Computer Aided Learning Chinese Idioms
(CALCI)

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Abstract

Computer aided learning have been implemented by lots of institutions and universities nowadays, due to the fast growing of information technology and the trend of moving towards paperless environment.

Computer aided learning of Chinese idioms, is a package developed to assist students in the Chinese idioms study. This package is limited to Chinese idioms in 4 characters only. The package will provides the entire syllabus of Chinese idioms learned at primary and secondary school. It also contains idioms story, exercises and quizzes. The development of this package is assisted by multimedia tool to make it a more attractive, efficient and effective during learning process.

It is hope that development of this package will assist all students to achieve better result in their examination.

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List Of Abbreviations

Acronym	Meaning
ALPS	A Leaning Package for SPM Physics Paper
CAI	Computer Aided Instruction
CAL	Computer Aided Learning
CALCI	Computer Aided Learning Chinese Idioms
CALLC	SPM Computer Aided Learning for Chinese Language
RADD	Rapid Application Design and Development
RTF	Rich Text Format
TTF	True Type Fonts

CHAPTER 1:
PROJECT INTRODUCTION

1.1 Project Overview

Computer Aided Learning (CAL) means using the computer as a learning tool to assist students in their study. According to Oxford Advanced Learner's English-Chinese Dictionary, idiom is a phrase or sentence which meaning is not obvious through knowledge of the individual meanings of the constituent words, but must be learnt as a whole. Chinese idiom is a short phrase used in daily life. It is represented by a fix number of words. It may refer to an incredible amount of information in an indirect or implied way. Derivation of the phrases may be independent or related to another happening or story in the past.

Computer Aided Learning Chinese Idioms (CALCI) is a computer-aided learning package developed for Chinese idioms, which is used to help students in the Chinese idioms study. This system covers Chinese idioms in 4 characters that are learned from primary school to secondary school.

In current system, process of learning Chinese idioms is a "learn by heart style". Students are asked by their teachers to memorize the meaning and use of a particular Chinese idiom. This is quite boring and ineffective in learning process. Chinese idioms are not easy to learn. It will be hard, and not possible for the students to remember or use an idiom without understanding the historical event or story behind it. Thus,

learning Chinese idiom by heart without understand its meaning clearly, will de-motivate students and reduce their interest of learning.

Therefore CALCI is developed to solve the above problems. This system is integrated with multimedia techniques, i.e. text, audio, animation and video displaying, which make the learning process more interesting, effective and efficient. Besides, an attractive and user-friendly interface is designed for the system, in order to attract attention and regain interest from the users.

The system includes pronunciation, description, example sentence and use of a particular idiom. It also includes a story telling of an idiom, which is presented by interesting graphics, pictures and animation together with the sound. In addition, it also provides exercises and quizzes for users to test their understanding and helps them refresh their memory after learning.

CALCI provides students with a change of style in learning, which moves from normal study to virtual study. By providing animation of graphics together with sound effect, instead of just reading the books, not only motivates students to learn and regain their interest, but also makes the learning process more efficient, effective and successful. In conclusion, this system will improve the learning curve of students.

1.2 Project Objectives

The main objective of this project is to build a system **as a learning tool**, that can help users to learn Chinese idioms in more interesting way, and make the learning process more efficient and effective. This project will use techniques in multimedia, for example text, audio, animation and video displaying together with interactive teaching-learning environment via computer to achieve the above objective.

Besides, the project also aims to **attract students' interest** in learning Chinese idioms by using multimedia techniques in the system. It also gives an opportunity for students to explore to multimedia computer environment, in order to realize the power of computer based learning. Other objectives are as follow.

Finally, the package also serves **as a pre-test preparation** for UPSR, PMR and SPM. Students can use the package as a revision module to test their understanding of Chinese idioms. This could help them to face the actual examinations confidently.

1.3 Project Scope

This system includes only Chinese idioms in 4 characters.

It covers the Chinese idioms learned from primary school to secondary school. It is designed for students from Standard 3 until Form 5 and teachers who teach in these levels.

This system has 5 modules, they are note module, exercise module, quiz module, top ten module and search module.

- Note module that displays text, video, animation, pictures and sounds. It is use to help students to learn the idioms.
- Exercise module provides exercises to student. The style of exercises is similar as the school exercise books.
- Quiz module enables students to test their understanding and prepare themselves for examination.
- Top Ten module that records the best ten records in exercises and quizzes. Therefore, users will be motivated to challenge the others.
- Search module allows users to get a desire idiom in Chinese Idioms database more quickly.

As part of the question in UPSR, PMR and SPM Chinese paper include Chinese idioms, and thus students can use this system to prepare themselves for the examination. The system is divided to 3 level as follow:

- beginner level, designed for students from Standard 3 to Standard 6
- intermediate level, designed for students from Remove to Form 3
- advance level, designed for students from Form 4 to Form 5

Since most of the users of the system are students, user-friendly design is the main emphasis in the development.

1.4 Project Schedule

Project scheduling involves separating the total work involved in a project into separate activities, and judging the time required to complete these activities. Some of these activities are carried out in parallel [Sommerville, 1995].

Project schedule helps us to plan the work and work the plan, in order to ensure completion of a system in time. Below is a schedule of this project, which shows the activities and their duration.

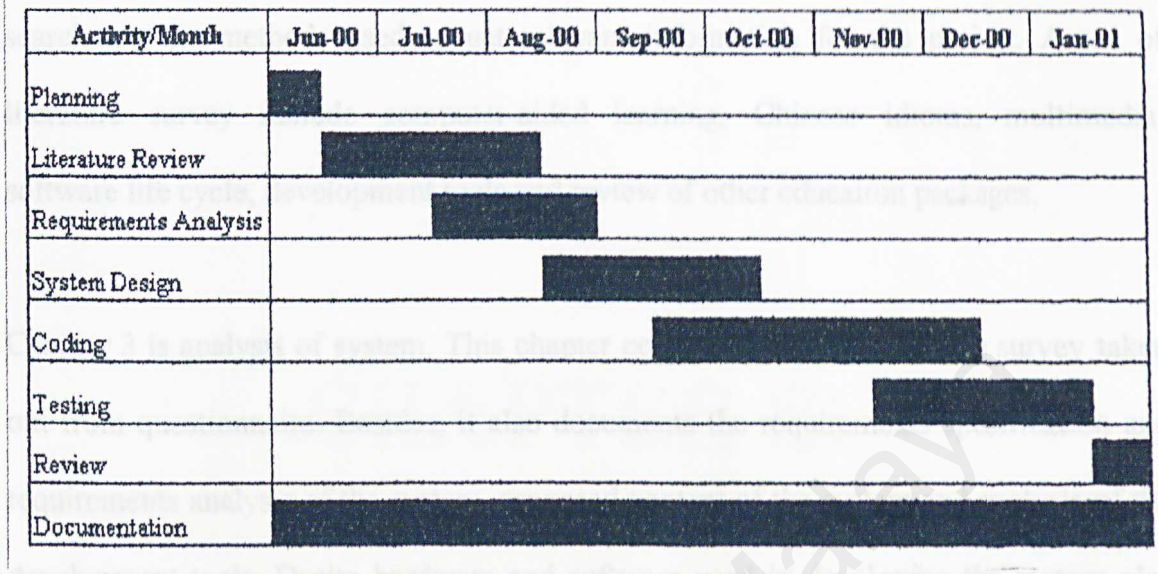

Figure 1.1 : Project schedule

1.5 Summary

Documentation for this project consists of four chapters.

Chapter 1 is an introduction of the project. In this chapter, it gives a brief overview of the project, objectives of the project to be achieved and the scope of project. It also describes the methodology used to develop this project and schedule of the project. The last part of this chapter is a summary of the documentation.

Chapter 2 is regarding literature survey of the project. Library search and Internet search are the methods used to get relevant information for the project. Areas of literature survey include computer-aided learning, Chinese idioms, multimedia, software life cycle, development tools and review of other education packages.

Chapter 3 is analysis of system. This chapter contains the analysis of the survey taken out from questionnaire. Besides, it also documents the requirements specification and requirements analysis of the system, proposed content of the system and analysis of the development tools. Desire hardware and software used in developing the system also stated. Finally, there is a user system requirements to run the package.

Chapter 4 is about system design. It shows the system architecture, database design, process design in a data flow diagram, user interface design and the expected outcome of the system.

Chapter 5 is about system implementation. Development environment, development tools and testing involved are explained in this chapter.

Chapter 6 is evaluation and conclusion of the system. Limitation, strengths and future enhancement of the system are discussed in this chapter.

CHAPTER 2:

LITERATURE REVIEW

2.1 Survey Analysis

In order to find out the interest of students about this system and what they are expected of the system, a survey is conducted. Two schools in Rawang have been chosen to conduct the survey. They are SRJK(C) San Yuk – primary school and Sekolah Menengah Seri Garing - secondary school.

The population of the survey comprises of 60 students. This includes 20 students from standard 3 to standard 6, 20 students from Remove to Form 3 and 20 students from Form 4 to Form 5.

From the survey, out of these 60 students, 40 students have a computer at home, which represents 67% of the population. Only 20 students do not have a computer at home. From these 20 students, 80% of them, that is, 16 students plan to buy a computer in future.

72% of the students have some computer knowledge about how to use a computer. Majority of the students, that is, 92% of them is interested in computer and 77% of them is interested in Chinese Idioms. In addition, 77% of the students would like to use computer learning package to assist them in learning Chinese Idioms.

From the survey analysis, we can conclude that, computer is one of the common house equipment nowadays. Besides, computer is also very popular among the students. Therefore, problem of using computer to learn Chinese idioms due to students do not have computer, lack of computer knowledge and no interest in computer and Chinese idioms are unlikely to happen. Below is a summary table of the results.

Table 2.1 : Survey of students background

	Percentage (%)	Number of students
Have computer at home	67%	40
Know how to use computer	72%	43
Have interest in computer	92%	55
Have interest in Chinese Idioms	77%	46
Would like to use computer learning package to learn Chinese Idioms	77%	46

It is noted from the survey, that 13% of the students have difficulty in learning Chinese idioms. 70% of them felt that the difficulty level is in middle level and 17% of them felt learning Chinese Idioms is very easy (Figure 2.1).

There are various types of difficulties faced by students during learning Chinese Idioms. The major problem is that students do not understand the meaning of idioms.

Consequently they felt that it is very hard to learn the Chinese idioms. This is represented by 53% of the population as shown in Figure 2.2. Besides, 50% of the students faced the problem of memorizing the idioms and 37% of them do not know how to apply the Chinese Idioms in a suitable situation. Only minority of the students does not know the pronunciation of the Chinese Idioms. This is represented by 8% of the population.

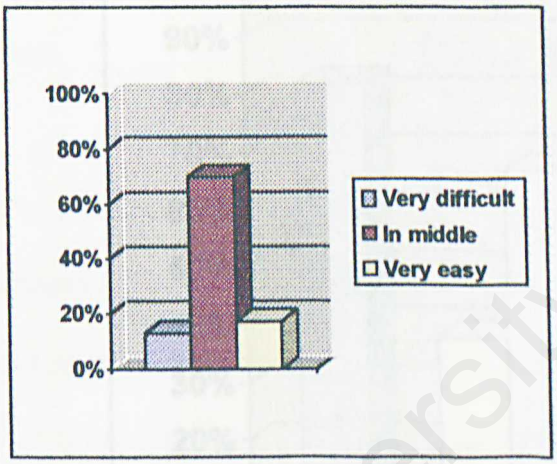

Figure 2.1 : Level of difficulty in learning Chinese idioms

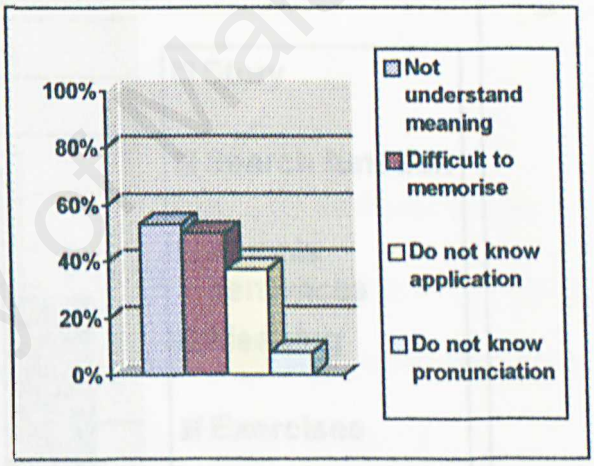

Figure 2.2 : Types of difficulty during learning Chinese Idioms

Due to the above difficulties faced by students during learning Chinese Idioms, most of the students expect the learning package to include the origin story of the idioms. The story is preferable be presented in animation with sound effect. This is represented by 82% of the population. Besides, 67% of the population expect the learning package to show the meaning of the Chinese idiom. 38% of the population expect it to have sample

sentences to show the application of Chinese idioms. 42% of the students expect the package to include exercises to test their understanding. Only 3% of the students expect the package to have search function in order to help them to search for a particular idiom (Figure 2.3).

