

**CREATING A BLENDED LEARNING ENVIRONMENT THROUGH
THE USE OF AN INTERACTIVE MULTIMEDIA E-BOOK FOR
TEACHING-LEARNING CHINESE AS A SECOND
LANGUAGE AT TERTIARY LEVEL**

By

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ABSTRACT

CREATING A BLENDED LEARNING ENVIRONMENT THROUGH THE USE OF AN INTERACTIVE MULTIMEDIA E-BOOK FOR TEACHING-LEARNING CHINESE AS A SECOND LANGUAGE AT TERTIARY LEVEL

Pang Set Weei

In view of the limitations of traditional teaching and e-learning approaches, this study explores the possibilities of introducing a blended learning (BL) approach which combines the advantages of both face-to-face and computer-mediated instructions in TCSL (Teaching Chinese as a Second Language) classrooms at tertiary level. The main objective of this study is to create and evaluate the efficacy of a BL environment through the use of an interactive multimedia e-book for TCSL. There are five sub-objectives: 1) To design and develop an instructional design model which is deemed suitable for TCSL through the use of an interactive multimedia e-book in a BL environment at tertiary level; 2) To design and create a conceptual framework and modules design model for the development of an interactive multimedia e-book for TCSL; 3) To develop a prototype of an interactive multimedia e-book which contains the existing printed textbook contents, educational activities, and main features that are perceived to be useful as one of the instructional tool in a BL environment for TCSL; 4) To evaluate the ease-of-use of the functionalities provided in the prototype of an interactive multimedia e-book for TCSL; and 5) To evaluate the efficacy of BL approach through the use of

an interactive multimedia e-book in TCSL compared to traditional instruction. The findings of usability evaluation on ECLearn showed that students perceive the functionalities for TCSL provided in ECLearn are ease of use. Results from the hypothesis testing using pretest-posttest designs indicated that the achievements of students in the BL environment for TCSL are comparable to or even higher than the traditional instruction. The study was conducted in a limited period of time (14 weeks), with a limited number of students (20 students). Overall, it can be concluded that, all the research objectives formed in this study have been successfully achieved.

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In addition, I would like to thank my co-supervisor, Ms Beh Hooi Ching, who has given me a lot of advices and at the same time encourage me to progress and completed this thesis. Her encouragement and support has been the driving forces that encourage me in completing my thesis.

Besides, I would also like to thank all my peers who have directly or indirectly helped me before during the development of my thesis. They have provided valuable solutions or suggestions for me when I faced problem.

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SUBMISSION OF THESIS

It is hereby certified that **PANG SET WEEI** (ID No: **10UEM03916**) has completed this thesis entitled “**CREATING A BLENDED LEARNING ENVIRONMENT THROUGH THE USE OF AN INTERACTIVE MULTIMEDIA E-BOOK FOR TEACHING-LEARNING CHINESE AS A SECOND LANGUAGE AT TERTIARY LEVEL**” under the supervision of Dr. Siew Pei Hwa (Supervisor) from the Department of Multimedia Design & Animation, Faculty of Creative Industries, and Ms. Beh Hooi Ching (Co-Supervisor) from the Department of Internet Engineering and Computer Science, Faculty of Engineering and Science.

I understand that University will upload softcopy of my thesis in pdf format into UTAR Institutional Repository, which may be made accessible to UTAR community and public.

Yours truly,

(PANG SET WEEI)

APPROVAL SHEET

This thesis entitled “**CREATING A BLENDED LEARNING ENVIRONMENT THROUGH THE USE OF AN INTERACTIVE MULTIMEDIA E-BOOK FOR TEACHING-LEARNING CHINESE AS A SECOND LANGUAGE AT TERTIARY LEVEL**” was prepared by PANG SET WEEI and submitted as partial fulfillment of the requirements for the degree of Master of Information Systems at Universiti Tunku Abdul Rahman.

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DECLARATION

I **PANG SET WEEI**, hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UTAR or other institutions.

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LIST OF ABBREVIATIONS

Abbreviation

ADDIE	Analysis, Design, Development, Implementation, Evaluation
AT	Authoring Tool
BC	Broadcasting
BL	Blended Learning
BLLE	Blended Language Learning Environment
C	Computer
CAI	Computer Aided Instruction
CAS	Computer Attitude Scale
CBL	Computer Based Learning
CD	Compact Disc
CE	Consults the Expert
CL	Computer Laboratory
CSL	Chinese as a Second Language
CT	Computer-based Technology
DC	Dick and Carey
DS	Design Specification
EC	ECLearn Prototype
ECLearn	E-Book for Chinese Learning
EE	Educational Expert
E/I	Existing Document/Instrument
FAS	Faculty of Arts and Social Science
FCI	Faculty of Creative Industries
FTF	Face To Face

GD	Graphic Design and Multimedia
GUI	Graphical User Interface
HSK	Hanyu Shuiping Kaoshi
I	Instructor
ID	Instructional Design
IDE	Instructional Design Expert
IME	Interactive Multimedia E-book
ITE	Information Technology Expert
IV	Interview
LC 2008	Learn Chinese 2008
LC 6.0	Learn Chinese 6.0
LCL	Learner Centred Learning
LMS	Learning Management System
MRK	Morrison, Ross and Kemp
MT	Multimedia Technology
NOCFL	National Office for Teaching Chinese as a Foreign Language
PC	Personal Computer
PDA	Personal Digital Assistant
POT	Post-Test
PRC	People's Republic of China
PRT	Pre-Test
PT	Print Technology
PTB	Printed Textbook
R	Review
S	Survey

SB	Storyboard
SEEQ	Students' Evaluation of Educational Quality
SEI	Student Evaluation of Instruction
SPSS	Statistical Package for Social Science
SWF	Shockwave Flash Format
TCSL	Teaching-learning Chinese as a Second Language
TI	Traditional Instruction
T-L	Teaching and Learning
TU	Target User
UCF	University of Central Florida
UM	User Manual
UT	Usability Testing Questionnaire
UTAR	Universiti Tunku Abdul Rahman
WBLE	Web Based Learning Environment
WSFLC	Wenlin Software For Learning Chinese

CHAPTER 1

INTRODUCTION

1.1 Introduction

The rising importance of Chinese language in the era of globalisation is undeniable. In recent years, the interest in the teaching and learning of Chinese as a second language has grown together with the international status of China. There is a huge global demand for Chinese as a second language. Preliminary statistics show that there are more than 40 million people in the world have learnt Chinese as a foreign (or second) language (Beijing Review 2011). Meanwhile, statistics from the National Office for Teaching Chinese as a Foreign Language (NOCFL) of China (Gong 2006) revealed that approximately 2,500 universities or colleges in more than 100 countries and regions offer Chinese courses.

As the number of learners grows, instructors should use effective teaching methods to create a more conducive environment to Chinese language learning. Sufficient teaching materials are needed to ensure learners can learn Chinese language more easily and effectively. Methods that can be used in language learning are traditional classroom and e-learning approaches. Kim (2007) claimed that traditional classroom approach is a proven and effective means of learning, with full opportunities for interaction between the

instructor and students, the learning-inducing stress of exams and homework, and relationship forming among students. According to Yucel (2006), e-learning approach is defined as:

... a web-based educational system on platform with Internet, Intranet or computer access. Students have access to the course contents whenever they want and communicate with their peers or teachers via communication tools such as e-mail and forums (p. 123).

However, recognizing the limitations of traditional classroom and e-learning approaches, the term “Blended Learning” (BL) which is defined as “a description of particular forms of teaching combined with technology” has come on the scene and has gained considerable interest among educators and researchers in recent years (Dzakiria et al., 2006).

This study gives emphasis to the development and use of a blended learning environment through an interactive multimedia e-book for Chinese language learning at tertiary level. It analyses the ways in which instructors can adopt a “blended learning” approach that incorporates both face-to-face and computer-mediated instruction into the TCSL (Teaching-learning Chinese as a Second Language) classrooms. A combination of classroom teaching and multimedia materials is believed to be an ideal combination for TCSL practices. Hence, it also aims to research on the efficacy of a blended learning environment through the use of an interactive multimedia e-book in TCSL compared to traditional instruction.

1.2 Background of the Study

Almost all the higher institutions in Malaysia offer Chinese or Mandarin as second language (some may consider as third language) course to its non-Chinese students. In Universiti Tunku Abdul Rahman (UTAR), the Department of Languages and Linguistics offers an elective subject called “Introduction to Chinese Language I” to non-Chinese educated students (previously this subject was offered by the Department of Chinese Studies). These students are undertaking Bachelor Degree of Communication, either majoring in Advertising, Graphic Design and Multimedia, Broadcasting, Journalism, English Language or Public Relation. The Chinese language background of these students can be generally categorised as follows:

- i. those who started learning the Chinese language from scratch in university and never study Chinese via formal language instructions,
- ii. those Chinese whose family members do not speak any Chinese,
- iii. those students who come with the Chinese language proficiency in listening and speaking, but lack competence in reading and writing, and
- iv. other ethnic (non-Chinese) students.

This elective subject introduces students to the basis of Chinese language pronunciation, writing, speaking and reading. Students are taught how to conduct casual conversation, and write some Chinese characters

following the correct stroke order. Student will also be taught appropriate elementary level vocabulary, grammar and the construction of sentences. The students study four hours per week for a total of 14 weeks.

In the existing instruction mode, the Chinese language instruction in the “Introduction to Chinese Language I” classroom adopts “chalk-and-talk” approach. It is implemented by giving well-structured lessons in the classroom that complements the prescribed printed textbook entitled “Learn Chinese with Ease” and traditional printed course materials. Figure 1.1 shows the cover page of the textbook. Besides, paper-based assessment such as assignments, tests and examination are given to students to assess students’ learning achievement in class.

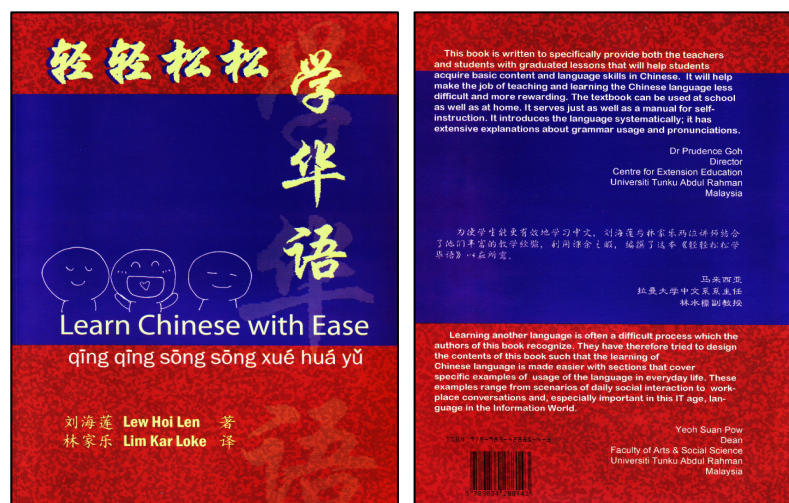


Figure 1.1: The cover page of the prescribed printed textbook entitled “Learn Chinese with Ease”

In addition, it is also supplemented with a resource website called WBLE (Web Based Learning Environment) which is available at <http://wble.utar.edu.my>. WBLE is a learning management system to facilitate

teaching-learning process at UTAR. It serves as a platform for students to obtain additional materials uploaded by lecturers. WBLE also acts as a communication tool for off-campus discussion. Students can discuss Chinese language learning related topics with the instructor or peers through the Forum function embedded in the WBLE. Figure 1.2 reveals the screenshot from the Login page of WBLE.

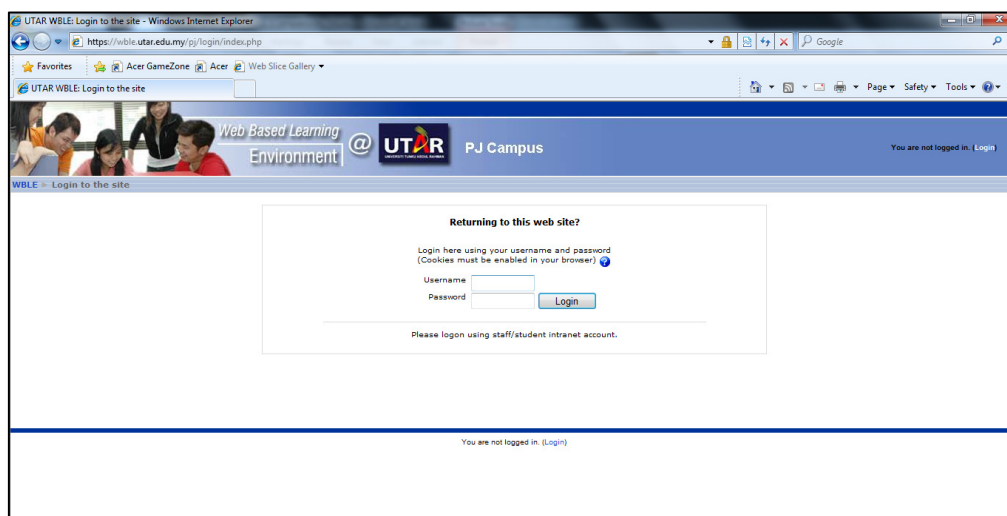


Figure 1.2: Screenshot from the Login page of WBLE

Chinese language has been recognised as one of the languages which require substantial effort to learn. In order to learn Chinese language efficiently, suitable instructional materials are needed to enhance the learning achievement. To provide students with the best experience, many educators opt for a blended approach: a traditional classroom with face-to-face interaction supplemented by online resources.

This study sought to create a blended learning environment for the instruction of “Introduction to Chinese Language I”, and evaluate its efficacy in TCSL compared to the traditional instruction mode. In the blended learning

environment, in addition to the existing instructional tools such as printed textbook, paper-based assessments and WBLE as stated above, an interactive multimedia e-book called ECLearn (**E-Book for Chinese Learning**) will be developed as an additional teaching aid tool. ECLearn is the transformation of the prescribed textbook i.e. “Learn Chinese with Ease” into an interactive multimedia e-book which containing a variety of educational activities.

1.3 Problem Statement

The teaching of the Chinese language has always suffered from an absence of suitable instructional materials. Since the publication of “Learn Chinese with Ease” textbook in year 2007, the TCSL instructors at UTAR tend to use the prescribed textbook as the main instructional tool. However, there are some instructors who realise that using printed textbook alone in the TCSL classrooms is insufficient to meet the needs of the students (H.L. Lew, lecturer, Universiti Tunku Abdul Rahman, interview, 5 March 2009; S.F. Ho, lecturer, Universiti Tunku Abdul Rahman, interview, 6 August 2010).

These instructors assert that for effective learning to take place, an instructor should use effective instruction and create an environment conducive to learning. The ex-Education Minister of China, Zhou Ji (Mo 2006) suggested that modern information technology and multimedia online instructions are required to be used more extensively to meet the learning demand.

Although there are ample interactive multimedia courseware and online courses for learning Chinese (or Mandarin) available in the market, however these learning materials are developed abroad without complying with the local needs as well as educational values (Goh and Kuek 2005; Tan and Lim 2008). Meanwhile, most of the online courses for learning Chinese (or Mandarin) are not suitable to be used as a supplementary instructional tool in the instruction of “Introduction to Chinese Language I” due to the following conditions:

- i. The materials are mostly written in Chinese characters without explanation in English (Figure 1.3),
- ii. The materials are fully written in Western scripts (*Hanyu Pinyin*) without Chinese characters (Figure 1.4), and
- iii. Some materials adopt traditional Chinese characters and the phonetic system of *zhuyin fuhao* (literally meaning phonetic symbol or colloquially called *bopomofo*) for transcribing Chinese, especially Mandarin (Figure 1.5). Although the traditional Chinese characters and *zhuyin fuhao* phonetic system have been phased out in China and Malaysia, but they are still widely used as educational tools and Chinese computer input method in Taiwan.

Consequently, the target users cannot understand the contents in Chinese (condition i), do not have the opportunity to learn Chinese characters (condition ii), and cannot understand the *zhuyin fuhao* phonetic system and

traditional Chinese characters since Malaysian education system is using *Hanyu Pinyin* system and simplified Chinese characters (condition iii).



Figure 1.3: Sample screenshot from Yes! Chinese – Learning Chinese website (<http://www.yes-chinese.com/>)



Figure 1.4: Sample screenshot from BBC Chinese Language website (http://www.bbc.co.uk/languages/chinese/real_chinese/)

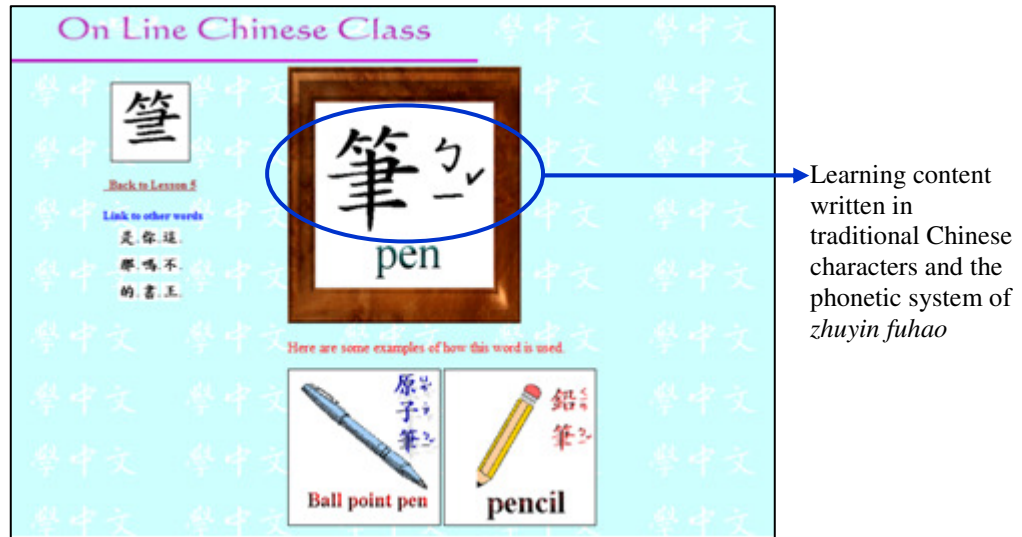


Figure 1.5: Sample screenshot from EZ Learn Chinese: On Line Chinese Class website (<http://www.ezlearnchinese.com/>)

In addition, the external content which mainly uses the examples in China (Figure 1.6) is also less suitable to the local communities. Besides, the lessons embedded in the CD-based or web-based applications are different from the lessons given in the course outline of “Introduction to Chinese Language I”. As a result, majority of the instructors are hesitant to employ existing multimedia or online learning materials in their teaching.

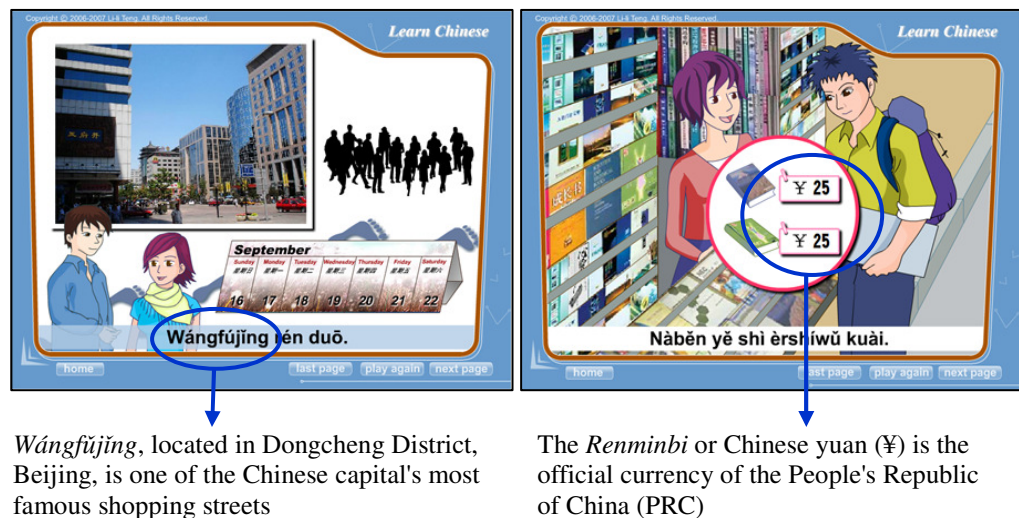


Figure 1.6: Sample screenshots from Chinese 101: Free online Chinese lessons for beginners website (<http://www.mychineseclub.com/>)

Many people say that Chinese language is one of the most difficult languages to learn, which in many cases requires years to master. The main thing that makes the Chinese language difficult for non-natives to learn is the unique pronunciation system. Today, the primary Romanisation system used in TCSL across the globe is *Pinyin*. The *Pinyin* shares the same letters with English. It operates with four different tones, meaning that the same syllable with different tones will become different words and have different meanings. For example, the syllables [ma1] and [ma3], pronounced in different tones, representing different words of “妈” (mother) and “马” (horse) respectively. If the speaker cannot pronounce a Chinese character correctly, it may bring different meaning to listeners. Learners with alphabetical language background are likely to severely mispronounce some words if they attempt to pronounce *Pinyin* according to their own language spellings (Xing 2006). It is this pronunciation that causes most trouble for nearly all new speakers and makes Chinese a difficult language to master. Failing to master the Chinese pronunciation will lead to reading and oral communication skills development problems.

Another thing that makes Chinese language difficult to learn is the writing system. Unlike most other alphabetic languages such as English, French, German, Italian and more, the writing system of Chinese is not alphabetic, but logographic in nature. Instead of using letters to spell out how words sound, it uses symbols which are known as Chinese characters to represent morphemes and words. As shown in Figure 1.7, a Chinese character is formed into a square by strokes. Therefore, Chinese characters are often

called as “square-shaped characters” (Brenndorfer 2009). The stroke order of a Chinese character is a crucial component of Chinese writing. The strokes are to be written in the right order and in the right way by following the rules for stroke order. Figure 1.8 reveals an example how the character *dong* (东, east) is built up with defined stroke order and direction. Mastery of the rules for stroke order helps one to write characters gracefully at speed (Lew and Lim 2007).



Figure 1.7: Each character is formed into a square by strokes



Figure 1.8: The character *dong* (东, East) is written according to defined rules for stroke order

The contents in printed textbook contain text and still picture-based demonstration on white background as shown in Figure 1.9. The dry contents may make learners feel bored in learning. Moreover, it is an impossible mission for Chinese instruction with restricted traditional teaching methods (Li 2007; Ng 2008). For instance, the printed textbook does not include sound and animation that can act as a tutor to teach the correct pronunciation of Chinese characters and writing skill. Students may find it difficult to pronounce a Chinese character correctly by just following the *Hanyu Pinyin* of syllables noted in the printed textbook as shown in Figure 1.10 without

listening to it. Besides, writing the characters, too, can be a tough skill to take on through the traditional “chalk-and-talk” (H.L. Lew, lecturer, Universiti Tunku Abdul Rahman, interview, 5 March 2009; S.F. Ho, lecturer, Universiti Tunku Abdul Rahman, interview, 6 August 2010). As described above, Chinese pronunciation scripts are entirely different from scripts with words spelled out by alphabets. The Chinese language is written using a very delicate and beautiful series of strokes. Hence, in the traditional classroom, the instructor plays a vital role in teaching the correct pronunciation and writing skill. However, it is impossible for teachers to keep repeating the instruction of Chinese pronunciation writing countless times as needed before students could master the language.

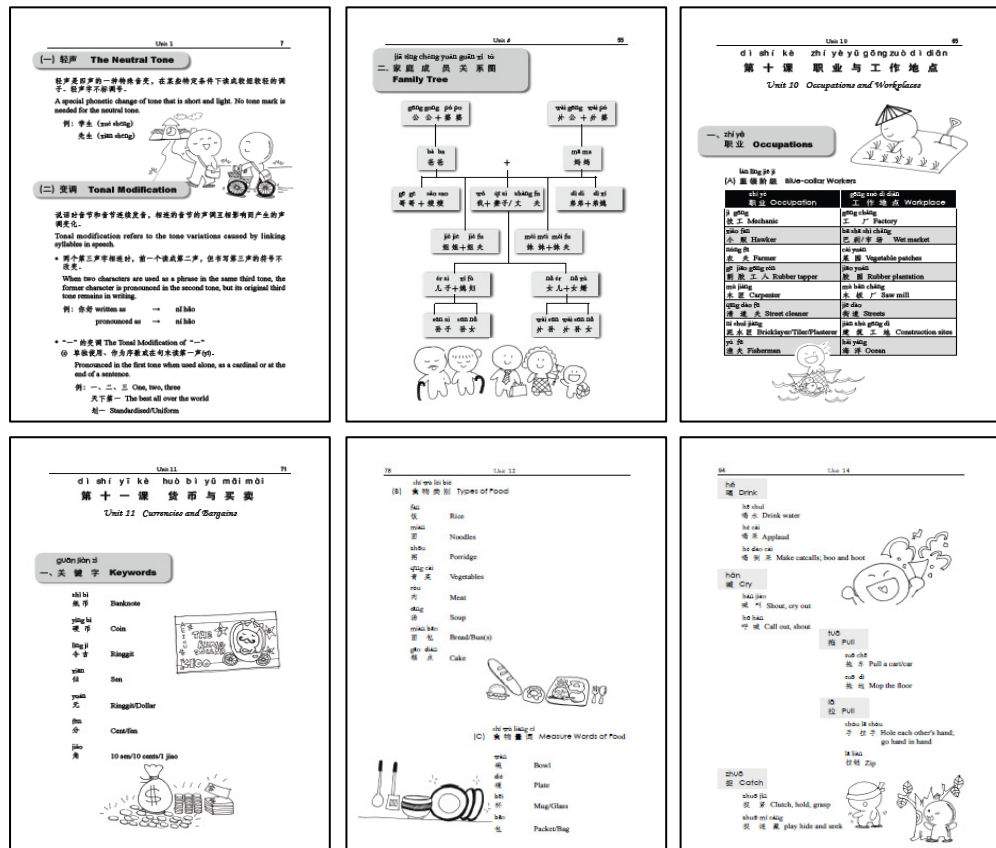


Figure 1.9: Several excerpts from “Learn Chinese with Ease” textbook which contains only text with black and white graphics on white background

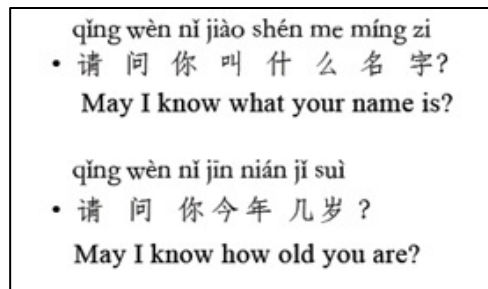


Figure 1.10: Chinese characters with *Hanyu Pinyin* (an excerpt from “Learn Chinese with Ease” textbook)

With the advent of computer technologies especially multimedia and internet based technology, greater opportunities in the target language have arisen through e-learning environments. The increased use of these computer technologies has changed second language learning by providing interactive multimedia materials and rich content that can be integrated into language learning activities (Bush 1997, cited in Sawatpanit et al., 2004). Nonetheless, as Dhaif (1989, cited in Gündüz 2005) asserted, computer can never replace the “live” teacher, especially in language teaching, where the emphasis is on mutual communication between people. Since language is used in daily communication, self-paced e-learning is not an effective way to develop communication skills. Learners need real-life situations to learn and practice communication skills in target language. This means that not all learning is best achieved in an electronically-mediated environment.

Furthermore, using e-learning alone is also insufficient to meet the needs of the students. Only learners who have strong independent learning and motivation skills are suitable to learn through e-learning. Hence the accessibility advantages of e-learning are being undermined because this kind of learners only constitute a sub-set of the learner population (Hameed et al.,

2008). Therefore, there is a need to adopt blended learning approach which combines the use of multiple delivery media that are designed to complement each other and promote learning. The blended approach promises the best of both worlds, offering the pedagogical benefits of e-learning without the loss of the “human touch” of face-to-face contact.

1.4 Research Questions

Given the background of this study, the primary aim of this study is to create and evaluate the efficacy of a blended learning environment through the use of an interactive multimedia e-book in TCSL. In order to achieve this aim, the study attempts to answer the following research questions:

- i. **Research question 1:** How to create an effective blended learning environment through the use of an interactive multimedia e-book for TCSL at tertiary level?
- ii. **Research question 2:** How to create an effective interactive multimedia e-book for TCSL in a blended learning environment?
- iii. **Research question 3:** How a suitable and useful interactive multimedia e-book can be developed for TCSL in a blended learning environment?
- iv. **Research question 4:** How the ease-of-use of the functionalities provided in the interactive multimedia e-book for TCSL can be evaluated?

- v. **Research question 5:** How the efficacy of blended learning approach through the use of an interactive multimedia e-book in TCSL compared to traditional instruction can be evaluated?

Then, further analysis was performed on research questions to form the objectives of this study.

1.5 Objectives and Hypotheses

Two main objectives were formed as below:

- i. To create a blended learning environment through the use of an interactive multimedia e-book for TCSL at tertiary level.
- ii. To test hypotheses related to:
 - a. the ease-of-use of the functionalities provided in the prototype of an interactive multimedia e-book for TCSL.
 - b. the efficacy of a blended learning environment through the use of an interactive multimedia e-book for TCSL at tertiary level compared to traditional instruction.

In order to achieve the main objectives, further analysis was performed and additional sub-objectives were constructed. The results of this further analysis were the following five sub-objectives:

- i. **Sub-objective 1:** To design and develop an instructional design (ID) model which is deemed suitable for TCSL through the use of an interactive multimedia e-book in a blended learning environment at tertiary level.
- ii. **Sub-objective 2:** To design and create a conceptual framework and modules design model for the development of an interactive multimedia e-book for TCSL.
- iii. **Sub-objective 3:** To develop a prototype of an interactive multimedia e-book which contains the existing printed textbook contents, educational activities, as well as the main features that are perceived to be useful as one of the instructional tool in a blended learning environment for TCSL.
- iv. **Sub-objective 4:** To evaluate the ease-of-use of the functionalities provided in the prototype of an interactive multimedia e-book for TCSL.
- v. **Sub-objective 5:** To evaluate the efficacy of blended learning approach through the use of an interactive multimedia e-book in TCSL compared to traditional instruction.

From the main objectives, the study was expecting that:

- i. The functionalities provided in the developed interactive multimedia e-book are ease-of-use. The evaluation of the ease-of-use includes the analysis on user interface design, navigation and interactivity, content, and students' perception towards the use of interactive multimedia e-book in Chinese learning

compared to printed textbook in a blended learning environment. For this aspect, the following null hypothesis was tested:

H₀1: Students do not perceive that the functionalities provided in the interactive multimedia e-book are ease of use.

ii. A blended learning approach through the use of an interactive multimedia e-book is more effective in TCSL compared to the traditional instruction. Thus, the null hypothesis below was tested:

H₀2: There is no significant difference between a blended learning environment through the use of an interactive multimedia e-book and traditional instruction in TCSL at tertiary level.

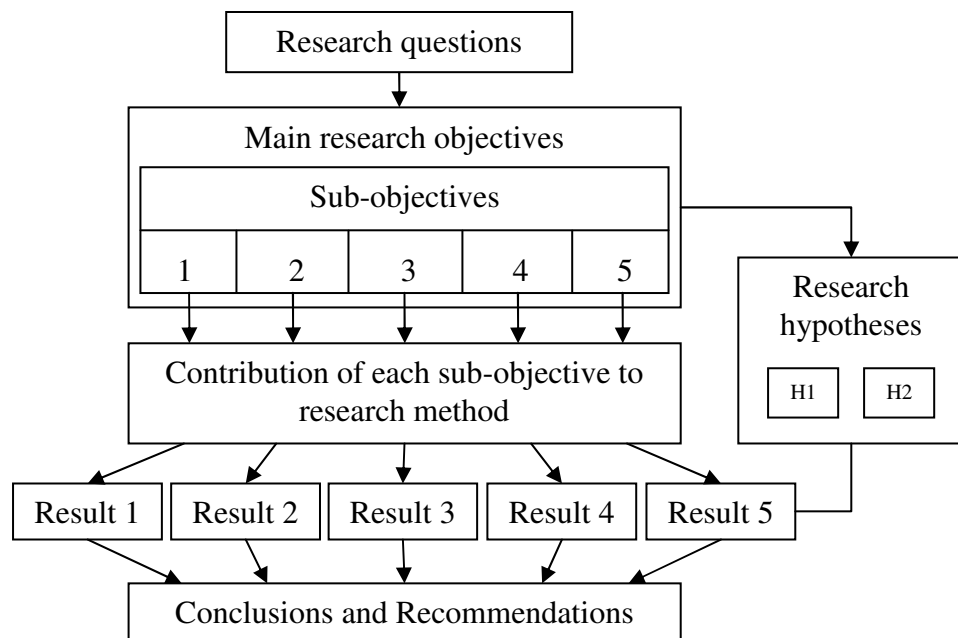


Figure 1.11: The relationships between research questions, objectives, hypotheses, methodology, results, and conclusions

Figure 1.11 shows the relationships between research questions, objectives, hypotheses, methodology, results, and conclusions.

1.6 Scope of Study

This study focuses on the creation and efficacy evaluation of a blended learning environment through the use of an interactive multimedia e-book for TCSL at tertiary level. It looks at the ways in which instructors can adopt a “blended learning” approach that combines both face-to-face instruction and computer-mediated instruction into the TCSL classroom for an elective subject called “Introduction to Chinese Language I”. The scope of the study encompasses activities as follows:

- i. The creation of a blended learning environment through the use of an interactive multimedia e-book. It includes:
 - a. the design and development of an ID model for blended language learning environment based on a generic ID model called ADDIE model which is further described in section 3.2.1,
 - b. the design and development of a conceptual framework and modules design model for the development of an interactive multimedia e-book which is described in detail in section 3.2.3.1, and
 - c. the development of the prototype of an

interactive multimedia e-book called ECLearn (E-Book for Chinese Learning); the prototype development mainly involves the transformation of the existing printed “Learn Chinese with Ease” textbook into an e-book which containing a variety of educational activities and multimedia learning objects. The development scope of the prototype is as shown in Table 1.1.

- ii. The evaluation of the ease-of-use of the functionalities provided in the interactive multimedia e-book.
- iii. The efficacy evaluation of the blended learning environment through the use of an interactive multimedia e-book compared to the traditional classroom instruction.

Table 1.1: Learning modules integrated in ECLearn

Module	Contents Outline
Module 1: Lessons	Lesson 1: The <i>Pinyin</i> System of Romanisation <ul style="list-style-type: none"> • Chinese Syllables • The Neutral Tone & Tonal Modification • Table of the Combinations of the Initials and Finals in Standard Chinese
	Lesson 2: Chinese Characters <ul style="list-style-type: none"> • The Origins and Development of Chinese Characters • Traditional Chinese Character Formation • The Strokes of Chinese Characters • The Rules for Stroke Order • The Structure of Chinese Characters • Introduction to Radicals

Table 1.1: Learning modules integrated in ECLearn (Continued)

Module	Contents Outline
Module 1: Lessons (Continued)	Lesson 3: Greetings <ul style="list-style-type: none"> • Basic Greeting Expressions • Greetings According to Time • Terms of Departure
	Lesson 4: Polite Expressions of Socialisation <ul style="list-style-type: none"> • Dialogue • Dialogue (Video) • Notes
	Lesson 5: Numbers <ul style="list-style-type: none"> • Introduction to Numbers • Table of Place Values • Idioms with Numbers
	Lesson 6: Self-introduction <ul style="list-style-type: none"> • If you are a student, you can introduce yourself as follows: • If you have just met a new friend, you can ask the following questions to know more about him/her. • Self-introduction (Video)
	Lesson 7: Dates and Time <ul style="list-style-type: none"> • Keywords • Reading Comprehension • A Diary Entry • Festivals and Greetings
	Lesson 8: My Family <ul style="list-style-type: none"> • Forms of Address of Basic Family Members • Family Tree • Pronouns and Possessives • Refer to the following sentences and introduce yourself and your family
	Lesson 9: My School <ul style="list-style-type: none"> • School Names • Faculties • Job Duties and Titles • Buildings on Campus
	Lesson 10: Occupations and Workplaces <ul style="list-style-type: none"> • Occupations • Places
	Lesson 11: Currencies and Bargains <ul style="list-style-type: none"> • Keywords • Currencies and Monetary Units • Dialogue • Remarks

Table 1.1: Learning modules integrated in ECLearn (Continued)

Module	Contents Outline
Module 1: Lessons (Continued)	Lesson 12: Food <ul style="list-style-type: none"> • Keywords • Chinese Food • Malay Food • Indian Food • Western Food • Drinks • Dialogue
	Lesson 13: Expressions of Emotion <ul style="list-style-type: none"> • Normal Emotions • Dialogue
	Lesson 14: Daily Activities <ul style="list-style-type: none"> • Common Action Verbs and Their Derivatives • Sentence Recital • Dialogue
	Lesson 15: The Information World <ul style="list-style-type: none"> • Keywords • Computer Commands • Dialogue
Module 2: Poems	Three Poems: <ul style="list-style-type: none"> • Is a Cup Necessarily Smaller Than a Teapot? • The Law of Hair • Loneliness

As can be perceived through Table 1.1, the development scope of ECLearn comprised two modules, namely Lessons and Poems modules. Lessons and Poems modules consisted of 15 lessons and three poems respectively as can be found in the printed textbook. Lessons and poems were presented using tutorial simulation strategies in lessons pertaining to conversation. Each lesson also included an assessment activity which serves as an interactive exercise to test the understanding of students on the lesson being taught. The interactive exercise adopted drills strategy.

Moreover, the contents and educational activities that are built into the e-book was mainly based on the characteristics of several learning theories

such as behaviourism, cognitive theory, constructivism and adult learning theory, which are further described in sections 2.8.1 through 2.8.4. Even though the e-book development scope is mainly focuses on behaviourism and adult learning theory, however, the application of cognitive theory and constructivism could be practiced and enhanced through the learning and practice of oral communication skills in the blended learning environment for TCSL.

1.7 Research Framework

This study aims to create a blended learning environment through the use of an interactive multimedia e-book for TCSL, evaluate its efficacy in TCSL compared to traditional instruction, and evaluate the ease-of-use of the functionalities provided in the interactive multimedia e-book. The study is divided into two sections as shown in Figure 1.12:

- i. The creation of a blended learning environment
- ii. The evaluation of the blended learning environment

1.7.1 The Creation of Blended Learning Environment

The life cycle of the blended learning environment creation began with analysis phase for requirements gathering, continued with the design phase for the development of ID model, as well as the conceptual framework and modules design model creation.

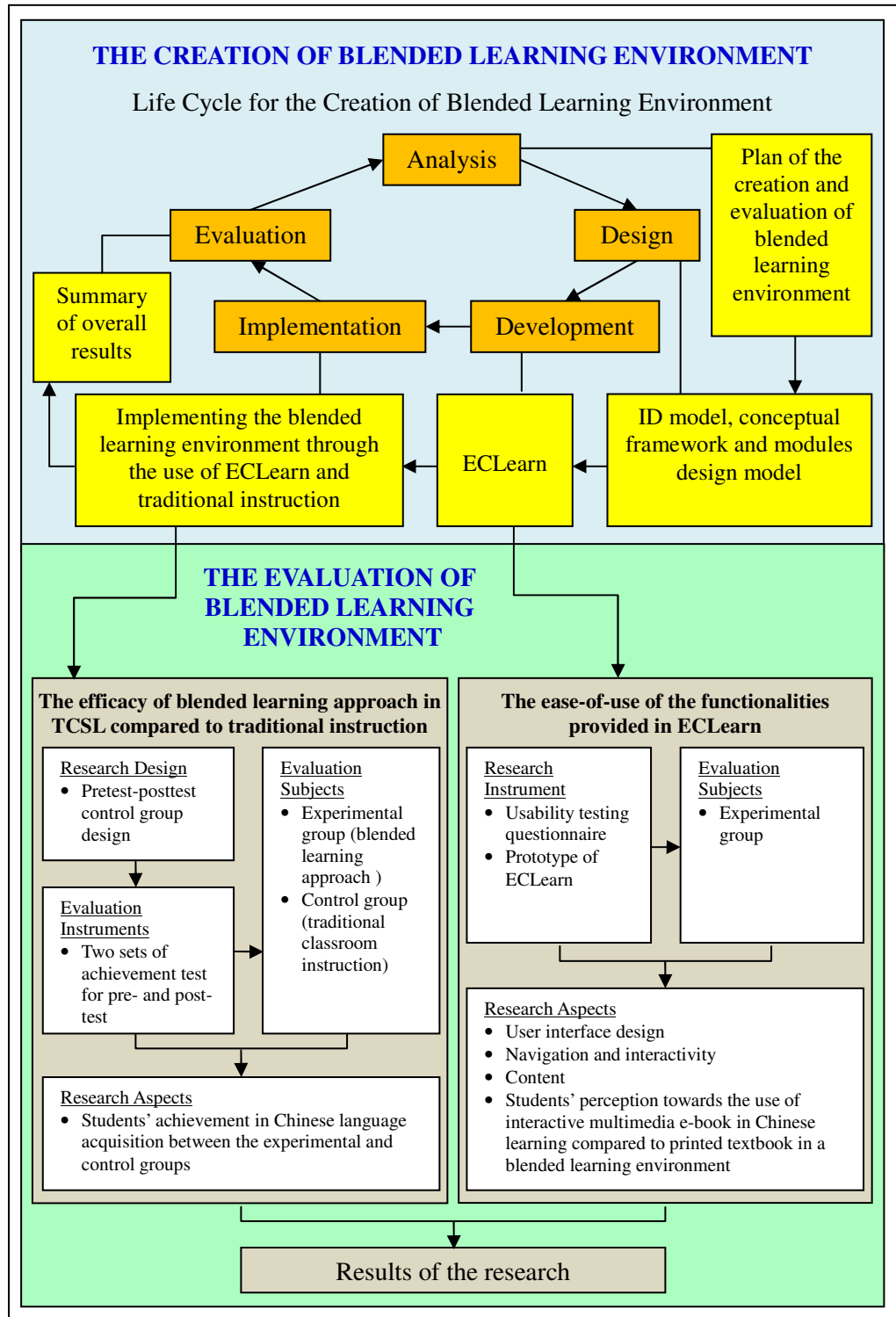


Figure 1.12: Research framework of the study

With the design specifications and outputs obtained in the design phase, ECLearn (i.e. the interactive multimedia e-book) was produced in the

development phase. Then, the blended learning environment through the use of ECLearn was implemented and evaluated. A summary of overall results was produced after the evaluation.

1.7.2 The Evaluation of Blended Learning Environment

In this study, the evaluation of blended learning environment included the efficacy evaluation of the blended learning environment through the use of ECLearn in TCSL compared to the traditional classroom instruction, and the ease-of-use of the functionalities provided in ECLearn.

The efficacy evaluation of the blended learning approach in TCSL was conducted using the pretest-posttest designs which involved two groups of students, namely experimental group (using blended learning approach) and control group (using traditional instruction). The evaluation study investigated whether or not there was a significant difference on students' achievement in Chinese language acquisition between these two groups.

In addition, the ease-of-use of the functionalities provided in ECLearn was evaluated using a usability testing questionnaire among the experimental group students. The usability testing questionnaire measures the usability of ECLearn in the aspects of user interface design, navigation and interactivity, content, and students' perception towards the use of interactive multimedia e-book in Chinese learning compared to printed textbook in a blended learning environment.

1.8 Significance of the Study

Currently there is more than 20 percent of the worldwide population which is more than one billion people from all around the world are speaking Chinese language (Karpaska 2010). As the Chinese-speaking areas are becoming the focus of the world economy, there exist employment opportunities in every areas. Thus, people who can speak Chinese language at the same time can operate successfully in the context of Chinese cultural will have an advantage to be hired by business leaders, and may also have an advantage in competing for an important position (The CLI team 2010). Due to this reason, more and more people are attracted to learn Chinese language in order to increase their career options. However, learning Chinese language as a second language is a difficult task for non-native learners. So, it is important to research and create suitable instructional methods for effective second language learning.

As the number of learners grows, there is, therefore, a need for developing and utilising new technological resources to facilitate listening, reading and actual conversation instruction. The advent of multimedia technology and the internet provide convenience for language learning and expand possibilities for using them to support language instruction. Multimedia features such as being multi-sensory offer great potential to improve the delivery of language instruction. According to the instructors of “Introduction to Chinese Language I”, multimedia software may arouse interests of students in learning Chinese language (H.L. Lew, lecturer,

Universiti Tunku Abdul Rahman, interview, 5 March 2009; S.F. Ho, lecturer, Universiti Tunku Abdul Rahman, interview, 6 August 2010).

It is crucial to master the correct pronunciation of syllables at the beginner stage in Chinese learning. Although the number of learners in Chinese language is increasing, there is always lacking of sufficient teaching materials in TCSL. Some instructors realize that using printed textbook alone is insufficient to meet the needs of students. The instructors of “Introduction to Chinese Language I” claimed that it is extremely difficult for non-native students to learn the correct Chinese pronunciation through printed textbook alone (H.L. Lew, lecturer, Universiti Tunku Abdul Rahman, interview, 5 March 2009; S.F. Ho, lecturer, Universiti Tunku Abdul Rahman, interview, 6 August 2010). In this study, standard pronunciation demonstrated by human voices is integrated in the interactive multimedia e-book for learners to imitate and study correct pronunciation. The multimedia-based pronunciation instruction enables learners to correct and improve their pronunciation promptly without instructor’s supervision.

