1. Introduction

1.1 Background

In July 1997, an ad hoc committee (the Committee) was set up under the Curriculum Development Council to conduct a holistic review of the mathematics curriculum in Hong Kong. In 1998, at the request of the Committee, the Education Department commissioned two research studies to provide inputs to the Committee in its work of reviewing the mathematics curriculum. This report recounts the first of the two commissioned research studies.

1.2 Research Questions

The research questions for the present study, as stipulated in tender documents from the Education Department, are as follows:

1.2.1 To study the mathematics curriculum of the major Asian and Western countries with reference to their:

1.2.1.1 curriculum documents including aims and objectives, content and depth of treatment of each domain, modes of courses;
1.2.1.2 modes of assessment (both internal and external);
1.2.1.3 implemented curriculum including scale of implementation, problems encountered and actual effort paid by their students in studying mathematics; and
1.2.1.4 strength and weaknesses of students in each country.

1.2.2 To analyze the current mathematics curriculum in Hong Kong in comparison with and in contrast to overseas curricula in terms of:

1.2.2.1 aims and objectives;
1.2.2.2 modes of courses;
1.2.2.3 content and depth of treatment of learning areas (both described in the document and in real practice);
1.2.2.4 modes of assessment (both internal and external); and
1.2.2.5 strength and weaknesses of local students in mathematics.

1.2.3 To make recommendations on the:

1.2.3.1 aims and objectives of the future mathematics curriculum;
1.2.3.2 modes of courses;
1.2.3.3 modes of assessment (both internal and external); and
1.2.3.4 learning areas that need to pay more attention and learning areas that need to pay less attention.

1.3 Relation with the Other Research Study

As mentioned above, this is one of two related research projects commissioned by the Education Department on the mathematics curriculum. The other project is headed by Dr. N.Y. Wong of the Chinese University of Hong Kong on the attitudes of stake holders on the mathematics curriculum. Although the two are commissioned as separate projects, they are very much related to each other. Actually, the two projects were planned together as a coherent whole and so should be seen as two parts of a larger project, and the findings of the two projects should complement each other. In particular, the literature review presented in Part 2 below is not only essential in placing the comparison of curriculum in this present study into context, but also serves as the basis for constructing the questionnaires in the other research project. Also, the recommendations to be made on the mathematics curriculum in Hong Kong (research question 1.2.3 above) will appear in the report for the other research study only, as the recommendations are made on the basis of the findings of both studies.

1.4 Structure of this Report

The present report is divided into 4 parts. Following this first introductory part, the first part is a literature review on the current state of mathematics education in Hong Kong and beyond. It is essential that a comparison of the curriculum (and the design of questionnaires) is based on research that educators in the field have already done, so that we do not unnecessarily repeat what others have done and that we can build our study on the findings of other researchers. The literature includes international and local publications. For the latter, we have included, as an appendix, an analysis of the examiners reports of past Hong Kong Certificate of Education (HKCE) and Advanced Level (AL) examinations. This provides valuable information on the strengths and weaknesses of Hong Kong students, and is important background information for both this comparative study (in particular, the answer to research question 1.2.2.5) and the attitude study.

The third part attempts to address the rest of the research questions. Based on more than 30 curriculum documents, the aim and objectives, the contents, and the modes of implementation (particularly the tracking or streaming of students) of the mathematics curricula in different countries are compared.

In part 4, some of the relevant results of the Third International Mathematics and Science Study (TIMSS) are summarized. This part is a response primarily to research questions in 1.2.1. In a sense, this research question has already been addressed to some extent in part 3, but since TIMSS is a very important study in which Hong Kong has participated, it is worth summarizing some of its findings which are relevant to the theme of the present study. In addition to student achievement, we will also look at the attitudes of students towards mathematics and mathematics teaching and learning.