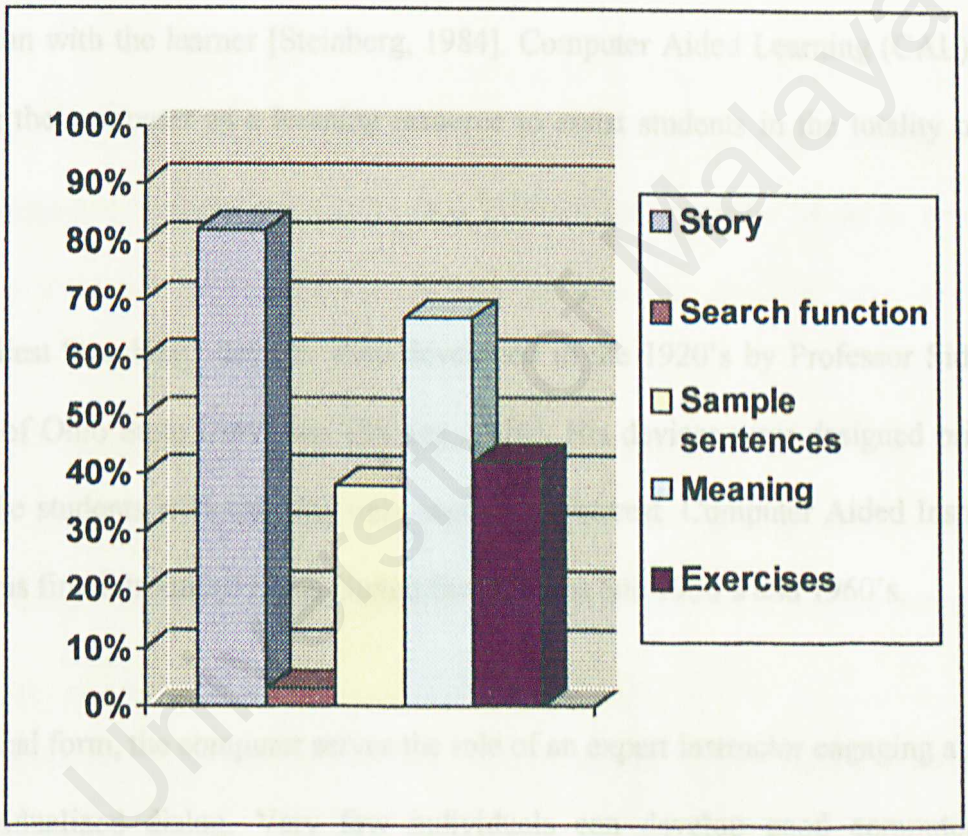

Figure 2.3 : Functions expected in Chinese Idioms learning package

2.2 Computer In Education

2.2.1 Introduction

The computer offers powerful features for facilitating learning, such as tutor-like interaction with the learner [Steinberg, 1984]. Computer Aided Learning (CAL) refers to using the computer as a learning resource to assist students in the totality of their tasks

The earliest "teaching" devices were developed in the 1920's by Professor Sidney L. Pressey of Ohio State University [Sidney, 1926]. His devices were designed primarily to test the students with teaching only secondary interest. Computer Aided Instruction (CAI) was first introduced in the United States in the late 1950's and 1960's.

In the ideal form, the computer serves the role of an expert instructor engaging a student in individualized dialog. Very few individuals can develop good computer-based learning material, in any substantial quality, as a casual activity. It is a serious activity demanding time, effort and resources [Weinstock, 1986].

Differences between CAI and traditional modes of instruction are as follow [Steinberg,1984] :

1. Human is interacting with a machine rather than another human being. Users can answer in the privacy of their interaction with the computer by ignore afraid of being wrong or being embarrassed by the others.

2. Students can ask questions in many ways in the classroom and expect the instructor to understand them. It is difficult for computer to do so unless the computer is designed or programmed to perform this.

3. CAI usually is an individual activity. The lesson itself is the only source of information, thus benefits of group discussion are lacking. In the classroom, students can learn from one another's responses as well as from the instructor.

4. Instructor can monitor a student's comprehension both by asking questions and by observing the student's behavior. CAI lesson can assess a student's understanding only by asking pertinent questions and monitoring responses.

5. Students respond by speaking or writing on paper or blackboard in the classroom. In CAI the response most frequently by pressing keys on a keyboard or clicking a mouse.

6. In CAI lesson, students are able to progress at their own pace. Those who learn quickly are not held back and those who are slow have a better chance of understanding the material by repeating it

2.2.2 Categories of CAL

A good CAL does not just happen, but authors make it. While produce CAL we should consider the subject matter presentation, the interactive dialogue between computer and learner, smooth communication between learner and computer, monitoring learner's understanding, motivating learner, sequencing the flow of instruction, designing screen display, programming the computer and evaluating the lesson [Steinberg, 1984].

There are 5 major categories of CAL as following:

1. Drill and practice are lessons that provide exercises of material already learned, in order to strengthen or maintain rote knowledge [Steinberg, 1984]. Drill and practice involved any exercise, physical or mental, that is performed regularly and with constant repetition. It is often associated with rote-memory learning. Its purpose is to prepare learners on lower-level skills more readily to perform some higher-level complex skill.

2. Tutorials seek to place the computer in the role of a tutor, one that carries the full instructional burden of guiding a student to the achievement of a specified set of objectives.

3. Problem solving presents situations or problems on the computer that are solved through a process logical deduction, synthesis and implementation.

4. Simulation creates an artificial, interactive environment that model a specific real or a specific fantasy environment. Such as managing the care of a sick patient or finding a faulty part in an electronic circuit. Success in the simulation task requires the application and synthesis of knowledge and the integration of new knowledge with old knowledge [Steinberg, 1984].

5. Game allow student to interact with instructional materials in a motivationally stimulating game format. "Competitive" feature in it is the ability to promote a high-level of student motivation. Success in a game may require only rote knowledge or it may involve the application and extension of knowledge [Steinberg,1984].

2.2.3 Advantages of Computer-Based Learning

1. Computer is interactive, unlike books, tapes, films, radios and televisions, the user determine what happens next. It requires active, motor involvement. It is not a passive exercise. Even if the choices are limited and the program merely provides the illusion of freedom, it still give children a sense of control.

2. Computers are fun. Human beings love to respond to challenges, love to make things happen. The computer games industry has grown rich on that basic axiom. By coupling education to games of challenges, CAL became fun.

3. Computers have infinite patience. It does not care the user responds very, very slow or how often a child or an adult make mistakes. It never gets tired or cranky.

4. Good education program never put a child down. Instead it provides effective positive reinforcement.

5. Computers can provide privacy. Children or for that matter teachers can make embarrassing mistakes without anyone seeing them. Ignorance, lack of skill, slowness to comprehend, poor condition, all can be overcome in privacy. The computer would not tell.

6. The computers can explain concepts in a more interesting and understandable manner by means of animated material. No amount of talking, writing, or providing diagrams, can compare with making things come alive on the screen.

7. Whereas it is very difficult to hide things in a book, it becomes possible to hide things in a program, which become apparent only on occasion. A book on re-reading holds few surprises. In Contrast, a computer program can be full of surprises. Good programs contain an element of mystery and uncertainty, which keep the user interested.

8. The ability to simulate complex situations such as chemical reactions, ecosystems, and demographic or economic changes is a particularly powerful reason for using computers in education. Training pilots, managers, doctors, chemical engineers, i.e. any profession or activity where a mistake in the real world could be very costly, is best served by learning on a computer which simulates the real-life situations. In addition, simulating real events of often makes is possible to train students to think 'laterally' across traditional subject boundaries.

9. The computer allows 'real time', that is instant responses or allows instant communication. Every constructed respond is judged immediately for accuracy.

It leaves no student wondering whether his or her response is correct or incorrect.

10. All of the above combine to allow a computer to create custom-tailored education for individuals: ' Hello Ali, what shall we do today?' followed by an infinitely patient, friendly, entertaining set of programs, at the right age-level, catering specifically to the pupil's interest, capabilities and needs.

2.2.4 Disadvantages of Computer-Based Learning

1. CAL causes less direct human-to-human interaction. Since students could learn a course through the course materials and exercises prepared in the CAL packages, there will be less time spent for attending lectures and tutorial sessions. The communication shifted from lecture-student to lecture-computer and student-computer.

2. CAL has limited system scope. Usually a CAL package is dedicated for a small scope. It is not feasible to develop a system that teaches all courses. This is because it need much more effort and time to develop and different courses has its own effective teaching methods

3. CAL packages need computer system to operate. If no computer system is available, then no CAL packages are available. Currently not every family in Malaysia has computer especially in urban area.

2.3 Multimedia

The integration of multimedia technology into the communication environment has the potential to transform an audience from passive recipients of information to active participants in a media-rich learning process. It makes the communication more effectively and even creates applications that would not be possible without sound and motion.

2.3.1 Introduction

Multimedia is a field concerned with the computer controlled integration of various forms of media. Multimedia has been described by Vaughan (1994) as "any combination of text, graphic art, sound, animation and video delivered to you by computer or other electronic means"

Text is one of the most widely used multimedia building block. The intensity of text usage depends greatly on purpose of the program. The text can always be displayed in different forms for different purpose, such as adding title, buttons, bullets, paragraph and scrolling text.

As ancient Chinese saying states that a picture is worth a thousand words. People often learn and retain more information from pictures than other forms of information. The integration of graphics into a multimedia application includes the elements background, photo, three dimensional pictures, charts, drawing and buttons.

Sound is one of the components of multimedia that can enhance the application by appealing to auditory learners. There are various forms of sounds such as special effect, narration, audio tracks from analogue or digital source, background music of musical performance and background or ambient sound.

Video usually is recording of live action. One can typically use video from three sources that are digital video stored in the files the hard disk or on compact disk, videodisk or video tape.

Moving image or animation is like a film and video. Animation displays a series of slightly different images in rapid succession and giving the illusion of motion. However animation is usually based on drawing.

It is generally agreed that most people retain about 20% of what they hear; 40% of what they see and hear; and 75% of what they hear, see and do. Experienced communications know that audience have little interest in rote memorisation and exclusively text-based learning [Villamil-Casaanova, 1996].

2.3.2 Advantages of Multimedia

Benefits of multimedia as follow:

1. Multimedia mirrors the way in which the human mind thinks, learns, and remembers by moving easily from words to images to sounds, stopping along the way for interpretation, analysis and in-depth exploration.

2. The combination of media elements in multimedia lesson enables trainees to learn more spontaneously and naturally, using whatever sensory modes they prefer. For example, some people learn best by seeing, others learn best by seeing and hearing, still others learn best through manipulation or kinaesthetic (tactile) exercises.

3. Combining media elements with well-designed, interactive exercises enables learners to extend their experience to discover on their own, so that they are no longer passive while information is "fed" to them. Additionally, programs may

be designed to include immediate feedback in order to clarify misconceptions before trainees become confused and to provide direct reinforcement for correct responses.

4. While students may only raise their hands to ask a question so many times, many multimedia programs (expert system) are designed allow learners to pause, branch, or stop for further remediation, exploration, or enhancement opportunities; these interactive qualities encourage non-linear thinking.

5. By combining words with pictures, graphics and audio, multimedia programs enable people with varying levels of literacy and math skills to learn by using sight, hearing and touch. Evidence suggests that using multimedia segments as context for trainees significantly aids in reading comprehension.

6. With a multimedia program as assistant, trainers can provide more individualized attention.

2.3.3 Disadvantages of Multimedia

However, multimedia has a few disadvantages.

1. Need high processor speed, memory, disk space and data throughput.

2. Those elements like sound, images or animation and video need higher bandwidth than text files because of the size.

2.4 Chinese Idioms

According to Oxford Advanced Learner's English-Chinese Dictionary, idiom is a phrase or sentence which meaning is not obvious through knowledge of the individual meanings of the constituent words, but must be learnt as a whole. Chinese idiom is a phrase used in daily life to give advice or tell you something about life.

Chinese Idioms is represented by a fix number of words. In this system, Chinese Idioms are limited to 4 characters only. Chinese Idioms may refer to an incredible amount of information in an indirect or implied way. Derivation of the phrases may be independent or related to another happening or story in the past.

2.5 Project Development Methodology

2.5.1 Waterfall Life Cycle

In developing a system, it is going through a process called life cycle. Waterfall model is a structured as a cascade of phases, where the output of one phase constitutes the input to the next one. Each phase, in turn, is structured as a set of activities that might be executed by different people concurrently [Ghezzi, 1991].

Waterfall life cycle model comprises the following phases as shown in Figure 2.4.

1. Requirements Analysis

   The purpose of this phase is to identify and document the exact requirements for the system. The specifier must state what qualities the application must exhibit, not how such qualities are achieved by design and implementation.

2. Design Specification

   The purpose of the design phase is to specify a particular software system that will meet the stated requirements. It involved decomposing the system into 1modules and documented what each module is intended to do together with the relationships among the modules.

3. Coding and Module Testing

This is the phase that produces the actual code that will be delivered to the user as the running system. The output of this phase is an implemented and tested collection of modules. Module testing is carried out to ensure the quality of the module.

4. Integration and System Testing

In this phase all the modules that have been developed before and tested individually are put together integrated and tested as a whole system. The purpose of this phase is to test the system under realistic conditions, but with understanding and forgiving users. It is also called alpha testing.

5. Delivery and Maintenance

Once the system passes all the tests, it is delivered to the user and enters the maintenance phase. The purpose of this phase is to perform a kind of controlled experiment to determine, on the basis of feedback from users, whether any changes are necessary prior to the official release. This kind of system testing done by selected users is called beta testing.