Besides, learning to write Chinese characters is often thought to be a very challenging and laborious task. However, new instructional tools are being created that might reduce learners’ tedium. In addition to the teaching of Chinese writing using “chalk-and-talk” approach in traditional classroom, this study also depicts the animated Chinese characters embedded in the interactive multimedia e-book to extend the functionality of the traditional instruction mode that will allow learners to learn Chinese characters effortlessly. In the

traditional classroom, to show the process how a character is composed, the instructor must be very patient to repeat the writing of a character in correct stroke order multiple times as needed. The instructor's role in the instruction of Chinese writing can be enhanced by using animation. With animation, an explicit instruction on the stroke order of a character is demonstrated to guide learners in learning the Chinese writing effortlessly.

While the traditional learning materials used in classroom instruction may fulfil the learners' needs in writing and pronunciation, appropriate materials for reading, listening and speaking are essential too. In this context, multimedia assisted instruction, especially video expedites activity of Chinese listening comprehension and oral communication skills. Video clips can be used to enhance the listening comprehension and oral communication skills in situational contexts. The lecturers of "Introduction to Chinese Language I" also asserted that e-learning alone is insufficient in teaching Chinese language because the communicative language learning requires a learner to speak with and listen to other learners. Through cooperative learning and peer-teaching situations in classroom settings, learners can openly discuss and debate their ideas (H.L. Lew, lecturer, Universiti Tunku Abdul Rahman, interview, 5 March 2009; S.F. Ho, lecturer, Universiti Tunku Abdul Rahman, interview, 6 August 2010). Thus, it can be said that in the blended learning environments, instructor-led classroom instruction and electronic-based instruction can complement each other to create high impact learning, especially in the communicative language learning activities.

1.9 Definition of Terms

This section defines several terms used in the study as follows:

- **Blended learning:** Blended learning (BL) refers to “the combination of traditional classroom and e-learning approaches” (Thirunarayanan and Pérez-Prado 2005). This term is further discussed in section 2.7.
- **Interactive multimedia:** Generally it is accepted that multimedia is classified as any combination of text, graphic art, sound, animation, and video, which is delivered to the user by electronic or digitally manipulated means (Vaughan 2008). Extending this definition, interactive multimedia is defined as “non-linear multimedia, that is, any tool that gives control to the user rather than the computer” (Mohler 2001, p. 294). This term is described in detail in section 2.6.
- **E-book:** The *Oxford Advanced Learner’s Dictionary* (2011a) defines e-book (or electronic book) as “a book that is displayed on a computer screen or on an electronic device that is held in the hand, instead of being printed on paper”. This term is discussed in depth in section 2.3.2.
- **Second language:** In the *Oxford Advanced Learner’s Dictionary* (2011b), second language is defined as “a language that somebody learns to speak well and that they use for work or at school, but that is not the language they learned first”. This term is further discussed in section 2.4.

1.10 Summary

This chapter has discussed about the problem statement and also the importance of implementing this study. Based on earlier discussion, blended learning has the advantages of utilising suitable computer technology while at the same time maintaining the advantages of traditional instruction to increase the effectiveness of TCSL to a desirable level. As multimedia learning objects are seemed to be capable in enhancing second language learning, therefore it is believed that blended learning approach through multimedia e-learning has great potential in providing an effective learning environment for TCSL at tertiary level. So, this study mainly aims to research on how efficacious is the blended learning environment through the use of an interactive multimedia e-book in TCSL.

1.11 Thesis Structure

This thesis has been organised into five chapters. Chapter 1 is titled introduction. The topics described in this chapter are: Background of the study, problem statement, research questions, objectives and hypotheses, scope of study, research framework, significance of the study, and definition of terms.

Chapter 2 presents the reviews of relevant literature. Types of teaching and learning materials used in higher educational environment, the evolution of books, second language acquisition, unique features of the Chinese

language, multimedia learning, blended learning, and the design and development of ECLearn are some of the topics covered in this chapter. Chapter 2 also includes the review of pertinent research and existing interactive multimedia applications for Chinese learning. The research methodology is described in chapter 3. This chapter first presents the methodology for the creation of a blended learning environment through the use of an interactive multimedia e-book for TCSL. Then, it describes the methodology for the evaluation of a blended learning environment through the use of an interactive multimedia e-book for TCSL.

Chapter 4 reports the results obtained in this study. It reveals the proposed ID model created for blended language learning environment, conceptual framework and modules design model for ECLearn development, and the contents of the prototype of ECLearn. Besides, this chapter also presents the findings of data analysis for the hypotheses testing that related to the evaluation of the ease-of-use of the functionalities embedded in ECLearn, and the efficacy evaluation of the blended learning environment through the use of ECLearn. Finally, conclusions of the overall study are discussed and summarised in chapter 5. This chapter also presents the contributions of study as well as the limitations and recommendations of the study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter discusses a number of topics related to the study. It contains a series of literature reviews covering the following topics:

- types of teaching and learning materials used in higher educational environment;
- the evolution of books;
- second language acquisition;
- unique features of the Chinese language;
- multimedia learning;
- blended learning;
- discussion on one of the main focuses of the study (i.e. the design and development of an interactive multimedia e-book which contains various educational activities). The topics of discussion covers instructional design (ID) models, learning theories, and the reasons for selecting those ID models and theories. It also includes the review of existing Chinese learning applications; and
- related studies.

2.2 Types of Teaching and Learning Materials Used in Higher Educational Environment

There exist different types of teaching and learning materials (T-L) nowadays and these materials can be generally divided into two categories which are conventional and high technology materials.

2.2.1 Conventional Materials

Conventional materials used in higher educational environment can be further divided into two main categories as follows:

- i. **Printed (Paper-based) materials** which include books, encyclopaedias, journals, magazines, newspapers, documents, drawings/paintings, maps, graphs/charts/diagrams, and so forth have become and still are the most indispensable materials in educational environments. Printed materials especially textbooks and paper-based assessment (e.g. assignments, tests/exams) are still treated as the main teaching material in learning institutions.
- ii. **Audio/Visual teaching aid tools** such as Microsoft PowerPoint slides, tapes, filmstrips, radio and television programmes, and so forth.

2.2.2 High Technology Materials

High technology materials can be divided into four main categories as follows:

- i. **Electronic Learning Materials** for instance interactive e-books, CBL (Computer Based Learning)/CAI (Computer Aided Instruction) and multimedia/hypermedia modules for individual self-paced learning, drill and practice software, simulations, educational digital games, virtual reality system software, artificial intelligence modules, and so forth.
- ii. **Communication Tools** for example email, instant messaging service, search engines, social media (e.g. Facebook, Twitter), Learning Management System (LMS), video conferencing, distance-learning, digital library, bulletin board, and so forth.
- iii. **Design Tools** such as presentation software, draw and paint programmes, desktop publishing software, authoring software, animation software, and so forth.
- iv. **Application Software** such as word processing software, spreadsheet software, database software, and computer-assisted design software.

Figure 2.1 illustrates a summary of the categories of the above T-L materials.

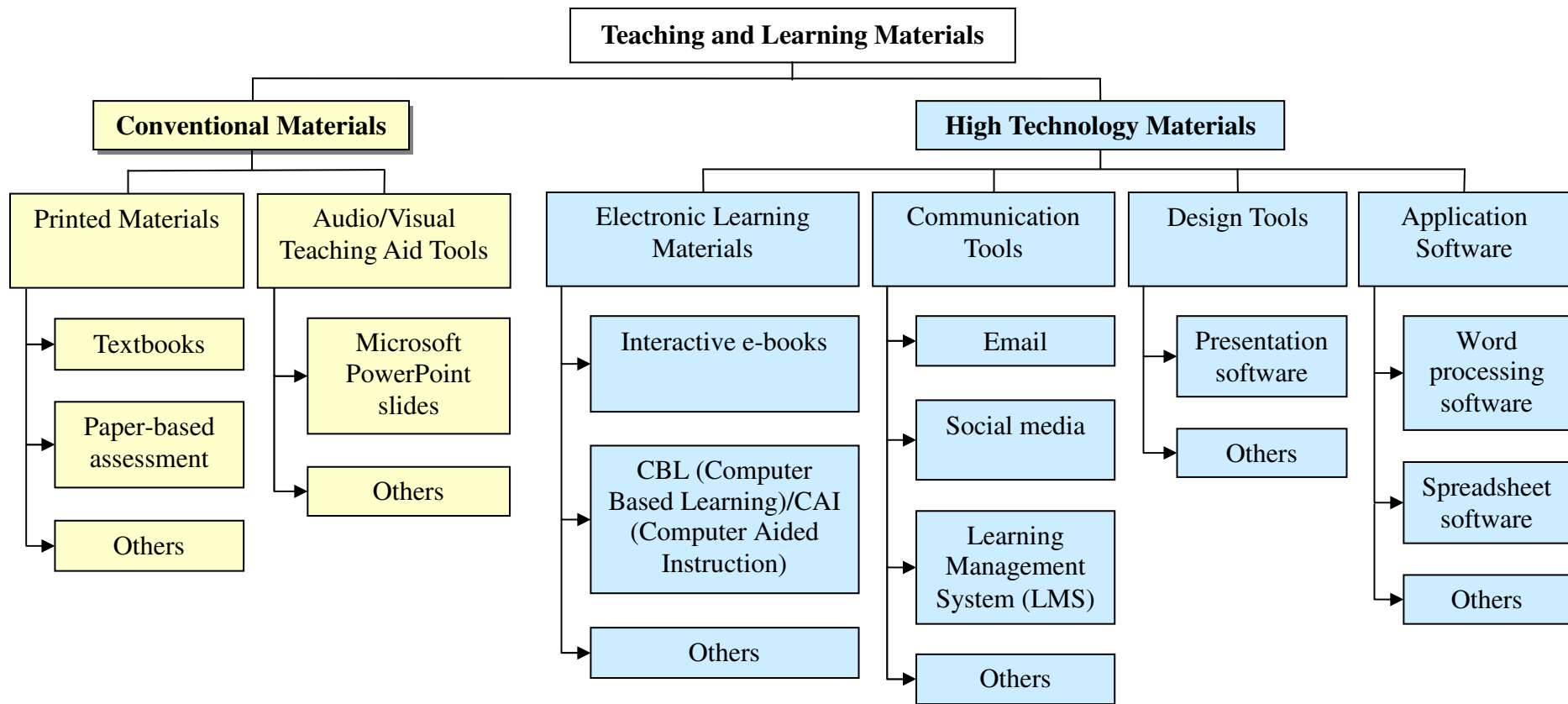


Figure 2.1: The categories of teaching-learning materials

2.2.3 Implication for the Study

For the purpose of this study, the T-L materials used in the blended learning environment for Chinese learning encompass both conventional and high technology media as follows:

- **Conventional materials:** Printed textbook called “Learn Chinese with Ease” and paper-based assessments such as assignments, in-class exercises, tests and examinations.
- **High technology materials:** An interactive multimedia e-book called ECLearn (**E**-book for **C**hinese **L**earning), and electronic communication tools (i.e. email, learning management system called WBLE, search engines and digital library).

2.3 The Evolution of Books

Books evolution was started when Sumerians of ancient Mesopotamia invented the earliest form of writing called cuneiform writing and the Sumerian clay tablet (Hallo 2010; Penna 2010). According to Rezende (2006), the cuneiform writing is in the form of pictograms which are symbols that represent actual things such as animal and other objects. The writing was used to keep record for trade, agricultural production, and other information (Lockard 2008). The advent of clay tablet then gave way to papyrus, bamboo book, wax tablet, parchment or vellum, and the codex. With the invention of papers, the evolution to printing press, manuscripts, and books took place.

2.3.1 Books

James (2005, p. 27) defined a book as “a collection of leaves of paper, parchment, vellum, cloth, or other material (written, printed, or blank) fastened together along one edge, with or without a protective case or cover”. Figure 2.2 and Figure 2.3 reveals the construction of book’s external parts and internal parts respectively. Examples of printed books include textbooks, reference books, and so forth. Textbooks have been used in learning institutions to support the teaching and learning activities while reference books are used by students to refer for facts and information. According to Thompson (2005, p. 1), “for more than five hundred years, books have been a key feature of modern culture and one of the foundations on which education and academic life are based”.

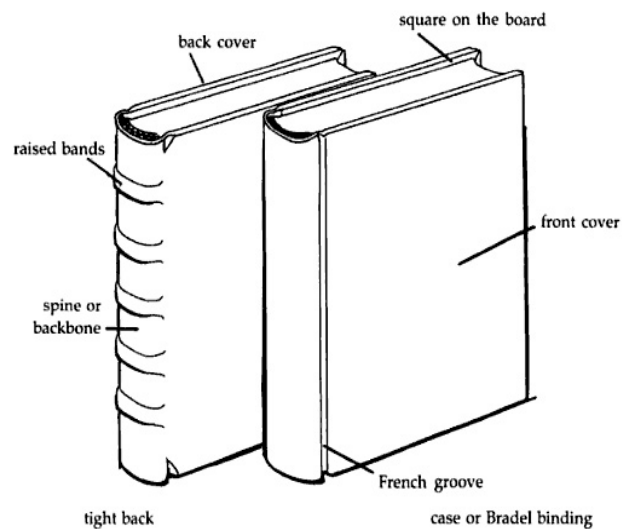


Figure 2.2: Construction of book’s external parts

Source: Young (1995, p. 2)

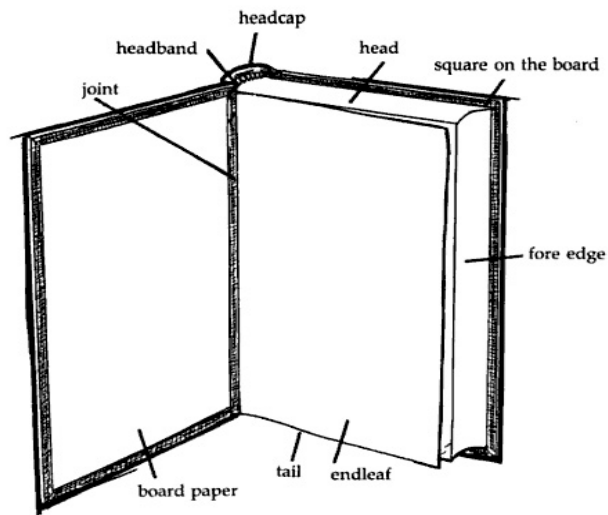


Figure 2.3: Construction of book's internal parts

Source: Young (1995, p. 3)

2.3.2 Electronic Books

An electronic book which is also called e-book is a book in digital form that can display large amounts of readable information to user through computers or other digital devices (Borchers 1999). At first, an e-book is just a single web page displaying pure text which can only read by scrolling. However, e-books of today have emerged and are able to display the contents of book page by page. As claimed by Morgan (cited in Lin and Hubbard 2000, p. 2), “with the help of intermediate software applications, existing electronic files and documents can be converted into electronic texts that can be loaded onto e-books for reading”.

The types of e-books include Web books, palm books, and e-books that will use electronic ink for content display which are currently in development

(Lin and Hubbard 2000). Web books are electronic texts which require necessary e-book reader software and an Internet connected computer for display and viewed. While Palm books are not necessarily requires the connection of Internet. Palm books are more portable and can be viewed by using Palm Pilot or dedicated reader device.

E-book files can be stored in computers or portable devices which allow people to access to e-books at anytime and everywhere (Cavanaugh 2002). The technologies of e-book comprise of e-book hardware (e.g. e-reader, PC, and smart phone/PDA) and e-book software (e.g. Microsoft Reader, Adobe Reader, Internet browser).

E-books have becoming so popular nowadays which can be due to several reasons. According to the Springer user survey (Springer 2008), it is found that the advantages of e-books for users are their convenience, information access, and storage space required. The users have indicated that e-books can be accessed easily and fast at anytime and anywhere. Besides, a large number of e-books can also be easily carried around in a laptop compared to printed books. In addition, Hatzigeorgiu and Chatzisavva (2010) noted that e-book can include graphic, sound, animation, video, and other feature which are able to enhance the learning process. It provides user to read and learn in a more interactive and dynamic way compared to printed books.

2.3.3 Implication for the Study

The study on history of books gives an understanding on how books have evolved from the ancient time until today. The evolution of books from clay tablets until today's e-book have brought convenient and ease of use to people either in information recording or knowledge construction. During ancient time, books such as clay tablets are hard to carry around and it is also hard to produce a large amount of books before the invention of printing press. Today, people are using printed books worldwide which are more convenient to use compared to ancient time. With the advent of e-book, the e-books are easily shared, stored, carry around, and can also be interactive which consists of sound, animation, and video.

In the context of this study, both printed book and e-book are used. This study focuses on the transformation of the printed textbook called "Learn Chinese with Ease" into an interactive multimedia e-book which containing a variety of educational activities and multimedia learning objects such as colourful graphics, sound, animation, and video to enhance learners' efficiency in Chinese language learning.

2.4 Second Language Acquisition

Communication is an essential element in human interaction. Effective communication enhances many aspects of human life. According to Tonkin

(2003, p. 2), David Crystal has defined language as “the systematic, conventional use of sounds, signs, or written symbols in a human society for communication and self-expression”. This means that language is obviously a vital tool for social communication between human beings, and in a society. Throughout history, different people in the world have developed different languages as their specific means of communication. Consequently, there are thousands of different languages and dialects in the world. Languages differ in many ways such as their structures, writing systems, vocabularies, and so forth. Every language has its own specific features.

Language is generally ignored by its native speakers. The native language or first language is the language that a person first acquires naturally during their infancy and childhood in the rich native language environment (Danesi 2003). The first language comes natural to native speakers as does breathing and is an automatic behaviour. Any other language learned or acquired is known as the second language.

The term second language used in the literatures refers to any language learned after the native language or mother tongue (García Mayo and García Lecumberri 2003; El Bahri 2007). El Bahri (2007) noted that second language becomes umbrella terms for second and foreign languages. In this age of globalization, learning a foreign language as a second language (or sometimes as a third language) has become a necessary tool to broaden the horizons and gain a better understanding of foreign people and their cultures. Ranjini (2009) asserted that foreign language plays a magnificent role in the domain of

science, foreign affairs, publicity, tourism and communication.

Chinese is one of the popular foreign languages that people opt to learn. Learning Chinese as a foreign language is different from learning Chinese as a mother tongue. People with Chinese as their mother tongue have grown up in a rich Chinese language environment. They can naturally absorb the Chinese language and are familiar with the pronunciation through daily listening and speaking. In contrast, when learning Chinese as a foreign language, learners may be influenced by their own mother tongue, especially the language learners from the alphabetical languages background. In most cases, they may encounter difficulty in mastering the Chinese language especially in terms of characters, pronunciation, vocabulary, grammar, and so forth. Majority of the instructors assert that the pronunciation and writing system of Chinese are two major difficulties in TCSL.

According to Stork and Widdowson (cited in Rahimpour 2010), it seems that any human being is having the capability to learn any languages as a first language with equal ease, regardless of what kind of language it is to be learned. However, Beardsmore (cited in Bhela 1999) noted that many of the second language learners encounter difficulties in learning phonology, vocabulary, and grammar of the second language are due to the interference of habits from the first language. As there is difference between the structures of first language and second language, and they tend to use the formal elements of first language in the context of second language, thus end up with error appearing in second language.

Therefore, there is a need to understand about how the second language acquisition occurs before able to design a suitable instruction for second language acquisition. From the interactionist perspective of second language acquisition, it describes three functions essential to second language acquisition and learning which are comprehensible input, interaction, and comprehensible output (Mayer 2005). Figure 2.4 depicts the interactionist model of second language acquisition process.

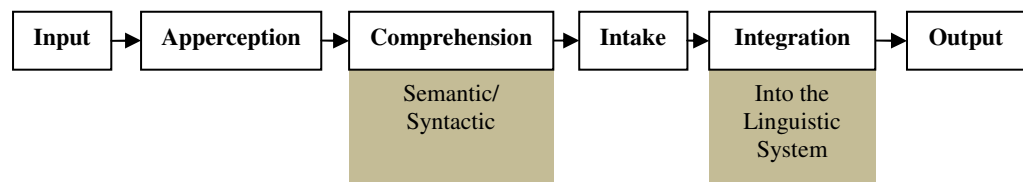


Figure 2.4: Interactionist model of second language acquisition process

Source: Modified from Mayer (2005, p. 470)

The six processes of second language acquisition in the model (Figure 2.4) are described as the following (Mayer 2005):

- **Input:** Input represents the linguistic materials that are presented to the learners. As only apperceived input can potentially be acquired, so comprehensible input should be provided for learners instead of just input, for instance, interaction in information links form which provide simplification, clarification, elaboration, or definitional support help students to more successfully apperceive the information.
- **Apperception:** The comprehensible input that has been successfully apperceived is ready for comprehension.

- **Comprehension:** The apperceived input which contains semantic content can be comprehended with or without the syntax understanding.
- **Intake:** Intake represents the comprehended input which is ready to be integrated into the linguistic system of learner.
- **Integration:** The comprehended input which has gone through the intake process will be integrated into the linguistic system of learner.
- **Output:** Comprehensible output including the identification of errors and adjustment for the correction of errors performed by learners represents the observable outcomes of the comprehensible input and interaction.

Implication for the study: With the past literature reviews of second language acquisition, Bhela (1999) claimed that a language learner often starts learning a second language from point zero (or close to it). Due to second language is not learned as part of the student's general cognitive development, so an instructor has to teach the students about the rules of Chinese language formally. As Chinese language is recognised as one of the most challenging or difficult languages to master due to its unique characteristics, TCSL in the classroom may be improved significantly when multimedia technology complements and extends the functionality of the traditional instruction.

2.5 Unique Features of the Chinese Language

Generally, there are seven major dialect groups in China which are Northern dialect or Mandarin, *Wu* dialect (spoken in the Yangtse Delta and Shanghai), *Xiang* dialect (spoken in Hunan), *Yue* or Cantonese dialect (spoken in Guangdong), *Min* dialect (spoken in Fujian province and Taiwan), *Hakka* dialect and *Gan* dialect (spoken in Jiangxi) (Yip and Rimmington 2006; He and Xiao 2008; LaFleur 2010). Brown and Ogilvie (2009) claimed that the Chinese language family is one of the major subgroup of the Sino-Tibetan language family. The official national language of China is the *Hanyu* (the language of the *Han* Chinese) or is commonly known as *Putonghua* (the common dialect) (Zhang et al., 2005; Owyang 2009).

Chen (cited in Sun 2006) claimed that *Putonghua* is the standard form of Modern Chinese based on the Northern dialect, with the Beijing phonological system as its norm of pronunciation. Huang and Wei (2009) had pointed out that *Putonghua* is not only spoken by majority of the Chinese people but also gradually interested to be learnt by foreign language learners. Among overseas Chinese communities, particularly in South East Asia, the language is commonly known as the *Huayu* (the Chinese language) (Theobald 2000; Lew and Lim 2007).

2.5.1 The Chinese Syllable and *Pinyin* Pronunciation

Pronunciation is one of the most difficult tasks to be handled for Chinese language instructors. The *Hanyu Pinyin* (*Pinyin* System of Romanisation) is the official romanised phonetic system of the modern standard Chinese (Grasso 2007). The *Pinyin* (literally meaning “transcribing speech sounds”) system is used in TCSL classrooms to help learners learn the pronunciation of Chinese characters. *Hanyu Pinyin* is made up of initials, finals, and tones (Rogers 2005; Lew and Lim 2007).

2.5.1.1 Initials

An initial is the consonant at the beginning of a Chinese syllable. There are 21 initials in modern Chinese: *b, p, m, f, d, t, n, l, g, k, h, j, q, x, zh, ch, sh, r, z, c, and s* (Lew and Lim 2007); for example, the initials of [*da4*] and [*xue2*] (大学, university) are *d* and *x*. There are some syllables which contain zero initials, namely without a consonant at the beginning of a syllable, for example [*e4*] (饿, hungry) and [*ai4*] (爱, love).

2.5.1.2 Finals

A final is the other half of a Chinese syllable that comes after a consonant. The finals are composed of the vowel and the final consonant (optional) (Rogers 2005). There are 38 finals in modern Chinese: *a, o, e, i, u, ü,*

ê, -i, er, ai, ei, ao, ou, ia, ie, ua, uo, üe, iao, iou, uai, uei, an, en, ian, in, uan, uen, üan, ün, ang, eng, ong, iang, ing, iong, uang, and ueng (Lew and Lim 2007). For example, the syllable [*meng4*] (梦, dream) is composed of the initial *m* and the final *eng* which made up of the vowel *e* and the final consonant *ng*.

2.5.1.3 Tones

Chinese is a tonal language. Tones refer to the rising and falling variations in pitch when Chinese characters are pronounced (Lew and Lim 2007). Figure 2.5 shows an example of the syllable [*ma*] which representing different meaning based on the different tone.

<u>Tone</u>	<u>Example</u>	<u>Meaning</u>
The first tone	<i>mā</i> (妈)	mother
The second tone	<i>má</i> (麻)	hemp
The third tone	<i>mǎ</i> (马)	horse
The fourth tone	<i>mà</i> (骂)	scold
The neutral tone	<i>ma</i> (吗)	Neutral marker of yes-no questions

Figure 2.5: The four main tones and the neutral tone applied to the syllable [*ma*]

Source: Modified from Ross (2011, p. 5)

Chinese language has four main tones which are high pitch (first tone), rising pitch (second tone), lower rising pitch (third tone), and falling pitch (fourth tone). The tone is represented by a tone mark (ˉ, ˊ, ˇ, and ˋ) placed on

top of the syllable. In addition, there is a special phonetic change of tone that is short and light called neutral tone. No tone mark is needed for the neutral tone. Chinese language consists of many Chinese characters which have the same pronunciation but with different meaning. Their meanings are to be differentiated according to the tone.

2.5.2 The Chinese Writing System

The instruction of Chinese writing is another challenge in TCSL classrooms. Kung (2008) stated that the Chinese writing system comprises Chinese characters which are also known as *Hanzi* (*Han* characters). Chinese characters have evolved from oracle bone script or *Jiagu wen* (inscriptions on tortoise shells and animal bones, a group of Chinese characters that resemble drawings) of the Shang Dynasty to today's characters over a long process.

A Chinese character is composed of strokes and is written in a square shaped virtual box as shown in Figure 1.7. There are eight basic strokes for Chinese characters writing which are dot (丶), horizontal (一), vertical (丨), left-falling (丿), right-falling (㇇), rising (㇏), vertical and hook (丨), and horizontal and turning (㇇) (Xing 2006; Lew and Lim 2007). Ross (2011) asserted that the strokes of a Chinese character have to be written in a specific order and specific direction according to the rules of stroke order as can be perceived through Figure 1.8.

Furthermore, two systems for Chinese characters have been developed, the traditional and simplified Chinese characters. Simplified Chinese characters system was created by decreasing the number of complex traditional glyphs of Chinese characters to fewer strokes; for instance the traditional Chinese character *yun* (雲, cloud) is simplified to the character “云” which contains lesser strokes. Simplified Chinese characters are used in Mainland China, Singapore and Malaysia, whereas traditional Chinese characters are mainly used in overseas Chinese communities such as Taiwan, Hong Kong, and Macau (Curriculum Development Council 2008; Ng 2008). Simplified Chinese characters have made it easier for non-native Chinese language learners to learn the writing of Chinese language (Ng 2008). In the context of this study, simplified characters are used.

2.5.3 Implication for the Study

The unique features of Chinese language especially the writing system and pronunciation has makes it became one of the foreign language that is difficult to learn. Unlike other alphabetic languages, Chinese language comprises Chinese characters that are built up of strokes; each Chinese character looks different from the other Chinese characters. Learners have to learn the stroke order for large quantities of different Chinese characters in order to master the language.

Besides Chinese characters, Chinese pronunciation is also difficult to be learned by second language learners due to there are some Chinese

characters with same pronunciation but different tone will present different meanings. Learners may easily mixed up the pronunciation and mispronounce the Chinese characters. Therefore, suitable T-L materials are strongly needed to provide effective Chinese language learning for second language learners.

An in-depth review on the features of Chinese language allows the author to gain more understanding on the selection of suitable T-L materials and creation of an effective blended language learning environment for TCSL. Consequently, it is able to help the author in determining the functionalities required to be integrated in ECLearn for effective TCSL in a blended learning environment.

2.6 Multimedia Learning

Godse and Godse (2007) described multimedia as the use of multimedia elements such as text, graphics, animation, sound, and video to present information. Mishra and Sharma (2005) defined interactive multimedia as the combination of some or all multimedia elements in a computer programme which allow users to control the environment at their own pace. These multimedia elements include:

- **Text:** Text can be used to present the contents.
- **Graphics:** Graphics can be used to convey message as it is easier to understand compared to text.
- **Animation:** Animation can be used to shows changes in the

operation which may reduce the learning times, present dangerous events, and provides enjoyment.

- **Sound:** Sound can be used for narration of visual information, to provide feedback, to attract attention, and to make presentation more enjoyable.
- **Video:** Video can be used to present the processes and action, and show real time events.

Multimedia offers exciting possibilities for meeting the needs of 21st century learners. According to Dervan et al. (2006), multimedia instruction can enhance learning by simultaneously stimulating multiple sensory organs through the use of multimedia elements. The combination of text, graphics, animation, sound, and video are able to provide graceful and enhanced explanation of the learning objects.

Numerous studies (Felix 1998; Yoshii and Flaitz 2002; Jones 2003; Reder et al., 2003, cited in Inoue and Bell 2006) have shown that multimedia has the potential in the second language acquisition especially the reading, listening, speaking, and writing skills due to multimedia allow students to actively participate in the learning process. Multimedia also helps them in transferring the knowledge they have learned into daily life communications. By taking advantage of the multimodal processing capability of multimedia, the use of multimedia instruction can significantly enhance student learning. An in-depth review at the dual coding theory and cognitive theory of multimedia learning give us further insight into how relevant media elements

promote information processing and, therefore, learning.

2.6.1 Dual Coding Theory

Paivio (2007) described dual coding theory as:

Cognition involves the cooperative activity of two functionally independent but interconnected systems, a nonverbal system specialised for dealing with non-linguistic objects and events, and a verbal system specialised for dealing directly with language (p. 33).

Figure 2.6 depicts the dual coding theory structural model which shows the representational units and their referential and associative interconnections.

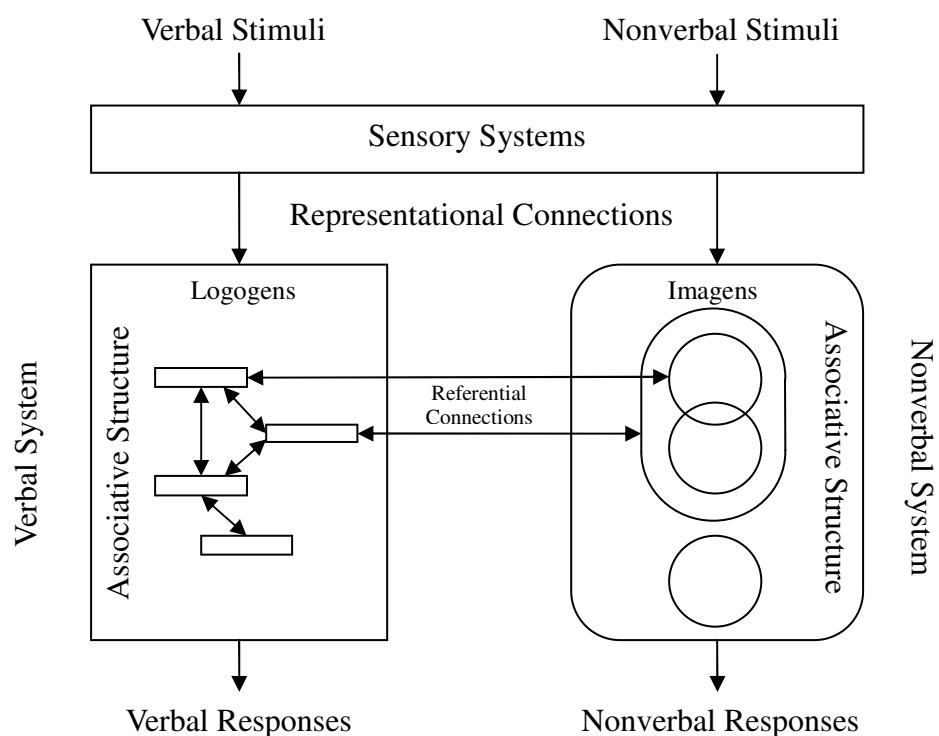


Figure 2.6: Dual coding theory structural model

Source: Modified from Paivio (2007, p. 34)

Heine (2010) noted that both the nonverbal and verbal systems can be activated independently or simultaneously; for instance, the verbal system is activated independently when a person reads a house description, and simultaneously the nonverbal system is also activated when a mental image of a house is formed at the same time.

Scott and Livingston (2008) stated that the dual coding concept elaborates the referential connections formed between the nonverbal system and the verbal system allows an individual to remember the information more easily and enhance learning. In regard to this, Gallegos-Butters and Schneider (2004) provided an example which states that a person can recalling a sentence more successfully if the person had a mental image which associated with the verbal sentence. Furthermore, Zhang and Barber (2008) claimed that multimedia which combined text (verbal) and graphics (nonverbal) to present information is able to help learners to have a better understanding on the information.

2.6.2 Cognitive Theory of Multimedia Learning

Mayer (2005) claimed that:

Cognitive theory of multimedia learning describes how people learn from words and pictures, based on consistent empirical research evidence and on consensus principles in cognitive science (p. 32).

Tergan and Keller (2005) noted that this theory is based on three assumptions as follows:

- There are two systems of information processing which are

auditory/verbal and visual/pictorial,

- The capacity of the information processing systems is limited, and
- The information is necessarily to be processed actively.

Tergan and Keller added that both systems have a limited cognitive capacity, so cognitive overload of one system would hinder learning. To prevent it from happening, the information should be presented partly in a verbal and partly in a pictorial manner which makes the learners have to use both the systems for information processing. Figure 2.7 shows the cognitive model of multimedia learning.

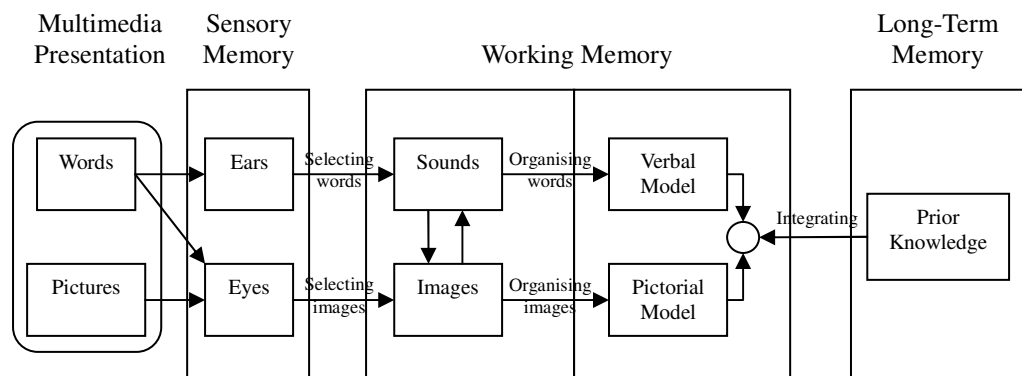


Figure 2.7: Cognitive model of multimedia learning

Source: Modified from Mayer (2005, p. 37)

As can be seen in Figure 2.7, learners have to go through five cognitive processes in order to allow meaningful learning occurs. The five cognitive processes are as follows (Mayer 2005):

- **Selecting words:** Relevant words in a multimedia presentation will be selected by learners to produce sounds in working

memory.

- **Selecting images:** Relevant images in a multimedia presentation will be selected by learners to produce images in working memory.
- **Organising words:** Connections among selected words will be built by learners to produce a coherent verbal model in working memory.
- **Organising images:** Connections among selected images will be built by learners to produce a coherent pictorial model in working memory.
- **Integrating:** Connections between verbal and pictorial models will be built by learners with prior knowledge.

Mayer added that the occurrence of each process can be many times all the way through the multimedia presentation. For example, first few words from the narration and first few seconds' images from the animation will be selected, organised, and integrated by learners, then the next segment and so on will repeat all the processes again.

2.6.3 Implication for the Study

Multimedia learning is able to enhance Chinese language learning because it provides an active learning environment which consists of multimedia elements for efficient Chinese learning. As Mayer (2005, p. 6) stated: "People learn better from words and pictures than from words alone".

In this context, words include written and spoken text, and pictures include static graphic images, animation and video. These multimedia elements are used to design and develop an interactive multimedia e-book called ECLearn. These multimedia elements are used to help enable the e-book to become a more interactive and user-friendly CBL (computer-based learning) software.

Text is the main element used to represent the learning contents in ECLearn. It is transformed from the contents in the printed textbook called “Learn Chinese with Ease”. Colourful graphics are integrated in ECLearn to provide visualization way of learning and get rid of bored feeling. Furthermore, animation is used to demonstrate Chinese characters stroke order. Meantime, standard pronunciation demonstrated by human voices is integrated in ECLearn for learners to imitate and study correct pronunciation. Then, the video clips of dialogues give learners an opportunity to see how sentences are used in a Chinese speaking environment, and teach the learners how to communicate politely in our daily lives.

Through the understanding of dual coding theory and cognitive theory of multimedia learning, suitable combination of multimedia elements for the presentation of contents is able to provide effective Chinese learning. As has been discussed in dual coding theory, students are able to understand, remember, and learn Chinese language more effectively via the interactive multimedia e-book that is properly designed and implemented. According to Mayer (2005), when related content is presented together in time and visually, learning is more effective.

Besides, ECLearn allows students to actively participate in the learning process and use both the auditory/verbal and visual/pictorial information processing systems for effective Chinese learning. This is in line with the cognitive theory of multimedia learning.

2.7 Blended Learning

Blended learning (BL) refers to the combination of traditional classroom and e-learning approaches (Thirunarayanan and Pérez-Prado 2005). Tinio (2003) noted that blending means not all of the learning are best achieved in the e-learning environment alone, especially one that includes a live instructor altogether. Tinio added, the subject matter, objectives and outcomes of learning, learners' characteristics, and the learning environment must be considered to achieve the optimum combination of instructional and delivery methods.

Sharpe et al. (2006) pointed out that it is actually quite difficult to define the term BL as it can mean different things to different people, institutions, or organisations. Overall, there are three most common definitions for the term BL as follows (Frydrychová Klímová 2009):

- The integration of traditional learning with web-based on-line approaches,
- The combination of media and tools (e.g. textbooks) employed in e-learning environments, and

- The combination of a number of teaching and learning approaches irrespective of the technology used.

According to Trapp (2006), the activities of BL can be divided into three levels as follows:

- **Theoretical level:** the combination of different learning theories such as behaviourism, cognitivism, constructivism, and adult learning.
- **Methodical level:** the combination of “self-directed with instructor-led learning, individual with cooperative learning, receptive with explorative learning”, and so on.
- **Media level:** the combination of traditional face-to-face (FTF) instruction with online learning, using different media such as books, e-books, and so on.

In the context of this study, the BL concepts created based on the three levels can be perceived through Figure 2.8.

Implication for the study: The idea of BL is to synthesise a number of different approaches in order to create high impact learning. The various interpretations mean that almost anything can be seen as BL. This study focuses on the creation and evaluation of a blended learning environment for the instruction of an elective subject called “Introduction to Chinese Language I”. For the purpose of this study, the blend typically includes traditional FTF classroom activities using printed textbook, print resources, paper-based

assessment activities, the resource web site called WBLE (Web-based Learning Environment), and an interactive multimedia e-book called ECLearn.

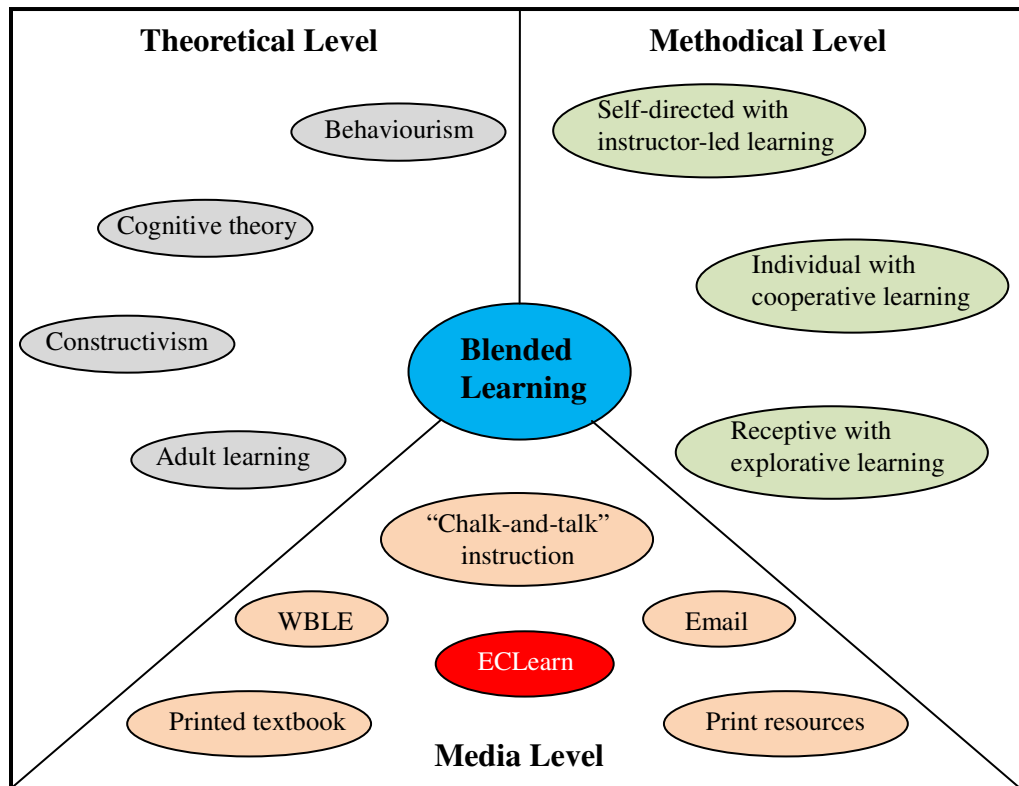


Figure 2.8: Three-level blended learning concepts in the study

ECLearn is an additional instructional material containing a variety of educational activities that are created using various types of multimedia elements. ECLearn adopts a variety of learning theories (is discussed in depth in section 2.8) and instructional strategies (is further discussed in section 2.9) for effective Chinese learning. Through the blended learning environment, it may facilitate learners in learning Chinese as a second language.

2.8 Learning Theories

Learning theory is used to explain about learning and performance by understanding the mental functions and behaviours of human (Richey et al., 2011). Shuell (2012) noted that “Theories of learning are efforts to explain how people learn. Different theories are based on different assumptions and are appropriate for explaining some learning situations but not others”. This section attempts to understand several theories of learning which include behaviourism, cognitive theory, constructivism, and adult learning theory.

Overall, all the theories of learning as described in the subsequent subsections are implied in this study for TCSL. However, the design and development of ECLearn are completed with the characteristics that are mainly based on behaviourism, cognitive theory, constructivism and adult learning theory that are further described in sections 2.8.1 through 2.8.4. These characteristics include providing positive and negative reaffirmation, content that is related to students’ experiences, student centred, providing exercises, and so on.

2.8.1 Behaviourism

Behaviourism explains that learning focuses on the acquisition of new observable behaviour with no consideration of the mental process (Pritchard 2009). Based on operant conditioning of behaviourism, Snowman et al. (2011) claimed that it focuses on how the consequences strengthen or weaken the

voluntary behaviours. This can be explained through the example of Skinner's study (Nevid 2007) where he places a pigeon in a cage, and a pellet of food will drop in the food tray when the button at the side of the cage is accidentally pecked by the pigeon through trial and error. The pigeon is soon learns the behaviour of pecking the button for food and it will starts to peck faster after repeating the behaviour followed by the reinforcement many times. Skinner added that if the reinforcement is increasingly delayed, its effects will increasingly become weaker.

Long et al. (2011) stated that there are two kinds of reinforcements which are positive reinforcement and negative reinforcement. Positive reinforcement is consider as rewards which strengthen the occurrence of the behaviour while negative reinforcement is strengthen the occurrence of the behaviour by removing the aversive stimulus. Orellana et al. (2009) added, both kinds of reinforcements are able to shape behaviour and continuous reinforcement will consequently increase the learning rate. As continuous reinforcement can strengthen the frequency of the behaviour, Allen (2007) suggested learners can be taught to practice more often by using the method of giving rewards to them when they provide correct responses.

Implication for the study: According to operant conditioning of behaviourism, reinforcement is able to shape behaviour and results in learning, so it is applied to the development of an interactive exercise activity at the end of each lesson in ECLearn. When learners answer a question in an exercise correctly, a congratulatory message is prompted. The message acts as positive

reinforcement to motivate the learner to attempt to answer more questions which results in learning. In addition, drills are used to train learners through repetitive practices on questions and gives feedback. The repetition of stimulus response behaviours can strengthen learners' learning behaviours.

2.8.2 Cognitive Theory

Cognitive theory explains that learning is not limited to observable behaviour as in behaviourism but is focus on how the new information is process and stored in the brain (Orellana et al., 2009). In cognitive theory, Rothwell and Kazanas (2008) noted that learners perceive and interpret information based on their experiences, expectations, and beliefs to create meaning of new ideas or new information.

According to Allen (2007), structured and meaningful information is said to be easier to remembered and recalled as it linked by related things that have been learned, the information's structures and concepts are to be compared with existing knowledge in memory and new information is more easily to be learned if it is similar to the existing knowledge. With that, Booth (2011) suggested the instructional content should be designed in a way that it is flow in manageable chunks through different media which can sustain attention, content should be structured to allow efficient transformation of information to memory, and explanation of content should based on learners' existing knowledge in memory.

