



Computer Aided Learning (CAL) For Malaysian O'Level Mathematics Curriculum (CALMOMC)

by

Norshuhada Shiratuddin

University of Nottingham

Dissertation Submitted September, 1995,
in partial fulfilment of the conditions for the award of
the degree of MSc in Information Technology.

Supervisor : **Jean Hitchings**

UNIT KOLEKSI KHAS

Acknowledgements

*My special dedications to my supervisor, Mrs. Jean **Hitchings** who has given me the opportunity to pursue this project, and for giving me valuable guidance and time. Thanks also to the Director of ICL Institute of Information Technology, Professor Peter H Ford for **allowing** me to come back to Malaysia to test and evaluate my system (see Appendix A).*

*I would also like to convey my appreciation to my employer, University Utara **Malaysia (UUM)** for giving me the opportunity to further my studies.*

*Without the willing assistance of **the** teachers, students and my spouse, **Shahizan Hassan**, this project could not have been carried through to a successful completion.*

*Finally, thanks to my parents, **Shiratuddin Haji Abd. Kadir** and **Hajjah Hamidah Haji Abd. Wahab** and my son, **Shazrin Shafiqi**, for their love and support.*

Abstract

This project is about a CAL system on Malaysian O'Level Mathematics Curriculum (CALMOMC). The first chapter simply discusses the era of electronic classroom in Malaysia. The second chapter then, reports about the Malaysian Mathematics Curriculum, its objectives and the Education Philosophy.

The third chapter covers the importance and benefits of CAL. There is also a discussion on traditional teaching methods and CAL VS the traditional methods,

The report then discusses the Author-ware package in details. Why Authorware is chosen, steps to produce a program, Author-ware VS Other CAL Oriented Languages and the characteristics of a CAL language are also covered.

There is also a chapter that views the proposed system in general. This chapter contains the system structure, system flowcharts, user manual and system screens.

In order to measure the success of the system, an evaluation was carried out. The results of the evaluation are discussed in chapter six.

Lastly, conclusion and suggestions for future improvements are in chapter seven.

Table of Contents

| | |
|--|------------|
| Acknowledgements | ii |
| Abstract | iii |
| 1. Introduction | 1-2 |
| 2. The Mathematics Curriculum | 3 |
| 2.1 Principal Work Targets of Ministry of Education Malaysia | 4 |
| 2.11 The National Education Philosophy | 4 |
| 2.12 Mission and Objectives of the Ministry of Education | 5 |
| 3. Computer Aided Learning in general | 6 |
| 3.1 The Importance of CAL | 7 |
| 3.11 Benefits of CAL | 7 |
| 3.2 Methods of Traditional Teaching | 8 |
| 3.3 CAL VS Traditional Teaching Methods | 9 |
| 3.4 summary | 10 |
| 4. CAL Using Authorware Professional for Windows 2.0 | 11 |
| 4.1 Why do I choose Authorware? | 11 |
| 4.2 Hardware Requirements | 12 |
| 4.3 Icon Palette | 12 |
| 4.31 Display Icon | 13 |
| 4.32 Animation Icon | 13 |
| 4.33 Erase Icon | 14 |
| 4.34 Wait Icon | 15 |
| 4.35 Interaction Icon | 15 |
| 4.36 Calculation Icon | 16 |
| 4.37 Map Icon | 17 |
| 4.4 Steps to produce an Authorware program | 17 |
| 4.5 Authorware VS Other CAL Oriented Languages | 18 |
| 4.5.1 Characteristics of a CAL Oriented Language | 19 |
| 4.6 Summary | 20 |
| 5. Overview of the CALMOMC System | 21 |
| 5.1 System Structure And Analysis | 21 |
| 5.11 Feasibility Study | 21 |
| 5.12 Requirements Analysis | 21 |
| 5.12.1 System Requirements | 21 |
| 5.13 System Structure | 22 |
| 5.2 System Flowcharts | 23 |
| 5.3 User Manual | 24 |
| 5.4 System Screens | 25 |
| 5.4.1 Title of the Project | 25 |
| 5.4.2 Notes about the Project | 25 |
| 5.4.3 Main Menu | 26 |
| 5.4.4 Mathematics Curriculum Menu | 26 |

| | | |
|-----------|--|-----------|
| 5.45 | Notes & Examples Menu | 27 |
| 5.46 | Modern Mathematics Menu | 27 |
| 5.47 | Additional Mathematics Menu | 28 |
| 5.48 | Questions & Answers Menu | 28 |
| 5.49 | Paper 1 & Paper 2 Menu | 29 |
| 5.50 | Past Years Menu | 29 |
| 5.5 | Program Running Examples | 30 |
| 5.5.1 | Differentiation Notes | 30 |
| 5.52 | Modern Mathematics, Question paper 1, 1993 | 30 |
| 5.53 | Answer on Modern Mathematics, Question 5, Paper 1(1993) | 31 |
| 5.53.1 | User answer = "yes" | 31 |
| 5.53.2 | User answer = "no" | 32 |
| 5.6 | Program Coding Lists | 33-45 |
| 6. | System Evaluation | 46 |
| 6.1 | Educational Evaluation | 46 |
| 6.11 | Staff Attitudes | 47 |
| 6.12 | Students Attitudes | 48 |
| 6.2 | Results of the System Evaluation | 48 |
| 6.3 | Summary | 49-50 |
| 7. | Conclusion | 51 |
| 7.1 | Suggestions for Improvements | 5 2 - 5 3 |