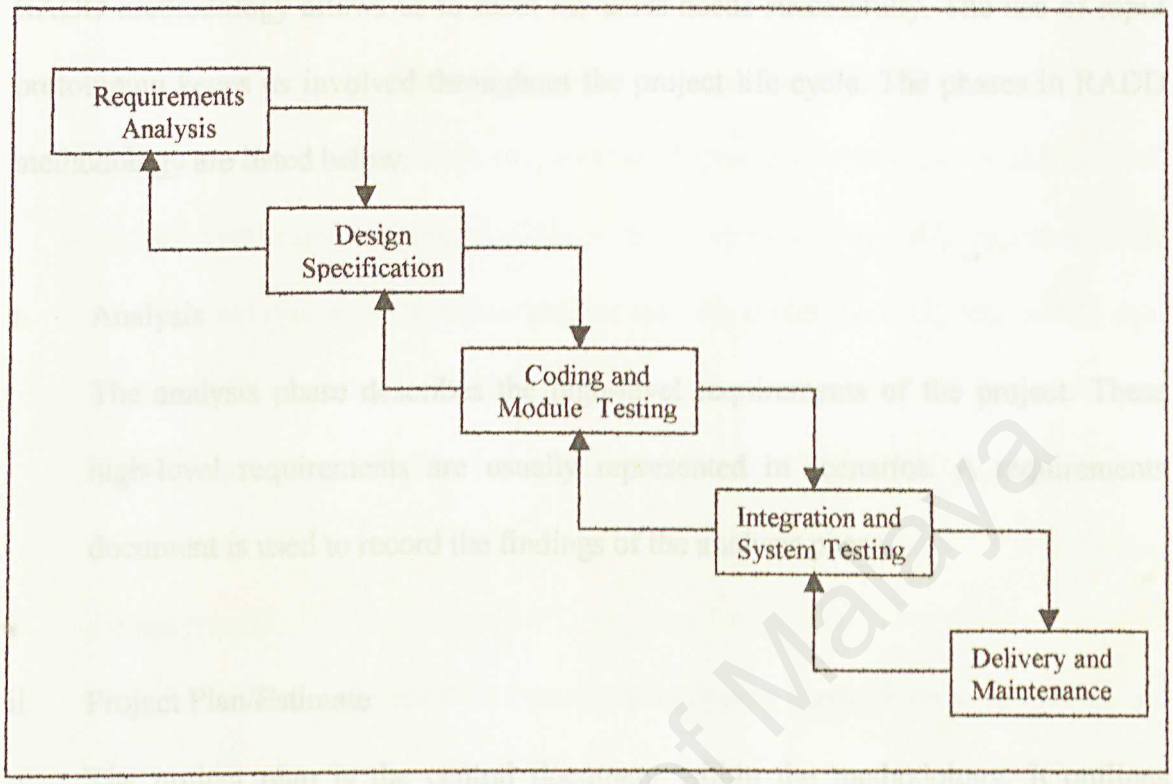

Figure 2.4 : Waterfall Life Cycle Model

2.5.2 Rapid Application Design and Development

Rapid Application Design and Development (RADD) methodology allows application development in very short time scale at a low cost, while maintaining very high standards in terms of user interface, code quality, database integrity and others aspects of system quality [RADD Methodology, 2000]. User-center design is an important feature in this methodology. It focuses on building a prototype early in the project life cycle. The prototype is then used to elicit users' feedback. Result of this methodology is the end product that meets users' expectations.

RADD methodology allows us to meet the users needs successfully. The use of rapid prototyping keeps us involved throughout the project life cycle. The phases in RADD methodology are listed below:

i. Analysis

The analysis phase describes the high-level requirements of the project. These high-level requirements are usually represented in scenarios. A requirements document is used to record the findings of the analysis phase.

ii. Project Plan/Estimate

The project plan is the central document within the methodology. It outlines various aspects of the project and covers items such as estimated cost and schedule, tasks, task dependencies, responsibilities, approach, communications, and project goals. Changes in any part of the project will affect changes on the project plan. Thus, the plan is continuously being reviewed based on changes and completion of each phase within the methodology.

iii. Design (Detail Requirements)

Detailed requirements are derived from the high level requirements. They are documented in a second version of requirements document. Then, it will be used as the basis for a design document. This phase involves data modeling, GUIs, object, data services, architecture, integration, data conversion, and reports.

iv. Prototype

Prototyping phase has three cycles i.e. GUI representation, GUI navigation, and GUI data. GUI representation involves development of the initial "look and feel" of the application interfaces. When users approve the GUI representation, interface navigation is then incorporated into the prototype. GUI data enable data interaction in selected interfaces. Subsequent to approval of the prototype, development phase will then be commenced.

v. Development

This phase continues the effort from the prototyping phase. It concentrates on the user interfaces as well as other tasks required to complete the application. Unit, system, and integration testing are integral parts of the development process.

vi. Change Control

Change control is used to manage changes in requirements or previously made design decisions. For example, if a screen has been prototyped and accepted, but subsequent, the need for additional data is discovered, a change control is issued to cover the change to that screen. Change control will affect the project plan, schedule, cost, etc. and will have to be communicated and approved by users.

vii. User Testing

Test cases defined in the design phase have been refined in this phase because of changes through the development process. Before starting the phase, bug reports are collected and then they will be classified and addressed.

viii. Deployment

Deployment contains three tasks, i.e., user training, technical training or knowledge transfer and deployment into production. Install disks or an appropriate medium is created for the deployment into production.

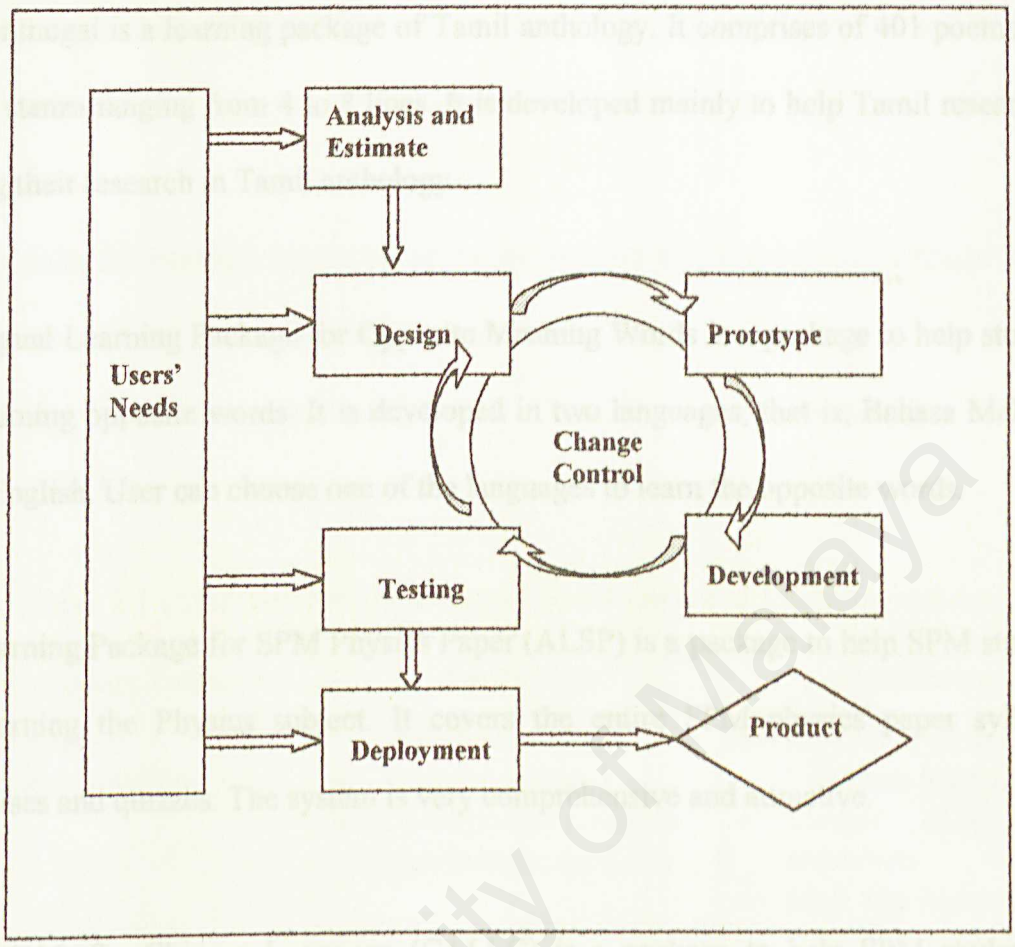

Figure 2.5 : RADD methodology

2.6 Learning Package Review

Several learning packages had been reviewed as a references, in order to learn their benefits from them and aware of their mistake. From the review will enable me to develop a good learning package as expected by the users. There are 4 learning package I had reviewed.

Kuronthogai is a learning package of Tamil anthology. It comprises of 401 poems with each stanza ranging from 4 to 8 lines. It is developed mainly to help Tamil researchers doing their research in Tamil anthology.

Bilingual Learning Package for Opposite Meaning Words is a package to help students in learning opposite words. It is developed in two languages, that is, Bahasa Malaysia and English. User can choose one of the languages to learn the opposite words.

A Learning Package for SPM Physics Paper (ALSP) is a package to help SPM students in learning the Physics subject. It covers the entire SPM physics paper syllabus, exercises and quizzes. The system is very comprehensive and attractive.

SPM CAL for Chinese Language (CALLC) is a package to help SPM students in learning the Mandarin subject. It is a comprehensive learning package, which comprises of the entire syllabus of the Mandarin subject, exercises and quizzes. Besides, it also provides forecasting system to help students forecasting the up coming exam paper.

From the review, it is noted that the most important characteristic for a learning package is to have a user-friendly interface, so that, users can handle it easily. Secondly, it should be integrated with multimedia techniques (graphics, animation, video, sound and text) in order to attract users' interest and make the learning process more interesting.

Thirdly, the speed of retrieval data should be as fast as possible, so that user will not feel frustrated waiting for the system to load an information.

In addition, the package should be as comprehensive as possible, which comprises all the resources that are needed by users in the learning process. Finally, the package should also provide maintenance facilities. Thus, if any errors occur, they could be easily corrected.

Table 2.2 : Characteristics summary of the reviewed learning package

Learning Package	Advantages	Limitation
Kuronthogai (Tamil anthology)	• Search capability • Mouse orientated • User-friendly interface • Maintenance facilities	• Low retrieval speed • Run from hard disk • Limited 1024 x 768 resolution • Must use Musara Tamil Font to support system
Bilingual Learning Package for Opposite Meaning Words	• Window platform • User-friendly interface • Bilingual (Bahasa Malaysia and English) • Learning through computer game • Allow administrative of data	• Low retrieval speed • Lack of graphics • Lack of animation • Difficulty in answering while the answer have antonyms words
A Learning Package for SPM Physics Paper (ALPS)	• Attractive animation and interactive experiment applications • Allow updated exam questions • User-friendly interface • Provide online help	• Stand alone system • No sound • No recovery support

SPM CAL for Chinese Language (CALLC)	• User-friendly interface • Comprehensive • Provide forecasting system • Provide online help	• No sound • Lack of graphics • Lack of animation

2.7 Development Tools

2.7.1 Programming Tools

1. Visual Basic 6.0

Visual Basic is an event driven programming language, where the code is executed as a response to an event. For example, while open button is pressed, an open file dialog box is displayed. It also is a usual tool for multimedia. It allows loading a picture or graphics, generating animation image, play sound and activating video program such as Flash. Besides, Visual Basic also allows access various of database for example ODBC, DAO and ADO.

In addition, we can use Visual Basic to write a Windows program easily and fast. Graphical user interface of Visual Basic makes it as an ease-programming tool. Add-in Manager of it also provides various functions or tasks to complete a

program. Finally, it enables programmers compile an executable program into set-up disks.

2. C programming Language

C is a structured program language. It is a discipline approach to writing programs that are clear, demonstrably correct and easy to modify. It is portable where programs can run in many different computers. However, it requires technical skill in programming and is quite a difficult programming language.

Table 2.3 : Summary of programming tools features

Programming Language	Features
Visual Basic 6.0	• Event driven programming language • Usual multimedia tool • Access of various databases • Windows program ability • Graphics user interface • Ease programming tool • Allows program to be compiled into set-up disks
C	• Structured programming language • Portable language • Difficult programming language

2.7.2 Database Tools

1. Microsoft Access 2000

Microsoft Access 2000 provides relational database power to give information to make better decisions. It can automatically builds tables, queries, forms and report from more than 20 types of full-featured templates, giving us the option to further customize them to suit your needs. Besides, it also automatically identifies the relationships in constructed data, such as a flat-file database and then re-organizes the information into a relational database.

In addition, it consists of an image control that provides a simple way to include graphical information on forms or reports, and improves the display performance of the images. Its compilation and better data manipulation technology result in quicker response and faster data operations. It also enables storage and retrieve data by Visual Basic.

The cue cards provide step-by-step instructions right alongside the task we are working on. It is like having our own tutor. Besides, it also helps us make the most of our past investments with direct support for Micrsoft FoxPro, Microsoft SQL ServerT, dBaser, Parodoxr and other popular file formats. Furthermore, it provides password for accessing a particular databases as security purpose.

2. Microsoft SQL Server 6.5

Microsoft SQL Server is mainly designed specifically for distributed client/sever computing. SQL Server could support databases up to 200 MB or 300 MB in size. Its scalability allows the same database engine to be used across platforms.

Microsoft SQL Server also includes the features of ease of installation, deployment, and use. It includes many tools and features that simplify the ability to install, deploy, manage, and use databases. Furthermore, it also has high performance database management and capable of operating efficiently on a small, single-user system with minimal administrative overhead.

In additions, it supports the data warehousing. It includes tools for extracting and analyzing summary data for online analytical processing (OLAP). It also includes tools for visually designing databases and analyzing data using English-based questions.

Finally, it allows the system integration with other server software. For example, SQL Server could integrate with e-mail, the Internet, and Windows.

Table 2.4 : Summary of database tools features

Database	Features
Microsoft Access 2000	• Relational database • Automatically builds tables, queries, forms and reports • Enable storage and retrieve data by Visual Basic • Security • Graphical user interface • Ease of use
Microsoft SQL Server 6.5	• Client/server computing • Scalability • High performance database management • Data warehousing • Internet integration • Ease of installation, deployment and use

2.7.3 Multimedia Tools

1. Macromedia Director 6.0

Macromedia Director is a industry standard authoring tool for multimedia production. It is mainly designed for web application. It combines multimedia

elements into portable movie and backs them up with Lingo, that is Director's own interactive scripting language.

Lingo is a powerful scripting language. It enables a Director developer and the movie's audience to control any situation in the production. While adding features to Director that Lingo does not provide, we can obtain or create C modules called Xtras, which could communicate with Director.

