Chapter 7

Summary of Recommendations

7.1 This chapter summarizes our recommendations made in the previous chapters. They are grouped into the following categories:

Chapter 4	Direction of Changes
Chapter 5	The Anticipated Mathematics Curriculum
Chapter 6	Implementation Strategies

Direction of Changes

7.2 Mathematics should be treated as an intellectual endeavour and a mode of thinking rather than a tool.
(paragraph 4.8)

7.3 The curriculum content of the primary and secondary mathematics curricula should be developed to materialize the aims of the curricula. Explicit statements for various aspects of the specific aims at the sixth form level and in each subject should be developed with reference to those aims of the primary and secondary mathematics curricula.
(paragraph 4.10)

The Anticipated Mathematics Curriculum

7.4 The mathematics curriculum should be designed according to a set of content-based learning dimensions so that learning objectives and students' progress can be structured and represented systematically from primary through secondary levels. However, it is not necessary to extend the use of dimensions in designing sixth form mathematics curriculum.
(paragraph 5.4)

7.5 The mathematics curriculum should be designed in such a way that mathematics learning progresses from concrete to abstract. The content in the mathematics curriculum should be arranged to let students get adequate prior experience with concrete objects before the formal treatment of mathematical concepts. Abstract concepts should also be backed up

by an abundance of mathematical and non-mathematical (daily-life) examples.
(paragraph 5.5)

7.6 HOTs should be incorporated into the content-based learning dimensions in designing the future mathematics curriculum.
(paragraph 5.6)

7.7 Teachers should be aware of those mathematical learning experiences, like social mathematics, mathematics appreciation, history of mathematics, which are not easily defined within the framework.
(paragraph 5.7)

7.8 Different levels should be considered as a continuous learning process. Objectives across various levels should be coherent and allow the development of mathematical concepts from concrete to abstract. The learning objectives and students' progress should be structured and systematically represented within and across levels.
(paragraph 5.14)

7.9 The acquisition of process abilities should be allied with the learning of mathematical content. Topics in the mathematics curriculum should be arranged into progressive learning dimensions so that students' cognitive development in mathematics can be enhanced in a more coordinated way and the relevance of students ensured.
(paragraph 5.15)

7.10 The mathematics curriculum should be developed as a whole, but it should be duly adjusted across different levels of learning to cater for the different abilities of students. Teaching too many topics in a single year and making learning fragmented should be avoided. Some measures like organizing bridging programmes should be taken to ensure that students of different abilities can follow. In the curriculum development process, a flow chart indicating the inter-relation of topics of different mathematics curricula at different levels is recommended to ensure continuity.
(paragraph 5.16)

7.11 Teaching strategies should be progressively changed through different levels of schooling, say from concrete to abstract, so as to cope with students' development. Teaching at P.1 should selectively adopt a thematic approach. Investigational work is encouraged at all the primary levels and should be continued in secondary schools.
(paragraph 5.17)

7.12 Teachers at different levels should be well informed on what is going on at the others. Measures should be taken to reinforce interflow between primary and secondary mathematics teachers.
(paragraph 5.18)

7.13 Children at the pre-primary level should not be formally assessed and no prerequisite academic knowledge should be expected of them on their admission to P.1. Heuristic methods of teaching should be adopted to help children foster an interest in learning mathematics and develop an inquiry mind. Thematic approach with integrated activities of learning should be used for the purpose of flexible curriculum integration.
(paragraph 5.22)

7.14 Mathematical concepts should be introduced according to the developmental stages of children, their interests and needs, by using simple language, and through learning activities which involve manipulation of objects and relate to children's experience.
(paragraph 5.23)

7.15 Children should be given the opportunities to explore, discover and develop mathematical ideas. Importance should be given to the process of learning mathematics rather than the outcomes of the activities. Flexibility should be allowed in planning teaching programmes and designing learning activities to cater for the learner differences, and incidental teaching should be adopted.
(paragraph 5.24)

7.16 Mathematical jargons like statistics, sum and difference, etc. which are beyond children's understanding should not be used. Over-teaching, premature exposure to mathematical knowledge and abstract concepts should be avoided as they may hamper children's development of learning mathematics.
(paragraph 5.25)

7.17 We do not agree to have curriculum differentiation in the years of general education. Instead, mathematics should be a subject studied by all students. To cater for the needs of different students at the upper end of the secondary schooling, the mathematics curriculum should be re-structured. A number of subjects, which may come from different combinations of modules and papers, should be designed for students who aim to further their studies in the mathematics related fields. Streaming students at an early age should be

avoided and opportunities for taking mathematics at the senior levels should be allowed for all students.
(paragraphs 5.29 – 5.31)

