conducted by MIE in the teaching & learning of STEM?

12 What is the timeline and major milestone in the implementation of new curriculum in STEM?

13 Do you have any other comments on the post-16 STEM Curriculum?

Thank you

Dr J. Naugah & Dr A.K Maulloo, Rajiv Gandhi Science Centre

Send me a copy of my responses.

Appendix 1f

Summary of responses received from MIE

Role of MIE in the preparation of STEM curriculum at all levels (Grades 1 to 9)

The statements of some respondents with respect to the role of MIE in the preparation of STEM curriculum are given in Table 11.

Table 11: Role of MIE in STEM Curriculum

Respondent 1	To design, prepare contents, etc
Respondent 2	MIE has a leading role in preparing STEM curriculum at lower secondary levels (grade 7-9) though STEM is not addressed in depth in the curriculum at this level. The process starts with in the relevant departments, and organize subsequent consultations with relevant stakeholders (educators, Ministry of Education officials and representatives from government and non-governmental organisations. It should be noted that there is a lack of proper communication among the subject areas at MIE related to STEM while preparing the curriculum. So, this favours a compartmentalisation in developing curriculum thus impacting on STEM as a holistic learning area.
Respondent 3	MIE has the pivotal role in the preparation of STEM curriculum materials for grades 3 to 7 presently; grades 1 and 2 having elements of science integrated in the materials; for grades 8 and 9 no final decision has been taken yet.
Respondent 4	Right at the inception of the preparation of the National Curriculum Framework, MIE ensures that scientific, mathematical, engineering, technological concepts are infused in the development of the NCF from grades 1-9. At the MIE, for PGCE /B.Ed/Teacher's Diploma courses, lecturers servicing the modules ensure that concepts related to STEM and related to the subject are integrated within section related to the pedagogical content knowledge.

Role of MIE in the preparation of the STEM curriculum from Grades 10 to 13

The response is unanimous as stated by this respondent:

“At this level, MIE’s role is limited to attending meetings organised by the MES who is the liaising institution with CIE-UK. Staff who has the expertise in STEM provide their views and comments to already established syllabi from CIE. We also attend workshops organised jointly by MES and CIE.”

Role of MIE in the delivery of the STEM Curriculum at SC and HSC levels

To the question about the role of MIE in the delivery of STEM curriculum at SC and HSC, statements of some respondents are given in Table 12.

Table 12: Role of MIE in delivery of SC & HSC curricula

Respondent 1	Aspects of the SC and HSC curriculum are included in our Teacher Education programme including its teaching and learning.
Respondent 2	MIE's role in the delivery of STEM curriculum is for teacher education. Through our PGCE and B.Ed courses, we have modules which are STEM compliant and thus our educators get an exposure to the content and to the pedagogy underlying the concepts related to STEM.
Respondent 3	Many educators have been trained by the MIE regarding how STEM curriculum should be implemented at SC and HSC levels. Many educators are still to be trained as it is a matter of choice from the educator whether s/he wishes to be trained, unlike the primary sector.
Respondent 4	Some resource persons from MIE form part of the subject Advisory Committee at the MES for the review of the syllabus at SC/HSC level.

Changes in the pedagogy of the science curriculum to encourage students to take up science after the compulsory level.

With regards to the changes in the pedagogy of the science curriculum to encourage students to take up science, a sample of the results is given in Table 13.

Table 13: Changes in pedagogy

Respondent 1	More activity-based for Design and Technology
Respondent 2	Two main and significant changes have been brought: one related to the contextualisation of the science concepts and second is about promoting inquiry skills.
Respondent 3	Under the nine-year continuous basic education, new NCF, new Teaching & Learning Skills and new curriculum materials have been prepared. We are also having innovations in teacher education programmes and moreover assessment of science at PSAC level has incorporated the innovations brought in the NCF and the curriculum materials to include Inquiry. So, changes are already on and we need to be more vigilant as to curriculum implementation at classroom level.

Change that is expected with the Nine Year Schooling after the compulsory level (Grade 9)

The responses to the question as to whether change is expected with the NYS have been favourable as shown in Table 14.

Table 14: Expected change with NYS

Respondent 1	Increase in the uptake of male and female students for Design and Technology
Respondent 2	The changes brought at grade 7-9 will certainly influence the choice of subjects among students at post grade 9 level (compulsory level)
Respondent 3	It is expected that after the compulsory level, more pupils will be motivated to learn science and benefit from it. The only hindrance may be the limited time allocated for science at primary and secondary levels ie, grades 1 to 9.
Respondent 4	An adolescent would be in a better position to cope with the challenges of everyday living in a modern society. Food and Textile studies would be offered to all students, irrespective of their gender, thus empowering them to become active and informed members of the society.

Resources used and their adequacy for teacher training at MIE

There was a mixed feeling with regards to the question of resources at MIE (Table 15).

Table 15: Resources at MIE

Respondent 1	Not adequate - Need for new and more up-to-date tools and equipment and staff.
Respondent 2	We make use of a lot of downloadable resources from the Internet. Teaching and learning in STEM requires resources which sometimes is a challenge because of their cost, availability and accessibility. So using e-resources is the only means to overcome this constraint.
Respondent 3	In terms of resources, many innovations have been brought, eg, the Sankoré suite, e-learning materials prepared by MIE, e-books, pupils' as well as teachers' books with additional notes for teachers and answers to all questions asked, training workshops for all new materials introduced. With all these resources curriculum implementation is expected to be better than before.
Respondent 4	Resources are available for training, but these can be reinforced in terms of Internet access in classrooms, rapid laptops,

	powerful projectors in all classes, latest software like mind-mappers installed, Powerful smartphones connected to projectors for easy curriculum implementation, mobile mouse and keyboards in classrooms connected to tutor laptops, etc.
Respondent 5	For the time being, resources used are reference textbooks available in the MIE library, online resources, Google books.