Implication for the study: According to cognitive theory, learning occurs through relatively permanent change in mental process based on experiences. In order to promote learning, ECLearn is developed with Chinese instructional contents that are well-structured and meaningful complying with the local needs, which can be easily absorbed by learners. Besides, multimedia elements such as graphics, sound, animation, and video were properly designed and integrated in ECLearn to sustain attention of learners for effective learning. Learners perceive, interpret, and store the Chinese knowledge in their memory related to their existing knowledge. Learners are then refining and revising what is retained in their memory through continuously compare the Chinese knowledge with their existing knowledge.

Cognitive theory is applied to the development of the instructional contents (i.e. 15 lessons and three poems integrated in the Lessons and Poems modules in ECLearn). The instructional contents embedded in ECLearn require learners to think and process the information they received before react to it. Cognitive theory plays a vital role in the construction of Chinese knowledge in which it focuses on critical thinking and problem solving skills. Tutorials are used for contents representation in ECLearn to develop learners' critical thinking and problem solving skills. In addition, drills activities embedded in ECLearn enable learners to test their understanding on the learning contents.

2.8.3 Constructivism

Constructivism explains that learners construct their own representation of knowledge and meaning actively from their experiences (Allen 2007). As cited in Spodark (2005, p. 429), Jonassen et al. have also noted that “Constructivists believe that knowledge is constructed, not transmitted... Teaching is a process of helping learners to construct their own meaning from the experiences they have by providing those experiences and guiding the meaning-making process”. Piaget (cited in Tuckman and Monetti 2011) stated that learning occurs through assimilation and accommodation which involved in the construction of mental structures called schema.

In the process of assimilation, new knowledge that can be deal with using the existing schemas will be incorporated into the existing schemas as new experiences without alter the schemas. Whereas in the process of accommodation, the existing schemas will be altered in order to fit the new experiences if the new knowledge cannot be deal with using the existing schemas. For example, the assimilation process can be seen as “a new wing is added to a building” while the accommodation process can be explained as “the remodel of a building” (Bourne and Moore 2005).

Implication for the study: According to constructivism, the representation of knowledge is constructed by human and teaching is just a process of providing experiences to help guide learners in constructing their own meaning. So, a learner-centred learning environment should be

implemented for TCSL classroom to encourage students to be actively involved in the learning process to assimilate or accommodate new knowledge into their existing schemas. In the context of this study, blended language learning environment which combines traditional instruction and computer-mediated approach allows students to actively participate in the learning process through cooperative and explorative learning with peers and instructor in the classroom. As instructor merely acts as a facilitator, students have the opportunity to think, express, and apply new knowledge of Chinese language. In addition, ECLearn which acts as an additional teaching aid tool also provides interactive contents that could encourage learners to construct their own knowledge of Chinese language, especially in oral communication skills development.

Specifically, some lessons in the Lessons module in ECLearn have adopted constructivism such as Lesson 4: Polite Expressions of Socialization (社交礼貌用语) and Lesson 6: Self-introduction (自我介绍). Both the lessons encourage learners to actively participate in oral communication skills learning process and demonstrate the skills in traditional classroom. Lesson 4 consists of a video demonstrating how two people communicate with each other politely in Chinese. Meantime, a video demonstrating self-introduction in Chinese is embedded in Lesson 6. These two lessons that delivered lessons via video clips assist learners to construct their own knowledge of Chinese communication. The Chinese communication skills learned enable learners to communicate politely with others and introduce themselves in daily life using Chinese language.

Through the multimedia elements integrated in the lessons in ECLearn, learners learn and construct Chinese language knowledge effortlessly. By applying constructivism to the blended language learning environment through the use of ECLearn, it encourages and helps learners to construct their own representation of Chinese language knowledge and then apply them in daily life. Through assimilation and accommodation, learners will be able to extend or reorganise the Chinese language knowledge based on their experiences and apply it to new situation. They are also able to think and apply the Chinese language knowledge correctly in the correct situation without misuse of the Chinese language knowledge based on their experiences.

2.8.4 Adult Learning

Adult learning theory explain about how adults learning new information and skills (Fry et al., 2009). Fry et al. added andragogy is a term that refers to adult learning. Knowles (cited in Fry et al., 2009) defined the theory of andragogy as “the art and science of helping adults learn”. Knowles claimed that there are six andragogical assumptions which are as follows (Knowles et al., 2005; Light et al., 2009):

- **First assumption:** Adult learners have a need to know about what, how, and why before they learn.
- **Second assumption:** Adult learners are self-directed and they can learn on their own.

- **Third assumption:** Adult learners have accumulated many life experiences and they are a rich source for learning among themselves and others.
- **Fourth assumption:** Adult learners are ready to learn about life-related tasks when they have a need to know and perform something.
- **Fifth assumption:** Adult learners are more towards problem-centred learning.
- **Sixth assumption:** Adult learners are motivated by internal such as self-esteem which provides them a reason to learn.

Implication for the study: ECLearn adopts adult learning theory as it serves as a T-L tool for students in higher educational institutions. According to andragogy, the needs of adult's learning are different from children as they have the needs of learning in order to change their social roles. As an adult, many life experiences that have been accumulated by them would be a rich resource for their Chinese language learning. Furthermore, adult learners are capable to think logically with better understanding compared to children. Adult learners are self-directed and they are able to learn Chinese language using ECLearn at anytime, anywhere, and any pace. So, ECLearn provides a variety of educational activities such as tutorials, drills, and simulations to assist adult learners in learning Chinese language efficiently.

2.9 Teaching Strategies

Kauchak and Eggen (2003) defined teaching strategy as “an interconnected set of teaching actions designed to accomplish specific goals”. In this context of study, the teaching strategies include tutorials, drills and simulations.

2.9.1 Tutorials

According to Alessi and Trollip (2001, p. 17), tutorials are effective for presenting information based on facts, for learning concepts, rules and principles, or for gaining knowledge of problem solving strategies. Merrill (cited in Handal and Herrington 2003) noted that “a tutorial may be employed to support and reinforce classroom instruction, to teach a selected topic and so forth”. Alessi and Trollip (2001, p. 89) claimed that “good tutorial should include both presentation and guidance, whereas extended practice and assessment are the domain of other methodologies”. Figure 2.9 represents the tutorial’s general structure and sequence.

As can be perceived through Figure 2.9, the sequence of the tutorial starts with an introductory section which provide introduction to the lesson. It follows by information presented to the learners. Then, question will be answered by the learners. The programme performs evaluation by judging the response of the learners. Feedback will be provided for learners to improve their performance. A sequencing decision on information that will be treated in

the next iteration will be made by the programme when reach each iteration's end. The sequence will be closed when either the learner or the programme has terminated the lesson. Tutorials are also useful in providing individualized instruction.

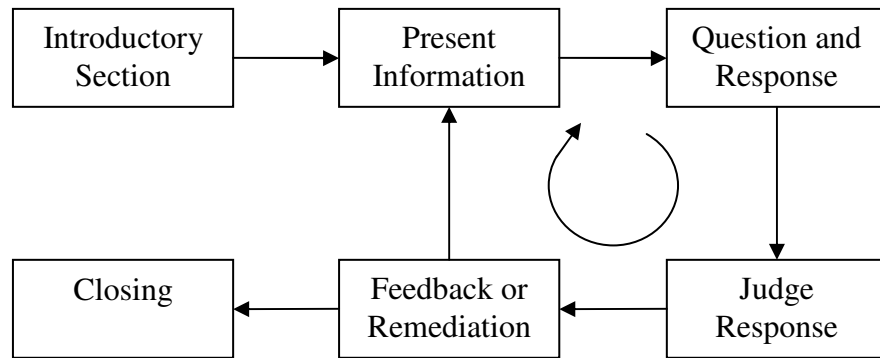


Figure 2.9: Tutorial's general structure and sequence

Source: Modified from Alessi and Trollip (2001, p. 90)

Implication for the study: Since tutorials are effective for presenting fact-based information and for learning concepts, rules, and principles, so tutorials strategy will be applied in ECLearn to develop learners' critical thinking and problem solving skills. As discussed in cognitive theory, learners are required to think and process the information presented to them before react to it. Hence, their understanding of the facts, concepts, rules, and principles presented in tutorials are able to help them in gaining the knowledge of problem solving strategies.

Tutorials strategy has been used to present the 15 lessons and poems in ECLearn to facilitate learners in learning Chinese language. Each lesson contains learning materials and activities to effectively arouse the interest of

learning among the learners. At the end of each lesson, exercise with multiple choice questions is provided for learners to test their understanding on the lesson they have learnt. Feedbacks are given to learners for improving their performance. Learners can relearn the lesson and redo the exercise until they have mastered the lesson before proceed to the next lesson.

2.9.2 Drills

Alessi and Trollip (2001, p. 181) stated that drills “provide practice and are useful for learning information in which fluency is required, such as basic math skills, foreign languages, spelling and language usage, and vocabulary”.

Figure 2.10 represents the drill’s general structure and sequence.

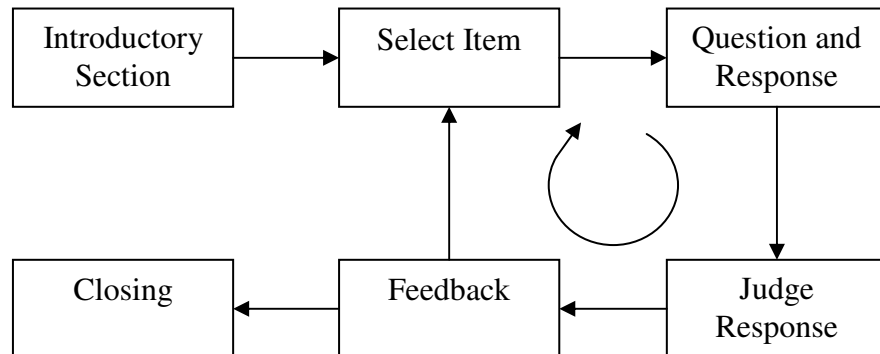


Figure 2.10: Drill’s general structure and sequence

Source: Modified from Alessi and Trollip (2001, p. 182)

Based on Figure 2.10, most drills start with an introductory section and then followed by item selection. The item selected by the learners will be displayed. Then, the learners will respond to the item. The response of the learners will be judged by the programme. Feedback about the response will

be provided for the learners. The cycle continues until it is terminated by the learners or some will be terminated after a specified time, specified number of items, or the performance of learners have reached a quality acceptable level.

Implication for the study: As discussed in section 2.8.1, the repetition of stimulus response behaviours will strengthen the learning behaviours of learners. So, drills strategy will be applied in the development of exercise embedded in each lesson in ECLearn to train learners through repetitive practices on questions and gives feedback. In each exercise, learners can choose which question to be answered first. The exercise in each lesson will provide immediate feedback to learners after they have done a question. If learners have provided correct responses, a congratulatory message is prompted in order to motivate them to attempt to practice more questions.

2.9.3 Simulations

According to Alessi and Trollip (2001, p. 213), “an educational simulation can be defined as a model of some phenomenon or activity that users learn about through interaction with the simulation”. They added that the definition provided does not include some formats such as animations, movies, and some of the games as those formats are generally not based on the internal model even though they consists of some reality representation or imitation. Laurillard (cited in Thomas 2003, p. 1) stated that “a computer-based simulation is a programme that embodies some aspect of the world, allows the user to make inputs to the model, and displays the results”. Laurillard also

claimed that animation which consists of reality representation or imitation is certainly a simulation even though “animation cannot be altered to reflect a change in system conditions, only responds to preset values” and user simply watches. Laurillard added that “when the full capabilities of a simulation are not used, then it is possible to turn a simulation into an animation or even the equivalent of a video”.

Figure 2.11 represents the learning theory from simulation which describes the combination of knowledge, learner, and simulation attributes to determine how learners are encoding, representing, and using knowledge. The attributes of knowledge such as the type (for example, declarative or procedural), organization (for instance, hierarchical, sequential, cyclical, or others), complexity, and precision (refer to knowledge accuracy and how well it can be predicted) of the knowledge will affect the design of simulation attributes. The attributes of learner such as gender, age, prior knowledge, learning styles, general cognitive and meta-cognitive abilities will affect the successful learning probability. Simulation attributes will be selected based on knowledge and learner attributes for simulation design in order to effectively facilitate learning. The combination of all the three attributes affects learning through learners encoding the knowledge, representing the knowledge in their brains, and using the knowledge.

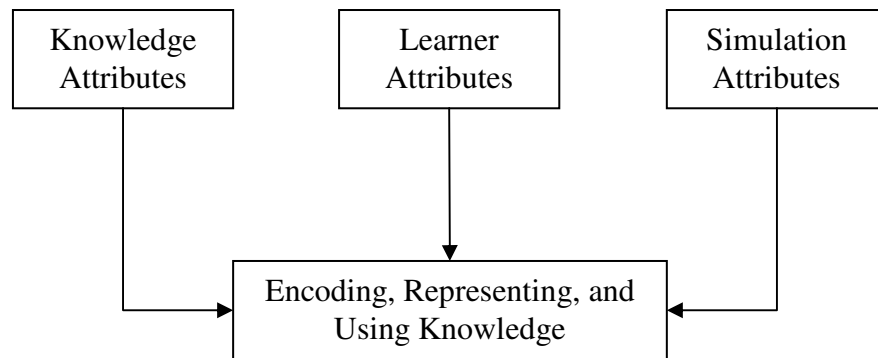


Figure 2.11: Learning theory from simulation

Source: Modified from Alessi and Trollip (2001, p. 232)

On the other hand, face-to-face (FTF) simulation refers to a “controlled representation of reality involving role playing” (Sampath et al., 2007, p. 77). According to Khan (2005, p. 191), role playing used to “represent real situations that provide learners the opportunity to practice situations they face in the real world or to empathize with decision makers, historical figures, and others”. It helps learners in developing their communication and interpersonal skills.

Implication for the study: As discussed in section 2.8.3, students are encouraged to be actively involved in the learning process to construct their own Chinese language knowledge. Furthermore, oral communication skills learning in the second language acquisition are hard to be achieved in the computer-mediated environment (Lai and Kritsonis 2006). So, in addition to computer based simulation, FTF simulation strategy has been applied in the blended language learning environment to facilitate effective Chinese communication learning. In the class, learners can be divided into small groups and they will have conversation with each other in the group using

Chinese language. Instructor may assign a simulated situation for each group and see how they will have conversation using Chinese language according to the simulated situation assigned. With that, learners are actively participate in the learning process where they think, express, communicate, and construct their own Chinese language knowledge through interact with FTF simulation.

Besides, Lesson 4: Polite Expressions of Socialization (社交礼貌用语) and Lesson 6: Self-introduction (自我介绍) in ECLearn have also provided two videos demonstrating how communication between people and self introduction using Chinese language to facilitate learners in learning Chinese communication. Both videos consist of reality representation which assist learners in understanding the use of Chinese language in communication and construct their own meaning. Learners can imitate how to communicate using Chinese language with people in daily life through watching the videos.

2.10 Instructional Design Model

Instructional design is a systematic approach to analyse the goals of instruction and design effective instruction to achieve successful learning (Richey et al., 2011). Chen (2008) defined instructional design models as “the visualised representations of an instructional design process, showing the main elements or phases of the process and their relationships”. Examples of

instructional design model include ADDIE model, Morrison, Ross and Kemp model, and Dick and Carey model.

2.10.1 ADDIE Model

ADDIE model is a generic instructional design model which provides a framework for instructional designers to make their instructional design process as efficient as possible to produce effective instructional products (Zimnas et al., 2009). The ADDIE model as shown in Figure 2.12 comprises of five phases as follows (Parekh 2006):

- **Analysis phase:** During this phase, requirement analysis will be performed, the project's objectives and goals will be identified, and the target users will be specified.
- **Design phase:** In this phase, the story, the script and the storyboard will be prepared. The collection of source material has finished up to an appreciable level.
- **Development phase:** During this phase, the project will be divided into parts and a development team will be assigned for each part. A group leader will be assigned to manage each team. Each team may consist of content writers, programmers, visual designers and so on.
- **Implementation phase:** In this phase, the modules developed by each development team will be integrated into a single production. If there is any integration problems occur, the problems will be resolved.

- Evaluation phase:** During this phase, the target users will evaluate the material and provides feedbacks to the developers. The developers further improve the material based on the feedbacks and take the improved material back to the target user for evaluation again.

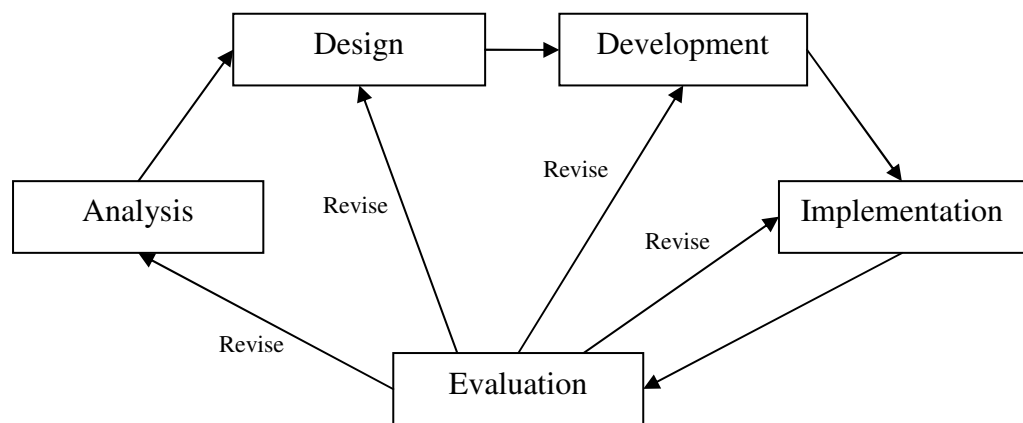


Figure 2.12: ADDIE model

Source: Modified from Koohang and Harman (2007, p. 361)

2.10.2 Morrison, Ross and Kemp Model

Orey et al. (2010) stated that Morrison, Ross and Kemp (MRK) model is a holistic approach which all the factors in the environment will be consider for instructional design. The process in the model is iterative and also subject to constant revision. Furthermore, MRK model is different from the traditional instructional design approach in which it focuses on planning the curriculum based on the perspective of learners rather than the content (Morrison et al., 2010; Ndon 2010).

As shown in Figure 2.13, there are nine design elements in the model which the instructional designer can approach through different paths. Besides, there are also two outer ovals in the model showing that revisions are occurring all the way through the process. Formative evaluation and revision are provided by the first outer oval whereas project management, summative evaluation, planning, and support services are provided by the second outer oval (Seels and Glasgow 1998).

The following represents the nine design elements of the model (Akbulut 2007):

- Instructional problems will be identified and relevant goals will be specified.
- Learner characteristics will be examined.
- Subject content will be identified and task components which are related to the instructional goals will be analysed.
- Instructional objectives will be stated.
- Content within each unit will be sequenced to sustain logical learning.
- Instructional strategies will be designed for each learner to achieve the objectives.
- Instructional delivery will be planned.
- Evaluation instruments will be developed.
- Instructional resources will be selected to support learning activities.

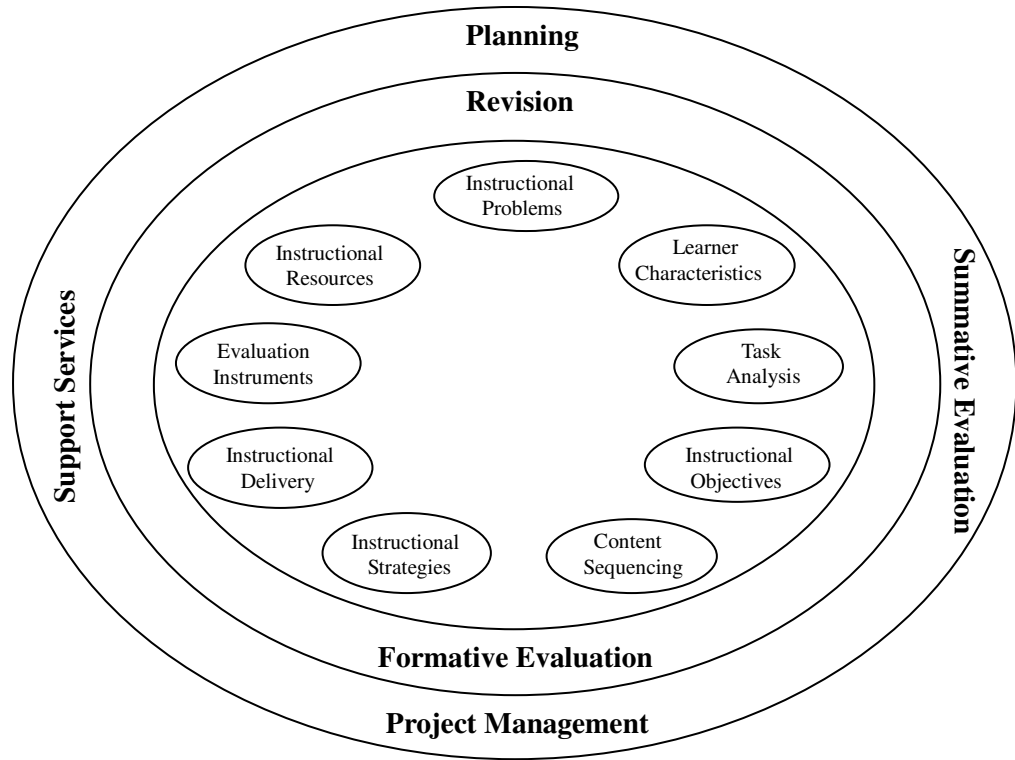


Figure 2.13: Morrison, Ross and Kemp model

Source: Modified from Seels and Glasgow (1998, p. 175)

2.10.3 Dick and Carey Model

Seels and Glasgow (1998) claimed that Dick and Carey (DC) model provides an instructional design process which start from assess the needs to identify the goals, then through writing the objectives to develop the instructional materials and evaluate the instruction. Taylor (2010) noted that DC model is suitable to be used in various context areas such as primary and secondary schools, business, and government. As the model provides step-by-step descriptions which aiding the progress, so it is also suitable for various

users ranged from novice to expert. Below represents the ten components of the model as shown in Figure 2.14 (Akbulut 2007):

- Needs will be assessed and then the goals will be identified.
- Instructional analysis will be conducted.
- Learners and contexts will be analysed.
- Performance objectives will be written.
- Assessment instruments will be developed.
- Instructional strategy will be developed.
- Instructional materials will be developed and selected.
- Formative evaluation of instruction will be designed and conducted.
- Instruction will be revised.
- Summative evaluation will be conducted.

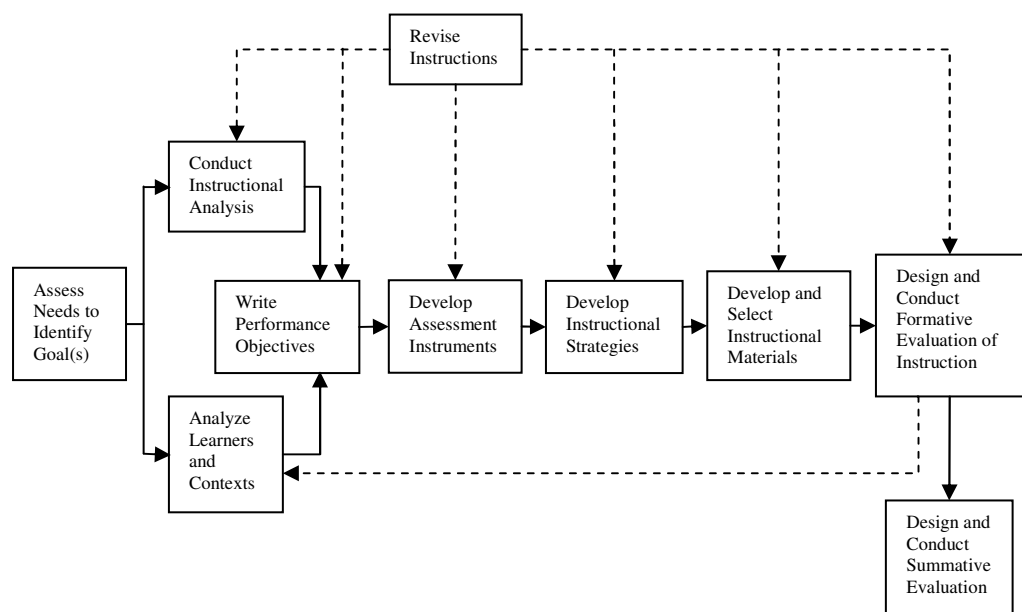


Figure 2.14: Dick and Carey model

Source: Modified from Seels and Glasgow (1998, p. 177)

According to Dooley et al. (2005), the test items in the model are developed through reference on criteria in order to determine whether had met the instructional objectives, and the model will also perform formative evaluation to make sure the instruction is efficient and effective.

2.10.4 Implication for the Study

As Ellington and Aris (2000) claimed, “ADDIE model is particularly well suited to the development of instructional systems within the context of formal research-and-development programmes”. In addition, a series of questions are provided in the model to make sure the instructional goals, learner needs, and learning objectives will be critically examined at each stage during the design process (Koohang and Harman 2007). Thus, the proposed instructional design model developed in this study was created based on the ADDIE model.

The author did not opt for MRK model in designing the instruction due to the model does not have start or end point where it allows instructional designer to begin the instructional design through different paths. It is lacking of direction which may confuse the novice instructional designer. MRK model is more suitable to be used by instructional designer who is well experienced and able to decide what steps to be taken to solve problems based on their personal judgment and creativity (Garcia et al., 2010).

The author also found that DC model was not suitable to be used as the foundation to develop the instructional design model in this study. The steps in DC model are built on each other where the next step cannot be approached if without the prior step, and also the instructional design process can only start after the establishment of instructional goals. Furthermore, DC model is more suitable for primary and secondary schools uses compared to students at tertiary level.

2.11 The Review of Existing Chinese Learning Applications

Before developing the ECLearn, it is a need to research on other Chinese learning applications; those applications can be served as references for the development of ECLearn. This may help to improve the quality of ECLearn. The existing Chinese language applications that had been reviewed are Wenlin Software for Learning Chinese, Learn Chinese 6.0, and Learn Chinese 2008. All these three applications are offline-based.

2.11.1 Wenlin Software for Learning Chinese

Wenlin software for Learning Chinese (WSFLC) is a CD-based application. It consists of an expandable Chinese dictionary, a text editor, and unique flashcard system. WSFLC provides instant vocabulary look-up through write down the character and clicking to access the detailed information of the vocabulary. The descriptions and cross-referencing of the characters in

WSFLC include ancient and modern forms characters with *Hanyu Pinyin*.

Below are some features integrated in WSFLC:

- The dictionary embedded in WSFLC consists of more than 10000 characters and about 200000 words and phrases,
- WSFLC provides the voice in both genders for all Mandarin Chinese syllables,
- WSFLC consists of Chinese literature collection, and
- WSFLC allow the dictionary to be edited, new vocabulary to be added, and definitions to be modified.

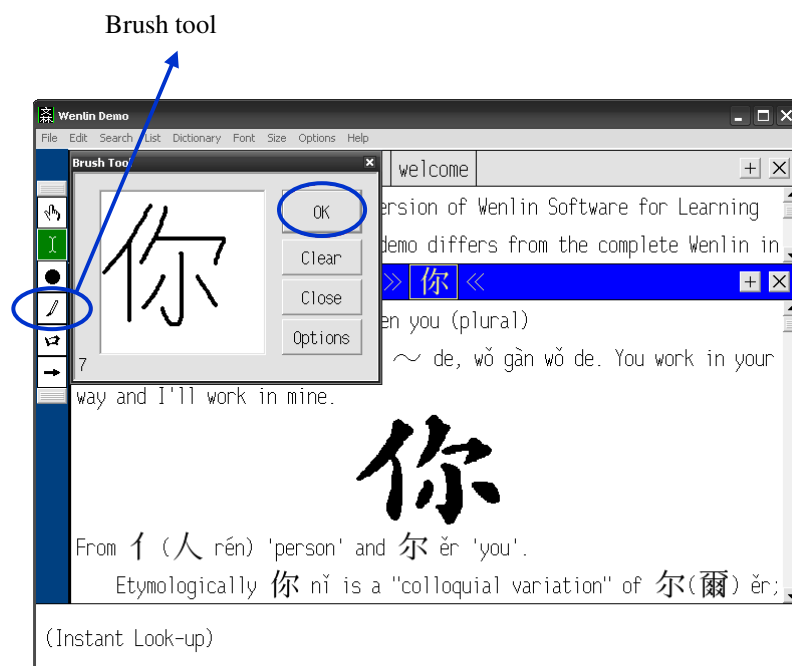


Figure 2.15: Sample screenshot from the Chinese characters composition section in WSFLC

As shown in Figure 2.15, when clicking on the Brush Tool in the panel at the left, a Brush Tool dialogue box prompts. User can write Chinese characters in the blank space area and then click on the “OK” button. Then the details of the Chinese character written appear on the screen in WSFLC.

2.11.2 Learn Chinese 6.0

Learn Chinese 6.0 (LC 6.0) is CD-based Chinese Mandarin learning software which is used to assist students in passing the Chinese Proficiency Test. The scope of LC 6.0 development is ranged from the basic to intermediate. LC 6.0 provides students an excellent foundation to learn Chinese language where it is focus on Chinese speaking and Chinese characters that is commonly used. It features 66 lessons of Chinese, 95 scene dialogues, more than 12000 words and phrases that are commonly used, more than 3500 commonly used Chinese characters writing demo, and so on. Some of the advantages found in the software are as follows:

- All the pronunciation provided are in standard Mandarin which is pronounced by a Chinese national announcer,
- The contents are based on the Chinese Proficiency Test,
- *Hanyu Pinyin* is provided for all Chinese characters,
- The function of text to speech is provided, and
- The function of exam is provided to test the understanding of students.

As shown in Figure 2.16, when a lesson is selected in the Index Treeview of LC 6.0, the Chinese sentence will appear in the Sentence and Dialog section. User can click the Sound icon to listen to the pronunciation of the Chinese sentence. After that, user can choose any Chinese character from the Chinese sentence and then user can choose the Speech *Pinyin* for the pronunciation of the Chinese character selected. When a user clicks on the

“Write” button in Figure 2.16, an animation on how to write a Chinese character will be shown. User can also click on the arrow button beside the “Write” button to replay the animation again.

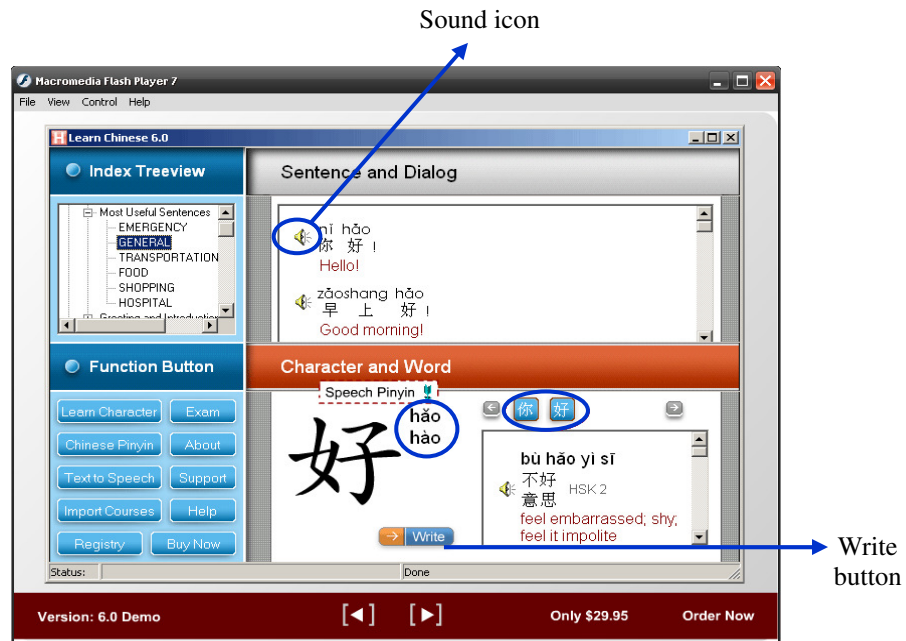


Figure 2.16: Sample screenshot from the Sentence and Dialogue section in LC 6.0

2.11.3 Learn Chinese 2008

Learn Chinese 2008 (LC 2008) is CD-based software which is used to learn the Chinese characters and vocabularies. Some features embedded in LC 2008 are as follows:

- Flexible word-list system is provided to allow user to create their own word-lists by selecting Chinese characters from the 400 characters available or the Chinese dictionary in LC 2008,
- LC 2008 provides Chinese character animations database which consists of more than 1400 Chinese characters include the demo of stroke order with replay functions,

- Character writing Quiz with intuitive Chinese character writing assistant in LC 2008 allow user to practice writing Chinese character,
- 16000 entries dictionary is embedded in LC 2008 as a database of Chinese characters, and
- LC 2008 provides Chinese characters pronunciation database which allow user to listen to Chinese characters pronunciation.

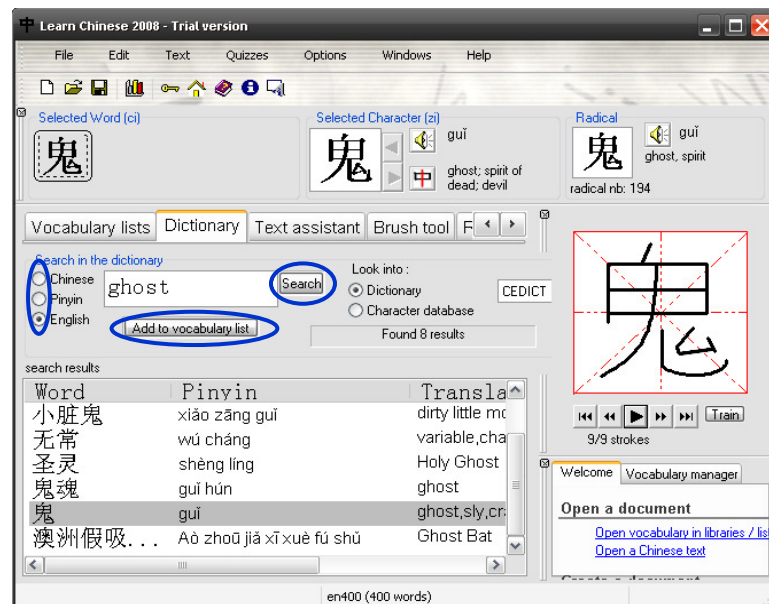


Figure 2.17: Sample screenshot from Dictionary section in LC 2008

User can search Chinese word in the dictionary by choosing to search input either in Chinese, *Pinyin* or English as shown in Figure 2.17. After entering a word, user can click on the “Search” button to search the word. The search will return search results that match the word. The search results display all the Chinese vocabularies that are related to the words that user input. User can also add the word into Vocabulary lists by clicking on the “Add to vocabulary list” button. Furthermore, user can practice to write a

Chinese character in the “Character writing Quiz” dialogue box as shown in Figure 2.18.

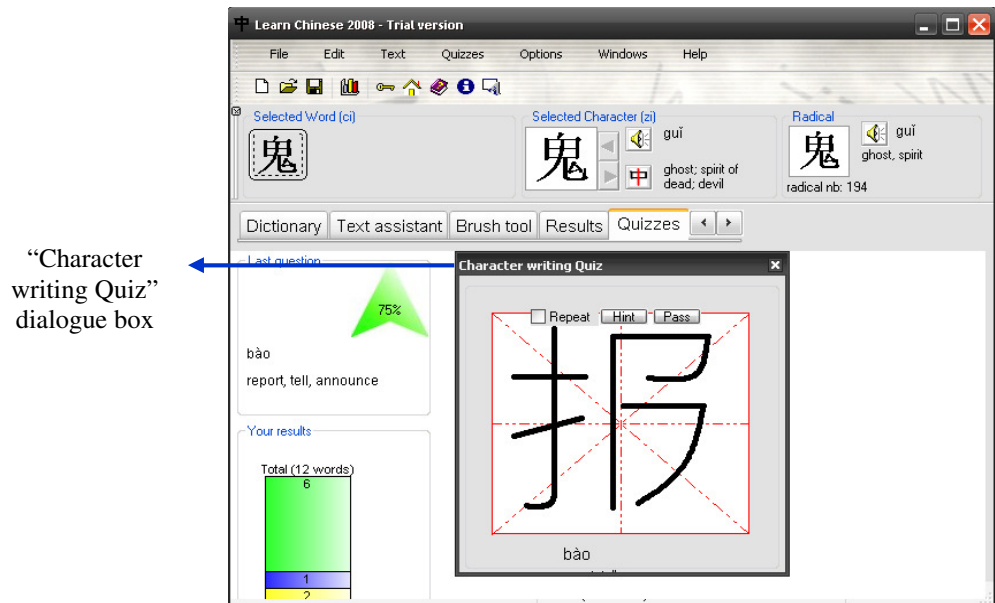


Figure 2.18: Sample screenshot from the Quizzes section in LC 2008

2.11.4 Implication for the Study

The author found that WSFLC, LC 6.0 and LC 2008 provide complicated graphical user interface which is not suitable for beginners. Those applications contain too many functional features inside them which maybe will confuse beginner for efficient Chinese language learning.

Moreover, LC 6.0 and LC 2008 are developed to help students to pass the Chinese Proficiency Test and HSK (*Hanyu Shuiping Kaoshi*) examination which is the People’s Republic of China’s only standardised test of Standard Mandarin Chinese proficiency for non-native speakers, namely foreign students, overseas Chinese, and members of ethnic minority groups in China.

So the standard of the content will be higher and is not suitable for beginners.

Besides that, Chinese Dictionary feature in the three Chinese learning applications is provided to learners who have basic knowledge of Chinese language. The feature is not suitable to be integrated in ECLearn, because the target users of ECLearn are those who do not have basic Chinese knowledge.

After reviewing other Chinese learning applications, the author has some idea in developing ECLearn to assist learners in Chinese language learning. Text, graphics, and audio are the most important elements to be integrated in ECLearn. Texts are used to represent Chinese characters, graphics are used to represent icons and provide attractive environment for learning, and audio is used in pronunciation of all the Chinese characters and sentences. Furthermore, video is used to demonstrate the Chinese conversations between people for learners. Chinese character stroke order animation is integrated in ECLearn to help guide learners in learning to write Chinese character step by step. Chinese character writing function is provided in ECLearn for learners to practice writing Chinese characters.

The comparison of the features integrated in Chinese learning applications and ECLearn can be perceived through Table 2.1.

Table 2.1: Comparison of the features between three Chinese learning applications and ECLearn

Features	WSFLC	LC 6.0	LC 2008	ECLearn
Text	✓	✓	✓	✓
Graphics & Images	✓	✓	✓	✓
Audio	✓	✓	✓	✓
Video	✗	✗	✗	✓
Animation	✗	✓	✓	✓
Chinese Dictionary	✓	✓	✓	✗
Chinese Characters Writing	✓	✓	✓	✓
Target Users	Chinese students and scholars	Students who are taking Chinese Proficiency Test	Students who are taking HSK examination	FAS/FCI students at UTAR

2.12 Related Studies

Before the creation and implementation of blended learning environment and interactive multimedia e-book for TCSL in this study, related studies including the implementation of blended learning in higher institutions and usability testing on applications are reviewed.

2.12.1 Blended Learning Studies

This section discusses several studies pertaining to the implementation of blended learning in higher institutions.

Ghaffari and Molaei (2011) examined the economics students' learning outcomes and satisfaction between FTF course (92 students) in first semester

of 2006, e-learning (74 students) course in first semester of 2007, and blended learning (84 students) course in second semester of 2007. The data collected were analysed using *t*-tests with $p < 0.05$ significance level. “Student Evaluation of Instruction (SEI)” instrument which contains 16 items using Likert scale (excellent=1 to poor=5) was administered to students prior to final exam for evaluating the instructor’s teaching and course overall. Based on the results obtained, blended learning course which has achieved 86.90 in terms of final course grades is significantly higher than the e-learning course (70.48) and the FTF course (75.66). There is also significant difference found in blended learning course in terms of student satisfaction with the other two methods, while there is no significant difference between e-learning and FTF course.

Uzun and Senturk (2010) assessed the course achievement of students and their attitudes toward computers between blended (86 students) and FTF (93 students) course delivery methods in their research. Pre- and post- tests control group design and the Computer Attitude Scale (CAS) which consists of 40 items using Likert scale (strongly agree=4 to strongly disagree=1) were employed to compare the students’ attitudes toward computers in both groups. Both groups were given the achievement test (consisted of final exam’s questions) and the CAS as pre-test at the beginning of the research. After being taught for 14 weeks, both groups were then given the same achievement test and CAS as post-test at the end of the course. Independent samples *t*-test with $p < 0.05$ significance level was used to analyse the data collected. Table 2.2 shows the *t*-test results of students’ post-test whereas Table 2.3 shows the

t-test results of students' attitudes toward computers at the end of the course in FTF and blended course. Both the results show that there is a significant difference between FTF and blended course in course achievement and attitudes towards computers.

Table 2.2: Independent samples *t*-test results of course achievement in FTF and blended course

Group	N	Mean	S.D.	df	t	p
FTF	93	51.16	9.97	177	6.913	0.000
Blended	86	61.49	10.003			

Table 2.3: Independent samples *t*-test results of Computer Attitude Scale scores in FTF and blended course

Group	N	Mean	S.D.	df	t	p
FTF	93	124.505	12.180	177	3.003	0.003
Blended	86	130.535	14.644			

Melton et al. (2009) investigated the students' achievement and satisfaction with blended learning course (98 students) delivery method compared to traditional FTF course (153 students) delivery method during Fall 2007. The research employed a pre- and post- tests control group design where the pre-test and post-test also contained the same 50 questions. In addition, students' achievement in four written exams and final course grade were collected as well. A Satisfaction survey (consisted of modified Students' Evaluation of Educational Quality (SEEQ)) contained 15 questions using Likert scale (strongly agree=5, agree=4, neutral=3, disagree=2, strongly disagree=1) was administered to students at the end of the course. Data collected were analysed using *t*-tests with $p \leq 0.05$ and 0.01 significance

levels. The *t*-tests results of students' achievement and the *t*-tests results of students' satisfaction in traditional FTF and blended learning course are shown in Tables 2.4 and 2.5 respectively. As shown in Table 2.4, the students' achievement brought mixed findings, however the final course grade have shown a significant difference between both course delivery methods where the blended learning course is higher than the traditional FTF course. Furthermore, there is also a significant difference between the satisfaction of students in blended learning and traditional FTF course as shown in Table 2.5. It can be concluded that students in blended learning course are more satisfied than students in traditional FTF course.

Table 2.4: Independent samples *t*-tests results of overall course performance in traditional and blended course (n=251)

Source of Variation	Blended Mean (S.D.)	Traditional Mean (S.D.)	<i>t</i> Value	Sign.
PreTest	19.13 (0.58)	18.88 (0.50)	0.112	0.911
PostTest	21.24 (0.59)	21.33 (0.38)	1.019	0.985
Written Exam 1	80.80 (1.31)	77.99 (1.06)	1.665	0.097
Written Exam 2	78.59 (1.52)	73.48 (0.95)	3.011	0.003
Written Exam 3	72.12 (2.04)	73.59 (1.11)	-0.684	0.494
Written Exam 4	73.63 (1.90)	78.15 (1.08)	-2.211	0.028
Final Course Grade	79.62 (1.24)	76.38 (1.04)	3.245	0.048

Table 2.5: Independent samples *t*-tests results of course satisfaction in traditional and blended course (n=170)

Source of Variation	Overall Sat. Mean	df	<i>t</i> Value	Sign.
Blended	54.986	168	3.464	0.001
Traditional	49.788			

Abraham (2007) studied the graduate engineering students' participation and performance in the financial management course based on

the number of attempts at weekly questions, results of in-session tests, and results of final examinations between blended learning (46 students) and traditional approaches (40 students) at a regional Australian university. Both approaches were adopted in two different semesters where traditional approach was adopted in 2005 and blended learning approach was adopted in 2006. It is compulsory for students in traditional approach to complete all assessment components, while it is flexible for students in blended learning approach as they need to achieve at least 50% overall mark in the course and only final exam is compulsory. Independent samples *t*-tests were used to analyse the data collected. Tables 2.6, 2.7 and 2.8 show the *t*-test results of attempts at weekly questions, the *t*-test results of in-session test, and the *t*-test results of final examinations of the students between blended learning and traditional approaches respectively. According to the results, students in blended learning approach shows increased attempts at weekly questions and also achieved higher marks in the in-session test and final exam compared to traditional approach.

Table 2.6: Independent samples *t*-test results of attempts at weekly questions in traditional and blended learning approaches

Group	N	Mean	t	df	Sig. (2-tailed)
Traditional	40	9.05	-4.263	59.407	0.000
Blended Learning	46	11.09			

Table 2.7: Independent samples *t*-test results of in-session test in traditional and blended learning approaches

Group	N	Mean	t	df	Sig. (2-tailed)
Traditional	40	56.23	-6.677	70.080	0.000
Blended Learning	46	75.49			

Table 2.8: Independent samples *t*-test results of final examinations in traditional and blended learning approaches

Group	N	Mean	t	df	Sig. (2-tailed)
Traditional	40	44.24	-3.743	84	0.000
Blended Learning	46	55.56			

Dziuban et al. (2004) researched on the learning outcomes of students in FTF, blended, and fully online courses at University of Central Florida (UCF). They claimed that blended courses are capable to increase the learning outcomes of students while lowering attrition rates compared to fully online courses. The students' success rates are shown in Table 2.9 whereas the students' withdrawal rates in FTF, blended, and fully online courses at UCF can be perceived through Table 2.10.

