

Response of ASHK to the Task Force on Review of School Curriculum

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We are glad to see the Task Force on Review of School Curriculum (TF) responding to the general call for trimming down and increasing flexibility on the four Core Diploma of Secondary Education (DSE) subjects. These have taken up an undue proportion of teaching time at the expense of other elective subjects and learning activities. We are also happy to see many universities adjusting their admission requirements to increase flexibility to cater for student diversity and to offer incentives to DSE students taking Advanced Mathematics and science subjects. There are, however, places in the report that require clarifications. The following are our observations:

1. Framework for a new secondary curriculum

The overarching aim of the TF report is to foster students' whole-person development, and the emphases on value education, creating space and catering for learner diversity, and applied learning, are laudable. The vision of breadth and depth of knowledge and the balance of broad-based science and humanities education, which were clearly spelled out in the last education reform (implemented since 2000), are unfortunately missing in this report. We believe such a vision should remain as the guiding principle behind the present TF underlying the changes beyond those recommended items. We suggest that the TF should delineate a clear framework of what it views as essential education for a secondary school student, in addition to the generic skills but also the knowledge required for his/her transition towards post-secondary education and/or vocation training.

It is generally agreed that the current Core subjects are lopsided towards the development of literacy and social aspect of education while severely lacking in promoting science and mathematics education. In an era of science and technology prominence, this can hardly serve the need for Hong Kong to survive the fierce competition globally, despite the fact that our youngsters up to junior secondary levels are ranked in the top echelon of the science and mathematics subject league tables in the world.

In 2016, the Hong Kong Academy of Sciences published a report entitled "*Science, Technology and Mathematics Education in the Development of the Innovation and Technology Ecosystem in Hong Kong*" (the ASHK report), which highlights the rising importance of innovation and technology in the development strategies of many countries and the increasing penetration of digital and other technologies into our daily lives. It argues that engaging students in various science and mathematics disciplines, fostering critical thinking to approach scientific and non-scientific matters and cultivating science and technology literacy are essential to ensure an adequate supply of school leavers and graduates. These are important if the government is to transform Hong Kong into a knowledge-based economy.

2. Mathematics education

While science and mathematics education may be partly fulfilled by so-called STEM education (see below), the TF should acknowledge and address the problem of low enrolment of DSE students in Advanced Mathematics, which constitutes the foundation of many science and technology subjects. By highlighting that taking the Foundational part of Core Mathematics is enough to earn Level 4 grade, the TF signals that taking less mathematics is good enough for a subset of students. It is important, however, for the TF to provide corresponding incentives for students to take Advanced Mathematics.

Specifically, the TF should consider giving Advanced Mathematics a separate subject status, either in the Core or in the Electives. The lack of proper recognition has probably contributed to the low enrolment of Advanced Mathematics, which dropped from 25% in 2012 to 14% in 2016-18 and is much lower than our regional peers including Singapore, Japan, Korea and Taiwan (40-80%). It is of interest to note that the enrolment rate of Advanced Mathematics is much lower than that of Physics, Chemistry and Biology, which all require Advanced Mathematics, especially Calculus, in further studies. This creates problems of articulation with higher education studies or pursuit of career in engineering and technology development. As observed in the ASHK report, the university admission offices have noted the decline of students' science and mathematics preparation when applying to engineering and science programmes and that the teaching of such specialty subjects has become increasingly difficult. In other words, the current DSE is seriously jeopardising the science and technology development of our city and the literacy advancement of our society.

Nonetheless, we applaud the actions of universities in providing due recognition and incentives to students taking Advanced Mathematics. Over the past two years, an increasing number of universities, individual faculties and departments recognise the two half modules of Advanced Mathematics (Module 1 and Module 2) as separate Electives in their admission and either make specific demand or offer extra incentives to students taking them. We therefore call upon secondary schools to make necessary adjustments to their teaching hours and classes on Mathematics to ensure adequate time is accorded to Advanced Mathematics students during regular school hours. One way to do so is to stream the Mathematics students into those who take Core Mathematics and those taking Core-plus-Advanced-Mathematics into different groups and allocate different teaching time to different modules according to the needs of the students.