References

- Appendix A - Permission Letter from Professor Peter H. Ford**
Appendix B - Evaluation Questionnaires

List of Tables

| | | |
|----------|--|----|
| Table 1. | CAL compared to teachers | 9 |
| Table 2. | CAL compared to books | 9 |
| Table 3. | CAL compared to tape recorder, video, slide, radio and tv. | 10 |

List of Figures

| | | |
|-----------|------------------|----|
| Figure 1. | Icon Palette | 12 |
| Figure 2. | Display Icon | 13 |
| Figure 3. | Animation Icon | 13 |
| Figure 4. | Erase Icon | 14 |
| Figure 5. | Wait Icon | 15 |
| Figure 6. | Interaction Icon | 16 |
| Figure 7. | Calculation Icon | 16 |
| Figure 8. | Map Icon | 17 |
| Figure 9. | Design Window | 18 |

Chapter 1

Introduction

Since the advent of the microcomputer, rapidly developing technology has greatly enhanced the machines and made them far more accessible to man in the street. Initially, the machines were unwieldy and very difficult to use, and their uses were limited. All this has changed and now the machines are very flexible in their applications.

The invention of these cheap and powerful machines has brought the era of the electronic classroom one step nearer. Every where in the world, schools, colleges and universities teachers of all subjects are using computers to enhance their teaching. Computer Aided Learning (CAL) has been introduced at the infant schools in the United Kingdom. Unfortunately, in Malaysia, CAL, is still a new area. No computers are placed in any **infant**, primary and secondary schools. Students are not introduced to computers until they are in the universities. But recently, there is an increase in the awareness of the importance of introducing computers as early as possible. Secondary schools in Malaysia have now managed to buy computer hardwares and softwares and established computer clubs at their own expenses. The government does not have enough budget to set up any computer club. Parents and private companies have contributed a lot in the set up of these computer clubs.

These clubs however, just taught the students to use commercial word processing packages to produce worksheets and reports, which help students with spelling and in

The contents of
the thesis is for
internal user
only

References

Authorware Professional Tutorial Guide (1993), Micromedia.

Authorware Professional Users Guide (1993), Micromedia.

Ayscough.P.B (1987), *Computer Assisted Learning in Chemistry*, Working Conference on CAL.

Beevers.C.E, Cherry.B.S.G, Foster.M.G & McGuire.G.R (1991), *Software Tools for Computer Aided Learning in Mathematics*, Avebury Technical.

Bethea.R.M, Duran.B.S & Boullion .T.L (1995), *Statistical Methods for Engineers and Scientists*, Marcel Dekker.

Braun.L (1980), *An Odyssey Into Educational Computing*, Working Conference on CAL.

Downs.E, Clare.P & Coe.I (1988), *Structured Systems Analysis and Design Method*, Prentice Hall.

Gane.C (1990), *Computer Aided Software Engineering*, Prentice Hall.

Gerhold.G (1985), *Teacher-Produced CAI*, Conference on CAL.

Hoffmann.L & Bradley.G (1993), *Brief Calculus with Applications*, McGraw-Hill.

Hofstetter.F.T (1987), *The Meaning of PLATO at the University of Deieware*, Working Conference on CAL, IFIP.

Howe.J.A.M, O'Shea.t & plane.F (1987), *Teaching Mathematics Through LOGO Programming: An Evaluation Study*. Working Conference on CAL.

Johnson.L & Arnold.J (1993), *Introduction to Linear Algebra*, Addison-Wesley.

Lewis.R & Tagg.E.D (1980), *Computer Assisted Learning: Scope, progress and limits*, North-Holland.

Lewis.R & Want.D (1980), *Educational Computing At Chelsea*, Working Conference on CAL, **IFIP**.

Moonen,J (1987), The Teaching of Statistics And CAL, **Working Conference on CAL**.

Sibley,M. (1985), *Computer Assisted Learning*, Century Communications.

Sweet.M.V (1984), *Algebra, Geometry And Trigonometry in Science, Engineering And Mathematics*, Wiley & Sons.

William.E & donald.R.C (199 1), *Business Research Methods*, Irwin.