Table 2.9: Percentages of students who are success (Grade A, B, or C) in FTF, blended, and fully online courses at UCF

	Spring 2001	Summer 2001	Fall 2001	Spring 2002	Summer 2002	Fall 2002	Spring 2003
FTF	91	93	91	90	94	91	91
Blended	91	97	94	91	97	92	91
Fully online	89	93	90	92	92	92	91

Table 2.10: Percentages of students who are withdraw from FTF, blended, and fully online courses at UCF

	Spring 2001	Summer 2001	Fall 2001	Spring 2002	Summer 2002	Fall 2002	Spring 2003
FTF	6	3	4	5	3	3	5
Blended	6	2	5	5	2	6	5
Fully online	10	6	8	8	6	6	7

Implication for the study: Since most of the results in past studies have shown that blended learning environment was more successful compared to traditional FTF or fully online learning, so the author believes that the blended learning environment could be implemented in the TCSL classrooms at tertiary level to enhance students' efficiency in learning Chinese language. To achieve an effective blended learning environment, suitable T-L activities should be considered and blended together for effective Chinese language learning. In the context of this study, the effectiveness of the blended learning environment in TCSL is then evaluated using pre- and post- tests control group design. The hypothesis was tested using independent samples *t*-test.

2.12.2 Usability Testing of Applications

Rubin and Chisnell (2008) defined usability testing as “a process that employs people as testing participants who are representative of the target audience to evaluate the degree to which a product meets specific usability criteria”. This section presents several studies pertaining to the usability testing of applications.

The evaluation of iC-COM courseware for learning basic computer system components was conducted by distributing a questionnaire which consists of several attributes in terms of content, interactivity, navigation, and screen design to 50 students from computer system and support programme in Kolej Komuniti Jasin, Melaka (Bahrudin et al., 2011). Results of the courseware evaluation are presented in Tables 2.11 through 2.14 respectively.

Table 2.11: Analysis on the content in iC-COM courseware

Item Questions	Mean	S.D.
The content was reliable	3.43	0.78
The grammar use is correct	3.75	0.81
Current and error free information	3.53	0.64
Information of sufficient scope and depth	3.25	0.87
The content is structured in a clear and understandable manner	3.35	0.92
The content is presented in creative way	4.13	0.72

Table 2.12: Analysis on the interactivity in iC-COM courseware

Item Questions	Mean	S.D.
This multimedia courseware provides opportunities for interaction with standardised icons	3.60	1.03
This multimedia courseware allows learners to discover information through active exploration	3.55	0.85

Table 2.13: Analysis on the navigation in iC-COM courseware

Item Questions	Mean	S.D.
Menu key to return to the main page	4.10	0.63
Exit key to exit from the programme	3.80	0.99
Key for moving forward or backward in a lesson	4.08	0.73
Key for accessing the next lesson in a sequence	4.00	0.78

Table 2.14: Analysis on the screen design in iC-COM courseware

Item Questions	Mean	S.D.
Screens designed in a clear and easy to understand	3.70	0.99
The presentation of information can captivate the attention of students	3.10	1.081
The presentation of information can stimulate recall	3.38	0.84
The use of space is according to the principles of screen design	3.63	0.87
The proper fonts in terms of style and size were used	3.45	0.93
The use of text follows the principles of readability	3.53	0.96
The colour of the text follows the principles of readability	3.63	0.90
The number of colours in each screen is not more than 6 colours	3.75	0.95
The use of colour is consistent	3.60	0.93
The quality of the text, images, graphics and video is very good	3.10	1.13
Images uses are relevant to the information included in the text	3.55	1.01
The use of graphics meaningfully supports the text provided	3.33	1.12
There is high contrast between graphics and background	3.48	0.88
The video enhances the presentation of information	3.35	1.10
The sound is of good quality and enhances the presentation of information	3.33	1.16
The sound is an alternative means of presenting information and not a necessity	2.85	1.19
The integration of presentation means is well coordinated	3.70	0.76

The study has concluded that, users agreed that the content of iC-COM courseware is clear and reliable. Besides, users also have the opportunities to interact with standardised icon and explore the courseware actively to discover information. For screen design, users find that the presentation of text, graphics, and audio in the courseware are helpful to them.

Noordin et al. (2011) found that “most of the students are not able to visualize the exact point of intersection between two planes, or a line with a plane which is sometimes hidden and unclear in 2-Dimensions (2D) image representation”. To overcome this problem, a multimedia courseware integrated with 3D model has been created for teaching and learning the topic of Lines and Planes in Mathematics in the study. A usability testing was conducted among 30 Form Four students from Sekolah Menengah Kebangsaan Benta, Pahang to evaluate the usability of the multimedia courseware for learning the topic of Lines and Planes in mathematics. The usability questionnaire was created using several usability attributes such as effectiveness, efficiency, utility, and learnability. Figure 2.19 represents the results of usability evaluation of the multimedia courseware. Overall, the study claimed that the multimedia courseware is an effective learning tool and is positively accepted by the students.

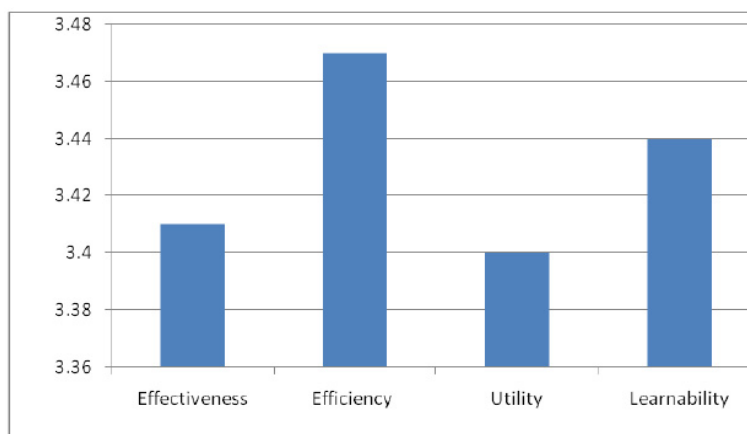


Figure 2.19: Usability evaluation of multimedia courseware

In the research of Mahmud et al. (2009), a ‘G-Reflect’ courseware was developed to overcome students’ difficulty in understanding the concept of Reflections. A Courseware Evaluation Checklist that adapted from the checklist by Robyler (2004, cited in Mahmud 2009) and Kok et al. (2008, cited in Mahmud 2009) had been used to evaluate the quality of the ‘G-Reflect’ courseware for learning the topic of Reflections in Mathematics. 34 Form Two students from a public secondary school in Malaysia have participated in the evaluation. The checklist contained three components of evaluation which included instructional design and pedagogical soundness, content, and technical soundness. The reliability of the checklist was obtained using Cronbach’s alpha which is 0.793. Table 2.15 shows the results of courseware evaluation where the scores interpretation are 0-30 as unacceptable courseware, 31-61 as fair courseware, 62-92 as good courseware, and 93-125 as excellent courseware. Based on the results of the study, it is shown that the ‘G-Reflect’ courseware is an excellent courseware for learning the topic of Reflections.

Table 2.15: Results of courseware evaluation

	N	Sum	Mean	Std. Dev.
I. Instructional Design and Pedagogical Soundness				
1. Teaching strategy was matched to students' needs.	7	31	4.43	0.535
2. Presentation did not confuse students.	7	28	4.00	0.577
3. Readability and difficulty were at an appropriate level for students.	7	29	4.14	0.378
4. Graphic fulfilled important purpose.	7	29	4.14	0.378
5. Appropriate feedback for correct answers.	7	32	4.57	0.535
6. Feedback reinforced more for correct than for incorrect responses.	7	28	4.00	1.000
7. High degree of interactivity.	7	32	4.57	0.535
8. High degree of user control.	7	25	3.57	0.976
9. Comprehensive teaching sequences and instruction was self-contained and stand alone.	7	30	4.29	0.488
10. Good documentation available on how program works.	7	30	4.29	1.113
II. Content				
11. The content was reliable.	7	32	4.57	0.535
12. Correct used of grammar.	7	30	4.29	0.488
13. Current and error-free information.	7	32	4.43	0.535
14. Concepts and vocabulary relevant to students' abilities.	7	30	4.29	0.488
15. Information relevant to curriculum.	7	31	4.43	0.535
16. Information of sufficient scope and depth.	7	32	4.57	0.535
17. Logical progression of sub-topics.	7	28	4.00	0.000
18. Content matches required curriculum objectives.	7	33	4.71	0.488
19. The content was structured in clear and understandable manner.	7	30	4.29	0.488
20. The structure allowed students to move around freely in different units.	7	29	4.14	0.900
III. Technical Soundness				
21. Program loaded consistently without error.	7	32	4.57	0.535
22. Program did not halt regardless of the response from the students.	7	30	4.29	0.488
23. Online links worked as indicated.	7	31	4.43	0.535
24. Animations worked as indicated.	7	28	4.00	0.816
25. The courseware is recommended for instructional use.	7	33	4.71	0.488
Mean Score	-	755	107.72	-

Mat Zin (2009) has conducted a research to evaluate the usability of A-MathS adaptive multimedia courseware for teaching and learning mathematics

based on the learning styles of students. During the courseware evaluation, a 5-point Likert scale questionnaire (very unsatisfactory/very much disagree=1, not satisfactory/disagree=2, medium/neutral=3, good/agree=4, and very good/agree very much=5) was distributed to 35 Form One secondary school students. The questionnaire consisted of several interface design dimensions included ease of use, screen design and navigation, information presentation, media integration, and overall user's perception of A-MathS functionality. Table 2.16 shows the results of usability evaluation of A-MathS courseware. Evaluation by the experimental group (Group 1) who have used the A-MathS courseware that was matching to their learning styles shown that the design of the interface is good for all dimensions. Whereas evaluation by the control group (Group 2) who have used the mismatched A-MathS courseware has shown that they are having some difficulty in using the courseware. Overall, the research concluded that majority of students who have used the A-MathS courseware that was matching to their learning styles are also agreed that the interface design of A-MathS courseware is good and able to enhance their learning effectively.

Table 2.16: Usability evaluation of A-MathS courseware

Variables	Dimensions							
	1		2		3		4 and 5	
	1	2	1	2	1	2	1	2
	-----Groups-----							
Ease of use	1	5	6	10	16	24	77	60
Screen design and navigation	-	8	5	6	18	18	76	67
Information presentation	2	4	5	7	14	17	80	72
Media integration	5	6	-	6	13	13	82	75
Perception of A-MathS functionality	-	3	1	5	14	27	84	66

Aris et al. (2006) have conducted a study to evaluate the usability of an interactive multimedia (IMM) courseware for learning “Goal Programming” among 40 Form Six Year One science class students from Sinaran Institute, Kota Kinabalu, Sabah. The questionnaire is using 5-point Likert scale (strongly disagree=1, disagree=2, somewhat agree=3, agree=4, and strongly agree=5) and contained six parts of evaluation which are content, interactivity, navigation, feedback, screen design, and students’ preferences toward the use of an IMM courseware compared to traditional methods of learning “Goal Programming”. Reliability testing using Cronbach’s alpha was conducted on each of the six parts in the questionnaire. The Cronbach’s alpha coefficient of each part is 0.84 for content, 0.79 for interactivity, 0.85 for navigation, 0.70 for feedback, 0.88 for screen design, and 0.72 for the final part. Results obtained in the study are presented in Tables 2.17 to 2.22 respectively. The study concluded that many students prefer using the IMM courseware in learning “Goal Programming” compared to traditional learning methods. Many students also indicated that the courseware is user-friendly and capable to support and enhance the learning.

Table 2.17: Analysis on the content in IMM courseware

No	Items	Mean	S.D.
1.	The content is reliable.	3.43	0.78
2.	Correct use of grammar.	3.75	0.81
3.	Current and error-free information.	3.53	0.64
4.	Concepts and vocabulary relevant to learners’ abilities.	3.43	0.84
5.	Information relevant to age group curriculum.	3.48	0.99
6.	Information of sufficient scope and depth.	3.25	0.87
7.	Logical progression of topics.	3.50	0.82
8.	Variety of activities, with options for increasing complexity.	3.50	0.85
9.	The content is structured in a clear and understandable manner.	3.35	0.92
10.	The structure allows learners to move around freely in different units.	4.13	0.72
11.	The structure of the multimedia courseware permits learners to advance, review, see examples, repeat the unit or escape to explore another unit.	4.23	0.86

Table 2.18: Analysis on the interactivity in IMM courseware

No	Items	Mean	S.D.
12.	The interactivity of this multimedia courseware is according to the maturity of the students.	3.60	1.03
13.	This multimedia courseware provides opportunities for interaction with standardised icons.	3.35	0.80
14.	The content is divided into small segments and includes formulas, examples and summaries for each segment.	3.60	0.87
15.	This multimedia courseware frequently poses questions to the users that do not interrupt the learning process.	3.43	0.68
16.	This multimedia courseware asks students to apply what they have learnt rather than memorise it.	3.70	0.85
17.	This multimedia courseware allows learners to discover information through active exploration.	3.55	0.85

Table 2.19: Analysis on the navigation in IMM courseware

No	Items	Mean	S.D.
18.	Help key to get procedural information.	3.75	1.06
19.	Answer key to answer a question.	3.80	1.04
20.	Glossary key to see the definition of any term.	3.25	1.08
21.	Objective key to review course objectives.	3.53	0.82
22.	Content map key to see a list of options available.	3.75	0.81
23.	Summary and review key to review the entire lesson or parts of it.	3.45	0.93
24.	Menu key to return to the main page.	4.10	0.63
25.	Exit key to exit from the programme.	3.80	0.99
26.	Comment key to record a learner's comments.	3.33	0.97
27.	Example key to see examples of an idea.	3.60	0.98
28.	Key for moving forward or backward in a lesson.	4.08	0.73
29.	Key for accessing the next lesson in a sequence.	4.00	0.78

Table 2.20: Analysis on the feedback in IMM courseware

No	Items	Mean	S.D.
30.	This multimedia courseware provides feedback immediately after a response.	3.55	0.82
31.	The placement of feedback is varied according to the level of objectives.	3.48	0.91
32.	This multimedia courseware provides feedback to verify the correctness of a response.	3.53	0.72
33.	For incorrect responses, information is given to the student about how to correct their answers or hints to try again.	3.23	0.97
34.	This multimedia courseware allows students to print out their feedback.	3.30	0.94
35.	This multimedia courseware allows students to check their performance.	3.53	1.04

Table 2.21: Analysis on the screen design in IMM courseware

No	Items	Mean	S.D.
36.	Screens designed in a clear and understandable manner.	3.70	0.99
37.	The presentation of information can captivate the attention of students.	3.10	1.081
38.	The presentation of information can stimulate recall.	3.38	0.84
39.	The use of space is according to the principles of screen design.	3.63	0.87
40.	The design uses proper fonts in terms of style and size.	3.45	0.93
41.	The use of text follows the principles of readability.	3.53	0.96
42.	The colour of the text follows the principles of readability.	3.63	0.90
43.	The number of colours in each screen is not more than six.	3.75	0.95
44.	There is consistency in the functional use of colours.	3.60	0.93
45.	The quality of the text, images, graphics and video is good.	3.10	1.13
46.	Presented pictures are relevant to the information included in the text.	3.55	1.01
47.	The use of graphics meaningfully supports the text provided.	3.33	1.12
48.	A high contrast between graphics and background is retained.	3.48	0.88
49.	There is only one moving image.	3.15	0.89
50.	The video enhances the presentation of information.	3.35	1.10
51.	The sound is of good quality and enhances the presentation of information.	3.33	1.16
52.	The sound is an alternative means of presenting information and not a necessity.	2.85	1.19
53.	The integration of presentation means is well coordinated.	3.70	0.76

Table 2.22: Analysis on students' preferences toward the use of an IMM courseware in learning "Goal Programming" compared to traditional methods of learning

No	Items	Mean	S.D.
54.	I prefer to learn mathematics with textbooks than via an interactive multimedia courseware.	2.45	0.96
55.	I prefer to learn mathematics with an interactive multimedia courseware instead of using textbooks.	3.28	0.98
56.	Learning mathematics with an interactive multimedia courseware that provides challenging quizzes and activities is more preferable than using textbooks.	3.93	0.75
57.	The activities provided in this interactive multimedia courseware are more effective compared to classroom activities.	3.18	0.87
58.	I prefer to learn mathematics using an interactive multimedia courseware with a teacher acting as a facilitator.	3.73	1.01
59.	Students should learn mathematics with textbooks without an interactive multimedia courseware.	2.33	1.21
60.	I will suggest to my friends to use an interactive multimedia courseware in learning mathematics instead of textbooks.	3.43	0.64

Implication for the study: The past studies on usability testing had shown that usability testing on applications is very important to ensure that the application developed is usable for the users. Although the usability

components that are being evaluated in each of the studies are different, however, there are several common usability attributes involved which included content, interactivity, navigation, and screen design of the applications. To evaluate the ease-of-use of the functionalities provided in ECLearn, a usability testing questionnaire which consists of four sections namely user interface design (Section A), navigation and interactivity (Section B), content (Section C), and students' perception towards the use of interactive multimedia e-book in Chinese learning compared to printed textbook in a blended learning environment (Section D) was created. The 5-point Likert scale questionnaire (Strongly Disagree=1, Disagree=2, Neutral=3, Agree=4, and Strongly Agree=5) for ECLearn evaluation was adapted from the questionnaire used in the studies of Aris et al. (2006) and Bahrudin et al. (2011).

Besides, it is important to conduct a usability testing with a reliable questionnaire. It is believed that a reliable questionnaire can minimise or avoid the occurrence of measurement errors in ECLearn evaluation (Rubin and Babbie 2011). Reliability testing using Cronbach's alpha was conducted on each of the four components of evaluation in this study. The reliability testing of the usability testing questionnaire is discussed in section 3.3.2.2.

2.13 Conclusions

The reviews of the literature on those topics pertaining to this study help the author in the creation and efficacy evaluation of blended learning environment for TCSL. Besides, the reviews of existing Chinese learning applications had provided valuable ideas on how to develop an efficient interactive multimedia e-book for TCSL learners. The review of past studies had also provided the author some valuable ideas on the kind of methods that could be used to conduct this study. Overall, the review on related literature plays a vital role in assisting the author in implementing the research on the creation and efficacy evaluation of a blended language learning environment for TCSL and ECLearn development.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

As discussed in chapter 1, this study aims to create a blended learning environment through the use of an interactive multimedia e-book for TCSL, evaluate its efficacy in TCSL compared to traditional instruction, and evaluate the ease-of-use of the functionalities provided in the interactive multimedia e-book. Hence, the discussion of the research methodology is divided into two sections as follows:

- i. Methodology for the creation of a blended learning environment through the use of an interactive multimedia e-book for TCSL;
- ii. Methodology for the evaluation of a blended learning environment through the use of an interactive multimedia e-book for TCSL.

3.2 Methodology for the Creation of a Blended Learning Environment through the Use of an Interactive Multimedia E-Book for TCSL

In this section, the methodology for the creation of a blended learning environment through the use of an interactive multimedia e-book for TCSL is

further divided into:

- i. Methodology for the design and development of a suitable instructional design (ID) model for blended language learning environment;
- ii. Results of data analysis for requirement analysis;
- iii. Methodology for the development of a prototype of an interactive multimedia e-book.

3.2.1 The Design and Development of an ID Model for a Blended Language Learning Environment

In this study, an ID model which is deemed suitable for adult learners in a blended language learning environment (BLLE) was designed and created. The BLLE ID model as shown in Figure 3.1 was created based on the generic ID model called ADDIE model. The BLLE ID model (Figure 3.1) provides a step-by-step process in designing and creating an effective blended learning environment for TCSL. It consists of five phases: analysis, design, development, implementation, and evaluation.

3.2.1.1 Analysis phase

Analysis phase involves the process to define what is going to be learnt. Before the commencement of this study, preliminary investigation is needed to identify the user requirements of target users. This refers to requirement analysis which is “a structured, or organized, methodology for identifying an appropriate set of resources to satisfy a system need” (Grady 2006, p. 7).

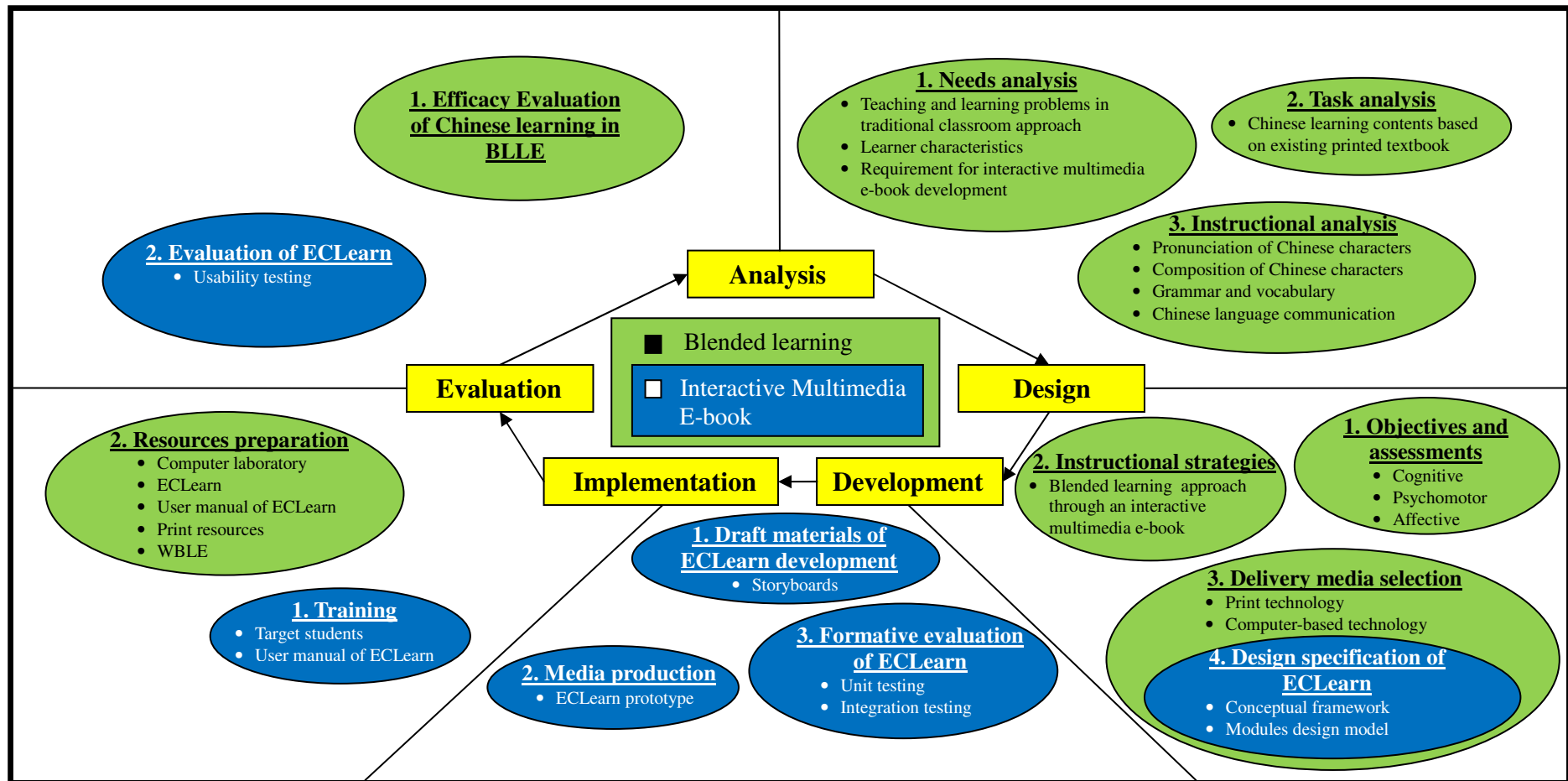


Figure 3.1: An instructional design model for a blended language learning environment (BLLE ID model)

The requirement analysis can be performed in three forms, namely needs analysis, task analysis, and instructional analysis. Figure 3.2 shows how these three types of analyses relate to each other.

I. Needs analysis

Needs analysis attempts to answer two questions which are “What are the teaching and learning problems in TCSL?” and “How to solve them?” In the context of this study, needs analysis was done through interviews and questionnaire survey. Data collected was analysed to find out the background of target users, the problems faced during the TCSL in the existing instruction mode and the requirements for the design and development of an interactive multimedia e-book. Then, literature reviews were carried out to help in planning the creation of an effective blended language learning environment for TCSL to overcome the problems faced by instructors and learners. It leads to the task analysis.

II. Task analysis

Task analysis answers the question “What is the teaching content?” In the existing mode of instruction in the “Introduction to Chinese Language I” classrooms, the teaching contents are delivered to the learners with the supplementary of a printed textbook called “Learn Chinese with Ease”.

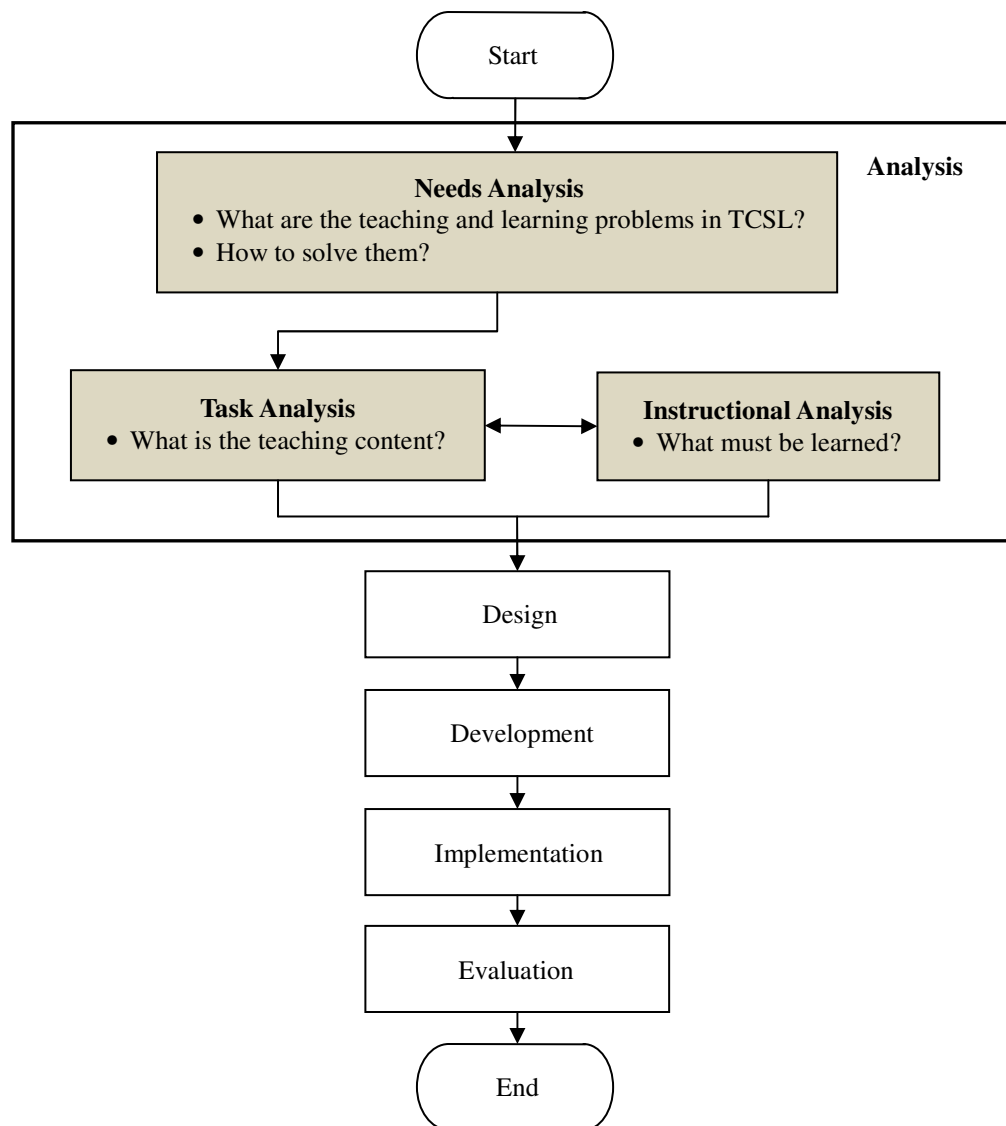


Figure 3.2: BLLE ID model - Analysis phase

In the context of this study, the existing printed textbook was transformed into an interactive multimedia e-book which is used as an additional teaching aid tool in a blended language learning environment for TCSL. Thorough task analysis was conducted to find out suitable and useful features for an interactive multimedia e-book development. This is to ensure that the developed interactive multimedia e-book is able to complement the existing instruction mode for effective Chinese learning. It then leads to the instructional analysis.

III. Instructional analysis

In instructional analysis, a question arise is “What must be learned?” In order to answer the question, the expected outcomes of learning the elective subject were analysed. At the end of this study, students should be able to pronounce and write Chinese characters correctly, make use of correct grammars and vocabularies of Chinese language, and communicate with people in daily life using simple Chinese language. The expected outcomes were able to help the analyst to further determine the instructional approach, instructional tools, and teaching contents based on the learner characteristics to be adopted for effective Chinese learning. Data collection methods such as interview and questionnaire were used to collect the data required in this study.

A. Interview

According to Lodico et al. (2010), conversation that is conducted between two or more people for a specific purpose is called an interview. They added that interview requires more time to administer and often involve smaller samples but it is able to provide more depth information compared to survey.

Kumar (2005) noted that interview can be flexible or inflexible; flexible interview allows interviewer to freely formulate the questions that are related to the issue being investigated during the interview while inflexible interview forces interviewer to use the questions that have been decided earlier.

With that, there are two types of interview as follows (Kothari 2004):

- **Unstructured Interviews:** Interview that does not consists of predefined questions and is not using standardised techniques to record information. Interviewer can freely ask questions, add or omit certain questions if necessary, and even can change the order of the questions.
- **Structured Interviews:** Interview that consists of a set of predefined questions and it is recorded using standardised techniques. All respondents will follow the same procedure in which the interviewer will ask the same questions and in the same order.

Structured interviews with two lecturers who have taught the “Introduction to Chinese Language I” subject has been conducted in this study. Through the interviews, the author collects useful information such as the problems encountered in the existing mode of Chinese language instruction, and features required in the interactive multimedia e-book development. According to the lecturers (H.L. Lew, lecturer, Universiti Tunku Abdul Rahman, interview, 5 March 2009; S.F. Ho, lecturer, Universiti Tunku Abdul Rahman, interview, 6 August 2010), students always encounter difficulty in learning the Chinese pronunciation, Chinese characters composition, listening and answering questions in Chinese. Both lecturers also think that the combination of traditional classroom instruction and computer mediated learning is more effective in Chinese learning as computer software can save time of repetition in learning (Reinking et al., 1998) and encourage self-paced

learning.

Both lecturers suggested that the interactive multimedia e-book should be developed with numerous features such as Chinese pronunciation, each Chinese character should be presented along with its *Hanyu Pinyin*, Chinese character stroke order animation and so forth. The interview transcripts are appended in Appendix A.

B. Questionnaire

Kothari (2004) stated that a questionnaire is a set of questions that are in printed form and respondents have to read, interpret, and record the answers on their own. A questionnaire is different from an interview in a way that the response to the questionnaire is recorded by the respondents themselves while the response of the respondents to the interview is recorded by the interviewer who asked the questions during interview (Kumar 2005).

Johnson and Christensen (2010) noted that there are two types of questionnaire as follows:

- **Open-ended questions:** Questions which have to be responded by the participants using their own words.
- **Closed-ended questions:** Questions which consist of predetermined responses to be chosen by the participants.

Normally, questionnaire is used in survey to gather information. Fink (2006, p. 1) described surveys as “information collection methods used to describe, compare, or explain individual and societal knowledge, feelings, values, preferences, and behaviour”. By using survey in research, respondents are selected from a population and then a standardised questionnaire will be administered to them (Babbie 2010).

A survey for the requirement analysis had been conducted using the questionnaire as appended in Appendix B to gather information required from 21 students who had taken the “Introduction to Chinese Language I”. The data collected via this survey is important to find out the requirement specifications before the design and development of an interactive multimedia e-book. The information such as experience of using computer and multimedia applications, difficulties encountered when learning Chinese, features expected to be integrated in the interactive multimedia e-book, and more were collected and analysed. The questionnaire consisted of closed- and open- ended questions. The results of data analysis are further discussed in section 3.2.2.

3.2.1.2 Design phase

The design of the instruction begins by identifying the teaching and learning objectives, followed by selecting the instructional strategies and the delivery media. Figure 3.3 shows the design phase of the BLLE ID model.

I. Objectives and assessments

Two questions developed at this stage are “What are the teaching and learning objectives?” and “How to know if the objectives are met?” To answer these two questions, the instructional designer is first to identify the teaching and learning objectives before designing the instruction. In this context, the teaching and learning objectives are associated with cognitive domain (learning skills related to the mental process), psychomotor domain (learning skills related to physical actions), and affective domain (learning skills related to the emotional processes) (Moore 2005). With the consideration of holistic development in the instructional design, it may help instructional designer to design an effective instruction for TCSL.

Then, the instructional designer identifies suitable instructional strategies and delivery media in order to achieve the objectives. It followed by a summative evaluation through an experimental design research in order to find out if the objectives are met at the end of the study.

II. Instructional strategies

A question arises is “What instructional strategies will achieve the objectives?” In order to answer the question, suitable instructional strategies for efficient Chinese learning in a blended language learning environment was selected. A blended learning approach through the use of an interactive multimedia e-book which provides participatory learning, self-paced learning,

and cooperative learning had been chosen as the instructional strategy to be adopted in blended language learning environment to achieve the objectives set in the study.

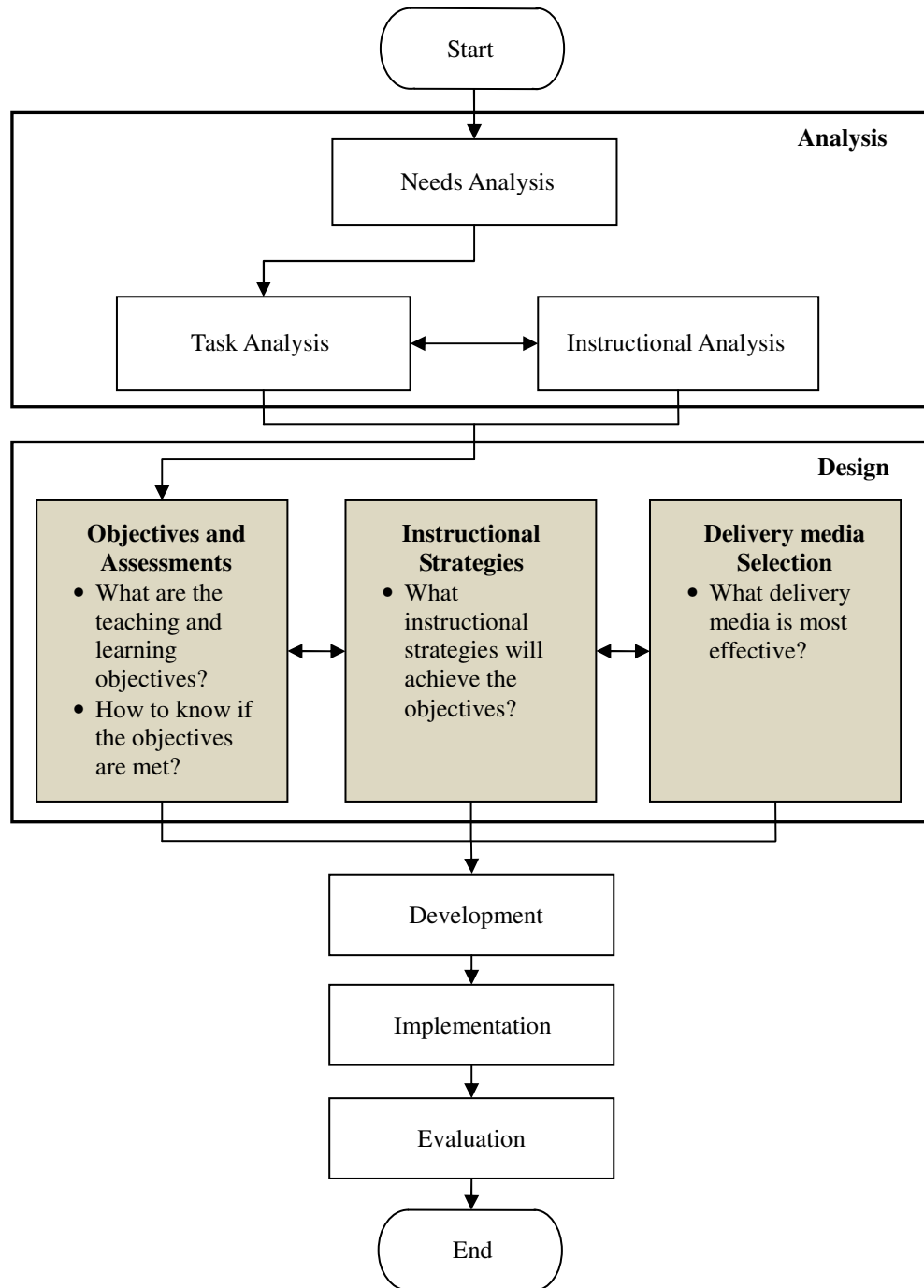


Figure 3.3: BLLE ID model - Design phase

Participatory learning allows learners to actively participate in class for learning such as discussion, provide feedbacks, questioning and answering. Interactive multimedia e-book encourages self-paced learning which allows learners to learn Chinese language at their own pace, and cooperative learning allows learners to develop their social communication skills and enhance their learning experiences.

III. Delivery media selection

A question arises here is “What delivery media is most effective?” To answer the question, suitable teaching methods and multimedia elements that facilitate students to efficiently learn Chinese language were selected based on user requirements. In this study, print technology and computer-based technology had been selected to deliver the instruction of Chinese language.

In addition to the existing instructional tools such as the “Learn Chinese with Ease” printed textbook, print resources, the resource website called WBLE, and emailing, an interactive multimedia e-book called ECLearn (**E**-book for **C**hinese **L**earning) was developed to complement the existing instruction mode of the subject. The integration of multimedia elements to present the expected features such as Chinese pronunciation, animated Chinese characters in defined strokes order, Chinese conversation video, and so forth in the interactive multimedia e-book is much needed for effective Chinese learning.

After the selection of suitable delivery media, the design specification of ECLearn was created in the forms of a conceptual framework and learning modules design model which is further discussed in section 3.2.3.1.

3.2.1.3 Development phase

The focus of the development phase is to develop an interactive multimedia e-book as the additional instructional tool for TCSL in a blended learning environment. There were three steps performed in this phase in order to produce an effective interactive multimedia e-book for TCSL, i.e. draft materials, media production, and formative evaluation. Figure 3.4 shows the development phase of the BLLE ID model.

I. Draft materials

A question arises is “What will the materials say?” In order to answer this question, storyboards were created for the development of the interactive multimedia e-book. Kearns (2010, p. 122) defined a storyboard as “a visual plan for an e-learning program, which clearly lays out the instructional, design, and interactive elements screen-by-screen”. Table 3.1 shows the representation of flow chart symbols in a storyboard. The samples of storyboards for the development of ECLearn are appended in Appendix C.

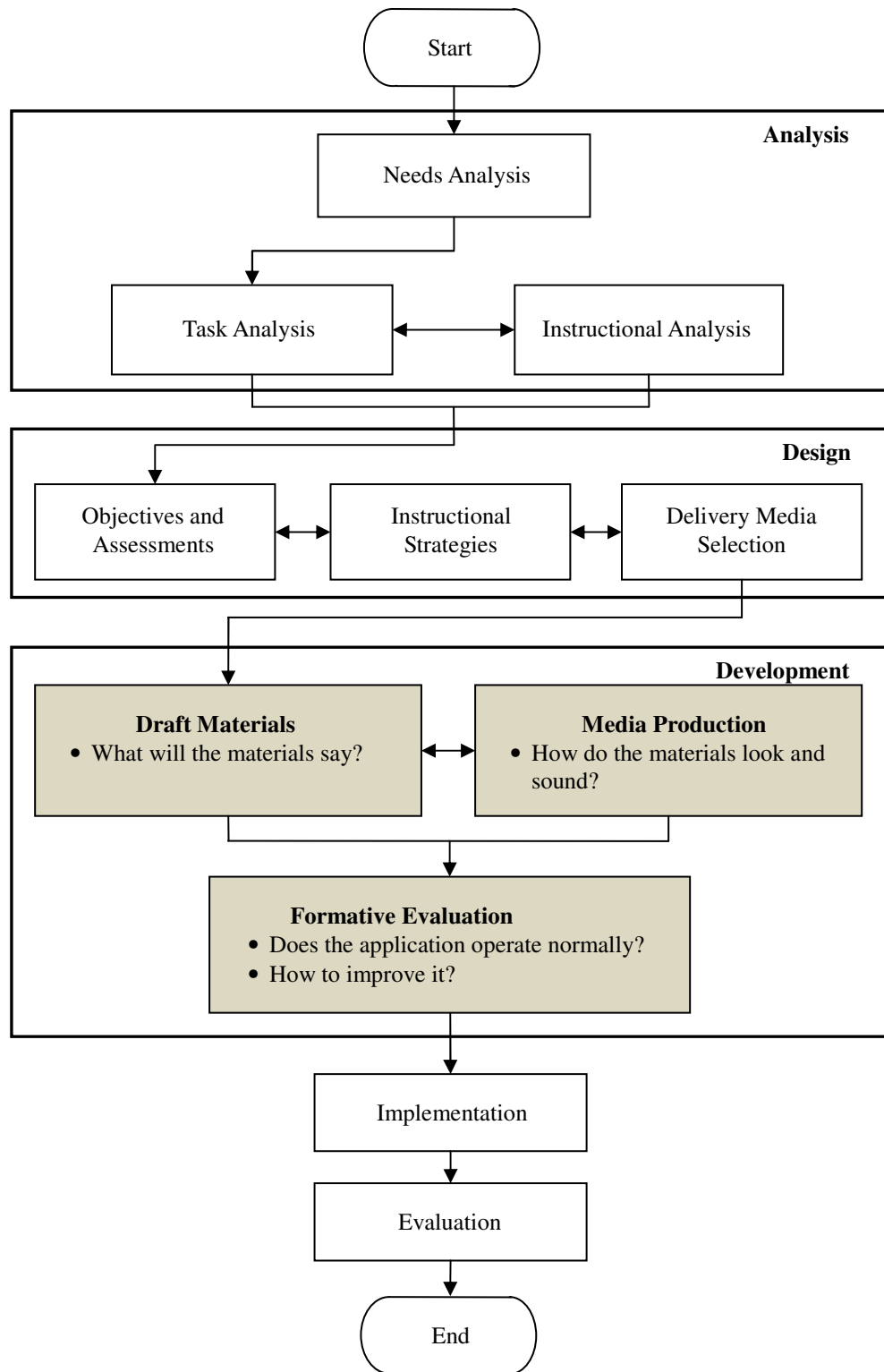


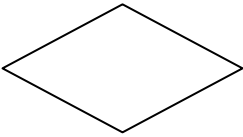
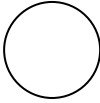
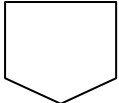
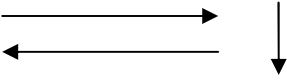


Figure 3.4: BLLE ID model - Development phase

Table 3.1: Representation of flow chart symbols in a storyboard

Symbol	Representation
 <p style="text-align: center;">Oval</p>	<p>Starting or ending activities</p> <ul style="list-style-type: none"> This symbol to mark the starting point as well as the ending point of the software.
 <p style="text-align: center;">Rectangle</p>	<p>Activity or step</p> <ul style="list-style-type: none"> This symbol represents the internal process, for instance screen displayed.
 <p style="text-align: center;">Diamond</p>	<p>Decision</p> <ul style="list-style-type: none"> This symbol represents the options available or branching which have more than one path. For example, it is used to show an interactive main menu which provides options for user to choose the page topic they intend to navigate to. This symbol also provides different route based on users answers such as Right/Wrong, Yes/No.
 <p style="text-align: center;">Circle</p>	<p>Continuation point</p> <ul style="list-style-type: none"> In flowcharts, this symbol is typically small and is used as a Connector to show a jump from one point in the process flow to another. The circle can be used to reference a point on the same page or on another page. Inside the circle you can use either letters or numbers.
 <p style="text-align: center;">Off-Page Connector Shape</p>	<p>Off-page connector</p> <ul style="list-style-type: none"> Off-Page Connector shows continuation of a process flowchart onto another page. Continue on another page.
 <p style="text-align: center;">Arrows</p>	<p>Flow lines</p> <ul style="list-style-type: none"> It represents a link that connects each symbol as shown above.

Source: Modified from Aris et al. (2008, p. 115-116) and Goel (2010, p. 154)

II. Media production

A question arises which is “How do the materials look and sound?” To answer the question, ECLearn was developed based on the design specification and storyboard created. The main authoring tool used to develop ECLearn was Adobe Flash. Chinese text, colourful graphics, sound, animation, and video were integrated into ECLearn to develop the 15 lessons, three poems, and an interactive exercise as assessment activity at the end of each lesson being taught.

Adobe Photoshop was used to edit some colourful graphics and then import into Adobe Flash. NextSpeak Mandarin TTS was used to convert the Chinese text into Chinese speech. The Chinese speeches were then edited using GoldWave and integrated into ECLearn to provide the Chinese pronunciation for learners. iWisoft Flash/SWF to Video Converter was used to convert the Flash movies on Chinese conversation created using Adobe Flash to video. The video was integrated in ECLearn for the learning of oral communication skills. During the development, formative evaluation was conducted throughout each development steps to ensure that the ECLearn developed is able to meet users’ requirements.

III. Formative evaluation

Formative evaluation process answers these two questions: “Does the application operate normally?” and “How to improve it?” Formative

evaluation was performed on ECLearn to make sure that the ECLearn developed was based on users' requirements and free from bugs and errors.