Implementation Strategies

7.18 We suggest the CDC Committee on Mathematics Education to consider our recommendations during the review of the Primary Mathematics Syllabus. At the same time, the content of the Secondary Mathematics Syllabus can be re-adjusted, if deemed necessary.
(paragraph 6.9)

7.19 The possibilities of setting minimal competence for mathematics at various stages of schooling should be explored.
(paragraph 6.15)

7.20 Assessment for high-stake purposes (such as placement and selection) should be played down to reduce over-drilling to students and minimize interruption to normal teaching and learning in schools. Assessment should be used as a means to collect feedback from students to improve teaching and learning.
(paragraph 6.16)

7.21 The needs of students at both ends of the ability scale are equally important. Attention should not be placed only on academically lower achievers. The needs of the more able students should also be catered for. More resources should be provided to strengthen the existing institution for the gifted and those related mathematics activities. However, means should be taken to prevent labeling effect.
(paragraph 6.18)

7.22 The mathematics curriculum should be flexible enough to cater for a wide spectrum of abilities of students. Measures, such as identifying the foundation and non-foundation components, allocating spare time periods, facilitating curriculum adaptation, can also be considered.
(paragraphs 6.22 and 6.24)

7.23 As learning content and objectives in secondary mathematics curriculum are arranged in terms of key stages instead of levels, teachers can judge for themselves their own sequences of learning units by basing on the needs of their students.
(paragraph 6.25)

7.24 According to the needs, interests and abilities of students, schools can adopt organizational arrangements, such as ability grouping, as well as instructional and curricular arrangements (such as remedial teaching, integrated learning and enrichment activities), in catering for learner differences.
(paragraph 6.27)

7.25 Mathematics-related activities like mathematics clubs, quizzes, competitions, games, projects and workshops are good means both to cultivate the interest of students and to provide students with learning experiences through informal curriculum.
(paragraph 6.28)

7.26 Active and purposeful learning activities, such as project work, worksheets, graded and optional class exercises, suggested leisure reading, that allows individualized ways in the construction of knowledge and appropriate use of IT provide teachers with ways to cater for learner differences.
(paragraph 6.29)

7.27 Relevant and realistic contextual tasks should be carefully selected for students. Teaching strategies should be well-organized to provide a learner-centred situation to match the capabilities of students.
(paragraph 6.31)

7.28 More emphasis should be laid on the assessment of minimal competence. Testing of unnecessarily complicated problems should be de-emphasized. A wide range of assessment activities is recommended for getting adequate information to organize students' learning experiences.
(paragraphs 6.32 and 6.33)

7.29 It is desirable to have subject specialists to teach mathematics to students at the upper primary level or above. The primary mathematics teacher should preferably possess a BEd degree majoring in mathematics and the secondary mathematics teacher should be one with a strong mathematical background and suitable teacher training. An ideal qualification for a mathematics teacher, in the long-run, is a bachelor's degree in mathematics or related discipline together with PGDE or PGCE.
(paragraph 6.40)

7.30 Collegiate exchange among mathematics teachers both within schools and in the mathematics education circle should be encouraged.
(paragraph 6.41)

7.31 We propose the CDC Committee on Mathematics Education to further explore the uses of IT tools in teaching and learning mathematics at their particular level and subject(s).
(paragraph 6.44)

7.32 Extensive use of IT tools may lead to de-emphasing of skills and trimming down of technicality. Therefore, mathematics should be taught in its own right and with its own educational objectives for the information age.
(paragraph 6.45)

7.33 We realize that IT should be cautiously used in classrooms and such messages and examples should be conveyed to mathematics teachers during teacher training sessions. Teachers should also act professionally towards choosing the most appropriate educational technology to benefit their students.
(paragraph 6.46)

7.34 The IT education planners, curriculum developers and school administrators should be fully aware of the consequences of the influence of mis-use of IT and should address these issues tactfully in designing territory-wide implementation strategies and school-based plans:

- IT competency among mathematics teachers
- IT proficiency of students at various level of schooling
- Teachers' knowledge and skills on strategies of using IT in classrooms
- Need for quality educational software and mathematics software tools
- Equity of access to IT equipment
- Level of technical and curriculum support within schools

(paragraph 6.47)

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