A Survey of Computer Assisted Learning software for Hong Kong Primary Mathematics *

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1. INTRODUCTION

With the fast advancement and development of Information Technology (IT) in this decade, the demand for teacher's competence in using computer as a teaching tool and instructional aids has become a professional goal (Vosniadou, et al., 1996; Paul & Mynga, 1995).   There are a variety number of ways a mathematics teacher can make use of computer for enhancing teaching and improving learning effectiveness, for example:

  ✧   the use of presentation software such as PowerPoint to present teaching materials in classrooms;
  ✧   the use of spreadsheet to nourish mathematics skills; and
  ✧   the use of authoring software such as Authorware™ or Visual BASIC™ to develop mathematics learning environment (Vosniadou, et al., 1996).

The main objective of this study is to obtain a knowledge profile of Computer Assisted Learning (CAL) software for Hong Kong primary mathematics and provide a preliminary evaluation according to the needs of the local primary mathematics teachers. In particular, we have the following questions in our mind:

  ● Is there any suitable primary mathematics CAL software available for teachers to use?
  ● Can they be used in local school environments? and

According to Neil et.al. (1993), teachers are overwhelmed by the intimidating mass of programs now available. However, among approximately 13,000 available education programs, only 7.7% of the total were reviewed as "Worthy of an 'A' grade" using their criteria for quality assurance. Teachers may have difficulties to search CAL software for use in classroom. This study tries to explore the feasibility of applying existing CAL software for local use in primary mathematics teaching and

learning. We hope our findings can be found useful to primary mathematics practitioners and educators in Hong Kong.

2. AIMS AND OBJECTIVES

This study aims to assist teachers to search CAL software and to identify what sort of tasks teachers could accomplish when using CAL software as a teaching aid. Two of the main objectives of this study are:

- ❖ to develop a concise and updated information list for accessing primary mathematics CAL software;
- ❖ to develop a database on CAL software which will be indexed according to the five dimensions and the two key stages of the TOC primary mathematics syllabus(CDC, 1995a, CDC, 1995b)

3. METHODOLOGY

The availability of CAL for primary mathematics in Hong Kong were investigated by studying the following sources:

1. catalogues provided by manufacturers in local and foreign countries such as U.S.A., U.K., Singapore and Taiwan;
2. information provided by the professional associations such as the Hong Kong Association for Mathematics Education, Hong Kong Association for Science and Mathematics Education, and Hong Kong Mathematical Society;
3. list of resources found in the Computer Resources Centre of the Education Department of Hong Kong; and
4. web-sites of the local primary schools.

The next stage of our study was to categorize the collected software with respect to the five dimensions and the two key stages of the TOC primary mathematics syllabus (CDC, 1995a, CDC, 1995b)[1].

4. RESULT

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[1] The five dimensions are numbers, measures, algebra, shape and space, and data handling. The two key stages refer to junior primary (primary 1 to 3) and senior primary (primary 4 to 6) respectively.

This section summarises the findings of our study according to the two main objectives stated in section 2 of this paper.

4.1 Sources of Primary mathematics CAL software

At the initial stage of our study, we contacted eight associations and visited the local primary school web-sites for identifying possible mathematics CAL sources. The contact points were shown in table 1 and the related web-sites were listed in table 2. Most of the CAL software available in these sources can be accessed locally and the details of the local dealers and prices can be obtained from these web sites as well.

Table 1: Related associations for identifying possible sources of CAL software

Contacted Points
American Mathematical Society
Computer Education Section, Educaiton Department of Hong Kong
Mathematics Education Section, Education Department of Hong Kong
Hong Kong Association for Mathematics Education
Hong Kong Association for Sciences and Mathematics Education
Hong Kong Education Web
Hong Kong Institute of Educational Research
Hong Kong Mathematical Society

Table 2: Web sites for mathematics CAL software

Universal Resource Locator
http://www.davd.com
http://www.10outof10.com
http://www.devinecreations.com
http://indigo.ie/~ionasoft/home.html
http://www.edmark.com
http://ww.tring.co.hk

4.2 Databases of available CAL software

The Chinese and English CAL software collected were shown in tables 3 and 4 respectively. They are categorized by topics according to the five dimensions stated in the target oriented curriculum (CDC, 1995a; CDC, 1995b). The notations P, N, M, A, S and D under the topic

column in tables 3 and 4 stands for Pre-number activities, Number, Measures, Algebra, Shape & Space and Data Handling respectively. The software designers suggested the age ranges. They were included in the tables for reference as well.

Table 3: CAL software in Chinese

Title	Origin	Language	Category	Age Range
動腦小贏家	台灣	普通話	數學遊戲	小一至小六
數學精靈 (Maths Blaster)	台灣	廣東話	N3,M1,S1	小一至小六
數學小贏家 (Maths Blaster Plus)	台灣	廣東話	N3,N4,M1	小一至小六
數學樂園 (Mathematics Fantasy Land)	香港	廣東話	N3,N6,N7,N8,A1,S1,M2,D1,D2	小六升中一

Table 4: CAL software in English

Title	Origin	Category	Age Range
Mega Math Blaster	USA	N2,N3,A1	6-12
Math Blaster Mystery - Pre-Algebra (The Great Brain Robbery)	USA	N1,N3,N4,N6	10-Adult
Alge-Blaster 3	USA	N2,N3,N6,A1	12-Adult
Out Numbered!	USA	N3	7-10
Operation Neptune	USA	N3,N4,N7	9-14
Maths Algebra	UK	N3	to 16
Maths Geometry	UK	S1	to 16
Maths Number	UK	N3,A1	to 16
Maths Statistics	UK	D1,D2	to 16
Addition and Subtraction	USA	N3	4-8
Mighty Math - Carnival Countdown	Ireland	P1,S1,N1,N2	4-8
Mighty Math - Number Heroes	Ireland	N3,N4,S1,S2,D1	8-12
Mighty Math - Calculating Crew	USA	N2,N3,N5,S1,S2	8-12
Global Maths Algebra	UK	P1,N1,N2,N3,N6,S1,A1	5-16
Global Maths Numbers	UK	P1,N1,N2,N4,N6	5-16

		,N7	
Play & Learn Math	USA	Difficult to determine	All ages

1.Discussion and Suggestion

This section summarizes our experiences gained in the process of accessing and selecting CAL software. The guidelines suggested may be useful to primary mathematics teachers in selecting software for their own schools.

First, if there are trial versions, teachers should try to obtain and work with the trial software. The rule is that trial experiences can help to rule out some software that are either poorly designed or inappropriate to local context. However, we must admit that there are difficulties in evaluating software in this way because many manufacturers do not provide trial versions for potential purchasers.

Second, teachers should distinguish carefully interactive CAL CD-ROMs from Video Compact Disks (VCD). The latter materials may also be packaged as Compact Disk (CD) and most of them are transformed from videos captured from real classroom or laboratory lessons. Teachers should justify carefully whether they can really help improve teaching quality or learning effectiveness.

Third, teachers should take care of the hardware key requirement of some CAL software. The original purpose of the keys is for protection against copyright infringement. However, some software providers require users to buy hardware keys for physical installation on their computers. The price of a particular CAL software may not be expensive, but they will be when the cost of the key is included. However, most of the trial versions might not need the keys.

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