Unit testing on ECLearn was performed to test the navigational buttons and icons individually. If errors being detected on a navigational button or an icon, the button or icon was refined. Then, it followed by integration testing to test all the testable parts in ECLearn as groups in multiple ways. This is to make sure the ECLearn developed is able to function properly for efficient Chinese learning.

3.2.1.4 Implementation phase

Implementation phase involves two vital tasks namely training and resources preparation. Figure 3.5 shows the implementation phase of BLLE ID model.

I. Training

Three questions arise are “Who will be trained?”, “How long is the training?” and “How to conduct the training?” To answer these three questions, target users to be trained, time used for training, and the methods used for training were determined. The target users are students who took “Introduction to Chinese Language I” and were assigned to the experimental group. The experimental group was given a two-hour introductory session on how to use the prototype of ECLearn in the computer laboratory. User manual of ECLearn

was prepared to assist the users in learning ECLearn effortlessly.

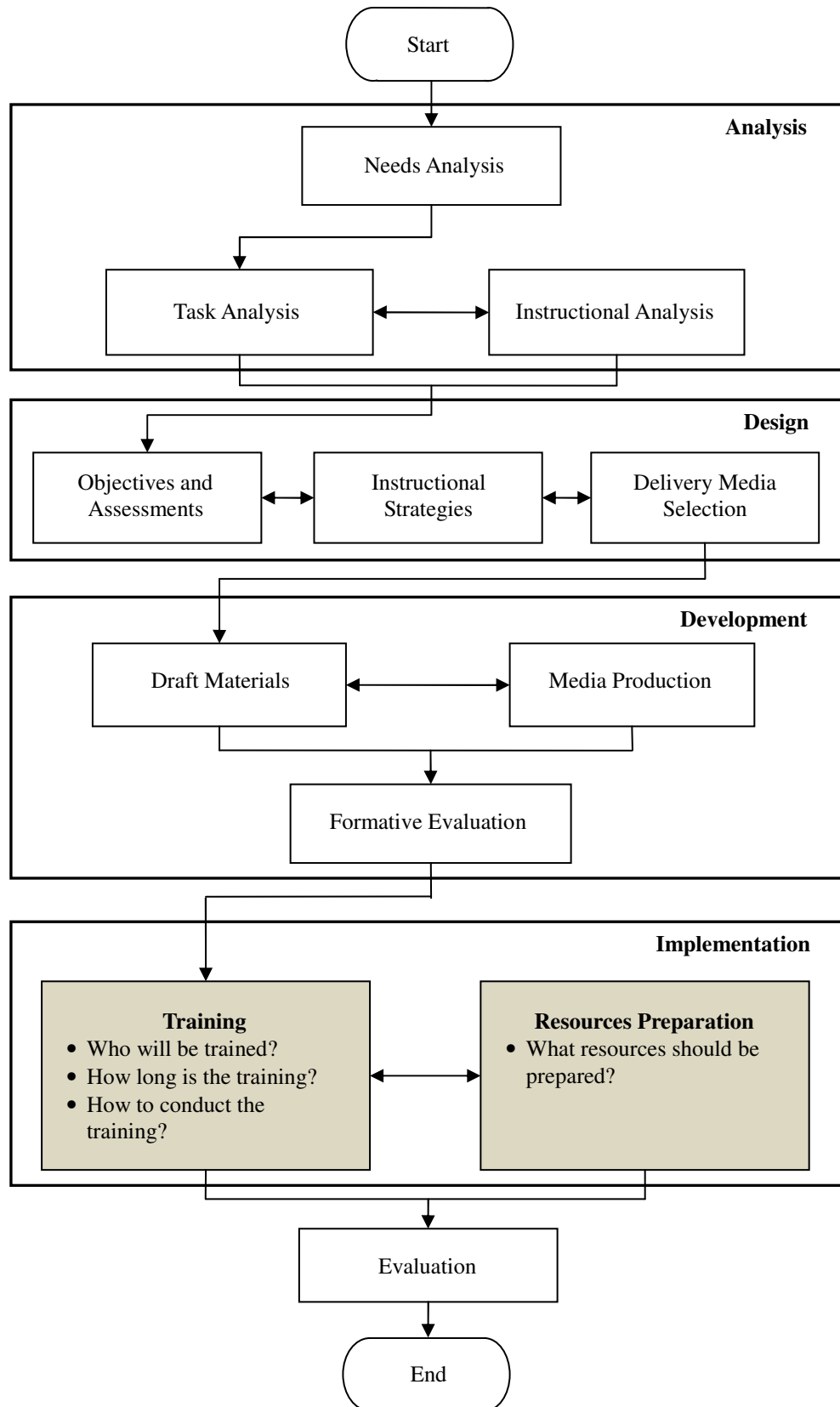


Figure 3.5: BLLE ID model - Implementation phase

II. Resources preparation

A question arises is “What resources should be prepared?” As the training involved computer mediated learning tool namely the prototype of ECLearn, hence the computer laboratory is needed for the training. The user manual as appended in Appendix D was prepared as a guide to assist users in learning and practicing ECLearn. Besides the resources prepared for training, Chinese learning related materials uploaded to WBLE, printed textbook, and print materials were also used in the blended language learning environment for effective Chinese learning.

3.2.1.5 Evaluation phase

During the evaluation phase, three questions arise are “Have the problems been solved?”, “What is the impact?” and “What needs to be refined?” At this stage, summative evaluation was performed to evaluate the efficacy of the blended learning environment through the use of an interactive multimedia e-book in Chinese learning compared to traditional classroom instruction.

Besides, it also involved the evaluation on the ease-of-use of the functionalities provided in ECLearn. Refinement of ECLearn based on users’ feedback was performed to increase the usefulness of ECLearn in TCSL. Figure 3.6 shows the evaluation phase of BLLE ID model.

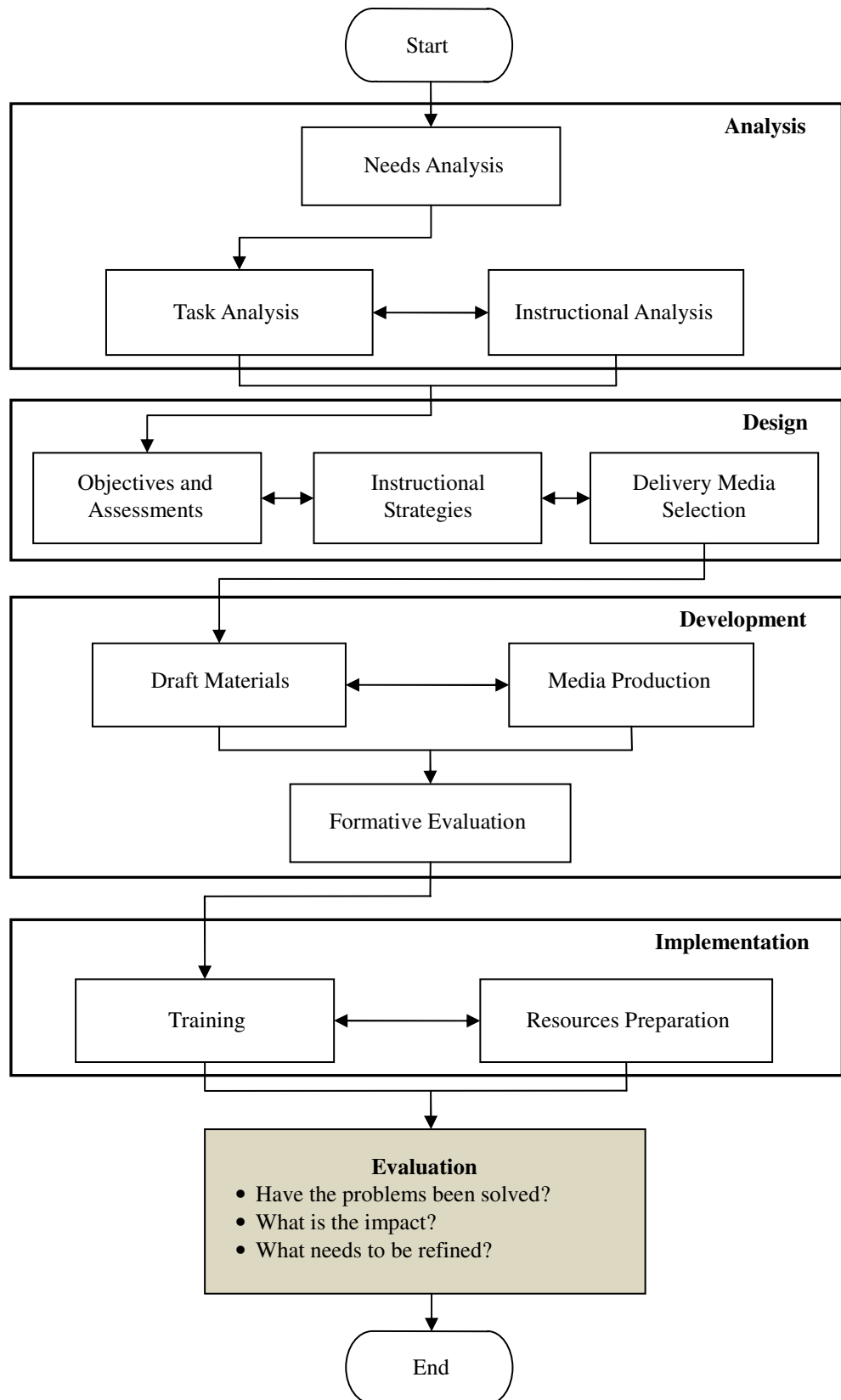


Figure 3.6: BLLE ID model - Evaluation phase

3.2.1.6 Summary of phases in BLLE ID model

Table 3.2: Summary of phases in BLLE ID model

Phases			Methods to Collect/Produce Data				
Phase	Focus	Questions	R	E/I	CE	IV	S
Analysis	Needs Analysis	<ul style="list-style-type: none"> What are the teaching and learning problems in TCSL? How to solve them? 	TU; I			I	TU
	Task Analysis	<ul style="list-style-type: none"> What is the teaching content? 		PTB	ITE; IDE; EE	I	
	Instructional Analysis	<ul style="list-style-type: none"> What must be learned? 		PTB	EE	I	
Design	Objectives and Assessments	<ul style="list-style-type: none"> What are the teaching and learning objectives? How to know if the objectives are met? 	TU; I		IDE; EE		
	Instructional Strategies	<ul style="list-style-type: none"> What instructional strategies will achieve the objectives? 			IDE; EE		
	Delivery Media Selection	<ul style="list-style-type: none"> What delivery media is most effective? 	PT; CT	DS	ITE; IDE		
Development	Draft Materials	<ul style="list-style-type: none"> What will the materials say? 		SB	ITE; IDE; EE		
	Media Production	<ul style="list-style-type: none"> How do the materials look and sound? 	DS; SB	MT; AT; C	ITE		
	Formative Evaluation	<ul style="list-style-type: none"> Does the application operate normally? How to improve it? 	EC	C	ITE; IDE		
Implementation	Training	<ul style="list-style-type: none"> Who will be trained? How long is the training? How to conduct the training? 		EC; CL; UM; C		TU	
	Resources Preparation	<ul style="list-style-type: none"> What resources should be prepared? 		EC; CL; C			
Evaluation	Summative Evaluation	<ul style="list-style-type: none"> Have the problems been solved? What is the impact? What needs to be refined? 	EC	CL; C; PRT; POT; UT		TU; I	

Note:

R	Review	CE	Consults the expert
E/I	Existing document/Instrument	IV	Interview
S	Survey	TU	Target user
PTB	Printed textbook	I	Instructor
EE	Educational expert	UM	User manual
ITE	Information technology expert	EC	ECLearn prototype
IDE	Instructional design expert	DS	Design specification
UT	Usability testing questionnaire	CL	Computer laboratory
AT	Authoring tool	SB	Storyboard
C	Computer	MT	Multimedia technology
CT	Computer-based technology	PT	Print technology
PRT	Pre-test	POT	Post-test

The description of tasks and tools involved in the five phases of BLLE ID model is summarised in Table 3.2.

3.2.2 Results of Data Analysis for Requirement Analysis

The process of designing and developing ECLearn begins with the requirement gathering phase, in which the author analyses user requirements to see how best to satisfy them for TCSL in a blended learning environment.

3.2.2.1 Respondents' background data

Before designing the instruction, the author analysed students' background data, students' difficulties in learning Chinese, learning factors, and students' expectations on the development of interactive multimedia e-book called ECLearn. Analysis on those data allows the author to gain better understanding on the needs of students and hence able to develop the ECLearn with suitable functionalities for efficient Chinese learning in the blended learning environment. 21 students have participated in the survey.

Before presenting the results of data analysis, summaries of the respondents' background data, i.e. gender, age and ethnic groups are presented in Figure 3.7. There are 52.4% females and 47.6% males participated in the survey. Majority of them (71.4%) aged between 21-23 and the rest aged 18-20. Besides, Figure 3.7 also reveals that 81.0% of the respondents are Chinese, followed by Indian (14.3%) and other ethnic groups (4.8%).

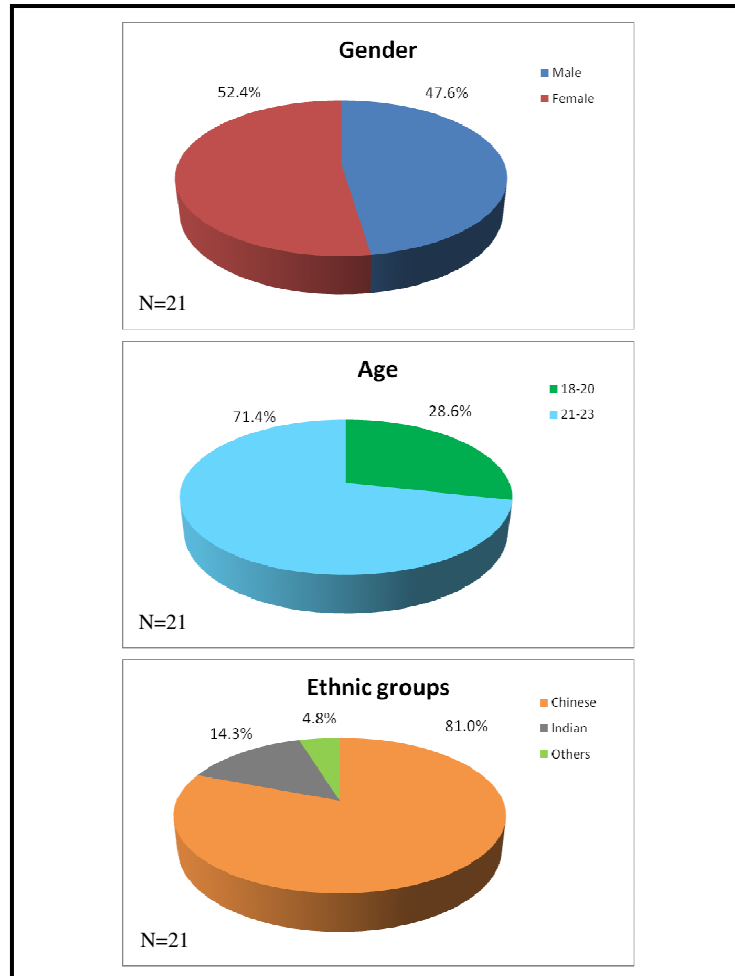


Figure 3.7: Respondents' background data

It is important to know about the respondents' background on language use at home, computer experiences and types of learning application used to determine the functional requirements for ECLearn development. The summaries of the respondents' background on their language use at home, computer experiences, and types of learning application used are shown in Figure 3.8, Figure 3.9 and Table 3.3.

Figure 3.8 shows that majority of the respondents (33.3%) use English language as a medium of communication at home, followed by Chinese

Mandarin (23.8%), Cantonese (14.3%), and other languages (28.6%).

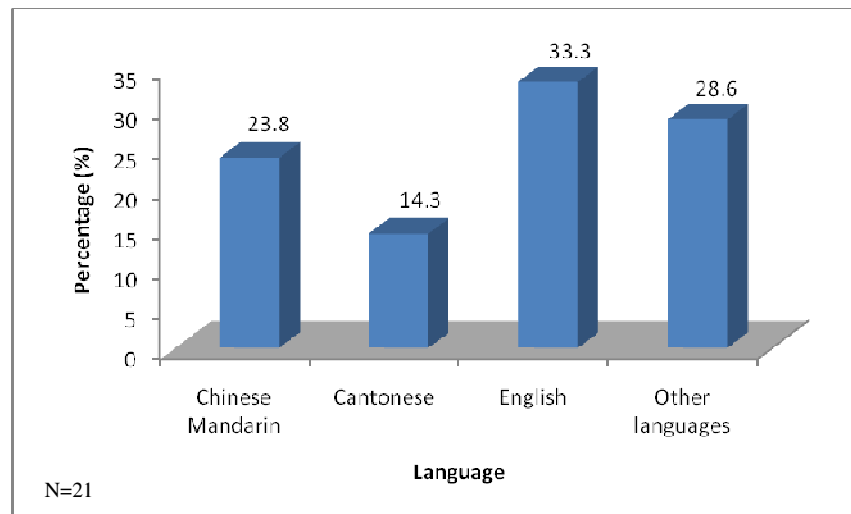


Figure 3.8: Language use at home

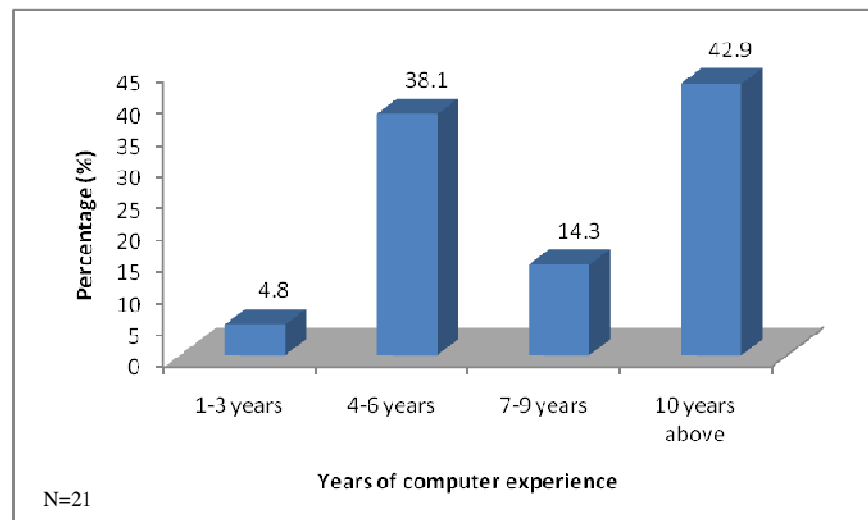


Figure 3.9: Computer experiences of respondents

As can be perceived through Figure 3.9, 42.9% of the respondents have computer experience for 10 years and above, followed by 4 to 6 years (38.1%), 7 to 9 years (14.3%) and 1 to 3 years (4.8%). Meantime, Table 3.3 reveals that 85.7% of the 21 respondents used English language application in learning, followed by Chinese language application (28.6%), Malay language application (23.8%), mathematics application (19.0%), history and Science

applications (9.5% respectively). In addition, there was 57.1% respondents have used online dictionary application in learning.

Table 3.3: Types of learning application used

Types of learning application used	Frequency	Percent of Cases
English language	18	85.7%
Online dictionary	12	57.1%
Chinese language	6	28.6%
Malay language	5	23.8%
Mathematics	4	19.0%
History	2	9.5%
Science	2	9.5%

N=21

Overall, the findings showed that most of the respondents (95.3%) have more than 4 years of computer experience, so they may not encounter problem to operate the computer and use the ECLearn. Furthermore, due to most of them (76.2%) use non-Chinese Mandarin as medium of communication at home, and only 28.6% have used Chinese language application in learning, therefore ECLearn must be developed in bilingual (English-Chinese) and in a way that is user friendly so that user can easily understand and use it in Chinese learning.

3.2.2.2 Analysis of students' difficulties in learning Chinese

Analysis of students' difficulties in learning Chinese enables the author to understand the learning difficulties of students in Chinese. In addition, the author also analyse the possible actions taken by students when facing difficulties in Chinese learning. With all these information, it helps the author

to develop an interactive multimedia e-book for effective Chinese learning.

The results are shown in Tables 3.4 and 3.5.

Table 3.4: Difficulties encountered when learning Chinese

Difficulties encountered when learning Chinese	Frequency	Percent of Cases
Chinese Writing	17	81.0%
Reading	15	71.4%
Speaking	3	14.3%
Listening	3	14.3%
<i>Hanyu Pinyin</i>	2	9.5%

N=21

Table 3.5: Most difficult tasks in Chinese learning

Most difficult tasks in Chinese learning	Frequency	Percent of Cases
Chinese writing	7	33.3%
Reading	4	19.0%
<i>Hanyu Pinyin</i>	2	9.5%
Speaking	2	9.5%
Listening	2	9.5%

N=21

As shown in Table 3.4, 81% of the respondents encountered difficulty in Chinese writing, followed by reading (71.4%), speaking and listening (14.3% respectively), and *Hanyu Pinyin* (9.5%). Besides, as can be perceived through Table 3.5, 33.3% of the respondents felt that Chinese writing was the most difficult task in Chinese learning, followed by reading (19.0%), and *Hanyu Pinyin*, speaking, or listening (9.5% respectively).

Overall, the findings showed that most of the students were facing the problems in Chinese writing and reading. These two tasks have also been the

most difficult tasks to be mastered in Chinese learning. Through interview with lecturers (H.L. Lew, lecturer, Universiti Tunku Abdul Rahman, interview, 5 March 2009; S.F. Ho, lecturer, Universiti Tunku Abdul Rahman, interview, 6 August 2010), they agreed that students are weak in writing as writing Chinese characters is the toughest skill to master among all skills in Chinese learning. Chinese characters are complicated and thus it required longer period of learning and practicing for students to familiarise with it. To help students coping with this problem, Chinese characters stroke order animation were embedded in ECLearn to provide step-by-step guide for students to learn Chinese characters formation. Furthermore, *Hanyu Pinyin* for each Chinese character and sound for the pronunciation of each Chinese character were integrated into ECLearn to help students to master the reading, listening, and speaking skills.

Respondents were also asked about the actions taken when facing difficulties in Chinese learning. Their responses are shown in Table 3.6. From Table 3.6, it can be seen that most of the respondents (85.7%) will seek friend's help, followed by consulting the lecturer through a face-to-face consultation (42.9%), doing Internet search (19.0%) and consulting the lecturer through emails (14.3%). Using bilingual translation online and dictionary was not a favourable action with only one response (4.8%) respectively.

Table 3.6: Actions taken when facing difficulties in learning Chinese

Actions taken when facing difficulties in learning Chinese	Frequency	Percent of Cases
Seek friend's help	18	85.7%
Consult the lecturer through a face-to-face consultation	9	42.9%
Internet search	4	19.0%
Consult the lecturer through emails	3	14.3%
Bilingual translation online	1	4.8%
Dictionary	1	4.8%

N=21

As most of them will seek help from friends, doing Internet search and consult the lecturer through a face-to-face consultation or emailing when facing difficulties in Chinese learning, thus a blended leaning approach that blend both the conventional and computer technology methods has been adopted for effective Chinese learning compared to computer mediated learning or traditional instruction alone.

3.2.2.3 Analysis of students' preferences towards the means of Chinese learning

The preliminary survey also investigates the preferences of respondents toward types of learning environment. The results are shown in Figure 3.10 and Table 3.7. As can be perceived through Figure 3.10, majority of the respondents preferred blended learning approach (71.4%) compared to traditional instruction (23.8%) and computer mediated learning (4.8%).

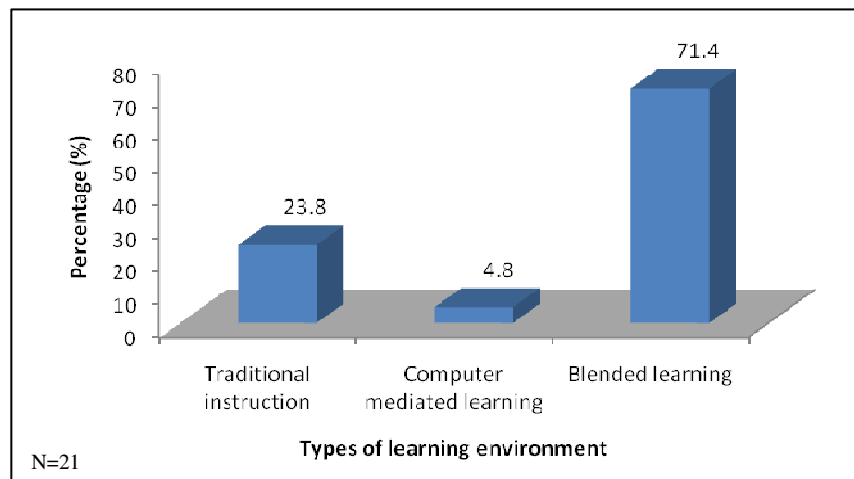


Figure 3.10: Respondents' preferences toward types of learning environment

The findings as revealed in Table 3.7 indicate that most of the respondents agreed that learning through blended learning (BL) approach is more interesting and could provide better understanding than traditional instruction (TI) with response rates of 81% respectively. Meanwhile, the findings also showed that majority of the respondents agreed that TI approach combined with the use of interactive multimedia e-book (IME) improve Chinese proficiency more effectively compared to TI alone in which a response rate of 85.7% was reported. Besides, there were 85.7% of respondents thought that lessons and activities integrated in IME can enhance Chinese learning via TI approach. However, Table 3.7 also reveals that only a small number of respondents agreed that using IME alone all the time is suitable for learning Chinese effectively, in which a response rate of 14.3% was reported.

Table 3.7: Respondents' opinions toward types of learning approach

Statements	Frequency	Percent of Cases
TI combined with IME improve Chinese more effectively compared to TI	18	85.7%
Lessons and activities integrated in IME enhance Chinese learning in TI	18	85.7%
Learning through BL is more interesting than TI	17	81.0%
Learning through BL could provide better understanding than TI	17	81.0%
Using IME alone all the time is suitable for learning Chinese effectively	3	14.3%

N=21

Overall, it can be concluded that majority of the respondents preferred BL approach with the use of an interactive multimedia e-book which they thought is more interesting and could provide better understanding compared to the traditional instruction.

3.2.2.4 Analysis of students' expectation on ECLearn

It is important to find out from target users about their favourable features to integrate in ECLearn. In the survey, the respondents were asked to select their expected features among several useful features for TCSL. These features included interactive exercises, pronunciation of Chinese characters and *Hanyu Pinyin* demonstrated by human voices, animated Chinese characters in defined strokes order, Chinese conversation video, and colourful graphics. Their response rates are shown in Table 3.8.

The response rate of 76.2% was reported for the feature of interactive exercises. The same response rate has been achieved for the feature of

pronunciation of Chinese characters and *Hanyu Pinyin* demonstrated by human voices. The respondents also expected to have the features of animated Chinese characters in defined strokes order and colourful graphics with the response rate of 57.1% respectively. The next favourable feature is Chinese conversation video with 33.3% response rate. The analysis of the expected features to be integrated in the interactive multimedia e-book may help the author to develop the ECLearn which could fulfil the students' needs in Chinese learning.

Table 3.8: Features expected to be integrated in the interactive multimedia e-book

Features expected to be integrated in the interactive multimedia e-book	Frequency	Percent of Cases
Interactive exercises	16	76.2%
Pronunciation of Chinese characters and <i>Hanyu Pinyin</i> demonstrated by human voices	16	76.2%
Animated Chinese characters in defined strokes order	12	57.1%
Colourful graphics	12	57.1%
Chinese conversation video	7	33.3%

N=21

3.2.3 Methodology for the Development of ECLearn

This section presents the methodology for the development of ECLearn. It includes the discussion on the topics of conceptual framework development and the design and development of ECLearn prototype.

3.2.3.1 Conceptual framework development

Before the development of ECLearn prototype using Adobe Flash, a conceptual framework and learning modules design model for ECLearn development have been designed and created.

Gruber (cited in Li and Gu 2009, p. 887) defined a conceptual framework as “an explicit specification of a conceptualisation which defines the terminology of a domain in terms of the concepts that constitute the domain and the relationships between them”. The conceptual framework as shown in Figure 3.11 consists of six components as follows:

- Objectives
- Learning theories
- Teaching strategies
- Interactivity
- Navigation
- Teaching and learning medium

I. Objectives

The objectives of developing ECLearn are related to the cognitive, psychomotor, and affective domains. ECLearn was designed and developed with suitable contents and functionalities to achieve the objectives of each domain.

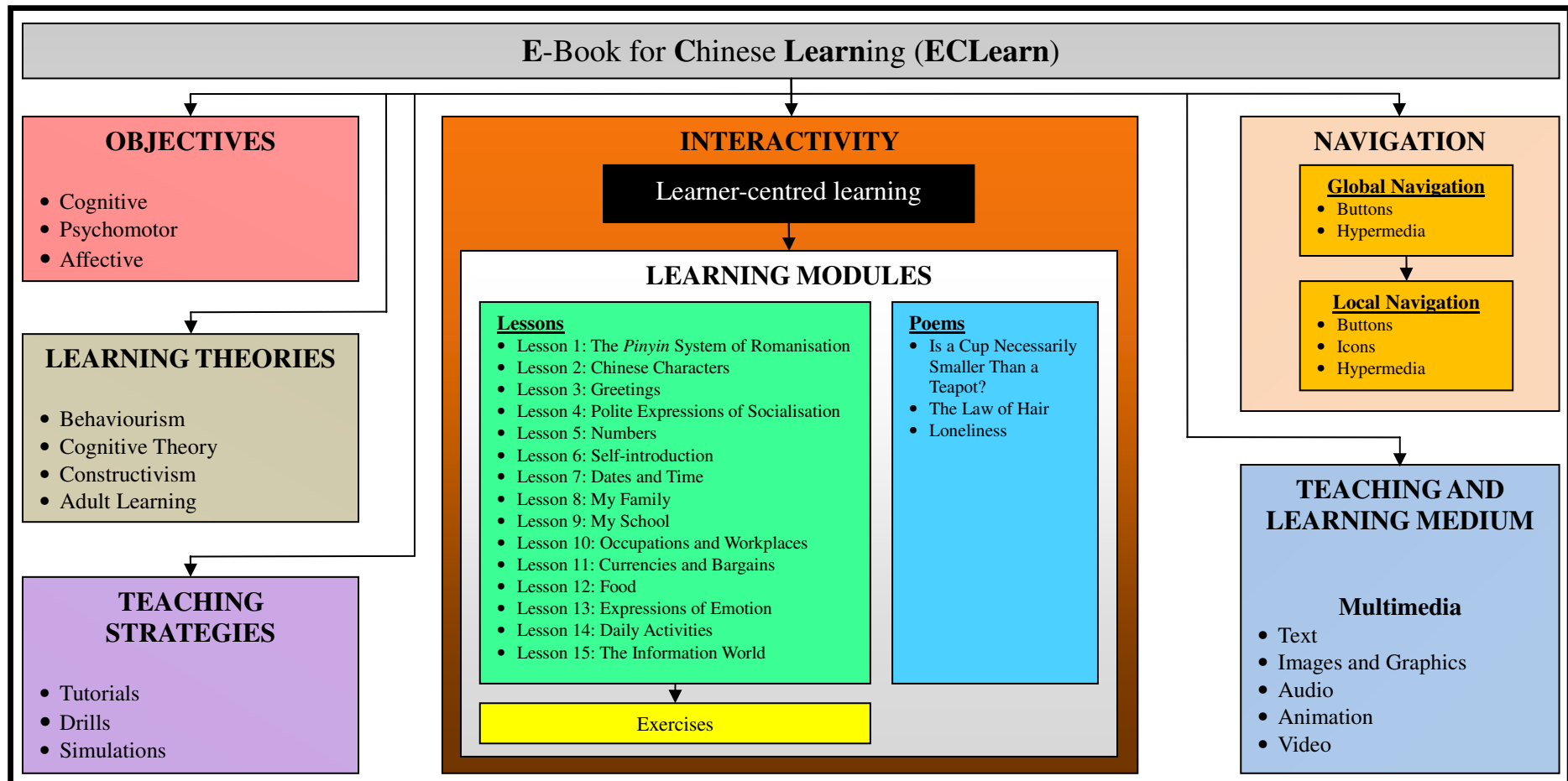


Figure 3.11: Conceptual framework for ECLearn development

To achieve the objectives of the cognitive domain, all the lessons and poems in ECLearn enable learners to develop their intellectual abilities and master skills in Chinese language such as pronunciation of Chinese characters, Chinese writing, vocabularies, and Chinese grammar.

In order to achieve the objectives of the psychomotor domain, interactivity is an important element. The level of interactivity offered by a multimedia application comes primarily from its navigation structure. A well-designed navigation structure links all the components into a cohesive system. Learners interact with ECLearn through the features and educational activities embedded in the application. The more involved the learner is with the application, the more he or she will remember the information to assist them in Chinese learning.

To achieve the objectives of the affective domain, ECLearn has used various types of multimedia elements such as colourful graphics, animation, sound and video to create an excited environment for TCSL as claimed by Zaidel and Luo (2010, p. 11) that “multimedia elements can provide variety and excitement to a computer-supported teaching and learning environment, adapting instruction to the diverse learning preferences of students”.

II. Learning theories

Learning theories such as behaviourism, cognitive theory, constructivism, and adult learning that have been applied to the development

of ECLearn were described in section 2.8.

III. Teaching strategies

ECLearn has adopted several teaching strategies such as tutorials, drills, and simulations had been discussed in section 2.9.

IV. Interactivity

Sims (cited in Kwan et al., 2008) stated that “interactivity refers to those functions and/or operations made available to the learner to enable them to work with content material presented in a computer based environment”. There are two learning modules (i.e. Lessons and Poems) and some interactive exercises embedded in ECLearn. The model of the two major learning modules design is shown in Figure 3.12. These learning modules emphasize learner centred learning (LCL) that uses active learning strategies to engage learners directly in learning processes. LCL is believed can foster active, interactive and deep learning strategies enabling students to achieve successful learning outcomes in a variety of contexts. In addition, the learning contents of the 15 lessons in Lessons module can be perceived through the learning contents design model as appended in Appendix E.

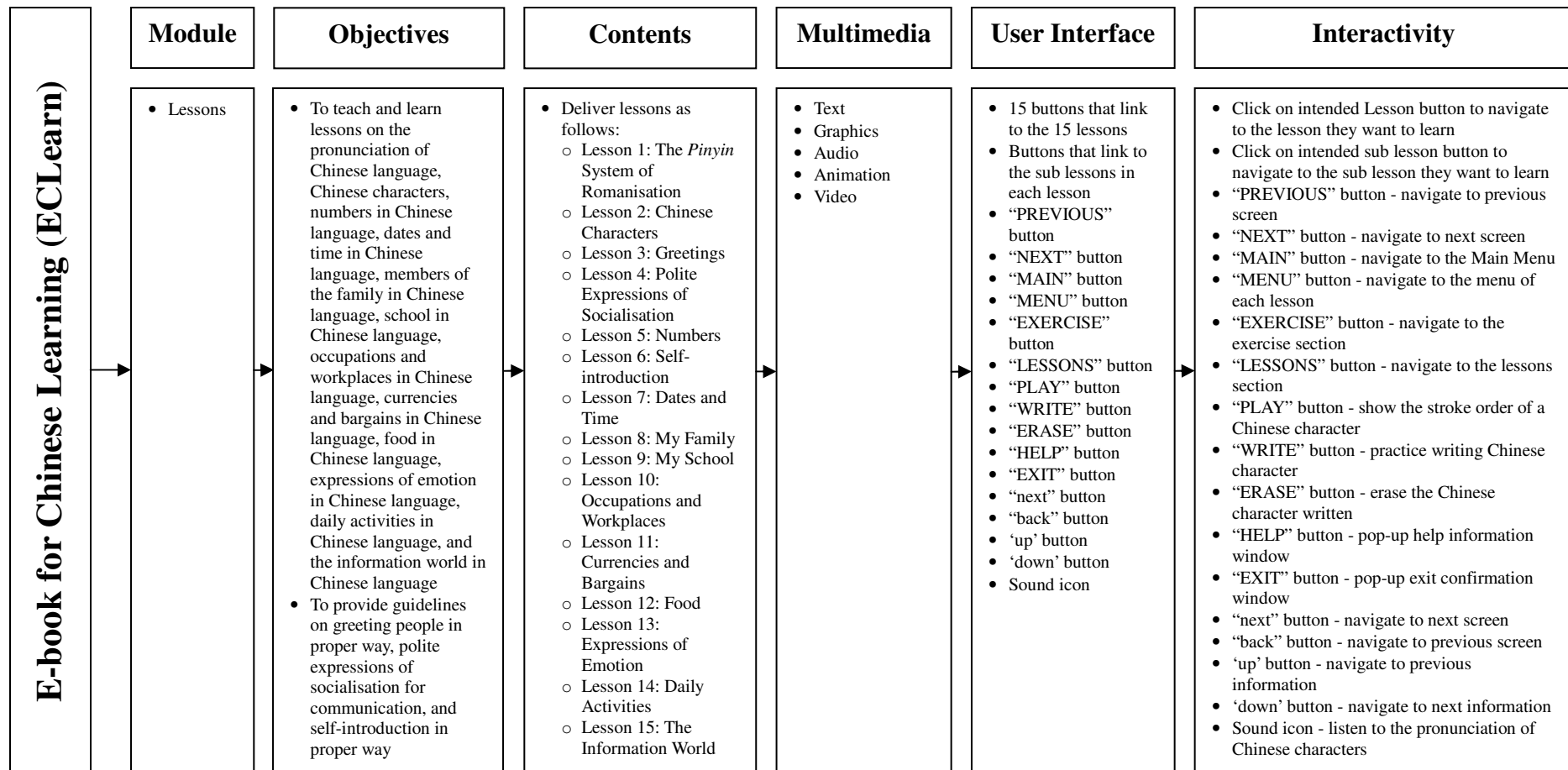


Figure 3.12: Modules design model for ECLearn development

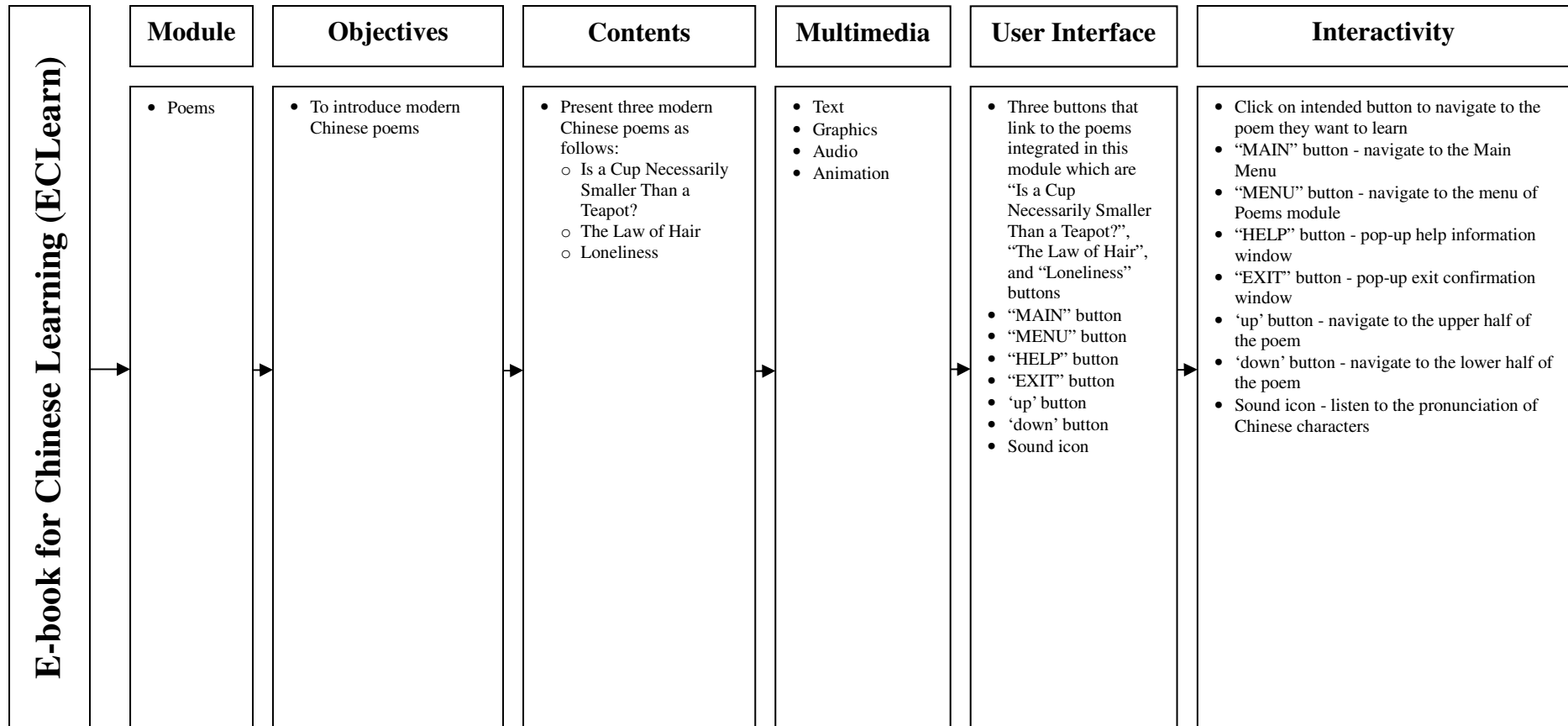


Figure 3.12: Modules design model for ECLearn development (Continued)

V. Navigation

Navigation refers to the set of methods which allow users to navigate through the program in the user interface of the software (Parshall et al., 2002). Global navigation allows user to navigate between the site's main sections or application through a consistent set of links or buttons on every page while local navigation allow user to navigate locally to search for information within some subset of pages (Baumgardt 2003; Tidwell 2006).

ECLearn provides interactivity for learners to freely navigate between the learning contents through global and local navigations. For example, learners can click on a Lesson button in the main menu page to navigate globally from the main menu to the learning modules they want to learn and vice versa. In each lesson, they can further navigate locally to the sub-topics and interactive exercise integrated. Besides that, hypermedia enables learners to navigate to the learning contents that contain stroke order of Chinese characters animation, Chinese conversation video, and the pronunciation of Chinese characters and *Hanyu Pinyin* demonstrated by human voices.

VI. Teaching and learning medium

ECLearn incorporates multimedia elements to convey the learning contents in a multi-sensory learning environment. The integration of different medium such as text, images and graphics, audio, animation, and video as described in section 2.6 could help to increase students' concentration during

the teaching and learning processes, hence improving the students' overall learning performances (Ayres 2002, cited in Masri et al., 2009).

3.2.3.2 The design and development of ECLearn prototype

This section discusses topics on functional and non-functional requirements for ECLearn development, analysis of features that result in successful interactive multimedia e-book development, and design principles for the development of ECLearn.

I. Functional requirements

Functional requirements specify the observable tasks which should be performed by the system that is under development (Kurbel 2008). Shiratuddin (2002) noted that when proposing design features for computer systems, the literature suggested using requirements engineering. The principal concept behind requirements engineering is eliciting what users want and what functions to include in a system. Hence, users' requirements of an intended system should be collected, specified and then presented in the form of models. The functional requirements of ECLearn development are as follows:

- ECLearn should be able to incorporate relevant text, images, graphics, sound, animation, and video to convey the learning contents which could facilitate students in TCSL effectively.
- ECLearn should be able to show the feedback on correct or

wrong answer immediately after students have done the interactive exercises.

- ECLearn should be able to provide help information to help guide students when they encounter problems in navigating the e-book.
- ECLearn should be able to provide interactivity between students and ECLearn to encourage students to actively participate in the Chinese learning process.

II. Non-functional requirements

Non-functional requirements specify the qualities that the system under development should have but not the tasks that will be performed by the system (Kurbel 2008). The non-functional requirements of ECLearn development are as follows:

- **Usability:** Usability is defined as “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use” (Stone et al., 2005, p. 6). In this context, ECLearn should be developed based on users’ requirements and preferences to arouse their interest of learning. Besides, the functionalities provided in ECLearn have to be user friendly so that students can use it to learn Chinese easily.
- **Consistency:** Consistency refers to “a design principle that emphasizes the importance of uniformity in appearance,

placement, and behaviour within the user interface to make a system easy to learn and remember” (Stone et al., 2005, p. 174).

This design principle has been applied in ECLearn development. For example, a set of functioning buttons are placed on the left side in ECLearn, so that students can easily find it and use it.

- **Simplicity:** Galitz (2007, p. 56) stated that “simplicity is achieved when everyone can easily understand and use a system regardless of experience, literacy, or concentration level”. The design of the user interface in ECLearn should be based on user-oriented terms (words, phrases and concepts familiar to the user) rather than system-oriented terms. Users benefit from functionality that is easily accessible and usable. The interface should support the user’s tasks and allows the user to work efficiently. For example, the information presented in ECLearn should be easy to search for and straightforward, redundant and decorative graphics should be avoided to make the user interface in ECLearn as simple as possible.

III. Analysis of features that result in successful interactive multimedia e-book development

It is important to analyse features that will result in successful interactive multimedia e-book development before developing ECLearn. These features include contents, navigation, interactivity, feedback, and also

interface design.

A. Contents

A successful interactive multimedia e-book should have accurate, appropriate contents with suitable scope. Below shows the contents that a successful interactive multimedia e-book should have (Georgiadou et al., 2001):

- **Accuracy:** Information is free of error, the spelling of words is correct, the use of grammar is correct, and the structure of sentence is correct.
- **Appropriateness:** The vocabulary and concepts are appropriate to the abilities of students.
- **Scope:** The topics are sufficiently covered by information of sufficient scope for the target audience, and the progression of topics is logical.