3. Elective subjects

We observe a general narrowing of knowledge of DSE students, with more than 80% of the last cohort taking only two or fewer electives. This is much worse than students of the old HKCEE system or that of our counterparts in many parts of the world, who take three or more electives other than languages and Mathematics and does not dovetail with the increasingly complex world that requires multi-dimensional and multi-disciplinary skills and knowledge for problem solving. We are concerned that, without addressing the major reasons behind the

strong focus of schools and students on the Core subjects, i.e., the university general entrance system, the Best-5 criteria of most university faculties in admission score calculation, the general social expectation and intense competition for university seats, etc., the Core subject bias will likely remain unless students are directed or encouraged to take more electives. Indeed, the original DSE design advocates four Core subjects and three Electives.

While we understand that students have diverse interests and aptitudes, and some may not be keen to pursue an academic pathway, a broad knowledge base, including that of Applied Learning, is needed not only for the pursuit of higher education but also for vocational training. More importantly, a broadening of knowledge is beneficial not only for science-oriented, but also for arts-oriented students.

We therefore recommend the TF should explicitly encourage students to take more Elective subjects, now that more time and space can be freed from the Core subjects. As some university departments have already started using six-subjects to calculate admission scores, we suggest others to follow the trend to give incentives to students taking more Electives to acquire a broader foundation of knowledge.

4. STEM education

While advocating the importance of science and mathematics education, we agree that the EDB may facilitate schools' planning and implementation of STEM education but it should not provide in any form a learning framework or curriculum guides. As we understand it, the EDB has already explained in its original design that STEM education is promoted through the Science, Technology and Mathematics Education Key Learning Areas (KLAs) in primary and secondary schools. Time table and key milestones have also been laid out.

We note that many schools have initiated STEM education and extracurricular activities through provisions of experiential learning opportunities for students, such as STEM laboratories, science fairs and robotic competitions, which we classify as general STEM activities. We also note that there are many serious science and mathematics competitions, such as the Olympiads, Hang Lung Mathematics Award, Yau Prize, etc. We agree that such activities are good ways to uncover and elevate students' interests in pursuing scientific and engineering studies in the future and we are happy to see the emergence of many interest groups and discussion forums to exchange ideas and experiences in promoting STEM. We strongly support such activities. We would like to caution, however, that the general STEM activities are only a means to an end. Science and mathematics education are built on layers of fundamental knowledge that require incremental assembly of principles and concepts. Proper science and mathematics education should not be replaced by general STEM activities.

Therefore, we strongly recommend that the EDB approaches the needs of science and mathematics education by providing students with adequate learning opportunities (through freeing up the study hours for the Core subjects) and instilling the concept of interdisciplinary knowledge integration and application through extra-curricular activities.

5. Standardised education requirements

The TF recommends the universities should maintain the General Entrance Requirements (GER) of 3322 in the Core subjects as the basic requirement for university admissions in principle yet encourages universities to exercise greater flexibility in admitting students who demonstrate talents and competencies through other means despite not fully meeting the GER.

We read the two recommendations above with great interest. The TF argues that full relaxation of GER might convey a wrong message to society and the international community that Hong Kong is compromising on the academic rigour of secondary education and abilities of students. It is unclear, however, how GER would inform the public about the quality of school education in Hong Kong. As all students would receive their own DSE assessment based on standard referencing, it would be the overall performance of the student cohorts that reflect the quality of Hong Kong's education system. We would therefore recommend that the TF refrains from recommending any GER while the school curriculum is being reviewed (and presumably reformed). We are not recommending the removal of the four Core subjects from the DSE, however – all students would still have to take examinations of the four subjects. It is the responsibility of universities to set proper admission standards in student recruitment, with due considerations of individual student's interests, DSE achievement and other relevant criteria, for each of their academic programmes in a fair and open manner.

We have noted in the ASHK report that, although there is no 'passing' threshold for the DSE as originally designed, the introduction of GER has unintentionally created a new measurement of success, which is unattainable to most school leavers. If the TF wishes to provide a strong signal to encourage our young people, it should consider proper recognition of students who have attained adequate senior secondary education, instead of maintaining the current GER.

Concluding remarks

In our observation, the TF has taken a horizontal approach to look at curriculum reform, in that the Consultation Document addresses students' whole-person development, value education, creating space and catering for learner diversity, and applied learning opportunities. We believe that the TF should provide more vision and recommendations in the vertical dimension, i.e., addressing the quality as well as the depth and breadth of students' learning experiences. Further, we believe that the detailed design of syllabi and examinations are the crux of any education reform. Therefore, while refining the school curriculum and education frameworks, we urge the EDB to make sure that the subject design teams and the examination authority are fully in sync before the final recommendations are implemented.

We would be happy to elaborate or provide further comments as necessary.