Furthermore, Director has a host of media editors to create, modify, import or edit graphics, sound, text, video, animation, and interactivity to deliver the highest quality productions possible. In addition, highly compressed and re-distributable Shocked fonts provide great looking fonts cross platform, cross browser, or anywhere.

Besides, its syntax is easy to understand and command like actual English. It also offers an easy use of developing environment similar to standard applications compared to C and Java. This helps developers to program more easily. However, it still required little technical proficiency to develop a project.

2. Macromedia Authorware 5.1

Authorware 5.1 is the leading visual rich-media authoring tool for Web and online learning. It allows developers, instructional designers, and subject matter

experts to create engaging, online learning experiences, track student results, and deliver consistent rich-media training on any platform. Thus, the ideas for programs require heavy and complex interactivity.

Decision icon of Authorware provides built in flow of control functionally. Besides, it also allows using framework and navigation icons such as next, previous, first, last section, therefore program can create easily without any scripting. Furthermore, using of map icon, can divide program into modular sections and this allows easy collaborations.

3. Macromedia Flash 5.0

Flash, lightening fast bookkeeping is what the name stands for. It provides a very simple bookkeeping and all legal documents are printed automatically. As other Macromedia products, Flash has the cross platform facility.

Flash provides familiar user interface, which is based on familiar and intuitive features that exist across the Macromedia product line as well as design products throughout the industry. Thus, it enables designers to create engaging graphics more easily and smoothly with the familiar user interface. It also fuses the precision and flexibility of vector graphics with bitmaps, audio, animation, and advanced interactivity to create brilliant and effective program that attract users.

Furthermore, Flash contains vastly improved documentation and learning aids to help new developers. It includes more than 800 pages of comprehensive documentation, online help and built in step-by-step lessons. Graphical user interface also makes development of a product more easily.

Table 2.5 : Summary of multimedia software features

Multimedia software	Features
Macromedia Director 6.0	• Wed application • Authoring tool for multimedia product • Combines multimedia elements into portable movie • Powerful scripting language (Lingo) • Cross platform • Broad media and file format support • Syntax easy to understand • Required little technical proficiency to develop a product
Macromedia Authorware 5.1	• Web and online learning application • Suitable for program that required heavy and complex interactivity • Provides built in flow of control functionally • Allows using framework and navigation icons
Macromedia Flash 5.0	• Provides simple bookkeeping • Cross platform • Create beautiful, compact and resizable animation and graphics • Provides graphical editing tools • Provides familiar user interface • Ease of learning • Ease of use

2.7.4 Editing Tools

1. NJSTAR CWP 4.31

NJSTAR is a stand-alone Chinese word processor designed to input, edit, format, convert and print Chinese documents on all language versions of windows 95, 98, NT and 2000. It supports both Simplified and Traditional Chinese characters and is an ideal Chinese word processing tool for users of all language levels, as it is also a great tool for Chinese language teaching/learning. Besides, it also enable convert/switch in between traditional and simplified Chinese on the fly with "one to many" artificial intelligence.

NJStar supports Chinese true type fonts (TTF) and Unicode Rich Text Format (RTF). It allows open, save and copy Chinese RTF files. It also supports Chinese character vertical printing; ability to enter/edit simplified Chinese, traditional Chinese and English on the same line.

It consists up to 13,000 Big5 and 6700 GB of character sets. It has various input methods such as Continuous Pinyin (LianPin), Standard Pinyin, Zhuyin, Cantonese, FiveStrokes, CangJi, Radical lookup, etc... Totally more than 20 methods. All the methods have word association (LianXiang).

Furthermore, it consists of a comprehensive two-way Chinese-English dictionary. Chinese to English and English to Chinese two-way fast lookup, with 50,000 entries in the dictionary. "Hanzi" Information function could converts a block of Chinese text to "Pinyin" with tone. Bilingual menu could display menu items in either English (default), simplified Chinese or traditional Chinese.

3. Chinese Star 2.97

Chinese Star is a commercial software designed to use in English and Chinese Microsoft Windows. This software allows users to perform Chinese computing in English MS Windows, and to build Chinese culture in Chinese MS Windows. Chinese Star enables us to read and write e-mails, browse through Internet and Intranet in both Chinese and English with our web browsers. Users can choose either GB or BIG5 encoding with one mouse click.

It also allows us to prepare text documents and tables in both Chinese and English, using Microsoft Windows text editors such as notepad, Microsoft Word, Microsoft Excel and Microsoft Wordpad. Besides, we can also use Chinese fonts in drawing utilities, such as MS Powerpoint, Photoshop, Paintbrush and Pagemaker.

The Chinese Star fonts are distinguishably beautiful. Documents and presentations authored in Chinese Stasr are delightful and tasty. Chinese Star has a complete line of all popular Chinese input methods. These input methods are exceptionally useful. It has user defined and customisable dictionaries, frequently used characters or phrases will come in as your top choices and infrequently used user-defined phrases will be gradually moved to the end of the line and eventually forgotten. Therefore, it can define entire sentences by a few strokes.

3. Adobe Photoshop 6.0

Photoshop is a powerful tool for digital image enhancement, photo retouching, and image composing. It provides multiple levels of undo and redo, editable text with character-level formatting, flexible and precise colour management controls, and built-in support for spot-colour channels. These features are totally time saving and increase productivity of tasks.

Graphical user interface, image window, toolbox, options bar and a set of floating palettes make a tasks done in more easier way. Photoshop also provides integrated tools for creating and outputting crisp, editable vector shapes and text. With these tools, we can incorporate resolution-independent, vector-based graphics and type into pixel-based images to achieve an unparalleled range of design effects.

It also enables us easily combine crisp, resolution-independent type with pixel-based images, and then output sharp type edges with our image to produce high-quality results. Besides, it also includes extensive new type formatting controls to help us produce the best-looking text possible. This including the new type warping that lets us twist and pull type to produce cool effects. Best of all, the type remains directly editable in the image no matter how we manipulate it.

Furthermore, it includes comprehensive optimisation features for producing the highest quality graphics with the smallest possible file sizes. It helps to precisely balance image quality and file size, compare an original image side by side with optimised versions. Its History palette enable us undo and redo multiple editing steps instantly. The History palette tracks and displays a complete list of recent editing steps.

Finally, Photoshop supports layer effects to enable quickly add drop shadows, inner and outer glows, bevels, and embossing to layers. When applied, these effects remain live, so they update automatically when we edit the layer. We could also use layer effects to create eye-catching text that's still editable or to design appealing rollovers, such as buttons that encourage interaction.

Table 2.6 : Summary of editing software features

Editing software	Features
NJSTAR CNP 4.31	• Stand-alone Chinese word processing • Supports Simplified and Traditional Chinese characters • Supports Chinese characters vertical printing • Consists up to 13,000 Big5 and 6700 GB of characters sets • Various input methods • Consists two-way Chinese-English dictionary • Bilingual menu
Chinese Star 2.97	• Microsoft Windows Platform • Supports Simplified and Traditional Chinese characters • Enable to read and write e-mail in Chinese • Could prepare text documents and tables and provides drawing utilities • Consists of all popular input methods • Consist of user defined and customisable dictionary
Adobe Photoshop 6.0	• Powerful tool for editing images, graphics and photos • Integrated with scan function • Produce high quality images and graphics with smallest possible sizes • Multiple levels of undo and redo functions • Flexible and precise colour management controls • Resolution independent • Ease of use

CHAPTER 3:

SYSTEM ANALYSIS

3.1 Users

This system is targeted to everyone, who may use the system, especially for those students from standard 3 to form 5.

3.2 Findings From Questionnaires

From the analysis of the questionnaires in chapter 2, we can conclude that majority of the students are interested in using computer to learn Chinese idioms. Regarding to their difficulties faced during learning, this CALCI system should be very comprehensive, which includes the entire syllabus, exercises, quizzes, stories, explanations, pronunciations, sample sentences and search capability.

3.3 Findings From Learning Package Reviewed

In order to develop a good learning package, CALCI should have a user-friendly interface. Thus, users can operate it easily. This system also should integrate with attractive graphics, animation, video, sound and text. Therefore, it can attract users' interest and also make the learning process more interesting. Besides, speed of retrieval

data should be as fast as possible. It should also be very comprehensive, which comprises all the resources that are needed by users in the learning process. Finally, it should provide maintenance facilities. Thus, if any errors are occur, it could be corrected easily.

3.4 Requirements Specification

Requirements specification used to describe the system to be designed and implemented. It includes all necessary information about what the system must do and all constraints on its operation. It comprises of functional requirements and non-functional requirements.

3.4.1 Functional Requirements Analysis

Functional requirements define what the system does. It describes what the product does by using informal, semiformal, formal notations, or a suitable mixture. [Ghezzi, 1991] The functional aspects cover the different ways in which real contents are to be delivered.

Listed below are the 5 modules in the system.

1. Top ten module

   This module is enabled to show the best ten records or results in the exercises and quizzes done by users. The purpose of this module is to motivate users to challenge each other in order to in the top ten list.

2. Notes module

   This module consists of all the Chinese idioms. All notes are stored in picture format with the file extension ".jpeg". The file name that contains Chinese idioms notes are retrieved from the database after the user has selected a particular level. The module will then loads and displays the jpeg file on the screen using PictureBox Control. Special functions such as pictures, animation and sound will also be displayed on the screen. This module provides the 'Next' and 'Previous' button to allow user to view the next or previous screen.

   - Note function

     The file names are retrieved from database based on the level selected. The selected jpeg file will then be displayed on the screen using PictureBox control. Pictures, animation and sound application names are also retrieved from database and displayed on the screen.

   - Sound functions

     Sound is displayed with the note file when the user selects it.

- Animation function

  Run the animation file.

3. Exercise module

This module provides all the exercises for each level. After completing the exercise, result will be displayed. The result is checked whether will be included in top ten list.

- Questions function

  Select questions from the database. Display the questions and selections on the screen. User selects the answer.

- Mark function

  Calculate the marks for the exercise after user has completed the exercise. Each correct answer is given 4 marks, while wrong answer will be minus one mark.

4. Quiz module

This module will retrieve an amount of questions according to the levels. Beginner level consists of 20 questions. Intermediate level consists of 30 questions. Advance level consists of 40 questions. The timing to do the quiz is 15 minutes. Quiz time is set, when the time is over, the system will automatically terminate the quiz. Then result is displayed and the marks will be compare with the top ten list.

- Include function in Exercise module
- Time function

  Calculate the quiz time, that is, one hour. When time is over, the quiz will terminate automatically.

5. Search module

This module will allow users to search a particular Chinese idiom from the database. There are three types of search provided by this system, that is, search by alphabetical, by word and by category.

- Search by Alphabet function

  User needs to select the alphabet of the Chinese idiom and then select the Chinese idiom from the ComboListBox. Notes of the Chinese idiom will be displayed on the screen.

- Search by Word function

  User needs to select the number of stroke of the fist word of the idiom and then select the idiom from the ComboListBox. Notes of the idiom will be displayed on the screen.

- Search by Category function

  User needs to select the category of the idiom and then select the idiom from the ComboListBox. Notes of the idiom will be displayed on the screen.

3.4.2 Non-Functional Requirements Analysis

Non-functional requirements define the attributes of the system as it performs its job. It includes the aspects of supporting elements or anything that will enhance the system. These may be classified into the following categories: reliability (availability, integrity, security, safety, etc), accuracy of results, performance, human-computer interface issues, operating constraints, physical constraints, portability issues, and others. [Ghezzi, 1991]

1. User Friendliness

   A software system is user friendly if its human users find it easy to use. The user interface is an important component of user friendliness. For novice user a window interface and a mouse is friendlier than one that requires to user to use a set of one-letter command. Besides, consistency of the system's user with and operator interface, correctness and performance of the system, ease of use also affect the user friendliness. By considering most of the users are student, who are non-technical users, therefore the system must has a very user-friendly interface.

   User friendliness comprises of

   - attractive screen
   - notes are short, precise and easy to see

- user friendly interface
- mouse orientated

2. Understandability

Understandability is an internal product quality. Understandability in terms of coding method used, allows other programmers to understand the logic of program flows, thus changes can be made easily upon the necessary program segments. From an external point of view, the user considers the system understandable if it has predictable behavior. Simple and clear statements or messages are display to help user to use this system easily. We can follow certain guidelines to produce more understandable designs and write more understandable programs.

3. Efficiency

Efficiency means a process or a procedure can be called or accessed in several times to produce similar outcomes at a creditable pace and speed. For example, user can search any idioms within the database by using different methods in a short time. Story of the idiom is displayed immediately after user presses the story button.

4. Maintainability

It is commonly refers to the modifications that are made to a software system after its initial release. Majority time spent on enhancing the product with features that were not in the original specifications or were stated incorrectly there. Therefore, the system should possible to meet the changing needs of users. Develop a system in several modules which perform different tasks will ease the maintenance.

5. Reusability

In product evolution, we modify a product to build a new version of that same product; in product reuse, we use it – perhaps with minor changes – to build another product. Reusability appears to be more applicable to software components than to whole products but it certainly seems possible to build products that are reusable.

6. Correctness

A program is functionality correctly, if it behaves according to the specification of the functions it should provide. Correctness can be assessed through testing the program. It can be improved by using standard algorithms or using libraries of standard modules, rather than inventing new ones.

3.5 Development Tools Analysis

Analysis on the development tools for the system is carried out. After reviewing and analyzing all the requirements, the tools to be used to develop this system are decided. In choosing the development tools, suitability of the tools to the requirement is considered. Besides each of the selected tool must be able to support each other.

3.5.1 RADD Medothology

RADD methodology is the methodology used in developing this project. This methodology allows application development in very short time scale at a low cost, while maintaining very high standards in terms of user interface, code quality, database integrity and others aspects of system quality [RADD Methodology, 2000]. User-center design is an important feature in this methodology. It focuses on building a prototype early in the project life cycle. The prototype is then used to elicit users' feedback. Result of this methodology is the end product that meets users' expectations. RADD methodology allows us to meet the users needs successfully.