Contents are the most important feature to be included in ECLearn. ECLearn is useless without reliable contents or with contents that are not appropriate for Chinese learning. ECLearn was developed based on the “Learn Chinese with Ease” printed textbook. The contents of the printed textbook was analysed and re-organised using appropriate multimedia elements in developing ECLearn to fulfil students’ needs. Some new relevant interactive exercises have been design and included in ECLearn to enhance the format of the exercises found in the printed textbook.

B. Navigation

Navigation is necessary to be included in a successful interactive multimedia e-book to facilitate ease-of-use. Herrington and Oliver (cited in Kennedy et al., 1998) had stated three purposes to navigation as follows:

- To locate and access the information.
- To intentionally move between the related information.
- To establish the current position of user within the programme.

With effective navigation, students are able to control the situation where they can easily navigate from one location to another desired location in ECLearn. For example, students can choose the lesson they want to learn by just clicking on the button provided in the Lessons menu to navigate to the desired lesson. Students can also click on the sound icon when they want to listen to the pronunciation of the Chinese characters.

C. Interactivity

Past studies have found that interactivity has a strong positive effect on learning. For example, Bosco reviewed 75 learning studies and found that learners learn faster, and have better attitudes toward learning when using interactive multimedia (Shajrah 2011). According to the cognitive theory of multimedia learning (Mayer 2002), adding simple user interactivity can improve learning because it reduces the chances of cognitive overload and encourages learners to engage in each of the cognitive processes. Therefore, a

successful interactive multimedia e-book should be developed in a way that can provide effective interactivity to enhance the Chinese learning process.

Orr et al. (cited in Georgiadou et al., 2001) have stated the guidelines that can be used to increase the interactivity in instructional programmes which are as follows:

- The content are break into small segments and the questions, reviews, and summaries are integrated in each segment.
- Students are asked to apply the knowledge they have learnt instead of memorize.
- The opportunities for interaction are provided at least every three or four screens.

The learning contents in ECLearn are divided into 15 lessons and three poems. Interactive techniques used in the interactive multimedia applications are in the form of navigation controls. There are various types of navigation control such as buttons, menus and hyperlinks which can be used to help user to effectively navigate multimedia application. Interactivity gives the opportunity to students to explore the contents in ECLearn and allows them to participate actively in the learning process.

D. Feedback

Feedback is a necessary element of high quality instruction and it may serve as another instructional opportunity if it is well designed (Hays 2008).

There are some guidelines on performance feedback as follows (Georgiadou et al., 2001):

- Feedback is provided immediately after a response.
- The feedback placement is varied according to the objectives level.
- Feedback is provided to verify the correctness.

A successful interactive multimedia e-book should provide immediate feedback to students after they have answered a question. If student provided a wrong answer, feedback to indicate the wrong response should be given to student with or without the correct answer. Immediate feedback provided in the interactive exercises enables students to test their understanding for effective Chinese learning.

E. Interface design

Guralnick (2011) claimed that “e-learning interface design is especially critical, as the learning effectiveness and interface design are substantially intertwined”. Therefore, a careful design of the user interface is much needed to enhance its usability for effective Chinese learning. According to Georgiadou and Economides (2000), researchers have created some important interface design guidelines as shown below:

- **Use of space:** Areas which demand action are better placed close to the user’s attention centre as human eye will naturally pay attention to a larger picture before a smaller picture, to a

colour before black and white, and to a moving thing before a static thing.

- **Text:** Typeface uses should be consistent, and the display of large amount of text on a computer screen is difficult for reading and understanding.
- **Colour:** The colours of text and background should be highly contrasted, and functional use of colour should be consistent.
- **Graphics:** The graphics and background should be highly contrasted, and relevant meaningful graphics should be placed close to the text to help learners in understanding and remembering the information.
- **Animation/Video:** More than one animation presented in the same screen and at the same time will confuse the users, and video should be used for demonstrating real life situations instead of demonstrating abstract concepts and philosophies.

ECLearn was designed and developed with reference to the useful interface design guidelines to provide students a more interactive and excite environment for Chinese learning.

F. Multimedia learning design principles

The multimedia learning design principles was proposed by Mayer (2001) based on the cognitive theory of multimedia learning as described in section 2.6.2. The design principles encompass multimedia principle,

contiguity principle, coherence principle, modality principle, redundancy principle, and individual differences principle.

i. Multimedia principle

According to the multimedia principle, students learn better with the use of words and pictures instead of words or pictures alone (Mayer 2005). To provide a better instructional environment to students, ECLearn integrates text with the use of both static and moving images to support the computer-supported teaching and learning environment which enables learner to learn Chinese writing, vocabularies and conversation more efficiently.

ii. Contiguity principle

The contiguity principle notes that students learn better when corresponding words and graphics are presented near each other and should be presented simultaneously (Zhang and Barber 2008). Mayer (1989, cited in Jolly 2003) asserted that providing on-screen text and meaningful graphics close to one another on the screen promotes making pictorial and verbal connections and imposes less cognitive load. This principle has been applied to ECLearn for effective Chinese writing and vocabulary learning.

iii. Coherence principle

The coherence principle emphasises that students learn better when the instructional environment is free of unnecessary texts, pictures or sound which are only for decoration (Mishra and Sharma 2005). According to Mayer and Moreno (2002, p. 114), many past studies (e.g. Garner et al., 1989; Renninger et al., 1992; Harp and Mayer 1997; 1998) have found that adding interesting but irrelevant sentences to an otherwise boring text does not improve students' memory for the text. Mayer and Moreno added multimedia presentations should focus on clear and concise presentations. This principle has been applied to ECLearn where the learning contents are presented through meaningful text, graphics or images, animation, narration, and video that could help the learner to better understand the lessons and poems integrated.

iv. Modality principle

The modality principle states that students learn better when animation is presented with the use of auditory narration instead of on-screen text (Coiro et al., 2008). Mayer and Moreno (2002) stated that when words are presented as on-screen text together with animation, according to the cognitive theory of multimedia learning, the on-screen text is processed in the visual channel along with the animation. Consequently, the visual channel can become overloaded when students read the on-screen text and watch the animation concurrently. In this way, a split-attention effect (Mousavi et al., 1995, cited in

Mayer and Moreno 2002) occurs in which the on-screen text competes for visual attention with the animation.

In contrast, when words are presented as narration, the spoken text is processed in the verbal channel, thereby freeing the visual channel to focus on processing the animation. In short, students learn more deeply from animation and narration rather than animation and on-screen text. ECLearn adopts this principle where animation and narration are used to enhance the learning and practicing of the pronunciation of Chinese characters.

v. Redundancy principle

According to the redundancy principle, students learn, retain, and transfer information better when the instructional environment involves animation and narration rather than narration, animation and on-screen text (Coiro et al., 2008). The cognitive theory of multimedia learning states that when words are presented as narration and on-screen text together with animation, on-screen text could overload visual working memory. The added on-screen text will be processed in the visual channel compete with the animation that creates the split-attention effect. Students will have to pay attention visually to both the on-screen text and the animation, thereby missing out on some of the presented material (Mayer 2002).

However, Mayer (2001) claimed that the redundancy effect never nullify the value of letting learners to have choices in making adjustment on

multimedia presentations in some situations such as second language learning to fit their own learning style. Mayer (2002) added the rationale for presenting the same words in both spoken text and on-screen text formats enables students to choose the format that better suits their learning style. If students learn better from spoken words, they can pay attention to the narration; if they learn better from printed words, they can pay attention to the on-screen text. This redundancy effect has been applied to ECLearn where the Chinese conversation videos are presented with on-screen text in Chinese-English synchronised with the Chinese conversation to help the second language learners in learning and practicing the Chinese conversation skills more efficiently and effortlessly. The second language learners can choose to learn the Chinese conversation skills through either paying attention to the on-screen text in Chinese-English or auditory narration in the video based on their own learning style.

vi. Individual differences principle

The individual differences principle describes the design effects are mediated by learner characteristics (Coiro et al., 2008). According to Mishra and Sharma (2005), “design effects are stronger for low-knowledge learners (e.g. novices) than for high-knowledge learners and for high spatial learners (e.g. visual learners) rather than for low-spatial learners”. Research has shown that learners with low ability of spatial and verbal are worse in the acquisition of vocabulary compared to those with high ability of spatial and verbal when

only visual annotations are presented to them (Plass et al., 1998, cited in Mayer 2005).

Based on this principle, it is important to create the ECLearn as a well-structured multimedia presentation which integrates appropriate text, graphics, images, sound, animation, and video catering for diverse learning styles in Chinese language learning.

3.3 Methodology for the Evaluation of a Blended Learning Environment through the Use of an Interactive Multimedia E-Book for TCSL

This study sought to assess the efficacy of a blended learning environment through the use of an interactive multimedia e-book compared to traditional instruction on students' achievement in Chinese language acquisition. Meanwhile, the study also involves usability testing among the experimental group of students to evaluate the ease-of-use of the functionalities provided in the interactive multimedia e-book developed. The usability testing questionnaire is as appended in Appendix F.

The evaluation of the ease-of-use of the functionalities provided in the interactive multimedia e-book, and the efficacy evaluation of blended learning environment through the use of an interactive multimedia e-book for TCSL compared to traditional instruction were measured through hypotheses testing. The following null hypotheses were tested:

- **H₀₁:** Students do not perceive that the functionalities provided in the interactive multimedia e-book are ease of use.
- **H₀₂:** There is no significant difference between a blended learning environment through the use of an interactive multimedia e-book and traditional instruction in TCSL at tertiary level.

3.3.1 Research Design

This study aims to investigate the efficacy of a blended language learning environment for TCSL at tertiary level compared to traditional instruction. Meanwhile, it also aims to evaluate the ease-of-use of the functionalities provided in the interactive multimedia e-book for TCSL in a blended learning environment. The research methodology employs a quantitative and pretest-posttest designs. In this study, students' achievement in the acquisition of Chinese knowledge will be measured.

3.3.2 Evaluation Instruments

Two types of achievement tests were given to evaluation subjects to determine their achievements on the knowledge about Chinese language, before the intervention (pre-test), and at the end of the intervention (post-test). Each of the achievement tests (see Appendix G) contained 15 multiple-choice questions on the selected lessons presented in printed textbook and the

interactive multimedia e-book called ECLearn. Besides, demographic information was collected.

On the other hand, a usability evaluation questionnaire was distributed to the experimental group to evaluate the ease-of-use of the functionalities and features provided in the interactive multimedia e-book (i.e. ECLearn).

3.3.2.1 Pilot study

According to Ary et al. (2010), a pilot study “provides the opportunity to assess the appropriateness of the data-collection methods and other procedures and to make changes if necessary”. Basit (2010) noted that “the sample for the pilot should be representative of the sample of the main study, and the approach, methodology and methods used in the pilot ought to be reflected in the actual study later on”. She added that participants that have participated in the pilot study should not be part of the main study, and also the main study should not use the data collected in the pilot study. In this study, a pilot study is conducted among 10 students from Graphic Design and Multimedia course (excluded from the actual study) to pilot test the usability evaluation questionnaire as appended in Appendix F.

3.3.2.2 Reliability of usability testing questionnaire

Reliability refers as “the consistency and stability of a measurement” (Hartas 2010). A reliable instrument should produce consistent results at

different times under different conditions (Emory and Cooper 1991, cited in Shiratuddin 2002). Takona (2002) stated that “if the same questionnaire was administered to the same person twice in a short period of time and does not yield similar responses, the questionnaire probably contains unreliable items”.

Gliner and Morgan (2000) noted that “if each item on the test has multiple choices, such as a Likert scale, then Cronbach’s alpha is the method of choice to determine inter-item reliability”. So, the reliability of the usability testing questionnaire created in this study was measured using Cronbach’s alpha (α) coefficient to test internal consistency among items. The following represents the formula of Cronbach’s alpha where p = number of items x_i and $u = x_1+x_2+\dots+x_p$ (Vehkalahti 2000; Vehkalahti et al., 2006):

$$\alpha = \frac{p}{p - 1} \left(1 - \frac{\sum_{i=1}^p \sigma_{x_i}^2}{\sigma_u^2} \right)$$

According to Hartas (2010), Cronbach’s alpha “splits all the items in a questionnaire every possible way and computes the correlation values for them all. In the end, a computer output generates one number for Cronbach’s alpha”. As claimed by Sekaran (cited in Almrashdeh et al., 2011), a reliability coefficient which is in the range of 0.80 or 0.90 denotes that a scale is well constructed, while in the range of 0.70 are deemed acceptable, and in the range of 0.50 or 0.60 denotes that a scale is less well constructed.

In this study, a usability evaluation questionnaire was created to evaluate the ease-of-use of the functionalities provided in ECLearn. A variety

of items adapted from the questionnaire used in the studies of Aris et al. (2006) and Bahrudin et al. (2011) were created to measure the following four aspects:

- Section A: User interface design
- Section B: Navigation and interactivity
- Section C: Content
- Section D: Students' perception towards the use of interactive multimedia e-book in Chinese learning compared to printed textbook in a blended learning environment.

Reliability testing using Cronbach's alpha was conducted on each of the four sections in the usability evaluation questionnaire. The Cronbach's alpha coefficient of each section is 0.835 for user interface design, 0.849 for navigation and interactivity, 0.822 for content, and 0.809 for the final part. The value of acceptance of alpha was set above 0.8 indicating good inter-item correlation within each attribute (see Table 3.9 and Appendix H). The results of Cronbach's analysis show that the usability evaluation questionnaire was well constructed and reliable.

Table 3.9: Cronbach's alpha (α) coefficient for each attribute

Attributes	Cronbach's Alpha (α) Coefficient
User interface design	0.835
Navigation and interactivity	0.849
Content	0.822
Students' perception towards the use of interactive multimedia e-book in Chinese learning compared to printed textbook in a blended learning environment	0.809

3.3.3 Evaluation Subjects

Subjects are samples of real users, who are students of “Introduction to Chinese Language I” unit from the Broadcasting (BC) and Graphic Design and Multimedia (GD) courses. Students are randomly selected from the attendance list of the unit. 20 students participated in the evaluation.

The sample size adequacy should be determined before data collection is conducted. Bouma and Atkinson (1995, cited in Shiratuddin 2002) noted that if the population that is to be sampled is fairly homogeneous (i.e. the relevant characteristics are fairly evenly distributed), a smaller sample can be relied on than if the population is highly variable. In this study, the requirements of the samples are:

- have some experiences in using existing printed textbook;
- have basic knowledge of Chinese through the subject “Introduction to Chinese Language I”.

Since these requirements are easily met, it is possible to show that sample characteristics such as different gender, ethnic, and learning experience are fairly homogeneous in any sample of students. Hence, a small number of participants are assumed to be adequate.

3.3.4 Data Collection Procedure

The study was conducted during the period from January through April 2011. After the delivery of the first seven lessons of the subject in the traditional classroom instruction, the first set of the achievement test (pre-test assessment) was given to all evaluation subjects to assess their achievement on the seven topics prior to the presentation of ECLearn. The pre-test assessment contains 15 selected multiple choice questions from the first seven lessons of the unit.

Then the experimental group continued to study the following lessons of the unit with the complement of ECLearn at their own pace. The control group continued learning the unit through regular classroom instruction. Regular classroom instruction included mainly lecture supported by printed textbook. Table 3.10 reports the data collection procedure. Before the intervention started, two hours were spent on training the experimental group of students to use the prototype of ECLearn.

Due to the nature of study and the conditions of the lecture did not allow the experimental group to have learning session in computer laboratory, each student in the experimental group was given a piece of ECLearn to practice it during off-lecture hours. The treatment continued for four weeks. It was assumed that the control group did not have a chance to practice the ECLearn. After seven weeks from the pre-test session, students in both experimental and control groups were given an achievement test that consists

of identical questions in the pre-test assessment to assess their achievement in the unit.

Table 3.10: Data collection procedure

Group	Pre-test (given prior to the presentation of ECLearn)	Treatment	Post-test (given at the end of treatment)
Control (10 samples selected from BC course)	Achievement test set 1	Traditional classroom instruction included mainly lecture supported by the printed textbook entitled “Learn Chinese with Ease”	Achievement test set 2
Experimental (10 samples selected from GD course)	Achievement test set 1	Blended learning environment through the use of an interactive multimedia e-book called ECLearn	Achievement test set 2

Marks obtained through the pre- and post- tests conducted were calculated to measure students’ achievement in Chinese knowledge acquisition before and after intervention (i.e. learning Chinese in a blended learning environment through the use of an interactive multimedia e-book). Pre- and post- tests marks were used instead of formal exam marks since it was impossible for the author to conduct a formal final exam before and after treatment to monitor students’ performance and achievement.

In addition to achievement test, students in the experimental group were given a usability evaluation questionnaire to evaluate their perception towards the ease-of-use of the functionalities provided in the interactive multimedia e-book developed.

3.3.5 Data Analysis

Data analysis started with the coding of data and was completed by interpreting the results obtained using SPSS (Statistical Package for Social Science). The data collected through the study is analysed through descriptive and inferential statistics.

To test the null hypothesis 1 (H_01), descriptive statistical data were used to present the results of usability evaluation, namely the respondents' levels of agreement with the items that measure the perceived ease of use of the functionalities provided in the developed interactive multimedia e-book. Means, standard deviation (S.D.), frequency and percentage of cases were generated to find out the number of respondents agreeing or disagreeing with each item built into the usability evaluation questionnaire.

Whereas in relation to the testing of null hypothesis 2 (H_02), the data collected through pre- and post- tests were statistically analysed through inferential statistics. The independent-samples *t*-test was used to test the null hypothesis 2 (H_02), to determine whether there is a significant difference between the mean scores of students' achievements under two different conditions (i.e. blended learning and the traditional classroom instruction) in TCSL at tertiary level. The mean of pre- and post- tests was calculated using the formula below (Salkind 2011):

$$\bar{X} = \frac{\sum X}{n}$$

where

- The letter X with a line above it (also sometimes called “ X bar”) is the mean value of the group of scores or the mean.
- The Σ , or the Greek letter sigma, is the summation sign, which tells you to add together whatever follows it.
- The X is each individual score in the group of scores.
- Finally, the n is the size of the sample from which you are computing the mean.

The independent-samples t -test produces a t value, which grows larger if the difference between the mean of experimental and control groups grows larger. The t value for independent-samples t -test is calculated using the formula below (Salkind 2004):

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\left[\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} \right] \left[\frac{n_1 + n_2}{n_1 n_2} \right]}}$$

where

- \bar{X}_1 is the mean for Group 1
- \bar{X}_2 is the mean for Group 2
- n_1 is the number of participants in Group 1
- n_2 is the number of participants in Group 2
- s_1^2 is the variance for Group 1
- s_2^2 is the variance for Group 2

According to Cohen et al. (2007), t -test is used to find out whether there are statistically significant differences between the means of two groups, using parametric data drawn from random samples with a normal distribution. Leech et al. (2005) stated that independent-samples t -test is used to compare two independent or unrelated groups (between groups design) on an approximately normal dependent variable. So, independent-samples t -test is used to measure whether there is a significant difference on the different

delivery methods in TCSL between the experimental (using blended learning environment through the use of ECLearn) and control (using traditional classroom instruction) groups.

3.4 Conclusions

In conclusion, this chapter has described the activities and processes involved in achieving all the research objectives. Having described and discussed the methodology of this study, the following chapter outlines the outcomes of the interactive multimedia e-book development, and the results of hypotheses testing.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter discusses the results obtained in the study. It is divided into three sections as follows:

- i. The creation of a blended learning environment for TCSL;
- ii. The evaluation of the ease-of-use of the functionalities provided in the prototype of ECLearn for TCSL;
- iii. The efficacy evaluation of the blended learning approach through the use of an interactive multimedia e-book in TCSL compared to traditional instruction.

4.2 The Creation of a Blended Learning Environment for TCSL

This section presents the results pertaining to the following topics:

- i. The design and development of an instructional design (ID) model for TCSL in a blended language learning environment;
- ii. The design and creation of a conceptual framework and modules design model for the prototype of ECLearn development;

iii. The prototype of ECLearn development.

4.2.1 The Design and Development of an ID Model for TCSL in a Blended Language Learning Environment

As has been discussed in chapter 3, an ID model called BLLE ID model (Figure 3.1) for TCSL in a blended language learning environment had been designed and developed. It has been discussed in depth in section 3.2.1.

4.2.2 The Design and Creation of a Conceptual Framework and Modules Design Model for the Prototype of ECLearn Development

The conceptual framework (Figure 3.11) and modules design model (Figure 3.12) had been designed and created for the prototype of ECLearn development. The conceptual framework has been described in detail in section 3.2.3.1.

4.2.3 The Prototype of ECLearn Development

The vital task in the development phase of the study is to develop the prototype of an interactive multimedia e-book called ECLearn as the electronic counterpart to the existing “Learn Chinese with Ease” textbook using Adobe Flash. At the development phase, the application design outputs are then translated into error-free programme code, ActionScript in this context. The samples of ActionScript used in the prototype of ECLearn development are as appended in Appendix I. Throughout the development

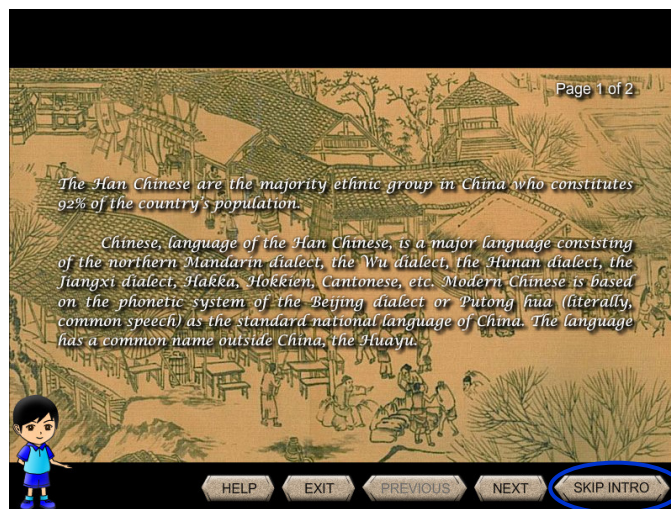
phase, the author tested the code as each module is added to the whole.

Overall, the development scope of ECLearn is as follows:

- i. Introduction to the application
- ii. Main Menu
- iii. Two main learning modules integrated in ECLearn, namely Lessons and Poems modules,
- iv. Help information as user guide
- v. Exit confirmation window

4.2.3.1 Introduction to the application

ECLearn starts with the Introduction screen (Figure 4.1) which shows a brief introduction of Chinese language. Users can click the “SKIP INTRO” button to navigate to the Main Menu in ECLearn (Figure 4.2). Users can return to Figure 4.1 by clicking the “INTRO” button in Figure 4.2.



Click the “SKIP INTRO” button to navigate to the Main Menu (Figure 4.2)

Figure 4.1: Sample screenshot from the Introduction screen in ECLearn

4.2.3.2 Main Menu

Main menu as shown in Figure 4.2 is designed in a simple style so that the users can browse through the options easily. It contains five navigational buttons for users to explore the contents embedded in ECLearn. These buttons are “INTRO”, “LESSONS”, “POEMS”, “HELP”, and “EXIT” buttons. The hierarchical chart of the Main Menu can be seen through Figure 4.3.



Figure 4.2: Screenshot from the Main Menu in ECLearn

In Figure 4.2, users can click on any of the navigational buttons to navigate to the intended screen. For instance, when users click on the “LESSONS” button in Figure 4.2, it directs users to menus of the Lessons module as shown in Figure 4.4. Each screen of the menu encompasses five lessons. Users can click on any of the buttons in Figure 4.4 to start their e-learning journey.



Figure 4.3: Hierarchical chart of the Main Menu in ECLearn



Figure 4.4: Screenshots from the menus of the Lessons module in ECLearn

4.2.3.3 Lessons and Poems modules

As described in section 1.6, there are 15 lessons and three poems integrated in both “Learn Chinese with Ease” textbook and ECLearn. An interactive exercise that adopts drills teaching strategy is embedded at the end of each lesson to test the understanding of learners on a lesson being taught. ECLearn contains existing printed textbook features as well as features that are perceived to be useful for Chinese learning. The contents integrated in the interactive multimedia e-book that are presented in the subsequent subsections are concerned with the learning of the following aspects in Chinese:

- Pronunciation instruction
- Learning Chinese characters

- Vocabulary learning
- Oral communication skills instruction
- Interactive exercises

I. Pronunciation instruction

The pronunciation instruction through *Hanyu Pinyin* is delivered in Lesson 1. Lesson 1 is sub-divided into three topics as can be perceived through the hierarchical chart of Lesson 1 in Figure 4.5.

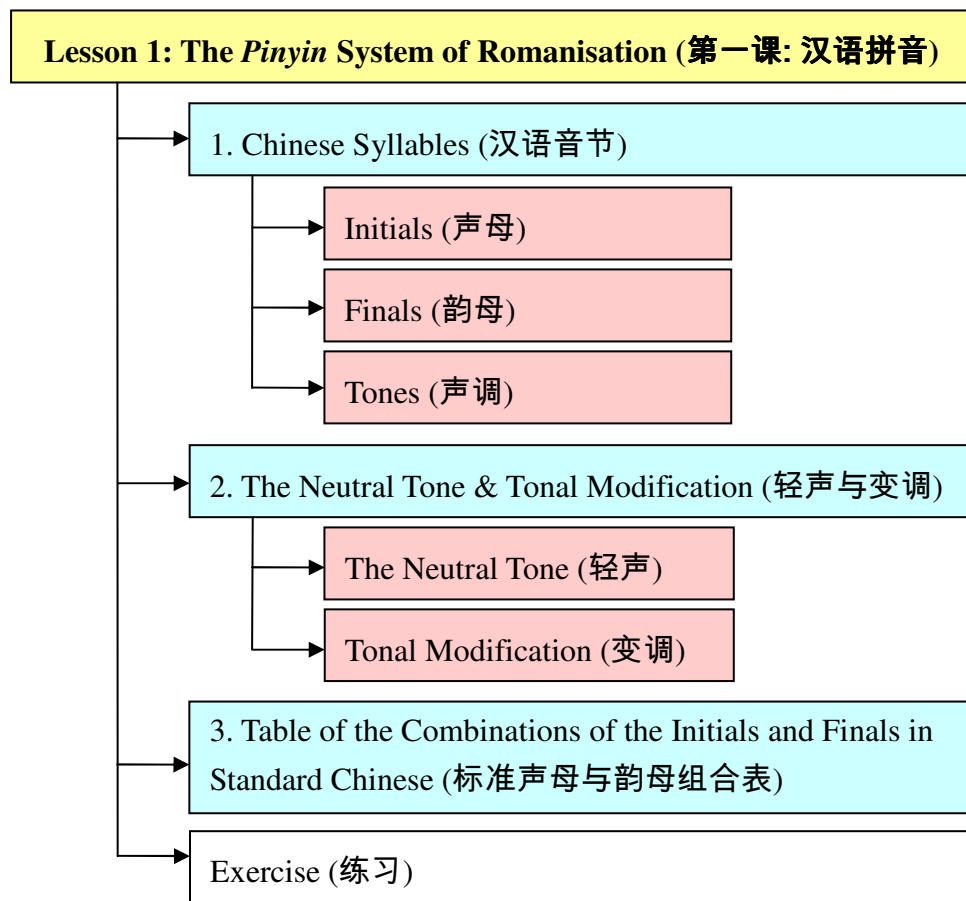


Figure 4.5: Hierarchical chart of Lesson 1

Figure 4.6 shows two sample screenshots from the lessons of Chinese Syllables which teach students about the pronunciation of initials and finals respectively.

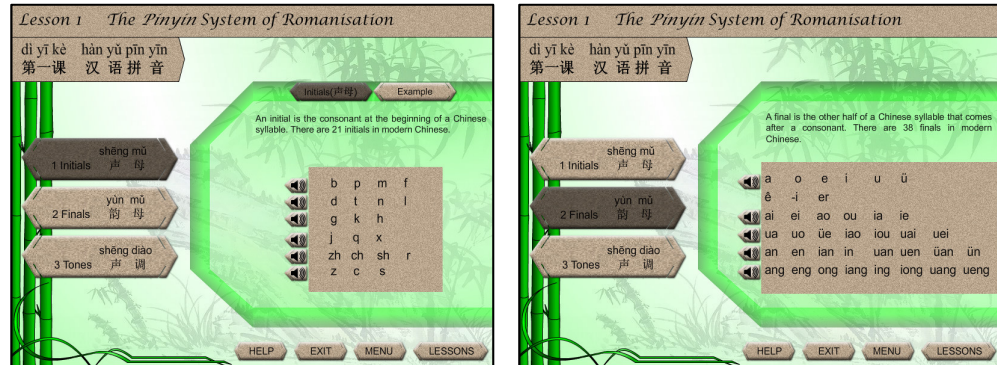


Figure 4.6: Sample screenshots from the lessons of Chinese Syllables in Lesson 1

The third topic integrated in Lesson 1 is about the combinations of the Initials and Finals in Standard Chinese. This topic is presented in table form as shown in Figure 4.7.

Table of the Combinations of the Initials and Finals in Standard Chinese Page 1 of 3

韵母	a	o	ê	e	-i	er	ai	ei	ao	ou	an	en
声母	a	o	ê	e		er	ai	ei	ao	ou	an	en
b	ba	bo					bai	bèi	bao		ban	ben
p	pa	po					pai	pèi	pao	pou	pan	pen
m	ma	mo		me			mai	mèi	mào	mou	man	men
f	fa	fo						fèi		fou	fan	fen
d	da		de			dai	dei	dao	dou	dian	dan	den
t	ta		te			tai		tao	tou	tan		
n	na		nè			nai	nei	nao	nou	nan	nen	
l	la		le			lai	lei	lao	lou	lan		
g	ga		ge			gai	gei	gao	gou	gan	gen	
k	ka		ke			kai	kei	kao	kou	kan	ken	
h	ha		he			hai	hei	hao	hou	han	hen	
j												
q												
x												
z	za		ze	zi		zai	zei	zao	zou	zan	zen	
c	ca		ce	ci		cai		cao	cou	can	cen	
s	sa		se	si		sai		sao	sou	san	sen	
zh	zha		zhe	zhi		zhai	zhei	zhao	zhou	zhan	zhen	
ch	cha		che	chi		chai		chao	chou	chan	chen	
sh	sha		she	shi		shai	shei	shao	shou	shan	shen	
r			re	ri				rao	rou	ran	ren	

Figure 4.7: Sample screenshot from the third topic in Lesson 1 (Table of the Combinations of the Initials and Finals in Standard Chinese)

II. Learning Chinese characters

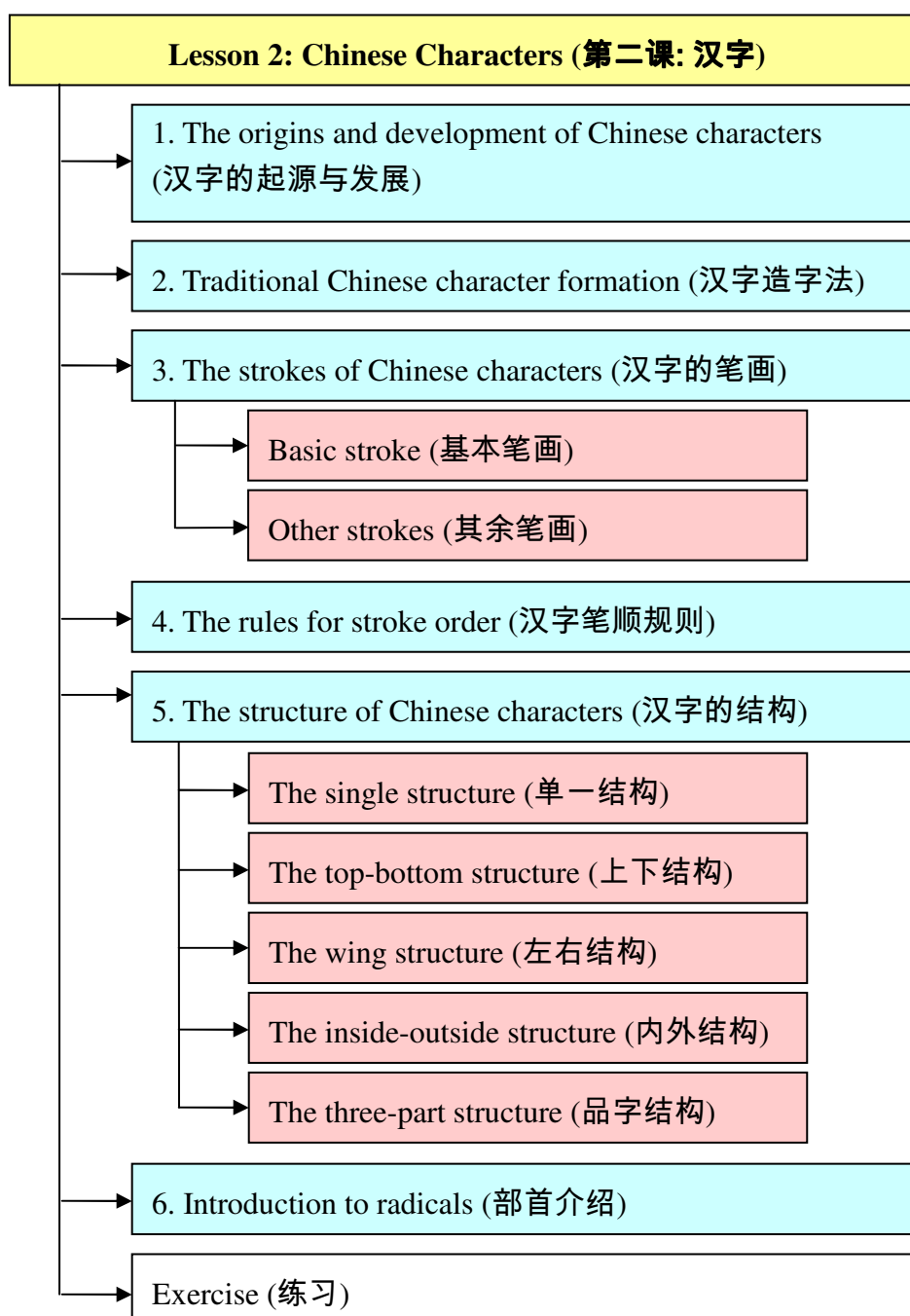


Figure 4.8: Hierarchical chart of Lesson 2

Instructional contents concerned with Chinese characters are delivered via Lesson 2. There are six topics integrated in Lesson 2 which are shown in the hierarchical chart in Figure 4.8. Figure 4.9 shows two sample screenshots

from the topic on ‘The Rules for Stroke Order’ which demonstrate the stroke order of characters for students and allow students to practice writing characters respectively.



Figure 4.9: Sample screenshots from Lesson 2 – Topic 4

III. Vocabulary learning

Instructional contents pertaining to vocabulary learning are delivered via 10 lessons in the Lessons module and three poems in the Poems module. The vocabularies taught in the Lessons modules included ‘Numbers’ (Lesson 5), ‘Dates and Time’ (Lesson 7), ‘My Family’ (Lesson 8), ‘My School’ (Lesson 9), ‘Occupations and Workplaces’ (Lesson 10), Currencies and Bargains (Lesson 11), ‘Food’ (Lesson 12), ‘Expressions of Emotion’ (Lesson 13), ‘Daily Activities’ (Lesson 14), and ‘The Information World’ (Lesson 15). The contents of these lessons are briefly described as follows:

- **Lesson 5: Numbers (第五课: 数字):** Lesson 5 consists of three topics as can be seen through the hierarchical chart of Lesson 5 in Figure 4.10. Two sample screenshots from this lesson are shown in Figure 4.11.

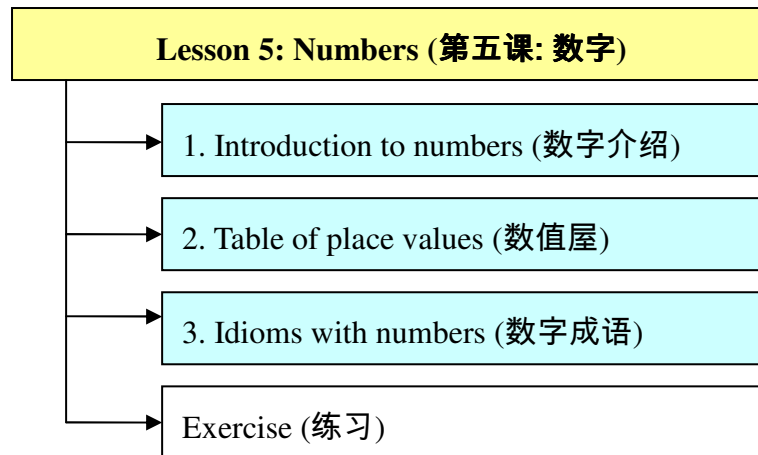


Figure 4.10: Hierarchical chart of Lesson 5



Figure 4.11: Sample screenshots from Lesson 5 – Topic 1 (Left) and Topic 2 (Right)

- Lesson 7: Dates and Time (第七课: 日期、时间):** There are four topics integrated in this lesson as shown in the hierarchical chart in Figure 4.12. Two sample screenshots from the first and forth topics are shown in Figure 4.13. Topic 1 delivers some keywords pertaining to dates and times, whereas Topic 4 includes some vocabularies on festivals and greetings. The other two topics are concerned with oral communication skills development which is presented later.



Figure 4.12: Hierarchical chart of Lesson 7



Figure 4.13: Sample screenshots from Lesson 7 – Topic 1 (Left) and Topic 4 (Right)

- Lesson 8: My Family (第八课: 我的家庭): Lesson 8 comprises four topics as shown in the hierarchical chart in Figure 4.14. A sample screenshot from the topic on ‘Forms of Address of Basic Family Members’ which teaches students about the forms of address of basic family members in Chinese is shown in Figure 4.15.

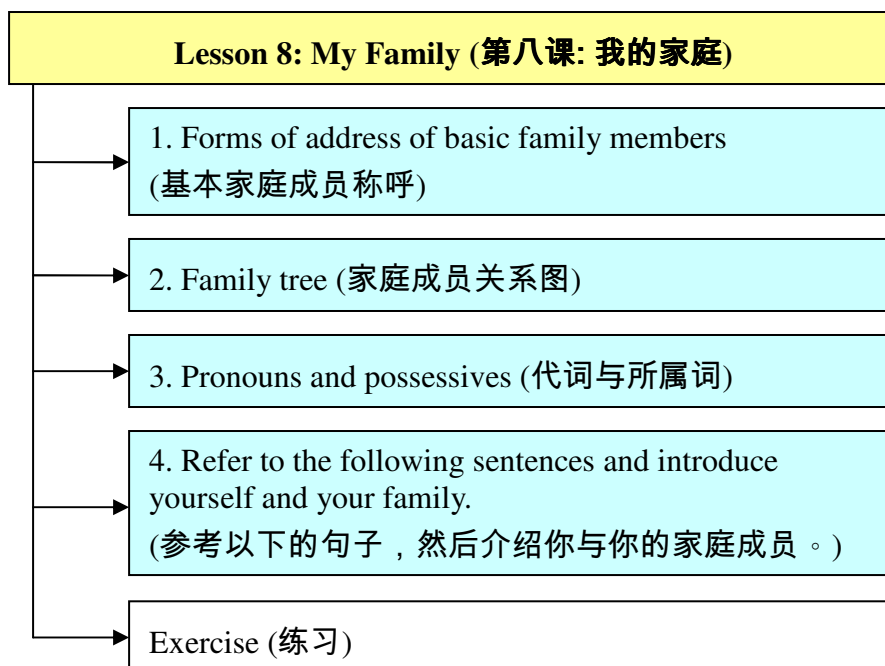


Figure 4.14: Hierarchical chart of Lesson 8



Figure 4.15: Sample screenshot from Lesson 8 – Topic 1

- **Lesson 9: My School (第九课: 我的学校):** There are four topics integrated in this lesson as shown in the hierarchical chart in Figure 4.16. Figure 4.17 reveals a sample screenshot from the topic on ‘School Names’ which teaches students about the school names in Chinese.

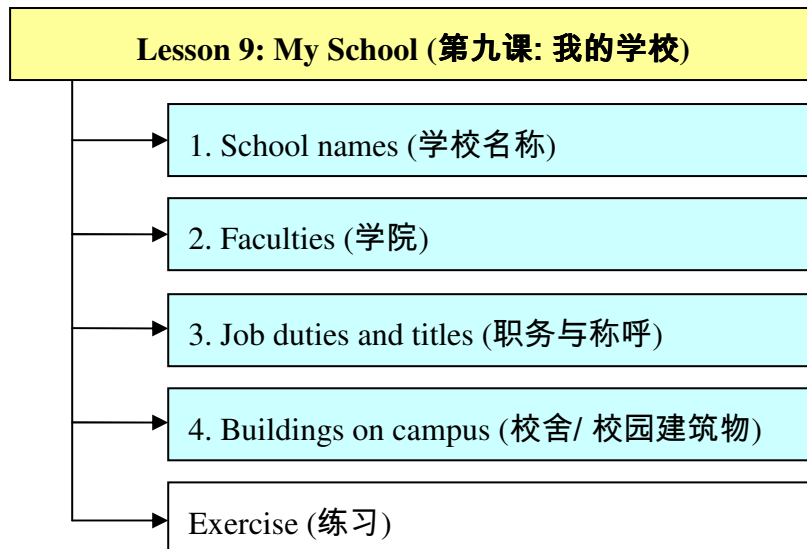


Figure 4.16: Hierarchical chart of Lesson 9

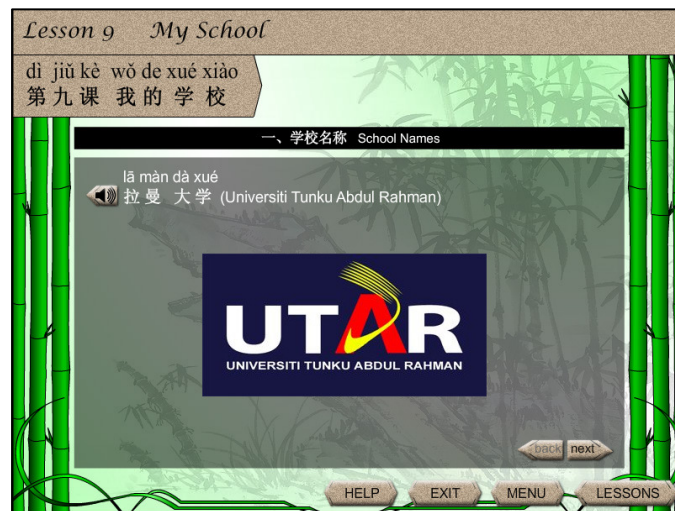


Figure 4.17: Sample screenshot from Lesson 9 – Topic 1

- Lesson 10: Occupations and Workplaces (第十课: 职业与工作地点):** Two topics are integrated in Lesson 10 as shown in the hierarchical chart in Figure 4.18. Each topic has its sub-topics. Figure 4.19 shows a sample screenshot from the sub-topic of ‘Occupations’ (Blue-collar Workers) which teaches students about the blue-collar workers in Chinese.

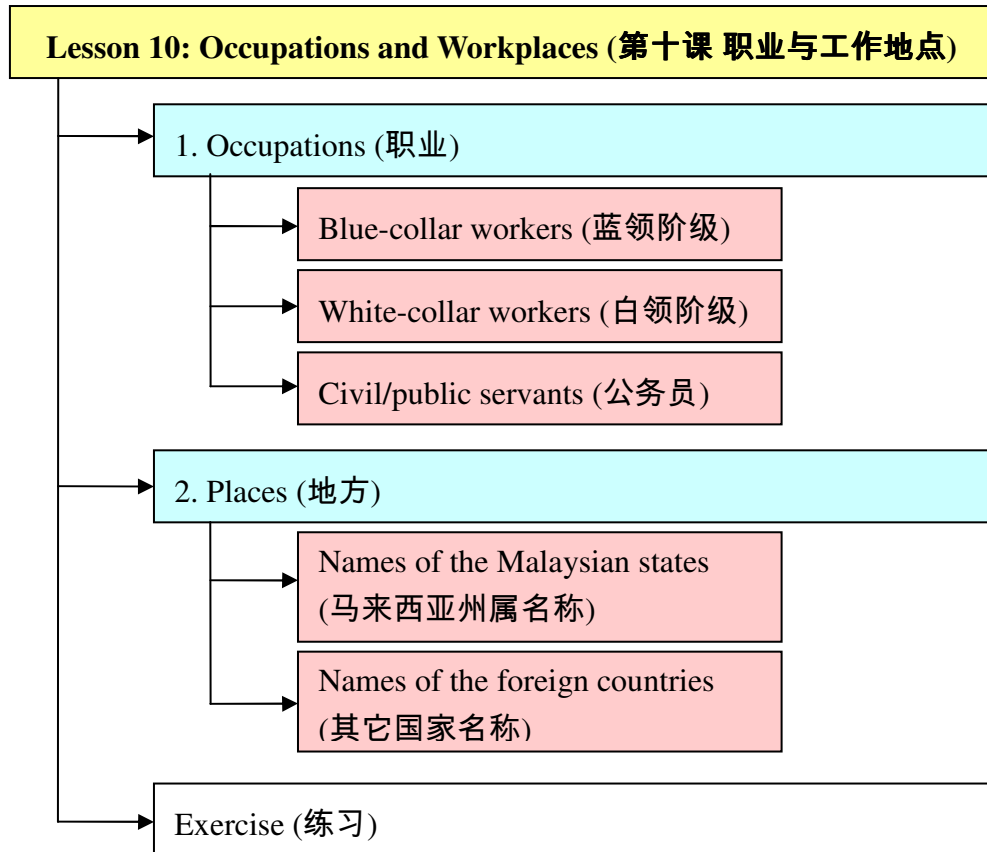


Figure 4.18: Hierarchical chart of Lesson 10



Figure 4.19: Sample screenshot from Lesson 10 – Topic 1 on ‘Blue-collar workers’

- **Lesson 11: Currencies and Bargains (第十一课: 货币与买卖):** There are four topics integrated in this lesson as shown in

the hierarchical chart in Figure 4.20. Topics 1 and 2 deliver vocabularies pertaining to currencies and bargains. Topics 3 and 4 are more concerned with oral communication skills development. A sample screenshot from Topic 2 of this lesson which teaches students about the currencies and monetary units in Chinese is shown in Figure 4.21.

