

## **2. RESULTS FROM RESEARCH 1**

### **2.1. Introduction**

Results from Research 1 were incorporated into the present study. Here, we give a summary of the TIMSS findings, analyses of examiners' reports of public mathematics examinations in Hong Kong and a review of some 100 research papers and articles on the current state of mathematics education, both locally and worldwide. Please refer to the report of Research 1 for details.

### **2.2. Summary of results**

#### *2.2.1. Curriculum trends*

In the era of universal education, a major concern of curriculum developers is how to maintain flexibility in a curriculum in order to cater for individual differences of students. Curriculum differentiation is one of the means. At the curriculum structure level, a number of models were proposed and at the implemented curriculum level, an individualised learning model was also proposed by Leou (1998). Mathematics education should also serve an expanding goal rather than aiming simply for acquisition of mathematical knowledge and skills. Higher order thinking should be addressed and cultural aspects of mathematics should not be overlooked.

Recent literature points out that there is no dichotomy between conceptual understanding and acquisition of basic skills. Basic skills form the foundation for the enhancement of higher order abilities and their utilisation. It was pointed out that the excellent academic performance of Chinese learners is due to the synthesis of memorising and understanding which is uncommon in the West and that repetitive learning is different from rote learning.

#### *2.2.2. Students' attitudes*

Hong Kong students in general have high regard for mathematics. This is further enhanced by the high value placed on constant practice and painstaking effort on the part of students which are significant features of Chinese culture. While students think that understanding is important in learning mathematics, getting the correct answers quickly is deemed even more important. Students hope for a lively approach in teaching and they value a teacher who shows concern for the students.

### *2.2.3. Students' mathematics performance*

Hong Kong students, together with those from other East Asian countries, perform exceptionally well in international mathematics studies. Examiners' reports in Hong Kong public examinations reveal that the major problems for students of the territory are their inadequacies in tackling problems and in their mental processes, rather than a lack of skills or basic knowledge.

### *2.2.4. Classroom practice*

Students spend over one-third of their homework time on mathematics homework, though the time spent has low correlation with their mathematics achievement. Classroom lecturing is the most common mode of instruction. The emphasis on examination reinforces learning by rote.

### *2.2.5. Issues concerning the Hong Kong mathematics curriculum*

Continuity and consistency throughout the primary and secondary levels of the mathematics curricula is another issue of concern. In particular, the curriculum structure at the senior secondary level needs urgent attention. The role of information technology should also be considered. Fung & Wong (1997) proposed a framework for designing the mathematics curriculum from an epistemological perspective.

### *2.2.6. Hong Kong's mathematics education in the wider world*

The TIMSS results reflected that despite having the highest population density among all 41 countries of the study, Hong Kong has the lowest investment in basic education. It is among the countries with the largest class size and the least experienced mathematics teachers. Its education system is the most centralised. It outperformed most of the other countries, coming fourth behind Singapore, Japan and Korea. However, Hong Kong students do not show exceptional interest in mathematics despite their high regard for it. What is of the greatest concern is that Hong Kong students in general do not have much confidence in doing mathematics.

### *2.2.7. The importance of the teacher*

The teacher is the key figure in student learning, especially for young students. The teacher's personality is a decisive factor of the students' liking of the subject. The teacher's professionalism and development is at the heart of any curriculum reform and implementation. The Japanese experience of "lesson study group" is certainly worth exploring.

### **2.3. Issues of major concern**

How to deal with individual differences and mixed abilities among students is one of the major problems of universal education, and so flexibility of the curriculum is called for. The mathematics curriculum is no exception. It should aim for expanding goals. A list of important considerations would include incorporation of higher order abilities and cultural features in the future mathematics curriculum, giving due consideration to both mathematical skills (content) and the process of learning (ability), as well as to the use of technology in mathematics teaching. Careful consideration should be given to examination orientations. Of paramount importance is the promotion of student interest in and understanding of the subject. At the very centre of the process of curriculum reform is the role of the teacher; after all, it is s/he who holds the key to successful curriculum implementation. All these major issues were taken into consideration in the design of this present research project.

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