3.5.2 Operating System

Microsoft Windows 98

The Microsoft Windows 98 operating system is the upgraded Windows that makes the computer works and functions better. It provides better system performance along with easier system diagnostics and maintenance. It also supports the latest graphics, sound and multimedia technologies. Beside, it has the ability to easily add and remove peripheral devices with support for Universal Serial Bus (UBS).

Users for this system are students. Most of their personal computer is using Windows 98 as operating system. Therefore, Microsoft Windows 98 is chosen as the platform to run the CALCI package.

3.5.3 Software

1. Microsoft Visual Basic 6.0

   Microsoft Visual Basic 6.0 is a powerful tool to develop a system nowadays. It is the most productive tool for creating high-performance components and applications. This is because it is easy to use and learn and has the ability to develop a graphical user interface. It is chosen as the main development tool in this project.

2. Microsoft Access 2000

Microsoft Access 2000 has a lot of powerful features that make the designing of database easier and ease of use. Performance Analyzer is one of the features that enables analyzing of a database and make suggestion to optimize the speed and performance of the database. Beside, it provides security of the database by using password. Unauthorized person cannot open or modify the database without the password. Furthermore, it is more suitable for stand-alone system compare with Microsoft SQL Server 6.5. Therefore, it is chosen to develop database in this project.

3. Macromedia Flash 5.0

Macromedia Flash 5.0 enables us to create beautiful, compact and resizable animation and graphics. Besides, it can also generate the product into video clip in a smallest size as possible. Furthermore, it does not require any technical skill to operate it. Thus, it is easy to use and learn. Therefore, it is used to create the story part of the system in the form of video clip.

4. Adobe PhotoShop 6.0

Adobe PhotoShop 6.0 is a powerful tool for digital image enhancement, photo retouching, and image composing. It is an advanced image processing and creating program. Besides, it also allows image like clipart, scanned photo,

video captured image to have its color modified and enhancement. Therefore, it is using to create and edit picture, graphics, images and animation.

5. Chinese Star 2.97

Chinese Star 2.97 is a Chinese word processor designed to input, edit, format, convert and print Chinese documents. It supports Simplified and Traditional Chinese characters. Besides, it also consists of various popular input methods. Due to the familiarity and ease of use, it is used for preparing the notes of Chinese idioms.

3.5.4 Hardware

1. IBM compatible computer
   - This is the computer used throughout the development phase.
2. CD-ROM driver
   - 10x speed is the minimal requirement for reading computer data.
3. SVGA with 640 x 480 and 256 colors or higher
   - 256 simultaneous colors chosen from a palette are needed for multimedia package.

4. 2.1 gigabyte hard disk

   - A large storage hard disk is needed to build a large multimedia learning package.

5. 300 x 600 dpi scanner

   - Scanner is needed for scanning the pictures from books.

6. 8 bit MPC or compatible sound card

   - It is needed to display and record sound.

7. Speaker

   - It is use to display sound.

8. Microphone

   - It is required for recording sound.

3.6 User System Requirements

The following are the specification requirements of the system to run this learning package.

1. Windows 95 or Windows 98
2. CPU 133MHz or above
3. 16MB RAM or above
4. At least 40MB free space in hard disk

5. SVGA monitor with 640 x 480 pixels and 256 colours

6. CD-ROM drive with 10x or above

7. 8 bit MPC or compatible sound card

CHAPTER 4:
SYSTEM DESIGN

4.1 Introduction

Design process involves developing several models of the system at different levels of abstraction. As a design is decomposed, errors and omissions in earlier stages are discovered. These allow earlier design models to be improved.

A specification of some kind is the output of each design activity. This specification may be an abstract, formal specification that is produced to clarify the requirements or it may be a specification of how part of the system is to be realized.

There are several activities in the design process. They are architecture design, database design, process design and user interface design.

4.2 System Architecture

A system can be decomposed into sub-systems that provides some related set of services. The initial design process of identifying these sub-systems and establishing a framework for sub-system control and communication is called architectural design. Architectural decomposition is necessary to structure and organise the specification. Architectural model is the starting point for the specification of the various part of the system.

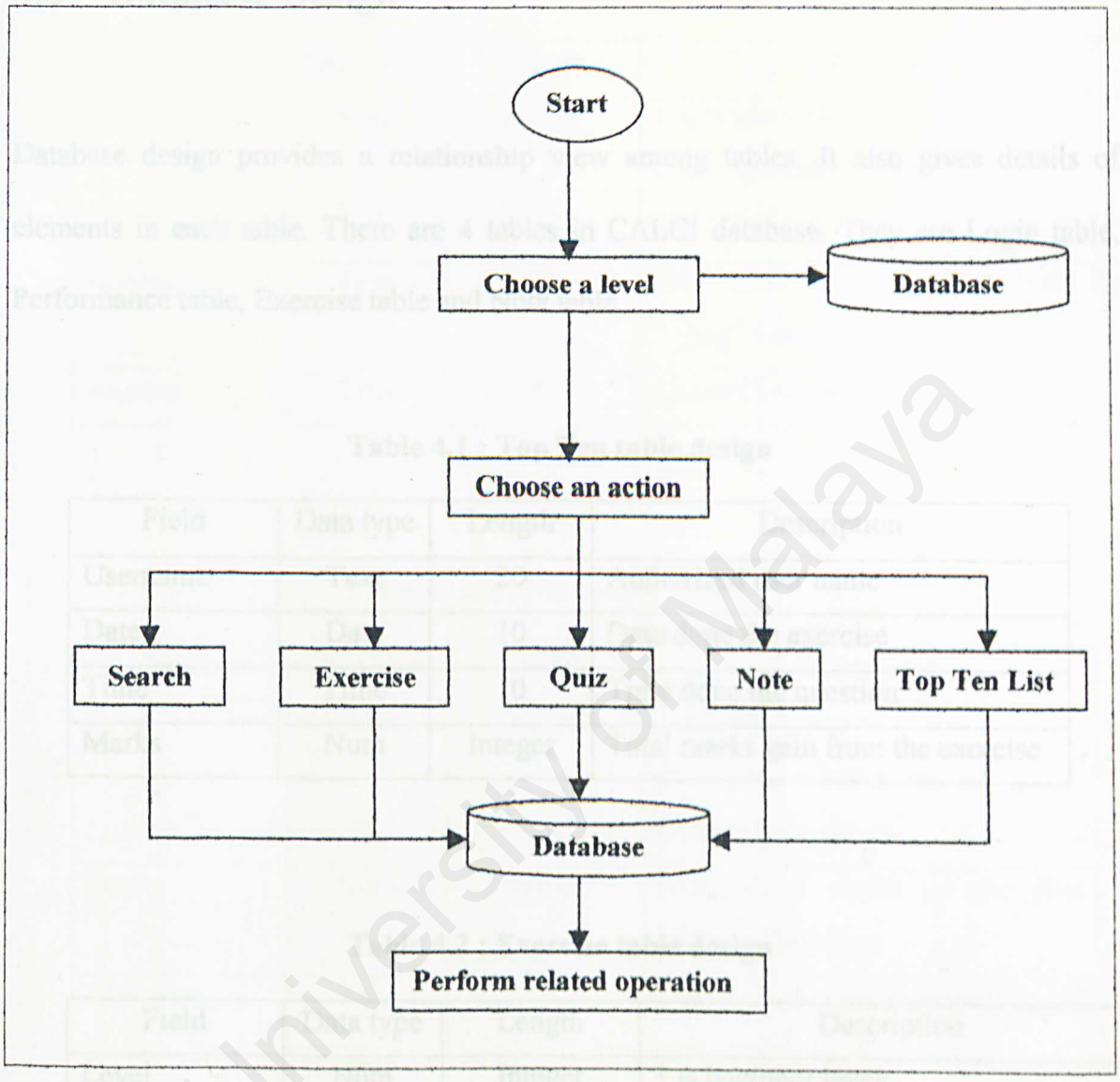

Figure 4.1 : Architectural design of CALCI

4.3 Database Design

Database design provides a relationship view among tables. It also gives details of elements in each table. There are 4 tables in CALCI database. They are Login table, Performance table, Exercise table and Note table.

Table 4.1 : Top Ten table design

Field	Data type	Length	Description
Username	Text	20	Authorized user name
Date	Date	10	Date done the exercise
Time	Time	10	Time done the question
Marks	Num	Integer	Total marks gain from the exercise

Table 4.2 : Exercise table design

Field	Data type	Length	Description
Level	Num	Integer	1 is beginner level; 2 is intermediate level; 3 is advanced level.
Question	Text	80	File name of the question with the ".jpeg" extension.
Answer	Text	50	Correct answer of the question

Table 4.3 : Quiz table design

Field	Data type	Length	Description
Level	Num	Integer	1 is beginner level; 2 is intermediate level; 3 is advanced level.
Question	Text	80	File name of the question with the ".jpeg" extension.
Answer	Text	50	Correct answer of the question

Table 4.4 : Note table design

Field	Data type	Length	Description
Level	Num	Integer	1 is beginner level; 2 is intermediate level; 3 is advanced level.
Stroke	Num	Integer	Number of stroke of the first letter of the idiom
Alphabet	Text	1	First alphabet of the first letter's pronunciation of the idiom
Category	Num	Integer	1 = encouragement ; 2 = social skill; 3 = morality; 4 = daily life; 5 = inner feeling; 6 = sight;
Idioms	Text	50	File name of the idiom's note with the ".jpeg" extension

Story	Text	50	File name of the idiom's story, which is a Flash application.
Picture	Text	50	File name of the idiom's picture with the "jpeg" extension.
Sound	Text	50	File name of the idiom's note reading record with the ".wav" extension.

4.4 Process Design

Process design that describes the flow of the whole system. Data structure chart or data flow diagram is used to illustrate the data flow of the system. It is also used as a reference to generate an algorithm.

Figure 4.2 shown the process design of CALCI system.

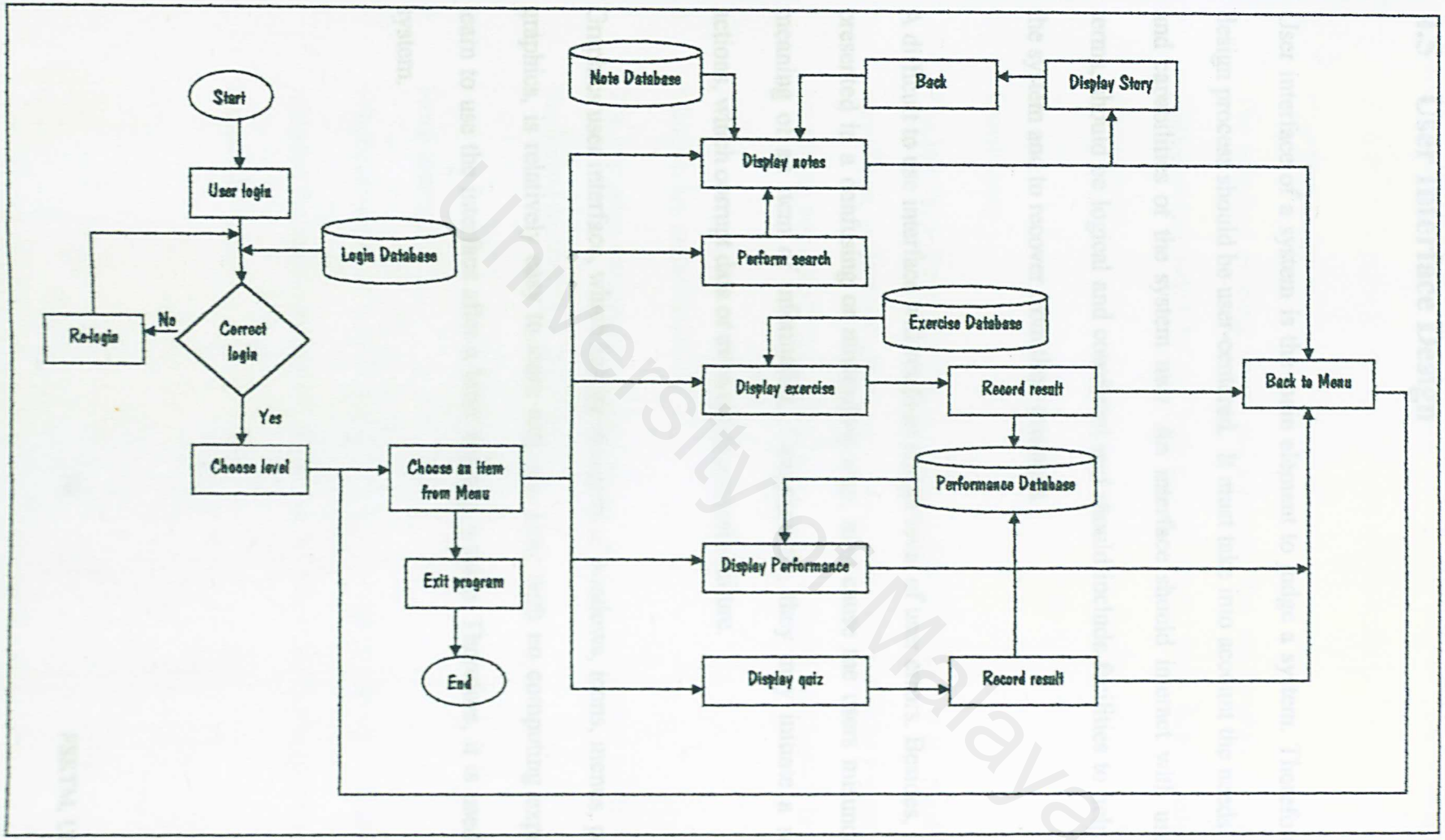

Figure 4.2 : Process design of CALCI system

4.5 User Interface Design

User interface of a system is the main element to judge a system. Therefore, interface design process should be user-centered. It must take into account the needs, experience and capabilities of the system user. An interface should interact with users in their terms, should be logical and consistent and should include facilities to help users with the system and to recover from their mistakes.