Adequacy of resources for the teaching of science in schools

To this question, there is a general opinion that: resources are not adequate; maintenance and replacement of old equipment required; and even a proposal for a modality/package for students opting for technology-based subjects.

How is the teacher training in STEM evolving with the introduction of the 9-year schooling?

To the question of training of educators, Table 16 summarises the responses of the respondents.

Table 16: Educator training

Respondent 1	For the science modules, a lot of emphasis is put on "how to enable learners develop inquiry skills". Also, the integrated approach using relevant themes are also being adopted.
Respondent 2	Training workshops have been organised for Inspectors and Head Masters so that they in turn drive the change in their schools. Trainee educators are being trained for implementation of the new curriculum, using innovative resources and techniques such as role play, field trips, project based learning, mind mapping and so on.
Respondent 3	Workshops/seminars have to be carried out to provide continuous professional development to educators.

Has MIE any role/influence/contribution in the Cambridge examinations at SC/HSC?

As mentioned earlier, MIE has a limited role and influence on the SC/HSC level. Some responses are given in Table 17.

Table 17: Role of MIE at SC/HSC

Respondent 1	MIE forms part of the advisory committee at MES regarding SC and HSC syllabi but we are called upon only to take note of the changes that CIE has brought in the syllabi and then to train educators accordingly. There should have been intensive debates on what should be taught and to what extent we can teach a concept, we should have been given the freedom to remove certain sections and reinforce others based on the current trends, but this does not take place.
Respondent 2	Previously for SC & HSC level, both for Food Studies and Design

	& Textiles, lecturers were involved in the monitoring process concerning students' work in progress. However, this last year and this year, we are currently not involved as at date.
--	---

What is the timeline and major milestones in the implementation of new curriculum in STEM?

The main responses concerning the implementation timeline for the new STEM curriculum are:

Response 1: "Since 2015, there is a new NCF for primary and 2017 has seen a new NCF for lower secondary (Grades 7-9). New curriculum materials are already in schools, others are under preparation, training of educators is on. At this trend in two years we will have fully undergone a curriculum renewal. Even assessment modes at grades 4, 5 and 6 have been reviewed and partly become modular assessment to alleviate pupils' burden. So, by 2018 many changes would have been brought."

Response 2: "The time line and major milestone is decided at Ministry level in consultation with the Director of the MIE. Right now, the work on the Curriculum writing of materials has started. Training of educators would most probably start around August/September 2017."

Do you have any other comments on the post-16 STEM Curriculum?

General comments about the post-16 STEM curriculum is summarised in table 18.

Table 18: General comments on post-16 curriculum

Respondent 1	Need to be more industry oriented in line with new development and progress in industry
Respondent 2	We should not only make our curriculum at this level more STEM compliant as we are all convinced by its importance. We should at the same time review CIE assessment practices so as to include project based assessment.
Respondent 3	Our students have very limited view of STEM. Efforts from the MIE, Ministry of Education, RGSC, Universities are doing a lot to improve the current situation, however, very few students are taking science and technology for higher studies. Maybe students as from SC and HSC should be given work-based experience to see how science takes shape in the world outside school. Even grade 9 students should be exposed to the real science so as to change their perception on STEM.

Appendix 1g

Information from Interview at MOEHRTESR

Category	Inputs
Features of post-16 Curriculum	<ul style="list-style-type: none"> • Choice of subjects at grade 9 for SC depends on various factors • In grade 11 choice for HSC. Special conditions for those competing. More flexibility for students not competing for National Scholarship. • NYCBE removes the prevailing separateness by ensuring continuity through an extended system and the Vocational education
Policy context	<ul style="list-style-type: none"> • Unhealthy competition in the system • System was too much academic • Less emphasis on the development of the individual • Align with international trends as per UNESCO Agenda • Broad curriculum (NYCBE) with holistic approach
Science subjects and skills within the curriculum	<ul style="list-style-type: none"> • Science for All • Enterprise Education and Travel & Tourism are having high demands (grade 7 to SC). Even Physical Education is gathering momentum • Practicals for science subjects exist but the mode of delivery depends on a number of factors. Alternative to Practicals are at SC level.
Impact of broad nature of curriculum on students outcome	<ul style="list-style-type: none"> • Since the NYCBE has recently been implemented, a complete picture can be obtained after a complete cycle. • However, there will be continuous monitoring and assessment of the system to ensure quality at all levels.
Financial and practical implications of curriculum model adopted	<ul style="list-style-type: none"> • With the new reform, there is a need for more training and more educators at all levels, along with physical resources (equipment & infrastructure) • With the gain in popularity of new subjects such as Enterprise Education, Travel & Tourism, there is lack of educators and supply teachers are being trained. • The Budget for 2017/2018 for the education sector is Rs 16.6 Billion as compared to the previous year for which it was Rs 16.1 Billion. Focus is

	on the successful implementation of NYCBE
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