

Chapter 3

Findings of the Research Studies

3.1 We proposed to conduct two supportive research studies to collect information about mathematics curriculum of other countries/regions and study different sectors' views on mathematics education in primary and secondary schools of HK. The two studies were respectively commissioned to HKU and CUHK in 1998. The final reports were submitted in mid-1999. The summaries of the two research studies are as follows:

Research 1 – Comparative Studies of the Mathematics Curricula of Major Asian and Western Countries

3.2 The team members of the research study include Dr. Leung Koon-Shing, Frederick, HKU (principal investigator); Dr. Lam Chi-Chung, CUHK; Dr. Mok Ah-Chee, Ida, HKU; Mr. Wong Ka-Ming, CUHK and Dr. Wong Ngai-Ying, CUHK. The study consists of three components: a literature review, an analysis of curriculum documents, and a summary of the HK results in the TIMSS. The literature review includes the topics of student's perception of mathematics and mathematics learning, student's cognitive style and performance, goals of mathematics education, world trend of the mathematics curriculum, the anticipated change in the mathematics curriculum, etc.

3.3 33 curriculum documents from HK and 7 other countries were compared and the TIMSS Curriculum Analysis data were analyzed. It was found that:

- (a) The revised Secondary Mathematics Syllabus (1999) in HK is generally in line with the worldwide trends.
- (b) The HK mathematics curriculum attempts to strike a balance between process abilities (which are very much emphasized in the West) and basic skills and content (which are stressed in Asian countries).
- (c) In HK, the introduction of topics into the curriculum is on average 2 years earlier than the international average.
- (d) The textbooks in HK focus much of their attention on students' performance of "knowing" and "using routine procedures".
- (e) A "canonical" curriculum is usually stipulated by the governments in Asian countries which is followed closely in schools.
- (f) East Asian countries put a lot of emphasis on textbooks; on the contrary, western

countries are more flexible in their use of textbooks.

- (g) Tracking for mathematics teaching is common, and there are various ways of implementing tracking in different countries.
- (h) HK is probably the place with the least flexibility and choice in its mathematics curriculum.

3.4 The results of TIMSS, which are relevant to the theme of the study, are also summarized:

- (a) HK students came fourth both in the 26 countries in grade four and the 41 countries in grade eight. They performed very well in routine problem solving but not so well at solving exploratory problems, and significantly worse in the TIMSS Performance Assessment where students were required to conduct some hands-on activities.
- (b) Students in HK, like their counterparts in the rest of the TIMSS countries, found mathematics important, but they did not particularly like mathematics.
- (c) Contrary to the common belief that students in East Asian countries attribute success more to hard work than to natural talent or ability, and that they attach a lot of importance to memorization, the TIMSS results indicate that students do not totally support these stereotypes. Teachers in HK however did not tend to believe in natural talent.
- (d) Students in HK did not think that they did well in mathematics and in general, girls had a lower perception of their ability than boys.
- (e) Compared to their counterparts elsewhere, HK students spent more out of school time doing mathematics homework, studying mathematics or attending extra mathematics lessons, especially at the primary school level.

3.5 The results show that HK students did extremely well in the TIMSS mathematics tests, but some students did not display the corresponding level of positive attitudes towards mathematics and some lacked confidence in doing mathematics. This may be a result of the Chinese culture stressing modesty, but it may also well be a result of the competitive examination system and a culture of lack of encouragement on the part of the teachers.

3.6 Readers can refer to Appendix 1 for the executive summary and the web site www.cdccdi.hk.linkage.net/cdi/math/index.htm for the full report of the research.

Research 2 – An Analysis of the Views of Various Sectors on the Mathematics Curriculum

3.7 The team members of the research study include Dr. Wong Ngai-Ying (principal

investigator), CUHK; Dr. Lam Chi-Chung, CUHK; Dr. Leung Koon-Shing, Frederick, HKU; Dr. Mok Ah-Chee, Ida, HKU and Mr. Wong Ka-Ming, CUHK. During the research period, surveys (with questionnaires and interviews) were conducted on students, parents, teachers, university lecturers, curriculum planners and human resources personnel in the commercial sector to collect their views on the mathematics curriculum of HK.

3.8 The following gives a summary of the findings of the surveys. Readers can refer to Appendix 2 for a more detailed executive summary or the web site www.cdccdi.hk.linkage.net/cdi/math/index.htm for the full report of the research.

- (a) Both students and parents showed high regard on mathematics.
- (b) Different stakeholders held a positive view on the mathematics curriculum.
- (c) Mathematics education should address a wider objective. HOTS should be addressed and teaching should provoke student thinking.
- (d) The interest of students has to be maintained.
- (e) The curriculum should be re-designed with epistemological and pedagogical considerations so as to strengthen thinking and conceptual understanding.
- (f) The problem of learner differences has to be addressed including curriculum differentiation at senior secondary level.
- (g) The idea of core and extended curriculum is worth further exploration.
- (h) Continuation at all levels should also be secured. Teachers at various learning stages should have knowledge of the curriculum of other learning stages.
- (i) Assessment and examination pressure should be carefully handled.
- (j) The teacher is the key person to curriculum reform and he/she needs guidance and support on various issues including use of IT, enhancement of process abilities and curriculum tailoring.
- (k) Pre-service and in-service teacher education should be strengthened.
- (l) Collegiate exchange in the circle should be promoted.
- (m) Different stakeholders should be well informed of the future curriculum changes to gain the supports.
- (n) The workload of teachers should be carefully considered.