A difficult to use interface will result in a high level of user errors. Besides, information presented in a confusing or misleading way, may cause the users misunderstand the meaning of an item of information. Consequently, they may initiate a sequence of actions, which corrupt data or even cause a system failure.

Graphics user interface, which has the elements of windows, icons, menus, pointing and graphics, is relatively easy to learn and use. User with no computing experience can learn to use the interface after a brief training session. Therefore, it is used in CALCI system.

Besides, user interface of this system also includes the following characteristics.

1. User familiarity

   The interface is using terms and concepts that are familiar to the users. The objects manipulated by the system also should have direct analogues user's environment.

2. Consistency

   The interface is consistent where comparable operations is activated in the same way. Then, system commands and menus also have the same format, parameters pass to all commands in the same way, and command punctuation is similar.

3. Minimizing memorization

   The system is designed to mouse orientated. User is required points and clicks at the button to execute a function.

4. Error message

   Whenever an error is occurred, an error message is pop up. The error message includes the information of problem describing, and offer suggestions on how to correct the error.

5. Minimize number of input actions

System provides different kind of selection methods for user as input a data. For example, user uses mouse to select input from a combo box.

6. User guidance

The interface has incorporated a help facility. It provides basic information on getting started with the system to a full description of system facilities.

Following showed the user interface design in CALCI system.

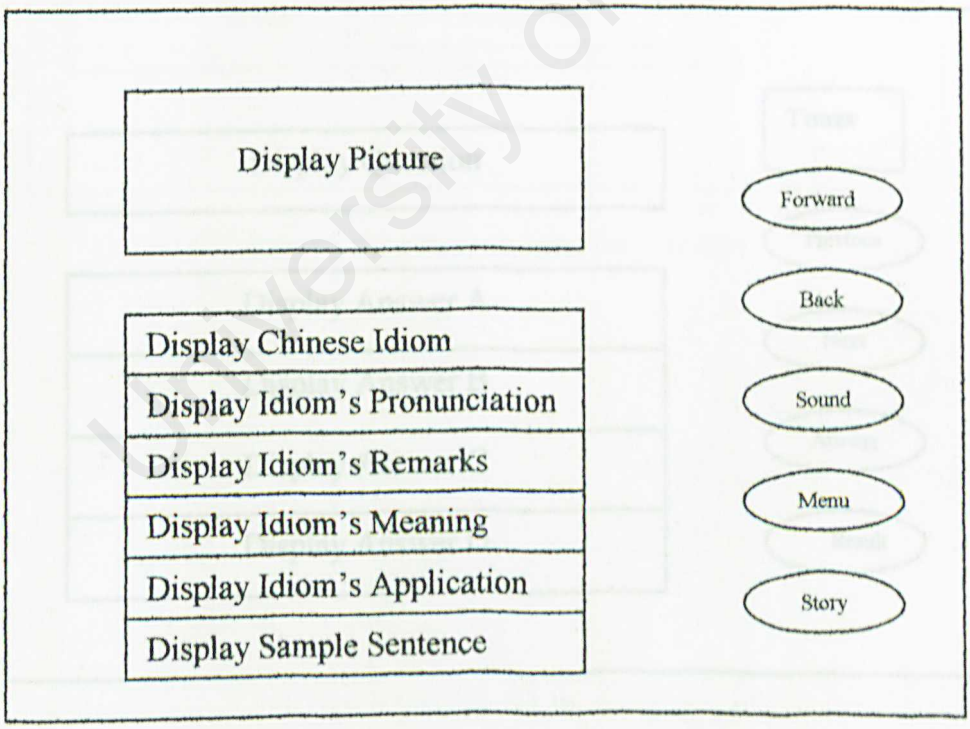

Figure 4.3 : Note interface design

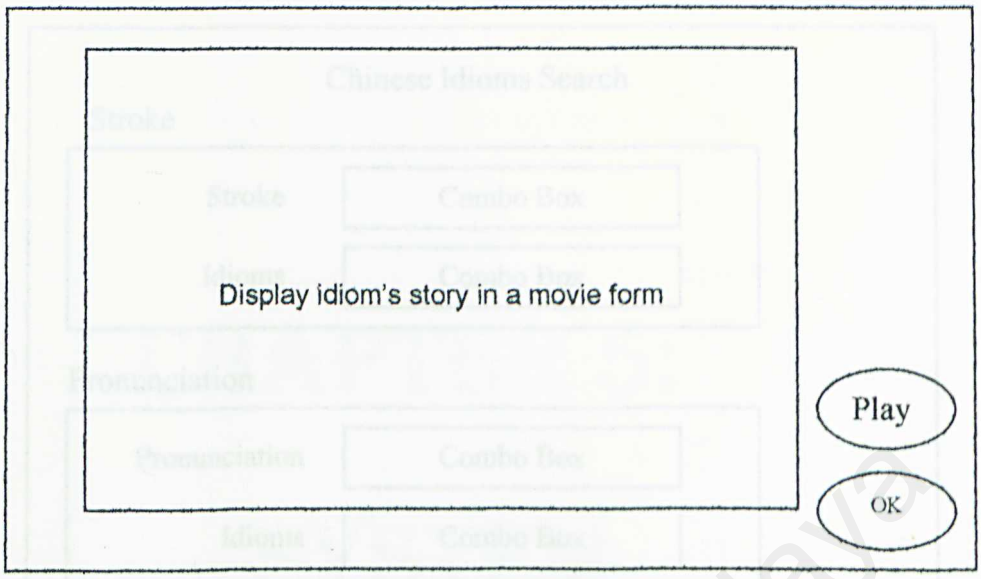

Figure 4.4 : Story interface design

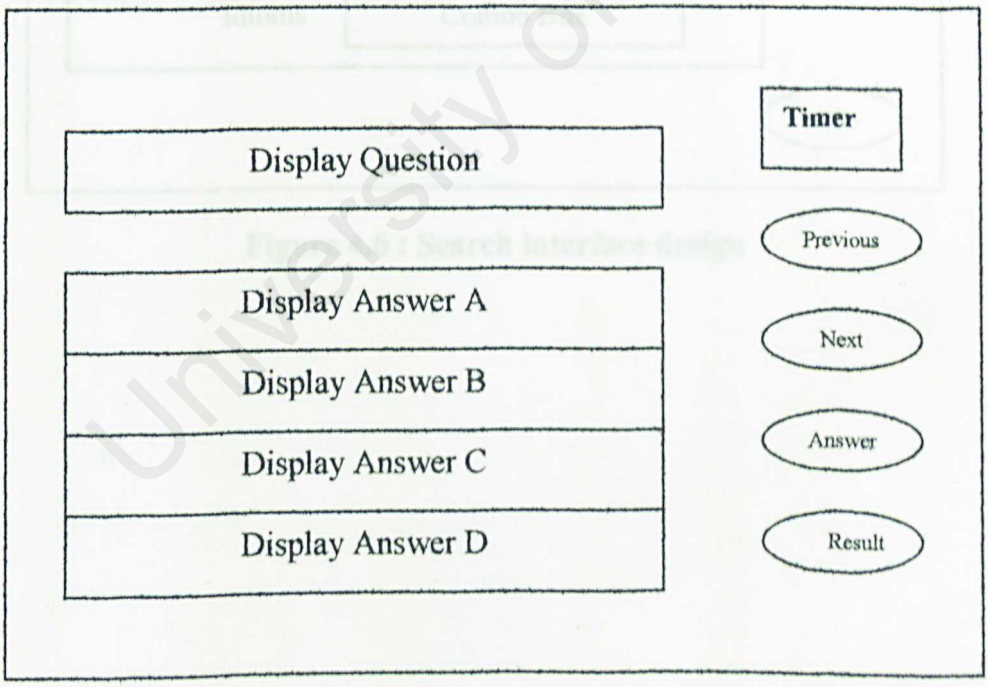

Figure 4.5 : Quiz interface design

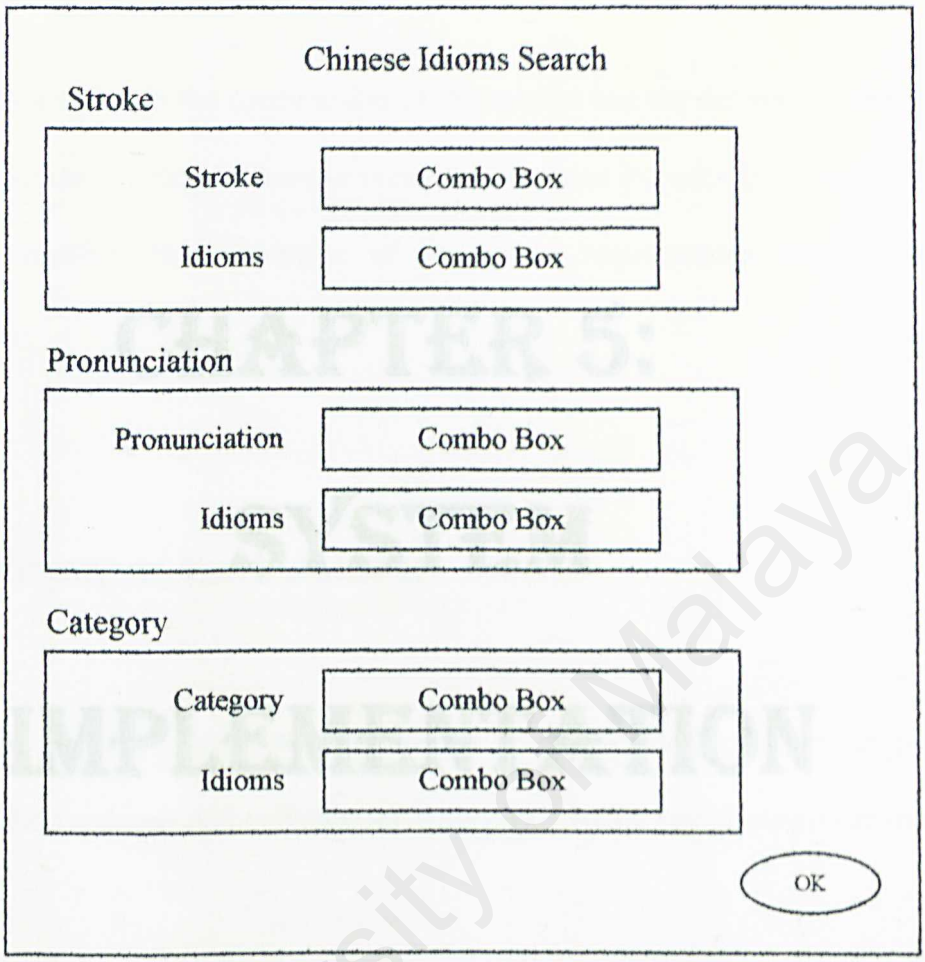

Figure 4.6 : Search interface design

CHAPTER 5:

SYSTEM

IMPLEMENTATION

5.1 Introduction

System implementation is the construction of the system and the delivery of that system into product. System implementation or construction phase includes building and testing of system. It involves the conversion of the system requirements and designs into program codes.

5.2 Development Environment

Using suitable hardware and software enable speed up system development. The following are the hardware and software tools used in develop and documented the entire system.

5.2.1 Hardware Requirements

Hardware used in develop CALCI system :

- 200Mhz MMX Pentium Pro Processor
- 32MB RAM
- 36X CD-ROM Drive
- 3.1 GB Hard Disk
- HP Scanner

- Speaker
- Microphone
- Other standard desktop PC components

5.2.2 Software Tools Requiremants

Below is a table that lists the software tools used in developing CALCI.

Table 5.1 Software Tools for Development CALCI

Software	Usage	Description
Microsoft Windows 98	System requirements	Operating System
Microsoft Visual Basic 6.0	System development	System coding
Microsoft Access 2000	Database	Build database to store and manipulate data
Microsoft Word 97	Contents deign	Note file design
Chinese Star 2.97	Contents design	Note file design
Adobe Photoshop 5.5	Interface design and contents design	Image and background design
Microsoft Paint 97	Contents design	Note file design
Macromedia Flash 4.0	Interface design and contents design	Background design and animation design
Presto! PageManager 2.30	Interface design and contents design	Scan images

5.3 Development of CALCI

Visual Basic 6.0 (VB6) is a very powerful tool for creates a graphical user interface application. CALCI had used some of its features and technology in creating, editing, deploying and managing the system. VB6 is chosen to develop the CALCI due to the following reasons.

- **Easy to learn**

  Coding of VB6 is as common language. Therefore it is easy to read, write and understand. Thus the learning time of this language is shorter.

- **Create windows application**

  VB6 enables development rapidly creates a windows-based application. It provides a complete set of building windows objects such as buttons, text boxes, list boxes, scroll bar and the others.

- **Support database connectivity**

  VB6 enable us to access the database built in Microsoft Access 2000. It acts as a front-end tool for user to modify, add, delete and view the contents of the database.

- **Support Flash application**

  VB6 consists component for supporting movie created by Flash in .swf extension This feature enable CALCI to display the idiom's story in a movie form with minimum size of file.

- **Timer control**

  VB6 provides timer control that enable execute code in a regular interval. In CALCI timer control is used to record the time of the quiz and exercise.

Microsoft Word 97 and Chinese Star 2.97 are used to prepare the idiom notes. Microsoft Paint 97 is used to convert all the notes from ".doc" into ".gif" format, by cut and paste method. By doing this, the CALCI system will able to display all Chinese characters without supporting of any Chinese software.

Besides, Presto! PageManager 2.30, Adobe Photoshop 5.0 are used for beatifying the interface. Presto! PageManager is used to scan pictures from newspapers, books and magazines. While Adobe Photoshop is used to edit and draw images.

Finally, Macromedia Flash 4.0 is used to create a movie of an idiom's story. All movie is save in swf file which supported by VB6.