- **Lesson 12: Food (第十二课: 食物):** There are seven topics integrated in this lesson as shown in the hierarchical chart in Figure 4.22. Topics 1 to 6 deliver vocabularies on different types of food, whereas Topic 7 is more for dialogue practice (part of oral communication skills development). A sample screenshot from Topic 5 of this lesson which teaches students about the western food in Chinese is shown in Figure 4.23.

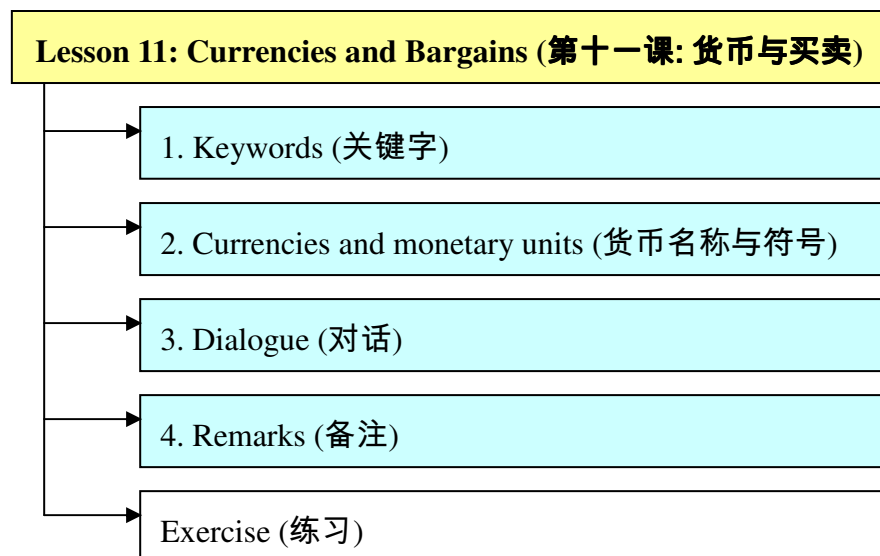


Figure 4.20: Hierarchical chart of Lesson 11



Figure 4.21: Sample screenshot from Lesson 11 – Topic 2

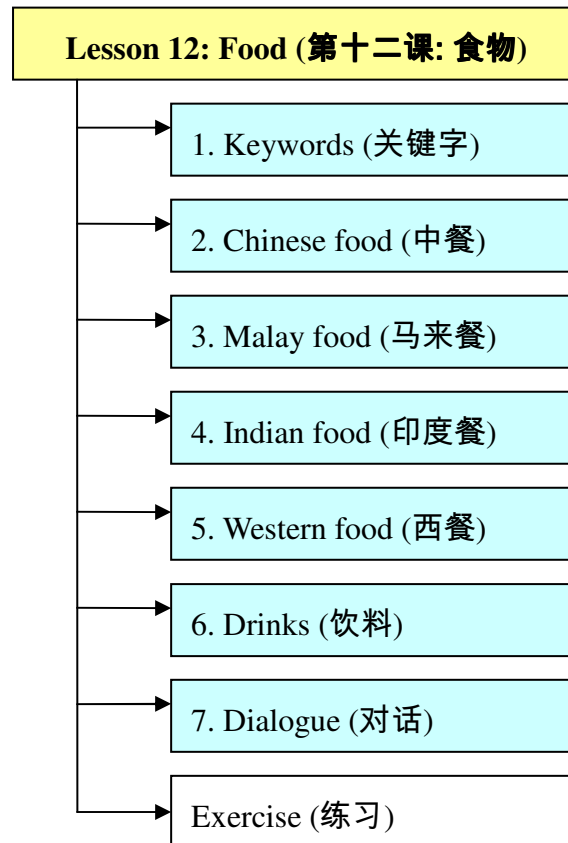


Figure 4.22: Hierarchical chart of Lesson 12



Figure 4.23: Sample screenshot from Lesson 12 – Topic 5

- **Lesson 13: Expressions of Emotion (第十三课: 情绪表达):**

There are two topics integrated in Lesson 13 as shown in the hierarchical chart in Figure 4.24. Only Topic 1 is concerned with vocabulary learning. Topic 2 focuses on dialogue practice (part of oral communication skills development). Figure 4.25 shows a sample screenshot from Topic 1 of this lesson which teaches students about the normal emotions in Chinese.

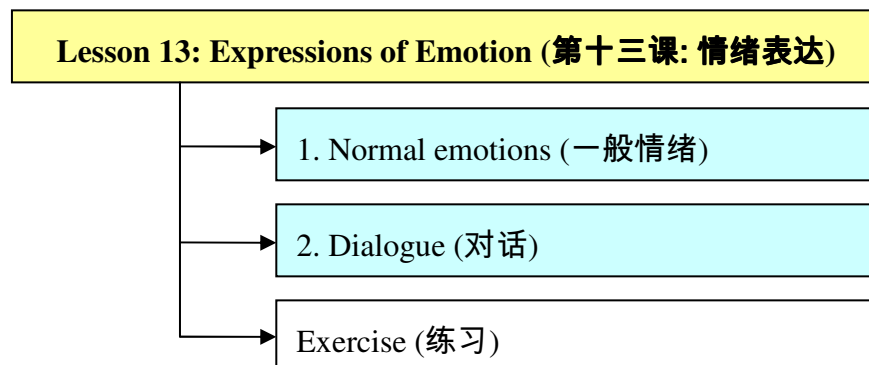


Figure 4.24: Hierarchical chart of Lesson 13



Figure 4.25: Sample screenshot from Lesson 13 – Topic 1

- Lesson 14: Daily Activities (第十四课: 日常活动):** As shown in the hierarchical chart (Figure 4.26), Lesson 14 consists of three topics. Only Topic 1 delivers vocabularies on daily activities. The rest are more focused on oral communication skills development. Figure 4.27 shows a sample screenshot from Topic 1 of the lesson which teaches students about the common action verbs and their derivatives in Chinese.
- Lesson 15: The Information World (第十五课: 资讯世界):** There are three topics integrated in Lesson 15 as shown in the hierarchical chart in Figure 4.28. Topics 1 and 2 deliver vocabularies about the information world. A sample screenshot from Topic 1 which comprises important keywords in the information world can be seen through Figure 4.29.

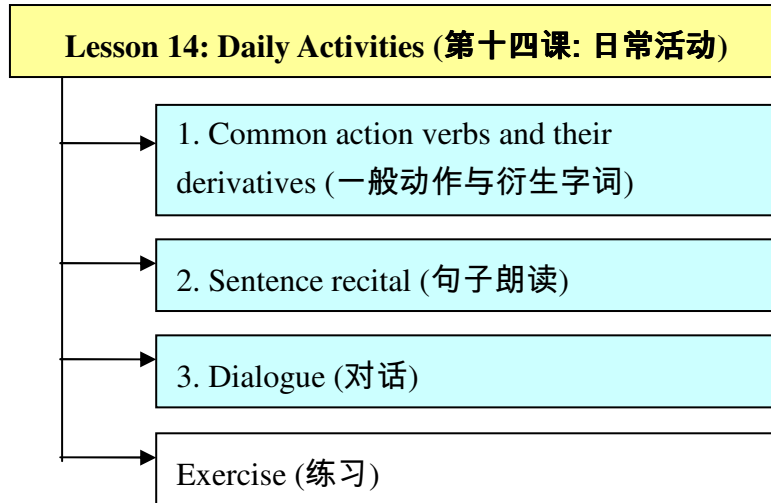


Figure 4.26: Hierarchical chart of Lesson 14



Figure 4.27: Sample screenshot from Lesson 14 – Topic 1

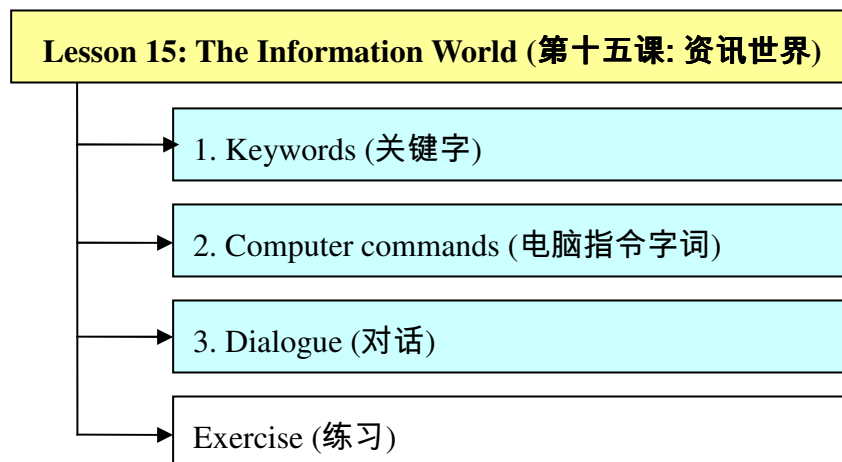


Figure 4.28: Hierarchical chart of Lesson 15



Figure 4.29: Sample screenshot from Lesson 15 – Topic 1

In addition, vocabulary can also be taught through the three poems integrated in the Poems module which are “(一) 茶杯一定比茶壶小吗?” (Is a Cup Necessarily Smaller than a Teapot?), “(二) 头发定律” (The Law of Hair), and “(三) 孤独” (Loneliness). All the three poems provide a fun and creative way for learners to learn the Chinese vocabulary. Figure 4.30 shows a sample screenshot from one of the poems in the Poems module.



Figure 4.30: Sample screenshot from the poem titled ‘Is a Cup Necessarily Smaller than a Teapot?’ in the Poems module

IV. Oral communication skills instruction

Communication skills included speaking, listening, reading, and writing skills. Vocabulary plays an important role in oral communication skills development because the contents which learners going to speak, listen, read, and write are build up of vocabulary words (Pikulski and Templeton 2004). Learners are needed to acquire an adequate number of vocabulary words in order to effectively develop their oral communication skills. Instructional contents concerned with oral communication skills are mainly delivered via ‘Greetings’ (Lesson 3), ‘Polite Expressions of Socialisation’ (Lesson 4), and ‘Self-introduction’ (Lesson 6). The relevant lessons are listed below:

- **Lesson 3: Greetings (第三课: 问候语):** There are three topics integrated in this lesson as shown in the hierarchical chart in Figure 4.31. Figure 4.32 shows a sample screenshot from the topic on ‘Basic Greeting Expressions’ which teaches users on how to greet people, in formal occasions, how to greet their elders, and how to communicate with others in Chinese.

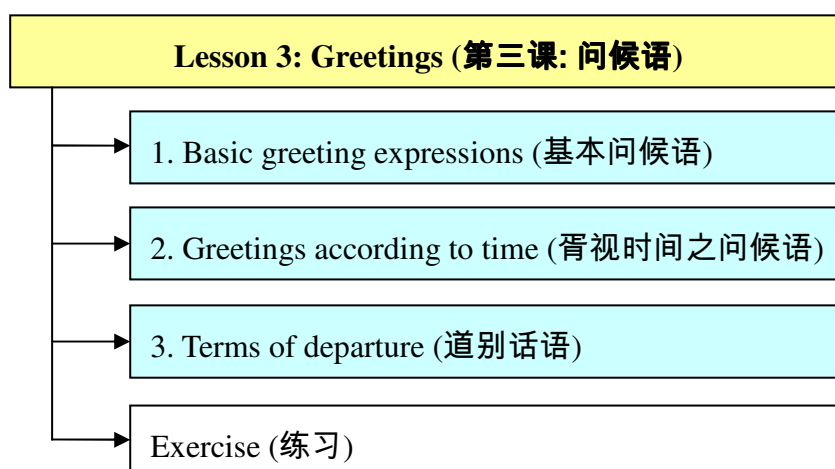


Figure 4.31: Hierarchical chart of Lesson 3



Figure 4.32: Sample screenshot from Lesson 3 – Topic 1

- Lesson 4: Polite Expressions of Socialisation (第四课: 社交礼貌用语):** As shown in the hierarchical chart of Lesson 4 (Figure 4.33), three topics are delivered in Lesson 4. Figure 4.34 reveals two sample screenshots from the first two topics in Lesson 4 which demonstrate to users how to conduct Chinese conversation with people politely in daily life.

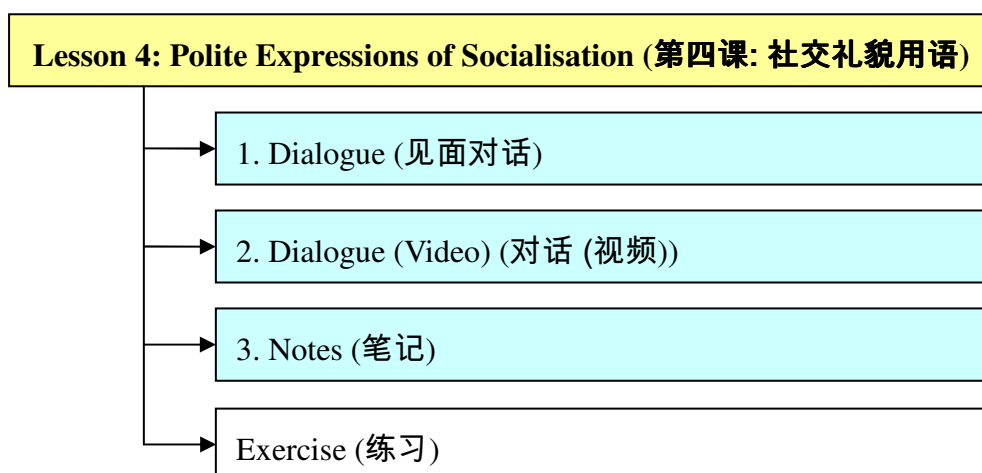


Figure 4.33: Hierarchical chart of Lesson 4

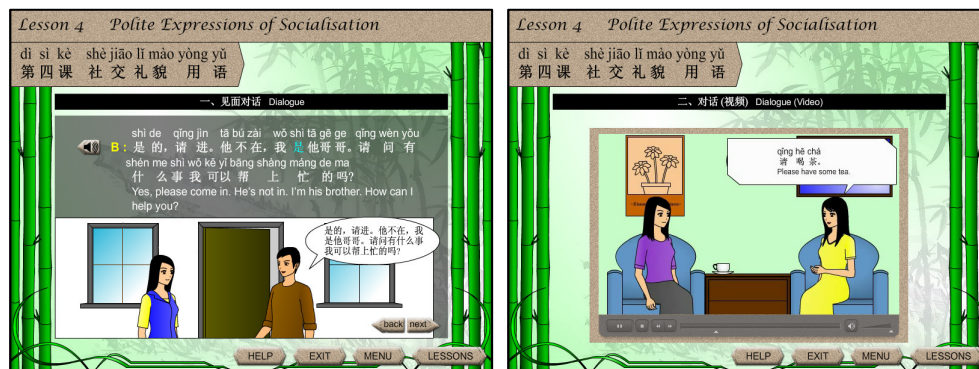


Figure 4.34: Sample screenshots from Lesson 4 – Topic 1 (Left) and Topic 2 (Right)

- Lesson 6: Self-introduction (第六课: 自我介绍):** Lesson 6 consists of three topics as shown in the hierarchical chart in Figure 4.35. Figure 4.36 reveals two sample screenshots from topic 1 and topic 3. Both topics teach users on how to introduce themselves in Chinese.

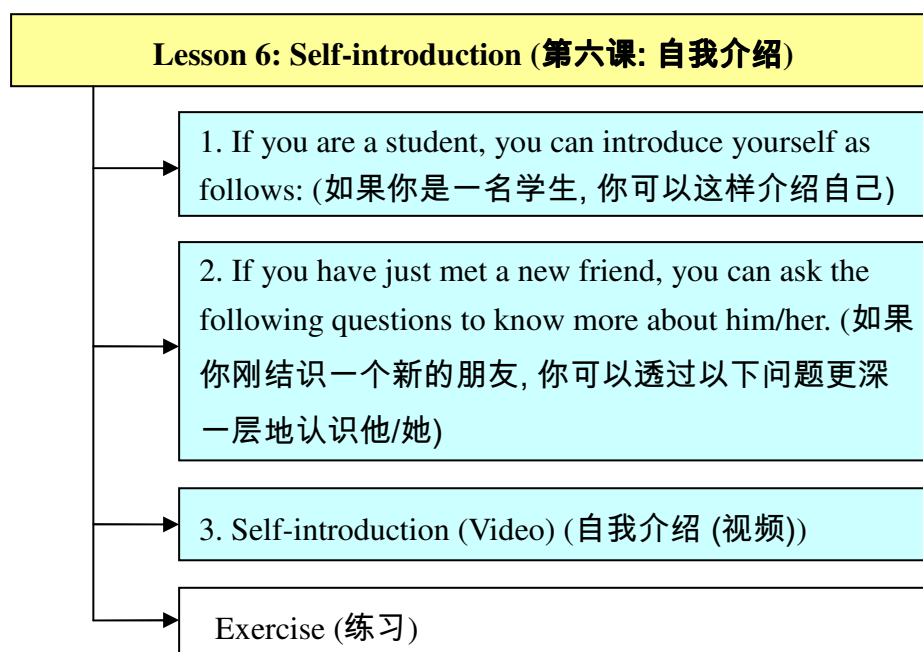


Figure 4.35: Hierarchical chart of Lesson 6

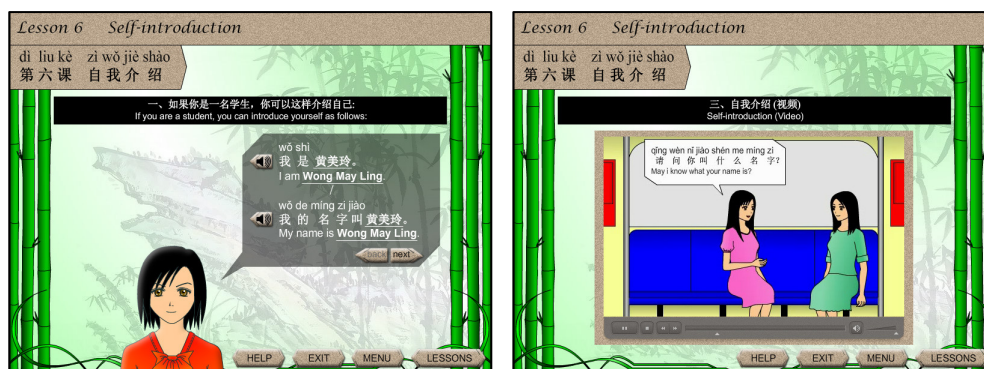


Figure 4.36: Sample screenshots from Lesson 6 – Topic 1 (Left) and Topic 3 (Right)

In addition, ‘Dates and Time’ (Lesson 7) has provided instructional contents related to oral communication skills development which is reading comprehension for reading practice as shown in Figure 4.37. Besides, reading contents about how to introduce one self and their family and sentence recital have been provided in ‘My Family’ (Lesson 8) and ‘Daily Activities’ (Lesson 14) respectively.

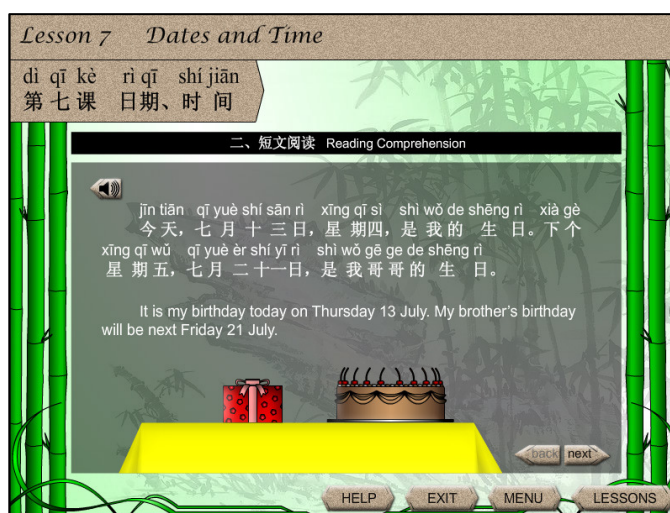


Figure 4.37: Sample screenshot from Lesson 7 – Topic 2

Meantime, the lessons such as ‘Currencies and Bargains’ (Lesson 11), ‘Food’ (Lesson 12), ‘Expressions of Emotion’ (Lesson 13), ‘Daily Activities’

(Lesson 14), and ‘The Information World’ (Lesson 15) deliver a dialogue with respective content to users for dialogue practice. Figure 4.38 shows a sample screenshot from topic 7 in Lesson 12 which delivers a dialogue about ordering food and drinks at a restaurant.



Figure 4.38: Sample screenshot from Lesson 12 – Topic 7

V. Interactive exercises

As shown in the hierarchical chart of each lesson, an interactive exercise with immediate feedback is integrated in each lesson to test users' understanding on each lesson they have learnt. Each exercise comprises nine multiple-choice questions. User can select a correct answer by clicking on one of the answer options given for each question (i.e. “A”, “B”, “C”, or “D” icon). Then, the feedback on either a correct (Figure 4.39) or wrong answer (Figure 4.40) is displayed based on user's input. If a user selected a wrong answer, the correct answer is shown to the user (Figure 4.40).

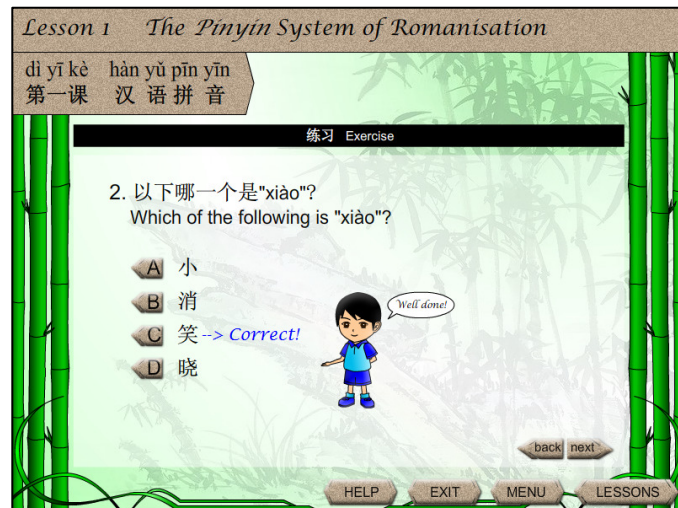


Figure 4.39: Sample screenshot from the interactive exercises activity in Lesson 1 showing the feedback to users with a correct answer selected

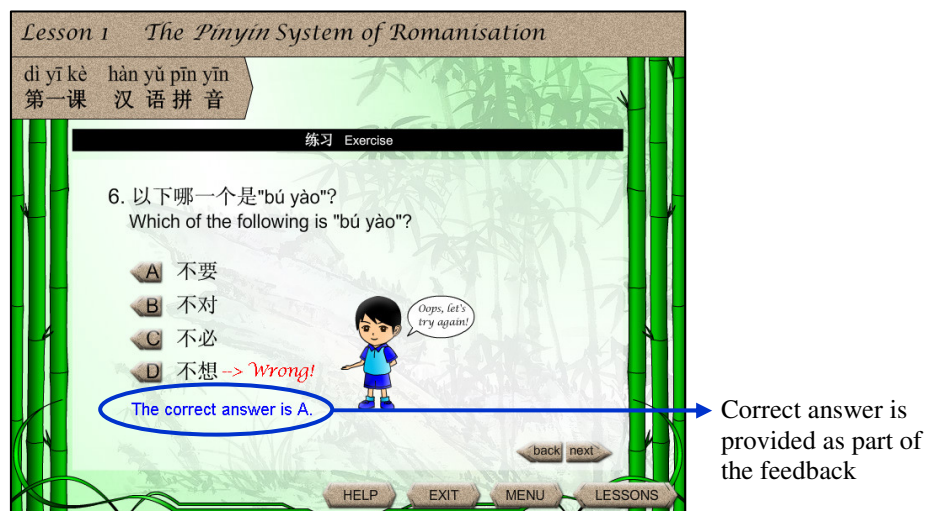


Figure 4.40: Sample screenshot from the interactive exercises activity in Lesson 1 showing the feedback to users with a wrong answer selected

4.2.3.4 Help information as user guide

When user selects the "HELP" button in Figure 4.2, it pops up a window with the Help information as shown in Figure 4.41. It serves as user guide when a user encounters problem in navigating ECLearn.

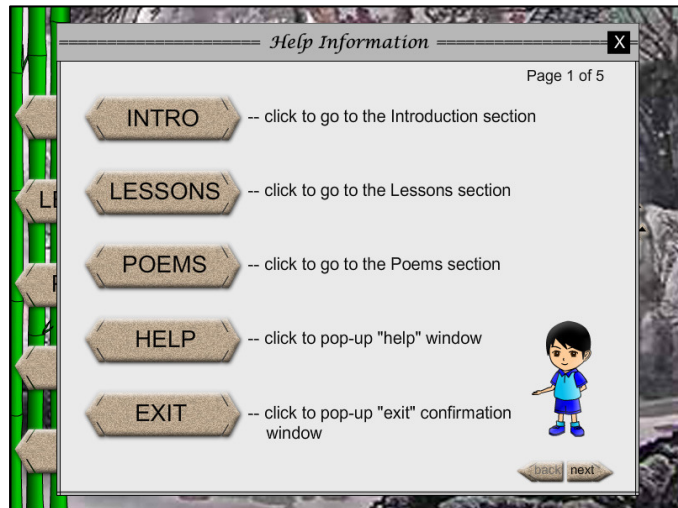


Figure 4.41: Sample screenshot from ECLearn showing the pop-up window with Help information

4.2.3.5 Exit confirmation window

When users click the “EXIT” button in Figure 4.2, ECLearn will pop-up an Exit confirmation window as shown in Figure 4.42. Users can choose to click the “YES” button to exit ECLearn or click the “NO” button to close the pop-up window.



Figure 4.42: Sample screenshot from ECLearn showing the pop-up Exit confirmation window

4.2.3.6 Summary of the prototype of ECLearn development

Overall, multimedia learning objects such as text, graphics/images, animation, sound, and video have been integrated in ECLearn to provide an interesting and effective environment for TCSL. Text is used in ECLearn to convey the Chinese learning contents which have been electronically transformed from the printed textbook called “Learn Chinese with Ease”. In ECLearn, the contents were presented in bilingual form where English was used in explaining the Chinese learning contents for second language learners. It facilitates second language learners in learning Chinese language for instance the meaning of its vocabulary and sentences more efficiently.

Although text is the most common way used in conveying information, however integrating meaningful graphics/images together with text in ECLearn could better convey the meaning of a Chinese vocabulary. This has greatly help second language learners in learning Chinese vocabulary which can be difficult to understand through limited learning materials in traditional classroom approach. With the combination of text and meaningful graphics/images, learners are not only able to understand the Chinese learning contents more effectively but are also motivated in learning Chinese as a second language.

Furthermore, animation is capable to demonstrate the correct stroke order of a Chinese character step by step for second language learners which can be hard to achieve through static text and graphics/images. Through the

use of ECLearn for TCSL, second language learners are able to watch the Chinese character stroke order animation continuously until they successfully master it. In addition, they can also practice writing Chinese characters in ECLearn with explicit stroke order guidance provided. The development of ECLearn encourages self-paced learning and practicing where second language learners can learn the stroke order easily at anytime even after class hours without an educator.

Besides that, sound is especially important for language learning in a TCSL environment. As second language learners may easily mispronounce a Chinese character without realising it, standard pronunciation demonstrated by human voices has been integrated in ECLearn to provide pronunciation for each Chinese character to facilitate effective Chinese pronunciation learning. ECLearn allows second language learners to keep on listen to the pronunciation of each Chinese character effortlessly. Each Chinese character was also accompanied with *Hanyu Pinyin* which let second language learners to be able to follow up when listen to the pronunciation. Moreover, Chinese character that is being pronounced will be highlighted to assist them in pronunciation learning.

As sound alone is unable to allow learners to perceive the actual way of communicating using Chinese language in daily life, a scenario of daily life accompanied with pronunciation would be a desire way to enhance second language learners' communication learning. Video clips which contain sound and visual components are suitable to be used to demonstrate communication

using appropriate Chinese language in daily life for TCSL. Two videos demonstrating communication between two individuals in daily life related to polite expressions of socialisation and self introduction has been integrated in ECLearn for effective Chinese communication leaning. Through watching the video clips, second language learners are able to practice their listening and oral communication skills more effectively compared to traditional classroom approach.

By integrating multimedia learning objects in ECLearn, it can effectively support the existing instruction mode of “Introduction to Chinese Language I” for TCSL in a blended learning environment. This can be explained through the cognitive model of multimedia learning as described in chapter 2. Relevant Chinese words and graphics/images presented in ECLearn will be selected, organised, and integrated by second language learners in their sensory, working, and long-term memory for meaningful Chinese learning.

4.3 The Evaluation of the Ease-of-Use of the Functionalities Provided in the Prototype of ECLearn for TCSL

As described in chapter 3, to test the null hypothesis 1 (H_01) that was “Students do not perceive that the functionalities provided in the interactive multimedia e-book are ease of use”, the descriptive statistics seem to be the most appropriate method for analysis. As it is stated, students do not perceive that the functionalities provided in the interactive multimedia e-book are ease of use. The usability evaluation of ECLearn involves 10 respondents in the

experimental group who had used ECLearn for TCSL in a blended learning environment. After the completion of post-test, a usability testing questionnaire was distributed to the experimental group for the usability evaluation of ECLearn. The survey items were adapted from related literature (Aris et al., 2006; Bahrudin et al., 2011).

The only way to know that is through the respondents' levels of agreement with the items that measure the perceived ease of use. The data collected was coded into SPSS programme for data analysis. Means, standard deviation (S.D.), frequency and percentage of cases were generated to find out the number of respondents agreeing or disagreeing with each item. This section presents the evaluation results for the ease-of-use of the ECLearn functionalities which embrace user interface design, navigation and interactivity, content, and students' perception towards the use of interactive multimedia e-book in Chinese learning compared to printed textbook in a blended learning environment.

4.3.1. User Interface Design

All respondents were asked their perception on ten statements pertaining to the user interface design. The results are shown in Tables 4.1 and 4.2. The average response for each of the statement on user interface design evaluation is above the midpoint (3) of Likert scale (see Table 4.1). This means that the respondents show a moderate level of agreement and their answers range between strongly agree and agree (see Table 4.2). Although the

mean for statement A4 was slightly less than 3 (mean = 2.80), the general perception of TCSL students toward the user interface design of ECLearn is positive.

Table 4.1: Descriptive statistics of user interface design

Statement	Mean	S.D.
A1. Screens designed in a clear and understandable manner.	3.60	0.516
A2. The presentation of information can captivate the attention of students.	3.30	0.675
A3. Text usage is suitable in the contents.	3.20	0.919
A4. Graphics usage is suitable in the contents.	2.80	0.919
A5. Colour usage is suitable in the contents.	3.60	0.516
A6. The sound is of good quality and enhances the presentation of information.	3.40	0.699
A7. The sound is an alternative means of presenting information and not a necessity.	3.90	0.568
A8. The video enhances the presentation of information.	3.50	0.527
A9. Animation helps in understanding the contents presented.	3.70	0.675
A10. Design for every module is consistent.	3.80	0.422

Besides, the findings in Table 4.2 show that majority of the respondents thought that the design of every module is consistent (statement A10), i.e. 80% were agreed and 20% remained neutral. None of the respondents showed disagree or strongly disagree behaviour.

The findings also indicated that the respondents has shown a high response rate (70% were agreed and 10% were strongly agreed) on statement A7 (The sound is an alternative means of presenting information and not a necessity). 20% respondents showed neutral responses.

Table 4.2: Frequency and percentage of responses for user interface design evaluation

Statement	Response	Frequency	Percentage
A1. Screens designed in a clear and understandable manner.	Strongly Agree	0	0
	Agree	6	60
	Neutral	4	40
	Disagree	0	0
	Strongly Disagree	0	0
A2. The presentation of information can captivate the attention of students.	Strongly Agree	0	0
	Agree	4	40
	Neutral	5	50
	Disagree	1	10
	Strongly Disagree	0	0
A3. Text usage is suitable in the contents.	Strongly Agree	0	0
	Agree	4	40
	Neutral	5	50
	Disagree	0	0
	Strongly Disagree	1	10
A4. Graphics usage is suitable in the contents.	Strongly Agree	2	20
	Agree	5	50
	Neutral	2	20
	Disagree	1	10
	Strongly Disagree	0	0
A5. Colour usage is suitable in the contents.	Strongly Agree	0	0
	Agree	6	60
	Neutral	4	40
	Disagree	0	0
	Strongly Disagree	0	0
A6. The sound is of good quality and enhances the presentation of information.	Strongly Agree	0	0
	Agree	5	50
	Neutral	4	40
	Disagree	1	10
	Strongly Disagree	0	0
A7. The sound is an alternative means of presenting information and not a necessity.	Strongly Agree	1	10
	Agree	7	70
	Neutral	2	20
	Disagree	0	0
	Strongly Disagree	0	0
A8. The video enhances the presentation of information.	Strongly Agree	0	0
	Agree	5	50
	Neutral	5	50
	Disagree	0	0
	Strongly Disagree	0	0

Table 4.2: Frequency and percentage of responses for user interface design evaluation (Continued)

Statement	Response	Frequency	Percentage
A9. Animation helps in understanding the contents presented.	Strongly Agree	1	10
	Agree	5	50
	Neutral	4	40
	Disagree	0	0
	Strongly Disagree	0	0
A10. Design for every module is consistent.	Strongly Agree	0	0
	Agree	8	80
	Neutral	2	20
	Disagree	0	0
	Strongly Disagree	0	0

When respondents were asked about the statements A1 (i.e. Screens designed in a clear and understandable manner) and A5 (i.e. Colour usage is suitable in the contents), 60% of the respondents were agreed, while 40% were neutral on these two statements. No “Strongly Agree”, “Disagree”, and “Strongly Disagree” responses were recorded.

The findings in Table 4.2 reveal that 50% of the respondents found that the sound is of good quality and enhances the presentation of information (statement A6), the video enhances the presentation of information (statement A8), and animation helps in understanding the contents presented (statement A9). Only 10% were strongly agreed with statement A9 and 10% were disagreed with statement A6. The rest of the respondents gave neutral responses. No respondents strongly disagree with statements A6, A8 and A9.

Table 4.2 also shows that 40% of the respondents were agreed that the presentation of information can captivate the attention of students (statement

A2) and text usage is suitable in the contents (statement A3). Only 10% of the respondents disagreed with statement A2 and 10% were strongly disagreed with statement A3. The rest of the respondents (50%) remained neutral.

When respondents were asked to rate their degree of agreement on statement A4 i.e. “Graphics usage is suitable in the contents”, 50% of the respondents agreed and 20% were strongly agreed with this statement. Meantime, there were 10% of respondents had contrary opinion. The rest (20%) remained neutral.

4.3.2. Navigation and Interactivity

Navigation is one of the visual design aspects. Respondents were asked to give their degree of agreement on several statements regarding navigation and interactivity design. Tables 4.3 and 4.4 show the results of the evaluation on navigation and interactivity design.

Table 4.3: Descriptive statistics of navigation and interactivity

Statement	Mean	S.D.
B1. This e-book provides opportunities for interaction with standardised icons.	3.70	0.483
B2. The navigation buttons used are easily identified according to their functions.	3.70	0.823
B3. The navigational buttons are consistently placed in each lesson.	3.90	0.316
B4. Able to move from one page to another easily.	3.90	0.316
B5. Help information in the e-book provides useful guide to the user.	4.00	0.667

The average response for each of the statement on navigation and interactivity evaluation is above the midpoint (3) of Likert scale (see Table 4.3). This means that the respondents show a high level of agreement and their answers range between strongly agree and agree (see Table 4.4). Almost all the statements that measure the navigation and interactivity possess mean above the 3.5. Therefore, the general perception of TCSL students toward the navigation and interactivity design of ECLearn is positive.

The findings in Table 4.4 shows that 90% of respondents agreed that the navigational buttons are consistently placed in each lesson (statement B3) and they were able to move from one page to another easily (statement B4). No respondents reported strongly agreed, disagreed or strongly disagreed with these two statements, and 10% remained neutral.

Regarding the statement of “This e-book provides opportunities for interaction with standardised icons” (statement B1), the findings showed that majority of the respondents, i.e. 70% of respondents had a favourable opinion. No respondents gave “Strongly Agree”, “Disagree” or “Strongly Disagree” responses, while 30% of respondents showed neutral behaviour.

A set of buttons typically in a row or column used as central point to link the user to selected topic or section in an application. When respondents were asked to rate their degree of agreement on the statement of “The navigation buttons used are easily identified according to their functions” (statement B2), 10% of respondents were strongly agreed and 60% were

agreed. Only 10% of respondents disagreed with this statement, while the rest (20%) remained neutral. No responses of “Strongly Disagree” were recorded.

The findings also revealed that only a small number of respondents (20%) agreed that the help information in the e-book provides useful guide to the user (statement B5), while 20% of respondents have contrary opinion. The rest of the respondents (60%) gave neutral responses. None of the respondents either strongly agreed or strongly disagreed with the statement.

Table 4.4: Frequency and percentage of responses for navigation and interactivity evaluation

Statement	Response	Frequency	Percentage
B1. This e-book provides opportunities for interaction with standardised icons.	Strongly Agree	0	0
	Agree	7	70
	Neutral	3	30
	Disagree	0	0
	Strongly Disagree	0	0
B2. The navigation buttons used are easily identified according to their functions.	Strongly Agree	1	10
	Agree	6	60
	Neutral	2	20
	Disagree	1	10
	Strongly Disagree	0	0
B3. The navigational buttons are consistently placed in each lesson.	Strongly Agree	0	0
	Agree	9	90
	Neutral	1	10
	Disagree	0	0
	Strongly Disagree	0	0
B4. Able to move from one page to another easily.	Strongly Agree	0	0
	Agree	9	90
	Neutral	1	10
	Disagree	0	0
	Strongly Disagree	0	0
B5. Help information in the e-book provides useful guide to the user.	Strongly Agree	0	0
	Agree	2	20
	Neutral	6	60
	Disagree	2	20
	Strongly Disagree	0	0

4.3.3. Content

Tables 4.5 and 4.6 reveal the results of content evaluation. The average response for each of the statement on content evaluation is above the midpoint (3) of Likert scale (see Table 4.5). This means that the respondents show a high level of agreement and their answers range between strongly agree and agree (see Table 4.6). Hence, the general perception of TCSL students toward the content of ECLearn is positive.

When respondents were asked on statements C1 (Information of sufficient scope and depth) and C6 (The structure allows learners to move around freely in different units), 60% agreed with these two statements respectively. Meanwhile, 40% of respondents gave neutral responses. No respondents showed strongly agree, disagree or strongly disagree behaviour.

Then, regarding statement C4 i.e. easily understood examples given, the survey revealed that 10% of respondents strongly agreed and 50% agreed with this statement. 40% of respondents gave neutral responses. None of the respondents either strongly disagreed or disagreed with the statement.

Table 4.6 also indicates that 50% of respondents agreed with the statement C5 namely the content is structured in a clear and understandable manner. The rest of the respondents (50%) gave neutral responses. No respondents showed strongly agree, disagree or strongly disagree behaviour.

Table 4.5: Descriptive statistics of content

Statement	Mean	S.D.
C1. Information of sufficient scope and depth.	3.60	0.516
C2. The content is interesting.	3.30	0.675
C3. Systematic presentation of contents.	3.40	0.516
C4. Easily understood examples given.	3.70	0.675
C5. The content is structured in a clear and understandable manner.	3.50	0.527
C6. The structure allows learners to move around freely in different units.	3.60	0.516

Table 4.6: Frequency and percentage of responses for content evaluation

Statement	Response	Frequency	Percentage
C1. Information of sufficient scope and depth.	Strongly Agree	0	0
	Agree	6	60
	Neutral	4	40
	Disagree	0	0
	Strongly Disagree	0	0
C2. The content is interesting.	Strongly Agree	0	0
	Agree	4	40
	Neutral	5	50
	Disagree	1	10
	Strongly Disagree	0	0
C3. Systematic presentation of contents.	Strongly Agree	0	0
	Agree	4	40
	Neutral	6	60
	Disagree	0	0
	Strongly Disagree	0	0
C4. Easily understood examples given.	Strongly Agree	1	10
	Agree	5	50
	Neutral	4	40
	Disagree	0	0
	Strongly Disagree	0	0
C5. The content is structured in a clear and understandable manner.	Strongly Agree	0	0
	Agree	5	50
	Neutral	5	50
	Disagree	0	0
	Strongly Disagree	0	0
C6. The structure allows learners to move around freely in different units.	Strongly Agree	0	0
	Agree	6	60
	Neutral	4	40
	Disagree	0	0
	Strongly Disagree	0	0

Furthermore, respondents were asked regarding the interesting of content in ECLearn (statement C2) and systematic presentation of contents (statement C3). 40% of respondents agreed that the content is interesting and the presentation of contents is systematic. While 50% and 60% of the respondents remained neutral on statement C2 and statement C3 respectively. Only 10% of respondents disagreed with statement C2. No respondents either strongly agreed or strongly disagreed with these two statements.

4.3.4. Students' Perception towards the Use of Interactive Multimedia E-Book in Chinese Learning compared to Printed Textbook in a Blended Learning Environment

Tables 4.7 and 4.8 present the evaluation results on the perception of respondents towards the use of interactive multimedia e-book in Chinese learning compared to printed textbook in a blended learning environment. All the respondents were asked about three statements pertaining to this aspect. The average response for each of the statement on students' perception evaluation is above the midpoint (3) of Likert scale (see Table 4.7). This means that the respondents show a high level of agreement and their answers range between strongly agree and agree (see Table 4.8). Therefore the results showed that students' perception towards the use of interactive multimedia e-book in Chinese learning compared to printed textbook in a blended learning environment is positive.

Table 4.7: Descriptive statistics of students' perception towards the use of interactive multimedia e-book in Chinese learning compared to printed textbook in a blended learning environment

Statement	Mean	S.D.
D1. I prefer to learn Chinese with an interactive multimedia e-book instead of using textbook.	3.30	0.675
D2. Learning Chinese with an interactive multimedia e-book that provides interactive exercises and activities is more interesting than using textbook.	3.80	0.422
D3. The activities provided in this interactive multimedia e-book are more effective compared to classroom activities.	3.70	0.823

Table 4.8: Frequency and percentage of responses for students' perception towards the use of interactive multimedia e-book in Chinese learning compared to printed textbook in a blended learning environment evaluation

Statement	Response	Frequency	Percentage
D1. I prefer to learn Chinese with an interactive multimedia e-book instead of using textbook.	Strongly Agree	0	0
	Agree	4	40
	Neutral	5	50
	Disagree	1	10
	Strongly Disagree	0	0
D2. Learning Chinese with an interactive multimedia e-book that provides interactive exercises and activities is more interesting than using textbook.	Strongly Agree	0	0
	Agree	8	80
	Neutral	2	20
	Disagree	0	0
	Strongly Disagree	0	0
D3. The activities provided in this interactive multimedia e-book are more effective compared to classroom activities.	Strongly Agree	1	10
	Agree	6	60
	Neutral	2	20
	Disagree	1	10
	Strongly Disagree	0	0

When asked about whether or not learning Chinese with an interactive multimedia e-book that provides interactive exercises and activities is more interesting than using textbook (statement D2), a high number of respondents

i.e. 80% of respondents agreed with the statement, and 20% did not give any opinion. No respondents exhibited strongly agree, disagree, or strongly disagree behaviour.

Findings also showed that majority of respondents (i.e. 10% strongly agreed and 60% agreed) thought that the activities provided in this interactive multimedia e-book are more effective compared to classroom activities (statement D3). 20% neutral response was recorded. Only 10% disagreed with the statement, whereas none of the respondents showed strongly disagree behaviour.

Table 4.8 reveals that 40% of respondents preferred to learn Chinese with an interactive multimedia e-book instead of using textbook (statement D1). Only 10% have contrary opinion and the rest (50%) remained neutral. No “Strongly Agree” or “Strongly Disagree” response was recorded.

4.3.5. Summary of the Results

Responses to the usability questionnaire (see Tables 4.1 to 4.8) show that the respondents were satisfied with the key design aspects in ECLearn. They have positively rated all the measurement items in the questionnaire which range between agree and strongly agree. Overall, the results show that respondents were overwhelmingly satisfied with the user interface design, navigation and interactivity and content in ECLearn. Therefore, there was enough evidence to reject the null hypothesis 1 (H_01). The results had revealed

that students perceive that the functionalities provided in the interactive multimedia e-book are ease of use.

Informal interviews had been conducted among students in the experimental group. According to students, the information presented in ECLearn is suitable and useful especially the Chinese character stroke order animation provided in ECLearn are able to help students in learning the stroke order of Chinese character more effectively. The respondents said that the strokes of Chinese character are hard to learn especially those Chinese characters with more than eight or ten strokes, and they have also commented it is good that the Chinese character stroke order animation has been provided in ECLearn. Besides, the Chinese character which is being pronounced will be highlighted is also the strength of ECLearn information presentation, as it is able to help the students in learning Chinese language more effectively. For the help information design of ECLearn, its strength is that students can easily search for the help information provided in ECLearn when they need it.