Program optimization is a process of improving the efficiency of the system. CALCI is a graphical user interface application. Thus, the speed at which information appears on the screen is the important issue for user to judge how well of the system. The following are the approaches used to optimize the program.

- **Enhance the execution speed of program**

  Avoid using variant data types, which require additional internal program standards to identify the information being store. Besides, minimize program initialization when loading a form also make the displaying faster.

- **Decrease the memory used to run the program**

  Reviewing codes for unused variables, constants and remove them from the program codes.

5.4 System Coding

Following are features of the system coding

- Modular

  System is built module by module. Each module have their own functions. For example, notes module will have functions of displaying picture and note, go to next note, go to previous note, enable sound and disable sound. Modulation will make the maintenance easier to carry out in the future.

- Independent

  Each function is independently. That is whenever changes are made in one function it will not affected the others function. Therefore, any changes needed on function will be easier and faster.

- Understandable

  Comments of coding or program are written in each function. This will make the coding of the system is easier to understand by others people.

5.5 Testing

The objective of software testing is to uncover errors. To fulfill this objective, a series of test steps are planned and executed. They are unit testing, integration testing and system testing.

Software testing is a critical element of software quality assurance and represents the ultimate review of specification, design and coding. There are several rules to achieve testing objective as following.

- Testing is a process executing a program with the intent of finding an error.
- A good test case is one that has a high probability of finding an undiscovered error.
- A successful test is one that uncovers a yet undiscovered error.

5.5.1 Unit Testing

Unit testing normally considered as an adjunct to the coding step. Unit testing focuses on verification effort on the smallest unit of software component or module. The module interface is tested to ensure that information properly flows into and out of program unit under test. Local data structure is examined to ensure that data stored temporarily maintains its integrity during all steps in algorithm's execution. While boundary conditions are testes to ensure that the modules operate properly at boundaries established to limit or restrict processing. All independent paths through the control structure are

exercised to ensure tat all statements in a module have been executed at least once. Finally, all errors handling paths are tested.

For CALCI, unit testing was taken out during coding phase. After the source codes of a module has been developed, reviewed and verified for the correct syntax, unit-testing case was designed. The module was tested to ensure that it operates correctly. Any errors found in the module are fixed immediately.

5.5.2 Integration Testing

The purpose of integration testing is to adequately test whether or not the software actually runs as one program. It is a systematic technique for constructing the program structure while at the same time conducting tests to uncover errors associated with interfacing. If interface testing shows that the calling/called structure is compatible, the called module works with a driver and the calling module works with a stub, then, interface testing show that this relationship is true when the two nodules are actually pit together and further linked into other modules that were similarly tested.

Incremental integration approach is used in CALCI, which base on " build a little, test a little" basic. Where the program is constructed and tested in small increments, where errors are easier to isolate and correct. All errors will be corrected before proceeding to the next integration.

5.5.3 System Testing

A system test is a series of different tests designed to fully exercise the system to uncover its limitations and measure its capabilities. Although each test has a different purpose, all work to verify that system elements have been properly integrated and perform allocated functions, which meet the specified requirements.

The following steps are used to test the CALCI system.

- **Function testing**

  This is the first step taken in the system testing, which focuses on functionality. Effective function tests have a high probability of detecting a fault. There are come guidelines used by CALCI for function testing as listed below.

  - Have a high probability of detecting a fault.
  - Know the expected actions and outputs.
  - Test both valid and invalid inputs.
  - Never modify the system just to make testing easier.
  - Have stopping criteria

- **Performance Testing**

  Performing tests are conducted to ensure that the system response time meets user expectations and does not exceed the specified performance criteria under heavy stress or volume. It is measured against the performance objectives set by user as expressed in the nonfunctional requirements. In CALCI, speed of response to the user

commands, accuracy of the result, and the accessibility of data are checked against the user's performance prescriptions.

- **Acceptance Testing**

The purpose of acceptance testing is to enable the users to determine whether the system built is meets their needs and expectations. Thus, two users have been chosen to perform the test. One of them is standard 5 and the other is form 3 student. They found that the system is quite attractive, especially the exercise part but still needs some enhancement on the animation part (story).

- **Installation Testing**

The final testing is installation testing the system at user sites. At the beginning of testing, we configure the system to the user environments. Installation tests require us to work with the user to determine what tests are needed on-site. Regression test may used to verify tat the system has been installed and works properly. While the test cases ensure that the system is complete and all necessary files and devices are present. In CALCI system, tests are focus on completeness of the installation system and verification of any functional or non-functional characteristics that may be affected by site conditions.

CHAPTER 6:

EVALUATION AND CONCLUSION

6.1 Project Problems and Solutions

There are some problems encountered throughout the development of CALCI as listed below.

- **Choosing software development kits**

  There are many software tools to develop CALCI system. Each software tools have their own strengths and limitations. Due to lack of knowledge about those software tools, the selection process of choosing suitable software development tools becomes more critical.

  However, the problem is solved by retrieving information of software tools from Internet and read their features from books. In addition, advice and guidance from course mates and project supervisor also make me to clarify what software tools are suitable to built the system.

- **Display image in a combo**

  Visual Basic cannot display in a combo box control. Therefore, with refer to the help file and references from books, image combo control is suggested. By using this control, all image should be keep in the image list in order to enable those image to display in the combo.

- **Convert Chinese characters from word format into image format**

  Although Chinese characters are organized and arranged nicely in word document, some of those characters are running out while paste to the Microsoft Paint. Especially those pronunciation symbols are disappearing after paste to the Microsoft Paint. Therefore, needs to adjust, edit and draw those improper Chinese characters by myself. This really took lots of time to do it.

- **Unfamiliar of Photoshop**

  Due to it is the first time of using Photoshop many powerful of its features are undiscovered and causes some problems while using it to edit picture. However, with the guidance of course mates and try and error, finally I manage to handle it to do my work.

- **Unfamiliar of Flash**

  Although Flash enables us to crate attractive animation, due to the time constraints I only able to learn some basic features of it. In additional, edit of a picture may take lots of time. Therefore, I have decided to make those animations in a simple form.

6.2 System Strengths

The following are strengths of the CALCI system.

1. **Attractive interface and picture**

   CALCI attractive interface to attract the desire of users to use it. Interesting picture presented in the system in order to help users memorized the related idiom.

2. **Interesting exercises**

   The exercises are develop as a game style, which make the exercises more interesting and users more willing to try on it.

3. **Story telling**

   The story is developed as a movie form. It enables user to know the source of the idiom come from.

4. **Voice reading**

   This system also provides voice reading for each idiom. It helps users to understand and know particular word that they do not know.

5. **User friendliness**

   CALCI system is a graphical user interface application. Buttons are provided to enable users to perform commands. Consistency of the interface and predictable control objects make the learning curves becomes shorter.

6. **Online help**

   Online help is provided in the system. It is useful to provide guidance to the user for a particular problem. It may reduce the time for user to search through the user manual.

6.3 System Limitations

CALCI is a fully electronic operation learning system. It also has its limitations like the others systems. The following are the limitations of CALCI.

1. **Cannot support multi-user environment**

   CALCI is a stand-alone system. It cannot support multi-user environment. All users have to install the system into their computer in order to run it.

2. **Cannot store additional notes**

   This system is not allows user to add new idioms into the database. Therefore, it is limited to store 690 idioms only.

3. **Do not keep user's performance record**

   This system does not keep each user's performance record related with the exercise and quiz. Thus, users are unable to trace their performance.

4. **Recovery**

   This system does not recover the quiz and exercise section when the system fails or halts. That means users have to redo the quiz or exercise.

6.4 Future Enhancement

The system limitations should be improved and corrected in order to enhance the functionality of CALCI in the future. The following are some suggestions to add more values to the current version of CALCI.

1. **Multi-user environment or network**

   CALCI system can be modify to enable network accessing. In this environment, the system is required to be install in a server. Thus the others computers which connected to the server will be able to access CALCI system. This situation is useful and suitable for school.

2. **Add notes into database**

   In future, this system will enable to add the others relevant note, picture, story, exercise and quiz into the database. Therefore, the system will be more up to date.

3. **Reporting user performance**

   Report function can be added to the system to show each exercise and quiz result of a user. Thus, users are able to keep track of their result and compare their performance in the pass easily.

4. **More interesting and attractive animation**

   There are only a few animations in the current system. To make the learning process more interesting in the future, each idiom should have its own story in animation form.

5. **Recovery**

   In future, the system should be able to automatically save the exercise or quiz during execution. So that, the system can recover the exercise or quiz after the system fails.

6.5 Conclusion

CALCI has been successful in attain its objective of develop a high quality courseware for the students. CALCI is a user friendly, easily understood and attractive, which make the learning process more efficient. However, some limitation as mention earlier should be enhanced in order to make the system more compatible and powerful in the future.

Develop a multimedia application is a very challenging task. A lot of research, time and effort have been taken in order to make this project successful. Anyway, a lot of valuable knowledge that cannot gets through the lecture is gained throughout the development of this project. They are window-based programming techniques, concepts and developing application using Visual Basic, opportunity to explore to others software tools like Macromedia Flash and Adobe Photoshop.

Throughout this project, a lot of experiences have been gained, new knowledge has been acquired, improvement in understanding project management and improvement in the

communication skill. Finally, this project enables the implementation of the software engineering approach to be implied in the development of the system.

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APPENDICES

APPENDICES A:

QUESTIONNAIRE

Survey of Using Computer to Learn Chinese Idioms

Please **circle** your answers:

1. Do you have a computer at home ? Yes No
   (If **Yes**, please answer question 3 to 9)
   (If **No**, please continue question 2 to 9)

2. Do you plan to buy a computer ? Yes No

3 Do you know how to use a computer ? Yes No

4. Are you interested with the computer ? Yes No

5. Are you interested with the Chinese Idioms ? Yes No

6. Do you feel that learning of Chinese Idioms is difficult ?
   Difficult Average Easy

7. What difficulties do you faced while learning Chinese Idioms ?
   (May be more than one answer)
   A. No problem
   B. Don't know the meaning of Chinese Idioms
   C. Hard to memorize the Chinese Idioms learned before
   D. Don't know how to apply the Chinese Idioms
   E. Don't know how to pronounce the Chinese Idioms
   F. Other difficulties (Please list down) :_____
   _____

8. Would you like to use computer to learn Chinese Idioms ? Yes No

9. If you could use a computer to learn Chinese Idioms, what are the functions that you are expected ?
   (Answer can more than one)
   A. Has idiom's story (includes sounds, pictures and animation)
   B. Has idiom's dictionary
   C. Has idiom's sample sentences
   D. Has idiom's explanation
   E. Has idiom's exercises and quizzes
   F. Other functions (Please list down) :_____
   _____

利用电脑学成语调查

请圈出你的答案

1 你家里有电脑吗？ 有 没有
【 如有，请回答第三题至第九题 】
【 如没有，请回答第二题至第九题 】

2 你有打算买电脑吗？ 有 没有

3 你会用电脑吗？ 会 不会

4 你对电脑有兴趣吗？ 有 没有

5 你对成语有兴趣吗？ 有 没有

6 你觉得成语难学吗？ 难 中等 容易

7 你学成语时面对什么困难？
【 可以圈超过一个答案 】

A 没有困难
B 不明白成语的意思
C 很难记得学过的成语
D 不会应用成语
E 不会成语的发音
F 其它困难（请写出来）：_____
_____

8 如果可以用电脑来学成语，你会去尝试用吗？ 会 不会

9 如果用电脑来学成语，你希望它有什么功能？
【 可以圈多过一个答案 】

A 有成语故事（有声音.图画和动画）
B 有成语字典
C 有成语例句
D 有成语解释
E 有成语练习
F 其它功能（请写出来）：_____

_____

APPENDIX B :

USER MANUAL

User Manual Table of Content

User Manual List of Figures

A. Main Section

1. Figure 1 is the first interface of the program.
2. Click on the button to access to the particular level you want.
3. Click the help button to get help.
4. Click exit button to exit the program.

Figure 1 : First interface of the program

(i) Level

1. Each level has the some buttons as shown in Figure 2.
2. Click the note button to access to the notes of the idiom.
3. Click the search button to enable you to search for a particular idiom.
4. Click the exercise button to access to the exercise section.
5. Click the quiz button to access to the quiz section.
6. Click the quick button to back to the main section.

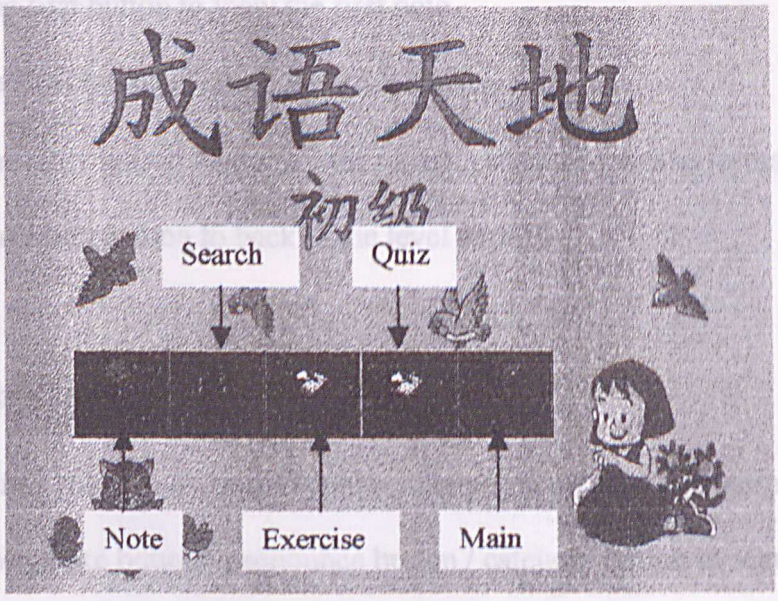


Figure 2 : Buttons in each level

B. Notes Section

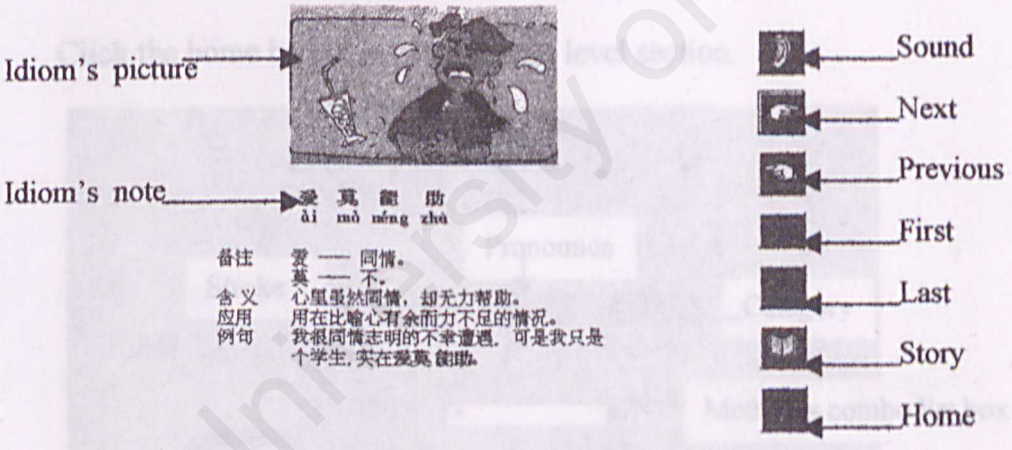


Figure 3 : Notes section interface

1. Click the sound button to disable the sound.
2. Click the next button to view the next idiom's note.
3. Click the previous button to view the previous note.

4. Click the first button to view the first note.

5. Click the last button to view the last note.

6. Click the story button to display the idiom's story in a movie format.

7. Click the home button to back to the level section.

C. Search Section

1. There are 3 methods for searching an idiom as shown in the Figure 4.

2. Click the stroke button / pronounce button / category button to search an idiom.

3. Click the combo list box of stroke / pronounce / category to choose the suitable information which match the idiom you want to find.

4. Click the combo list box of idiom and choose an idiom you want from the list.

5. Click the search button to display the idiom you have chosen.

6. Click the home button to return to the level section.

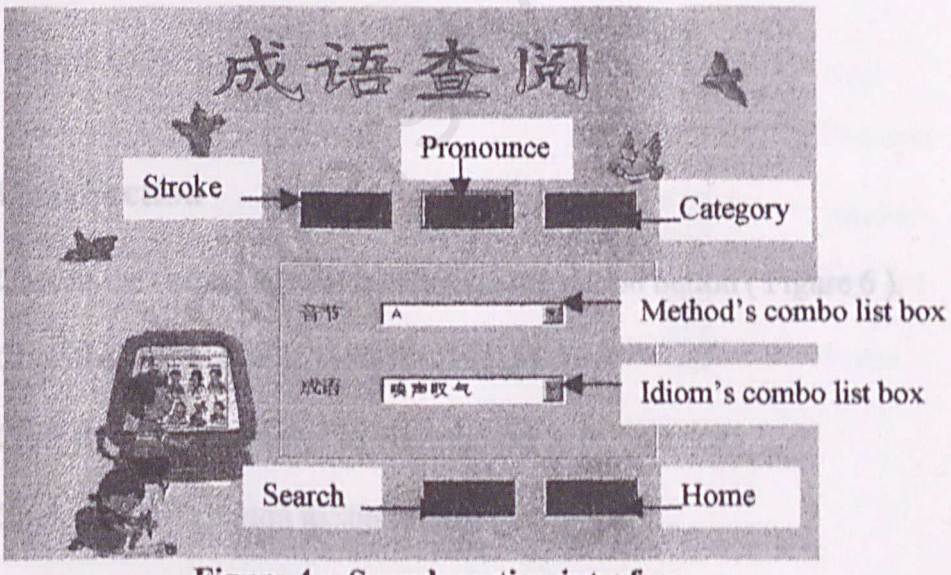


Figure 4 : Search section interface

D. Exercise Section

1. There are 30 seconds for you to do the exercise.
2. Click the correct colour of the snowman that matches with the answer.
3. Time and marks are shown at the right side of the interface (Figure 5).
4. 4 marks will be gained for each correct answer, while 1 mark will be deducted for each wrong answer.

Figure 5 : Exercise section interface

E Quiz Section

1. Choose the correct answer by clicking the option button (Figure 6).
2. Click the next button to view the next question.
3. Click the previous button to view the previous question
4. Click the finish button to summit the quiz.
5. Result of the quiz is shown. (Figure 7)
6. Click the answer button to view the correct answers of the quiz. You can navigator the answers by clicking the next button and previous button.

7. Click the top ten board button to view the top ten result. (Figure 8)

8. Click the home button to return to the level section.

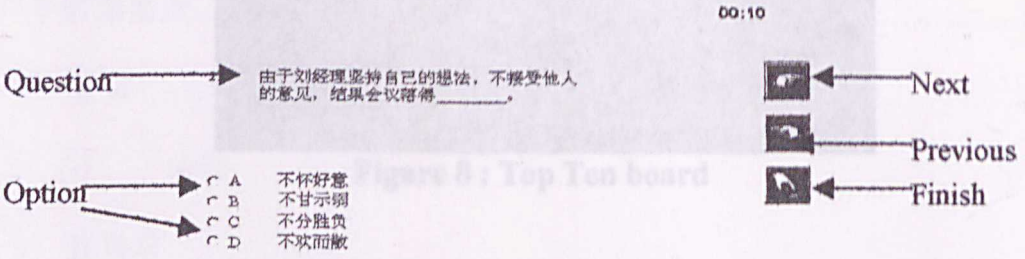


Figure 6 : Quiz Section interface

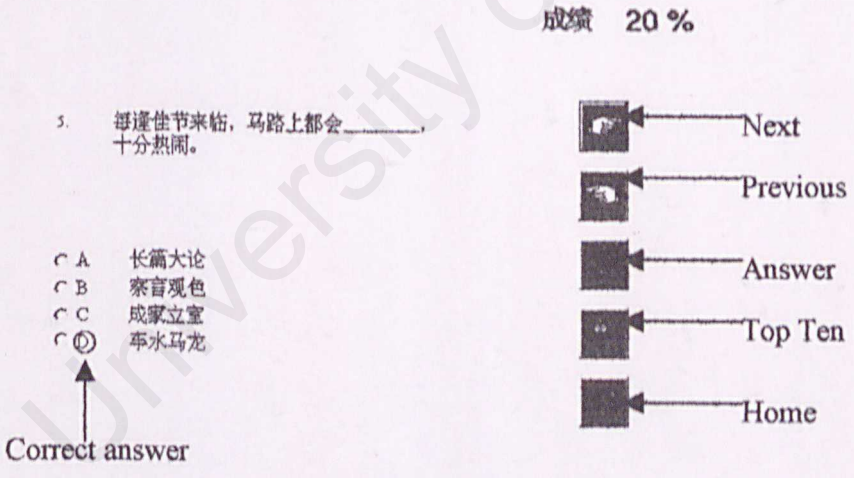


Figure 7 : Displaying quiz result

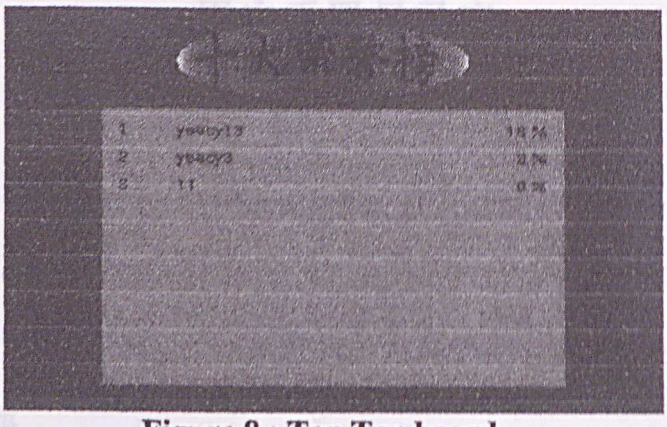


Figure 8 : Top Ten board

用户手册目录表

用户手册图案表

A. 首页

1. 图案(一)是此软件的首页.

2 请选择初级, 中级或高级按钮进入你所适合的阶级.

3. 按帮助按钮寻求帮助.

4. 按退出按钮以退出软件.

图案(一)：软件首页

(i) 阶级

1. 每个阶级都有相同的按钮如图案(二).

2. 注释按钮让你进入成语笔记.

3. 寻找按钮让你察寻成语.

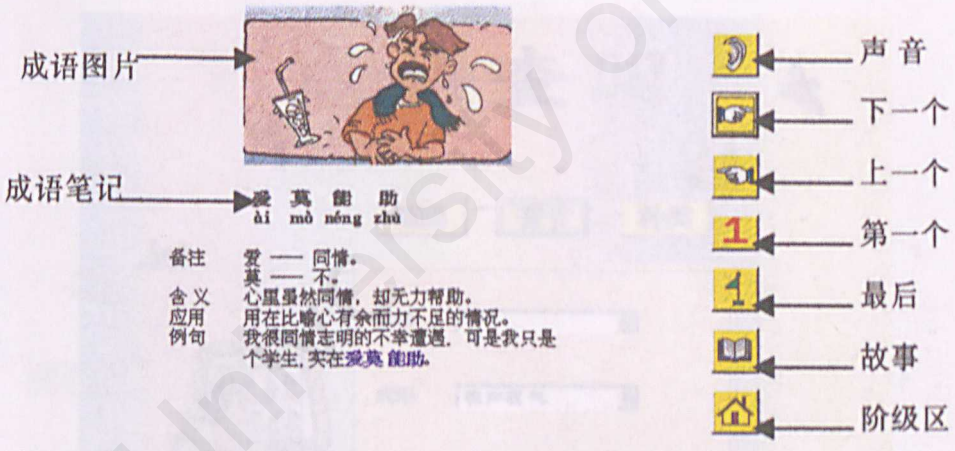
4. 练习按钮让你进入练习区.

5. 测验按钮让你进入测验区.

6. 回返按钮让你返回首页.

图案(二)： 阶级外表

B. 注释区



图案(三)： 注释区

1. 声音按钮让你关掉声音.

2. 下一个按钮带你 到下一个笔记.

3. 上一个按钮带你 到上一个笔记.

4. 第一个按钮带你到第一个笔记,

5. 最后按钮带你到最后一个笔记.

6. 故事按钮让你观赏成语故事电影.

7. 阶级按钮带你返回阶级区.

C. 寻找区

1. 一共有三种方法让你寻找成语如图案(四).

2. 选择你所要的方式按钮.

3. 在陈列格中选出恰当的笔画, 音节或种类, 然后再选出你要的成语.

4. 按查阅按钮以观看有关的成语注释.

5. 按返回按钮以回返阶级区.

图案(四)： 寻找区

D. 练习区

1. 只有三十秒让你完成练习.
2. 依照你选择的答案, 在恰当的雪人按一下.
3. 时间与分数都显示在右手边.
4. 每对一题将得四分, 错一题扣一分.

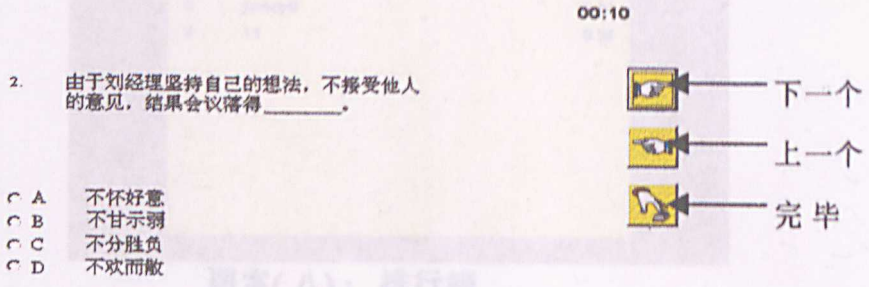
图案(五): 练习区

E 测验区

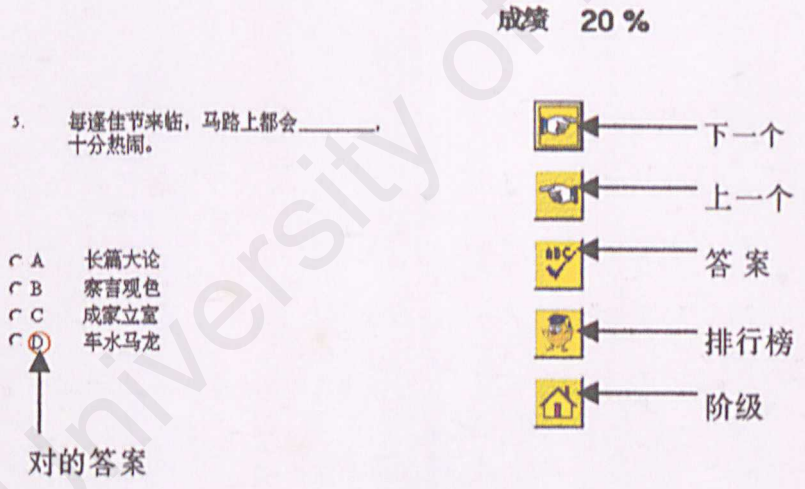
1. 在对的答案按一下.
2. 按下一个按钮到下一道问题.
3. 按上一个按钮到上一道问题.
4. 按完毕按钮结束测验.
5. 测验成绩将会显示出来.
6. 按答案按钮校对对的答案.

7. 按排行榜按钮观看十个最杰出的成绩.

8. 按阶级按钮返回阶级区.



图案(六)： 测验区



图案(七)： 答案校对

图案(八)： 排行榜