However, a small number of respondents had expressed negative feedback on ECLearn, which indicates the limitations of the application. The negative comments include there is a definite lack of creativity in the design, especially the graphics and background design, the application does not provide sufficient exercises to help students practice what they have learnt, and the help information provided was too simple for novice users. All the positive and negative comments from the respondents will be taken into consideration for future enhancement.

4.4 The Evaluation of the Efficacy of Blended Learning Approach through the Use of an Interactive Multimedia E-Book in TCSL compared to Traditional Instruction

As discussed in chapter 3, the efficacy of blended learning approach through the use of an interactive multimedia e-book in TCSL compared to the traditional instruction was measured through hypothesis testing using the pretest-posttest designs. The following null hypothesis was tested:

H₀2: There is no significant difference between a blended learning environment through the use of an interactive multimedia e-book and traditional instruction in teaching-learning Chinese as a second language at tertiary level.

Before the intervention started, it was assumed that there is no significant difference between the experimental (adopted a blended learning approach through the use of an interactive multimedia e-book) and control (adopted traditional classroom instruction) groups at the time of pre-test as both adopted same teaching-learning approach (i.e. traditional face-to-face classroom instruction). The pre-test results are shown in Table 4.9.

Table 4.9: Comparison of experimental and control groups on pre-test

Group	N	Mean ± S.E	SD	t-value	p
Experimental (Blended learning)	10	8.90 ± 0.71	2.23	0.28	0.787
Control (Traditional instruction)	10	8.60 ± 0.83	2.63		

$t < t_{0.05}$; $df = 18$; $p > 0.05$

Table 4.9 depicts that the calculated value of $t = 0.28$ is less than the table value (i.e. 2.10) at a 0.05 significance level. Furthermore, the p-value was rather large ($p = 0.787$; $p > 0.05$). It explains that there is no significant difference between the achievements of experimental and control groups at the time of pre-test. This means that there is no significant difference between the two groups before the implementation of blended learning approach through the use of an interactive multimedia e-book among experimental group students.

Through the post-test results as shown in Table 4.10, it can be seen that the calculated value of $t = 2.58$ is greater than the table value (i.e. 2.10) at a 0.05 significance level. The p-value was 0.019 indicating that the null hypothesis 2 (H_02) was rejected at a 0.05 significance level ($p < 0.05$). It explains that there is significant difference between the achievements of the experimental and control groups on post-test. Hence, there was a significant difference between the experimental and control groups in TCSL at tertiary level. It implies that the interactive multimedia e-book (ECLearn) can affect the performance of students in Chinese learning.

Table 4.10: Comparison of experimental and control groups on post-test

Group	N	Mean \pm S.E	SD	t-value	p
Experimental (Blended learning)	10	11.90 \pm 0.71	2.23	2.58	0.019
Control (Traditional instruction)	10	9.10 \pm 0.82	2.63		

$t > t_{0.05}$; $df = 18$; $p < 0.05$

The difference between the achievements of both the experimental and control groups on post-test is clearly shown in Figure 4.43. Figure 4.43 reveals that none of the students in the control groups (traditional instruction) attained the value of “Very Good” (answered 13-15 questions correctly in the post-test) compared to students in the experimental group (blended approach) was 40 percent. On the contrary, none of the students in the experimental group’s ratings fell on the value “Poor” (answered 4-6 questions correctly in the post-test) but the control group was 20 percent.

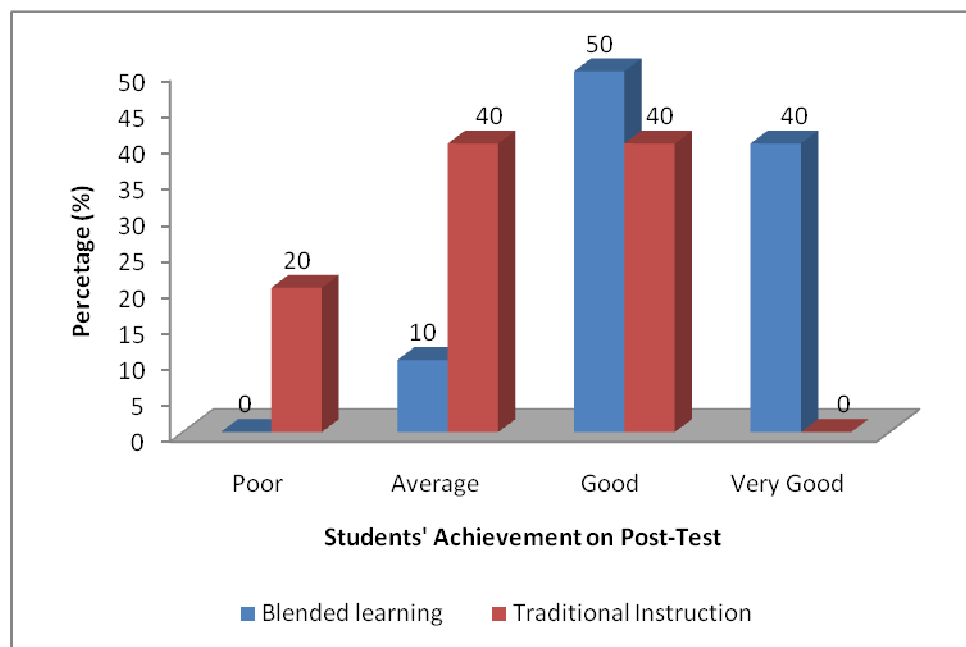


Figure 4.43: Students' achievement on post-test

Meantime, the percentage of students adopting the blended learning approach that contributed to the value “Good” (answered 10-12 questions correctly in the post-test) was slightly higher (50 percent) than the students using traditional instruction approach (40 percent). Besides, there were 40 percent of students in the control group’s rating fell on the value “Average” (answered 7-9 questions correctly in the post-test), whereas the students in the

experimental group was only 10 percent. Overall, the results indicated that using blended learning approach through ECLearn is more effective than traditional instruction approach in TCSL at tertiary level.

As has been described in chapter 1, one of the research objectives is to determine the efficacy of blended learning environment through the use of ECLearn and its impact on students' achievement in Chinese language acquisition. Results in pre-test indicated that there was no significant difference between the achievement scores of the experimental and control groups. However the results in post-test is contrary; it is clear that the students performed better when taught in blended learning environment using multimedia learning objects. The outcomes of this study are supported by past studies (Abraham 2007; Dziuban et al., 2004; Ghaffari and Molaei 2011; Melton et al., 2009; Uzun and Senturk, 2010) on the effects of blended learning on students' achievement in learning subjects as have been discussed in section 2.12.1.

Abraham (2007) claimed that there is significant difference between blended learning and traditional approaches in students' performance where the blended learning approach is significantly higher than the traditional approach. Dziuban et al. (2004) found that the faculty and students in University of Central Florida are highly satisfied with the blended learning courses provided by the university. The results have shown that the achievements of the students in blended learning courses are comparable to or in some cases even higher than face-to-face courses. Students have high

demand on blended learning courses due to the increasing convenience and flexibility. Uzun and Senturk (2010) also have noted the blended mode course delivery method was more successful than the face-to-face course delivery method in students' course achievement and attitudes towards computers in a computer literacy course at Uludag University.

The results are also in line with the findings of the study of Melton et al. (2009) as well as Ghaffari and Molaei (2011). Melton et al. evaluated the achievement and satisfaction of students in general health course between traditional face-to-face and blended learning course delivery methods at a midsize public university in Southeast Georgia. Whereas, Ghaffari and Molaei investigated the outcomes and satisfaction of students in an undergraduate economic course between e-learning, face-to-face, and blended learning course delivery methods in a general university. These two studies reported that blended learning had an ability to advance the achievement of students in their learning subjects. Both studies have proved that blended learning course is significantly higher than the traditional face-to-face course in terms of final course grades.

4.5 Conclusions

Overall, the results obtained have answered several research questions as presented in section 1.4 and thus successfully achieved the main and sub-objectives set at earlier stage, which are further discussed in chapter 5.

CHAPTER 5

CONCLUSIONS

5.1 Introduction

The assumption and related hypothesis, the objectives, and the scope of this study (chapter 1), and the review of literature (chapter 2) led to a structured method of this study (chapter 3) which involved preliminary investigation, elicitation, analysis, and evaluation processes were presented. Chapter 3 also discussed the design and development of a conceptual framework and the modules design model for the proposed interactive multimedia e-book, and the requirements specification for developing the e-book.

Furthermore, the study also evaluated the efficacy of blended learning environment through the use of an interactive multimedia e-book using the experimental design research. The efficacy evaluation involved two groups of students (i.e. the control and experimental groups with traditional face-to-face and multimedia instruction modes respectively) who have taken the subject of “Introduction to Chinese Language I” at UTAR. Then, a usability evaluation was conducted among experimental group students to investigate the ease-of-use of the functionalities provided in the prototype of the interactive multimedia e-book. The results of these evaluations (chapter 4) have

contributed to the conclusions and suggestions for future studies outlined in this final chapter. The contents of this final chapter include the following topics:

- overall conclusions from the prototype of the interactive multimedia e-book development, and hypothesis testing;
- contributions of the study;
- limitations and future recommendations.

5.2 Overall Conclusions from the Prototype of the Interactive Multimedia E-Book Development, and Hypothesis Testing

As described in chapter 1, this study arose from the problems found in the traditional face-to-face classroom instruction for TCSL at tertiary level. In particular, this study focuses on the creation and efficacy evaluation of a blended language learning environment for TCSL (Teaching-learning Chinese as a Second Language) through the elective subject called “Introduction to Chinese Language I”. In addition to the existing instructional tools such as printed textbook, paper-based assessments and the resource website called WBLE, an interactive multimedia e-book called ECLearn (**E-Book for Chinese Learning**) has been produced as the electronic counterpart to the existing “Learn Chinese with Ease” textbook.

Two main objectives were formed in this study:

- i. To create a blended learning environment through the use of an interactive multimedia e-book for TCSL at tertiary level.

- ii. To test hypotheses related to:
 - a. the ease-of-use of the functionalities provided in the prototype of an interactive multimedia e-book for TCSL.
 - b. the efficacy of a blended learning environment through the use of an interactive multimedia e-book for TCSL at tertiary level compared to traditional instruction.

To achieve the main objectives of this study, five sub-objectives were formed:

- i. **Sub-objective 1:** To design and develop an instructional design (ID) model based on the ADDIE model which is deemed suitable for TCSL through the use of an interactive multimedia e-book in a blended learning environment at tertiary level.
- ii. **Sub-objective 2:** To design and create a conceptual framework and modules design model for the development of an interactive multimedia e-book for TCSL.
- iii. **Sub-objective 3:** To develop a prototype of an interactive multimedia e-book which contains the existing printed textbook contents, educational activities, as well as the main features that are perceived to be useful as one of the instructional tool in a blended learning environment for TCSL.

- iv. **Sub-objective 4:** To evaluate the ease-of-use of the functionalities provided in the prototype of an interactive multimedia e-book for TCSL.
- v. **Sub-objective 5:** To evaluate the efficacy of blended learning approach through the use of an interactive multimedia e-book in TCSL compared to traditional instruction.

Overall, the main and sub-objectives of this study have been achieved. The subsequent paragraphs discuss the outcomes of this study.

A blended language learning environment (BLLE) ID model (Figure 3.1) which is deemed suitable for TCSL through the use of an interactive multimedia e-book in a blended learning environment at tertiary level has been created based on the ADDIE model. The BLLE ID model created has provided a step-by-step process for the development of an effective blended language learning environment for TCSL in this study. Besides, before the commencement of an interactive multimedia e-book development, a conceptual framework (Figure 3.11) and modules design model (Figure 3.12) have been designed and created. Through the formation of the conceptual framework, modules design model, and storyboards, a prototype of an interactive multimedia e-book called ECLearn for TCSL has been developed. ECLearn contains the existing printed textbook contents, educational activities, as well as the main features that are perceived to be useful as one of the instructional tools in the blended learning environment for TCSL.

In addition, the two hypotheses formed in the study have been proven through the hypotheses testing. The last two sub-objectives of the study is to determine the ease-of-use of the functionalities provided in the prototype of an interactive multimedia e-book, and the efficacy of blended learning environment through the use of an interactive multimedia e-book and its impact on students' achievement in Chinese language acquisition.

In order to validate the perceived usefulness of features in TCSL and the ease-of-use of the functionalities provided in ECLearn, a usability valuation has been successfully conducted. Through the results from the null hypothesis 1 (H_01) testing as presented in section 4.3, it can be concluded that in overall, most of the respondents were satisfied with the functionalities and features for TCSL provided in ECLearn which can help them to learn Chinese as a second language effectively. However, some respondents also provided feedback on the limitations found in ECLearn which are discussed in section 5.4.

Results from the null hypothesis 2 (H_02) testing (which has been discussed in section 4.4) indicated that the students performed better when taught in blended learning environment using multimedia learning objects. It is also an evident that the blended learning method of teaching Chinese which involves the application of multimedia technology has extended students' learning beyond what traditional classroom offers. The results also prove that the traditional instructor-led classroom instruction method, mainly with the use of printed materials does not enhance learning abilities of the students at

desirable level. The outcome of this study concurs with that of Lee and Chong (2007) who noted that blended learning is the “natural and ideal solution to quality language learning”.

The successful achievement of the five sub-objectives has contributed to the achievement of the main objective of this study which is to create and evaluate the efficacy of a blended learning environment through the use of an interactive multimedia e-book for TCSL at tertiary level. Generally, there were positive indications to conclude that:

- i. E-book containing interactive educational activities is useful to second language learners and instructors in the TCSL classrooms. The proposed activities are indeed perceived by the instructors as useful in catering for the diversity of students’ learning styles;
- ii. The proposed interactive multimedia e-book has the potential to assist classroom teaching tasks.

5.3 Contributions of the Study

In view of the limitations of traditional instruction and e-learning approaches, this study has explored the possibilities of introducing a blended learning approach in the TCSL classrooms at tertiary level. The blended language learning environment developed in this study benefits second language learners by incorporating the benefits of traditional face-to-face

instruction and multimedia based e-learning that are conducive to learning in a TCSL classroom. The blended language learning environment enables students to learn Chinese language through the use of an interactive multimedia e-book called ECLearn.

ECLearn is the transformation of the existing printed textbook into an e-book which containing a variety of educational activities, and multimedia learning objects (these include text, images, graphics, video clips, and audio recordings). The interactive educational activities include explicit Chinese writing instruction, vocabulary learning, pronunciation instruction, oral communication skills instruction, and interactive exercises. A conceptual framework was developed to deliver these materials in a suitably interactive way. ECLearn provides innovative solutions multimedia assisted Chinese instruction to extend students' learning beyond what traditional classroom offers for improvement of their abilities.

5.3.1. Pronunciation Instruction

As has been discussed in chapter 2, the pronunciation of Chinese language is based on the *Pinyin* system of Romanisation. There are three parts of the Chinese syllables which are an initial, a final, and tones. The pronunciation of Chinese seems to be quite easy, however to produce more or less accurate syllables is not so simple. It is considered difficult work for most non-native speakers, especially the pronunciation of the four main tones applied to the syllables (Figure 2.5). Without listening to the correct

pronunciation, the beginners are likely to mispronounce some words if they attempt to pronounce the *Pinyin* according to their own language spellings. So, it is crucial to master the correct pronunciation of syllables at the beginner stage in Chinese learning.

For effective pronunciation instruction, in addition to the *Hanyu Pinyin* of syllables noted in the printed textbook and teacher-based interpretation in the class-based learning, an innovative solution based on multimedia technologies could be utilised to bridge the gap. Sound such as voice-overs and music is the best way to make the presentation more enjoyable for the viewer (Barotfi 2000). Many multimedia programmes rely on text as a critical instructional component poses difficulties for poor readers. Orr et al. (1994, cited in Stemler 1997) stated that research data indicated that learners find it easier to complete lessons which use audio extensively to present information. In the context of this study, sound icons are embedded in ECLearn to ease the pronunciation learning as shown in Figures 5.1 and 5.2.

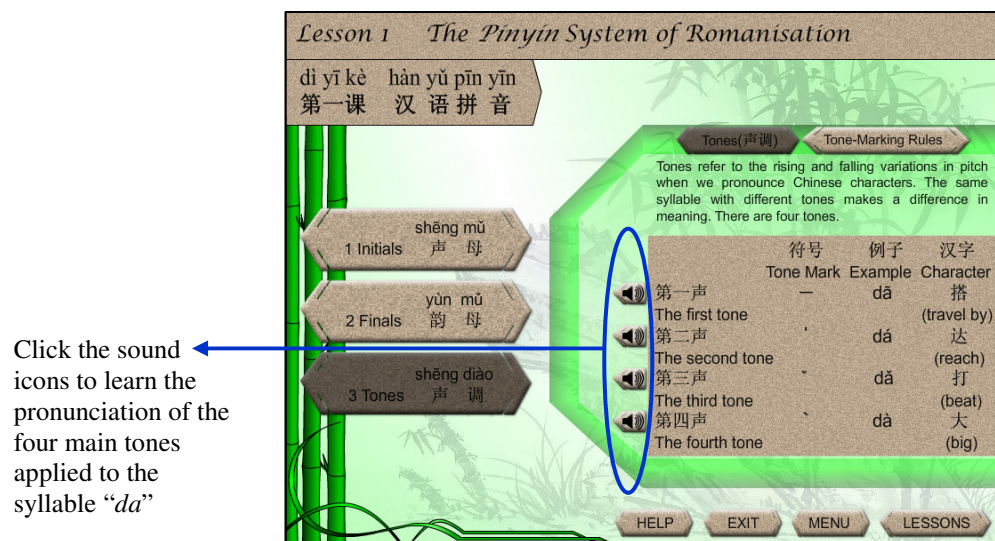


Figure 5.1: Sample screenshot from ECLearn showing the "Tones" instruction

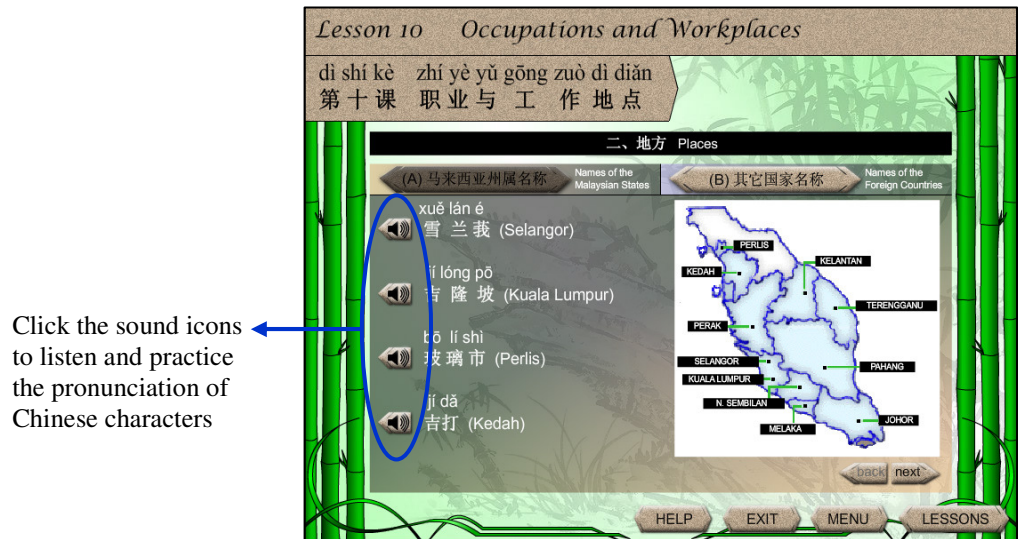


Figure 5.2: Sample screenshot from ECLearn showing the sound icons embedded for Chinese pronunciation learning

As described in adult learning theory, adult second language learners is different from children where they are self-directed and they can learn on their own. Since they have a need in learning Chinese as a second language, they will be self-motivated in learning the Chinese pronunciation. With embedded sound icons, learners are able to learn the Chinese pronunciation easily and efficiently. Learners can click on a sound icon multiple times as needed to listen and practice the pronunciation of a Chinese character, word or sentence until they successfully learn the pronunciation correctly. This is in line with behaviourism where repeating listen and practice the Chinese pronunciation can strengthen learners' learning behaviours and results in effective pronunciation learning. In addition, it also promotes listening skills.

5.3.2. Explicit Chinese Writing Instruction

The Chinese writing system is based on the strokes of Chinese characters (which has been discussed in chapter 2). Hence, writing the strokes in correct order and direction is a very important step in mastering Chinese writing. Chinese characters seem to be the most difficult part for people learning Chinese as a second language, especially learners from alphabetic reading backgrounds; it is intimidating to learn a language so different from their own. Since, stroke order is a very important component of Chinese writing, therefore, it is crucial to show a learner how to write a character in the right stroke order at early stages of learning Chinese writing. ECLearn introduces Chinese characters to beginners and foreigners in a fun and intuitive way.

As revealed in Figure 5.3, an explicit instruction on how a Chinese character is composed in proper stroke order is provided in ECLearn to help guide learners in learning the Chinese writing effortlessly. Besides, there is a space for learners to practice the character writing. In addition to that, the step by step stroke order with animation on how a character should be written will be shown when learners clicking the “PLAY” button in Figure 5.4 to supplement the learning process.



Figure 5.3: Stroke order demonstration and writing practices

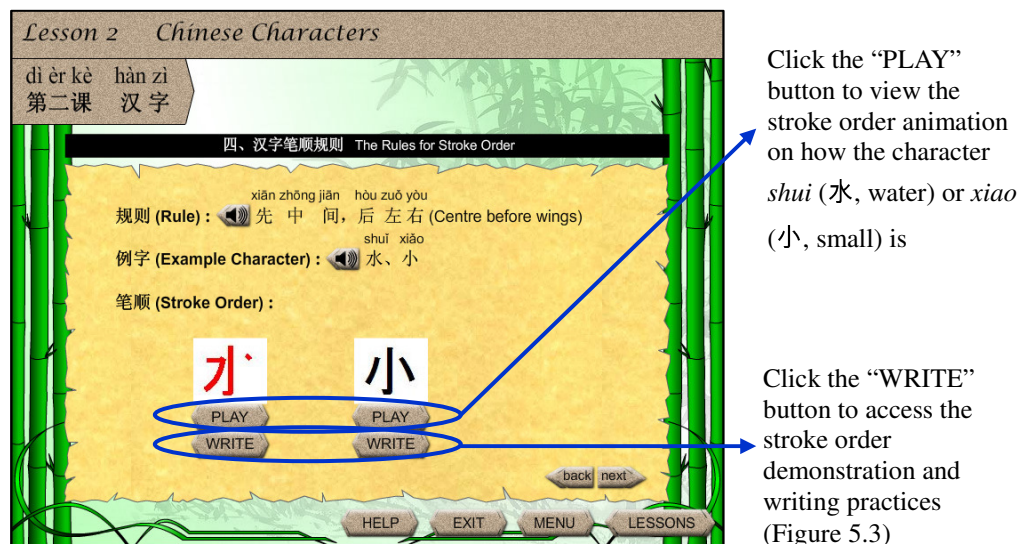


Figure 5.4: Chinese character stroke order animation

Unlike children, adult second language learners are self-directed, they are conscious about what they need and able to learn on their own as described in adult learning theory. Therefore, ECLearn provided interesting educational activities such as step by step stroke order animation and writing space along with explicit stroke order demonstration in order to motivate learners to keep on practicing character writing. As has been described in behaviourism,

learners repeating watching the stroke order animation and practicing character writing can strengthen their learning behaviours. With that, they are able to grasp the rules of stroke order and enhance their Chinese character writing.

5.3.3. Vocabulary Learning

The *Oxford Advanced Learner's Dictionary* (2011c) defines vocabulary as “the body of words used in a particular language”. Vocabulary plays an important role in second language acquisition because it is the key to second language learners understanding on what they listen, speak, write, and read in a second language. Through literature review, it is found that learner difficulties in the reception and production of target language arise from the inadequacy in vocabulary knowledge among second language learners (Meara 1980; Laufer 1986; Nation 1990, cited in Fu 2005). Therefore, an adequate number of vocabulary words should be acquired by learners in order to communicate effectively with people in a second language. Furthermore, many researchers and commentators (Richards 1980; Allen 1983; Laufer 1986; Nation 1990, cited in Lawson and Hogben 1996, p. 102) have also pointed out the importance of vocabulary acquisition for second language learners. Hence, the teaching of Chinese vocabulary has been regarded as an important task for all instructors.

In order for students to learn Chinese vocabulary effectively, effective vocabulary teaching methods should be used. Decarrico (2001, cited in Nguyen

Thi Thanh Huyen and Khuat Thi Thu Nga 2003) claimed that words should not be learnt separately or by memorization without understanding. So, multimedia-assisted vocabulary learning materials have been used for the teaching of Chinese vocabulary.



Figure 5.5: Visual text, images, and spoken text for vocabulary learning

As shown in Figure 5.5, the information found in ECLearn is presented in visual text, images, and spoken text to create an authentic and multi-sensory language context for CSL learners. Multimedia -assisted vocabulary learning environments attempt to help learners construct referential connections between the nonverbal and verbal systems (Mayer and Sims 1994), resulting in an increase in vocabulary knowledge and exercising a positive effect on reading comprehension (Tozcu and Coady 2004, cited in Constantinescu 2007). This is also in line with cognitive theory where learning contents should be presented in a meaningful way through different media, so that it can sustain attention, easier to be remembered, recalled, and stored in memory.

5.3.4. Oral Communication Skills Instruction

Communication is the process by which information is exchanged between individuals or groups of people (Tyagi and Misra 2011, p. 3). It is a process to convey thoughts as clearly and accurately as one can. Communication is an essential element in human interaction. Effective communication enhances many aspects of human life. Without effective communication, a message can turn into error, misunderstanding, or frustration by being misinterpreted or poorly delivered.

Communication is successful only when both the sender and the receiver understand the same information. In today's highly informational and technological environment, it has become increasingly important to have good communication skills. A video demonstrating Chinese conversation between people is a highly effective way of developing learner's communication skills. The visual content of the video clip provides the learners with the necessary environmental and physical clues to help them better understand language usage in a particular context. Video is a compelling and motivating medium for use both in the classroom and self study.

Videos on self introduction or conversation between individuals or groups of people are integrated in ECLearn to help a learner improve his or her listening and speaking ability. Figure 5.6 shows two sample screenshots from ECLearn. The video clips of dialogues give learners an opportunity to see how sentences are used in a Chinese speaking environment, and teach the

learners how to communicate politely in our daily lives. One can practice sentence by sentence or word by word. It also facilitates the recognition of characters. Each dialogue is offered in characters and *Pinyin*, a Romanisation system used to assist non-natives with pronunciation of characters.

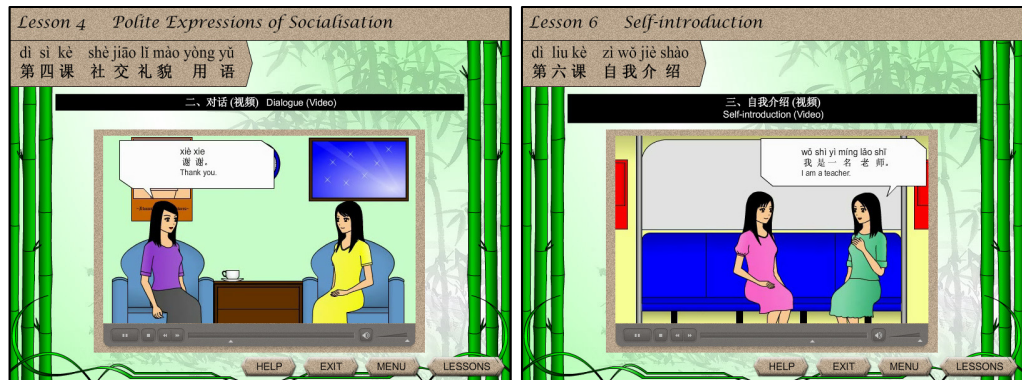


Figure 5.6: Sample screenshots from ECLearn showing the embedded videos featuring the dialogues between two individuals for learning and practicing listening and speaking skills



Figure 5.7: Text, sound, and graphics used to present the instructional contents related to sentence recital

Besides that, text, sound, and graphics have been used to present the instructional contents which are related to reading comprehension and sentence recital (Figure 5.7). Chinese text and *Pinyin* provided along with

graphics allow learners to practice reading comprehension and sentences, whereas Chinese pronunciation sound is provided for listening practice.

Furthermore, simple animations along with Chinese text and sound were used to present dialogues for dialogue practice as shown in Figure 5.8. With the combination of text, sound, graphics, animation, and video integrated in ECLearn, learners would be able to understand and remember the usage of Chinese language in particular context effectively through watching the video or other instructional contents such as reading comprehension, sentence recital, and dialogue. This is because the referential connections will be constructed between the nonverbal and verbal systems, which results in deep learning as described in dual coding theory.



Figure 5.8: Text, sound, and simple animations used to present dialogues for dialogue practice

Since language is used in daily communication, self-paced e-learning is not an effective way to develop communication skills. Learners need real-life situations to learn and practice communication skills in target language. This

is in line with constructivism as learners need to actively participate in the learning process to construct their own meaning. Communicative language learning requires a learner to speak with and listen to other learners. Through cooperative learning and peer-teaching situations in classroom settings, learners can openly discuss and debate their ideas. The instructor acts as a facilitator in this process to guide the learners in communicative language learning activities. Therefore, in this study, through a blended learning environment, prior to enhance the learning of oral communication skills through resources such as videos integrated in ECLearn, learners study the conversation such as basic greetings and polite expressions for particular situations in daily life through the printed textbook. Besides, they can also practice to speak Mandarin with tutor and peers.

5.3.5. Interactive Exercises

Usually, exercises, quizzes and tests were given in class to test the understanding of learners on the instructional materials. However, online quizzes have become increasingly popular in higher institutions due to its capability to provide immediate feedback to learners. Multimedia applications embedded with online quizzes (e.g. multiple-choice questions, or short-answer questions, with built-in feedback) allow the learners to monitor and test their understanding on the learning contents delivered promptly. Figure 5.9 shows a sample screenshot on the online exercises embedded in ECLearn.

Glover's (1989, cited in Yun et al., 2008) research suggests that recall is effective in learning. Recall plays a greater role in transferring knowledge (Yun et al., 2008). An exercise embedded at the end of each lesson is an activity of simply retrieving what the learner has learnt. The exercise is provided to help learners to test their understanding of one lesson before proceeding to the next lesson. Drills approach has been applied to the exercises developed in this study which allow students to be able to practice and redo the questions in each lesson until they successfully mastered the lesson. The repetition of practicing the questions and gives feedback will strengthen the learning behaviours of learners as in behaviourism, hence learners are able to learn Chinese as a second language effectively.

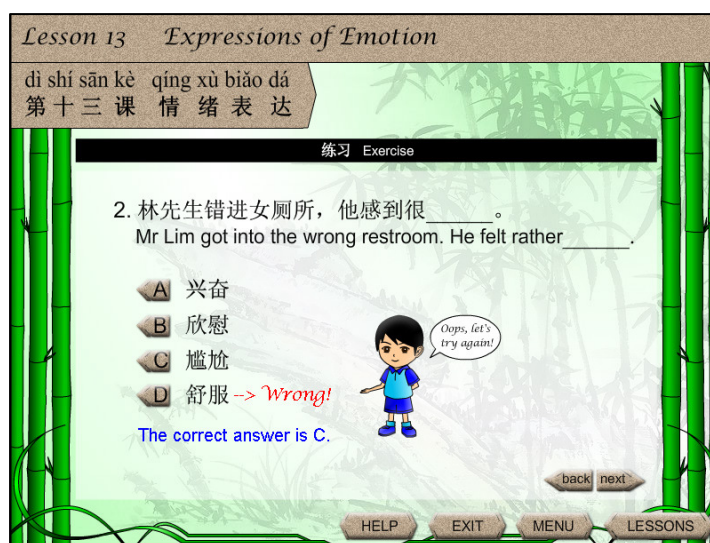


Figure 5.9: Sample screenshot from ECLearn showing the online quizzes with appropriate feedbacks

5.4 Limitations and Recommendations

The limitations of this study are mostly due to the limited research time constraints and functionalities provided in ECLearn. Taking into account these limitations, this section also suggests several future enhancements to overcome the limitations found in this study.

First of all, this study represents an initial attempt to measure students' achievement in Chinese language acquisition between blended learning and traditional instruction. Moreover, this study was conducted in a limited period of time which is only 14 weeks, and also with a limited number of students which is only 20 students. So, it may not possible to generalize the findings that have been obtained from the present study. It is suggested that larger sample sizes could be used in future research to increase the power of generalising the results. Furthermore, it is recommended to highlight the research aspects such as examine the impact of multimedia on learning outcomes, the role of dual code and interactivity in promoting deep learning, the effectiveness of learning theories in Chinese learning, and so forth in future research.

Secondly, the functionalities provided in ECLearn should be able to assist the learners in Chinese learning effectively. However, ECLearn only contains some useful functions such as Chinese pronunciation based on human voice, highlighting a Chinese character when it is being pronounced, step-by-step stroke order animation for Chinese writing demonstration, Flash videos

featuring Chinese conversations between people, and exercises with immediate feedback. ECLearn with more useful features such as voice recording function and real-life videos could not be developed at this stage due to the lack of time, budget and personal expertise. Without the integration of voice recording function in ECLearn, learners are not able to record their pronunciation of Chinese characters to check the pronunciation accuracy. Thus, voice recording function is an important feature which should be developed in future research for measuring the Chinese pronunciation accuracy.

Besides, based on the feedback given by the respondents (which has been discussed in chapter 4), the limitations found in ECLearn also include the uninteresting graphical user interface (GUI) design and insufficient number of exercises (there are only nine questions provided in each exercise of the 15 lessons in ECLearn). Respondents proposed to embed more interesting GUI design and provided more exercises to monitor their achievement in Chinese proficiency. Therefore, a future development should be focused on developing a programme that will take into consideration the requirements and features proposed in this study.

5.5 Conclusions

From the findings obtained in this study, there were indications that:

- By eradicating the disadvantages of paper books, maintaining their advantages, and integrating the benefits of information

technology, while at the same time identifying the technology disadvantages could pave the way towards successful blended learning implementation,

- The multimedia computing and the internet technology enhance language learning and expand possibilities for using them to support language instruction in classrooms, and
- E-book will become an important media of learning in future. It is highly dynamic and has a great potential when it comes to delivering up-to-date information and is particularly useful in the educational environments.

Blended learning is ideal for the purposes of adding creative dimensions to the lacklustre classroom environments. The teaching tools in the BL environment, the interactive multimedia e-book (ECLearn), particularly takes on the role of a very patient private tutor who is willing to repeat countless times everything the learner wishes, and needs to hear, to see, and learn. Anecdotal evidence indicates that BL is more effective in learning. Thus, one of the research objectives is to investigate the efficacy of BL approach through multimedia learning objects in the TCSL classrooms at tertiary level. It also proved that Chinese language learning in a BL environment is able to be achieved by utilising a variety of instructional materials wisely. The blended approach that blends the class-based learning and e-learning activities is hoped to become an effective instructional method that could optimise the second language learning experience.

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Appendix A

Interview Transcripts

Interview session 1

Interviewer: The author

Interviewee: Lecturer 1 of “Introduction to Chinese Language I” (with 1 year teaching experience)

(Start of Interview)

Interviewer: Do you think traditional face-to-face instruction is an efficient method for teaching Chinese? Why?

Interviewee: The traditional instruction method by “books” is not enough. Face to face is good for guiding or starting point. But for a person who doesn’t have any basic ability in Chinese speaking, it will be difficult to further catch up the different tone and sound.

Interviewer: What are the problems that you faced when teaching Chinese?

Interviewee: i) To teach a student who came from different language system (such as Indian or Malay language) in catching the accurate tone and certain initial (声母) and final (韵母) . ii) Listening and answer the question in Chinese.

Interviewer: Do you think fully computer based learning without face-to-face instruction is an efficient method for teaching Chinese? Why?

Interviewee: No, because they will need somebody to correct their mistake. Unless the computer can function the corrective action in terms of listening, speaking and writing.

Interviewer: Do you think the combination of computer based learning and traditional face-to-face instruction will be more effective for teaching and learning Chinese? Why?

Interviewee: Yes, because the computer/software can be a guide for the student to continue their self learning at home.

Interviewer: Do you think a Chinese learning electronic book is useful to assist you in teaching Chinese? Why?

Interviewee: It can function as a portion of the learning - listening and reading. But it will not be enough for writing and speaking, unless it complete with the function of “recording”, “checking”, and “correction”.

Interviewer: What are the features that you expected to be integrated in a Chinese learning electronic book?

Interviewee: The proper pronunciation guiding, from basic phonetic alphabet and tone, each character and also sentence, passage, etc. It can come with tape or CD or include inside the program.

(End of Interview)

Interview session 2

Interviewer: The author

Interviewee: Lecturer 2 of “Introduction to Chinese Language I” (with 7 years teaching experiences)

(Start of Interview)

Interviewer: Do you think traditional face-to-face instruction is an efficient method for teaching Chinese? Why?

Interviewee: Yes. Because when errors happen (e.g. pronunciation, I can correct it and demonstrate the right way immediately.

Interviewer: What are the problems that you faced when teaching Chinese?

Interviewee: Students need to pay close attention to the demonstration especially in learning a new Chinese word (the different strokes of Chinese character). Once the student miss it due to various reasons, it take time to re-demonstrate it from the beginning again. Sometimes it does affect the progress of the syllabus.

Interviewer: Do you think fully computer based learning without face-to-face instruction is an efficient method for teaching Chinese? Why?

Interviewee: I think the best way is both: combine the traditional face-to-face instruction and computer based learning without face-to-face instruction. As mentioned above, computer software will save many times of repetition and sometimes it may also cultivate interests.

Interviewer: Do you think the combination of computer based learning and traditional face-to-face instruction will be more effective for teaching and learning Chinese? Why?

Interviewee: Yes. As mentioned above.

Interviewer: Do you think a Chinese learning electronic book is useful to assist you in teaching Chinese? Why?

Interviewee: Yes. It can save a lot of time in preparation of teaching materials. And it can also help the student when they review the lessons without teacher staying around. Beside this, by repetition, which is very crucial in manage a language, students can easily go back to the software and check for correction.

Interviewer: What are the features that you expected to be integrated in a Chinese learning electronic book?

Interviewee: For efficiency, the Chinese sentences should have *Hanyu Pinyin* under each Chinese character. The sequences of stroke of the Chinese character can be demonstrated accordingly. Interesting animation can motivate the learner. Finally, with English explanation will be a tool for the beginner to manage the Chinese language easier.

(End of Interview)

Appendix B

Requirement Analysis Questionnaire



UNIVERSITI TUNKU ABDUL RAHMAN

Dear Participant,

My name is Pang Set Weei and I am a Master student at Universiti Tunku Abdul Rahman. For my Master's project, I am doing a research on creating and evaluating the efficacy of a blended learning environment through the use of an interactive multimedia e-book in teaching-learning Chinese as a second language. Because you are taking or had taken the elective subject "Introduction to Chinese Language I", I am inviting you to participate in this survey by completing the attached questionnaire. In order for the results of this survey to truly represent your thinking, it is important that you fully complete the enclosed questionnaire.

The following questionnaire will require approximately 20-min to complete. The answers to this questionnaire are absolutely confidential. Your name will never be placed on the questionnaire. No individual responses will be reported. Please answer all questions as honestly as possible and return the completed questionnaires promptly to your lecturer who helps me to conduct the survey.

Thank you for taking the time to assist me in my educational endeavours. The data collected will provide useful information for an interactive multimedia e-book development. If you require additional information or have questions, please contact me at the number listed below.

Sincerely,

Pang Set Weei

Pang Set Weei
Tel: 016-6334047
E-mail: xuwei_86@hotmail.com



UNIVERSITI TUNKU ABDUL RAHMAN

Part I: INFORMATION ON CHINESE LEARNING

1. Difficulties encountered when learning Chinese (You may choose **more than ONE**):
 - Reading
 - Chinese writing
 - Speaking
 - Listening
 - Hanyu Pinyin*
 - Others (Please specify): _____

2. Most difficult tasks in Chinese learning (Please **choose ONE**):
 - Reading
 - Chinese writing
 - Speaking
 - Listening
 - Hanyu Pinyin*
 - Others (Please specify): _____

3. Actions that will be taken when facing difficulties in learning Chinese (You may choose **more than ONE**):
 - Seek friend's help
 - Consult the lecturer through a face-to-face consultation
 - Internet search
 - Consult the lecturer through emails
 - Bilingual translation online
 - Dictionary
 - Others (Please specify): _____

4. Which types of learning environment do you prefer when learning Chinese?
 - Traditional instruction
 - Computer mediated learning
 - Blended learning

Reason:



UNIVERSITI TUNKU ABDUL RAHMAN

5. Do you think traditional instruction combined with interactive multimedia e-book could improve Chinese more effectively compared to traditional instruction?

Yes

No

Reason:

6. Do you think lessons and activities integrated in interactive multimedia e-book could enhance Chinese learning in traditional instruction?

Yes

No

Reason:

7. Do you think learning through blended learning is more interesting than traditional instruction?

Yes

No

Reason:

8. Do you think learning through blended learning could provide better understanding than traditional instruction?

Yes

No

Reason:



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9. Do you think using interactive multimedia e-book alone all the time is suitable for learning Chinese effectively?
- Yes
 - No

Reason:

10. Features expected to be integrated in the interactive multimedia e-book (You may choose **more than ONE**):
- Interactive exercises
 - Pronunciation of Chinese characters and *Hanyu Pinyin* demonstrated by human voices
 - Animated Chinese characters in defined strokes order
 - Colourful graphics
 - Chinese conversation video
 - Others (Please specify): _____

Part II: PERSONAL DETAILS

1. **Gender:** Male Female
2. **Age:** 18 – 20 21 – 23 24 – 26 27 and above
3. **Ethnicity:** Malay
 Chinese
 Indian
 Others (Please specify): _____
4. **Language use at home:** _____



UNIVERSITI TUNKU ABDUL RAHMAN

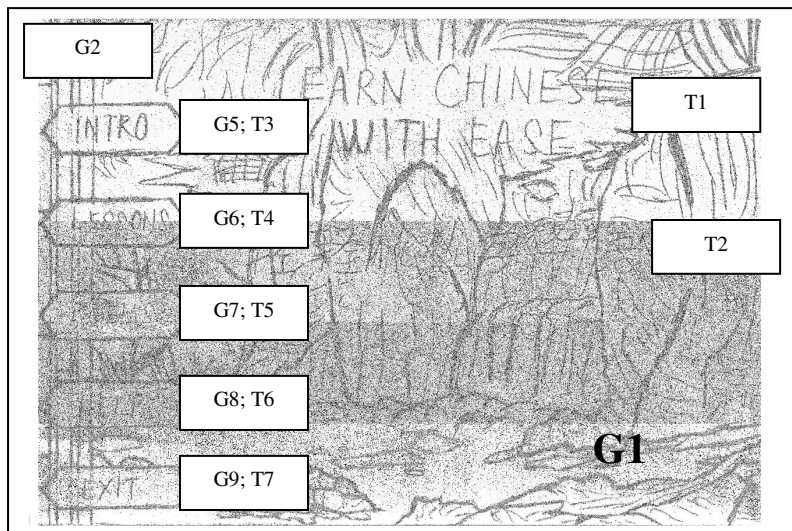
5. **Experience of using computer:** Yes (Please **choose ONE**):
- 1 – 3 years
 - 4 – 6 years
 - 7 – 9 years
 - 10 years above
- No
-
6. **Experience of using learning application:** Yes (You may choose **more than ONE**):
- English language
 - Chinese language
 - Malay language
 - Mathematics
 - History
 - Science
 - Online dictionary
 - Others
(Please specify): ___
- No

Thank you for completing this questionnaire

Appendix C

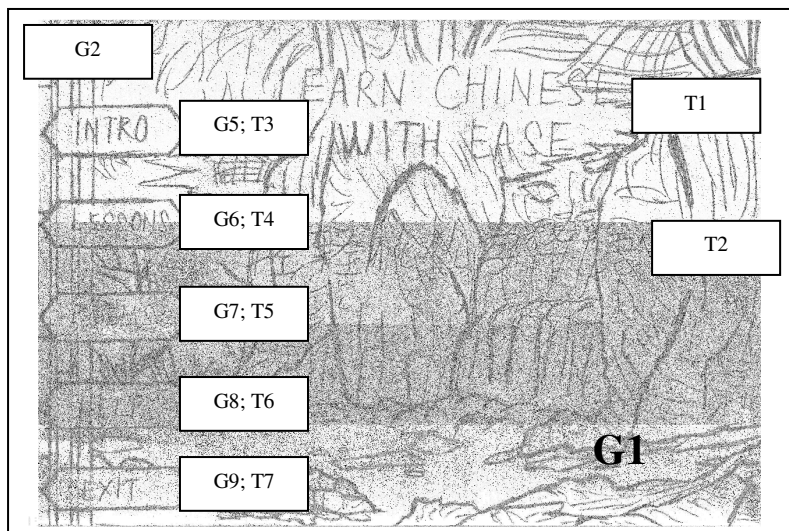
Samples of Storyboards

No. of Storyboard : SB (1) F (1) I (1)
Title of Project : Creating a Blended Learning Environment through the use of an Interactive Multimedia E-book for Teaching-Learning Chinese as a Second Language at Tertiary Level
Topic : Main Menu
Title of Screen (if any) : Menu
Remarks : Allow users to select a learning activity
Screen Size : 800 x 600

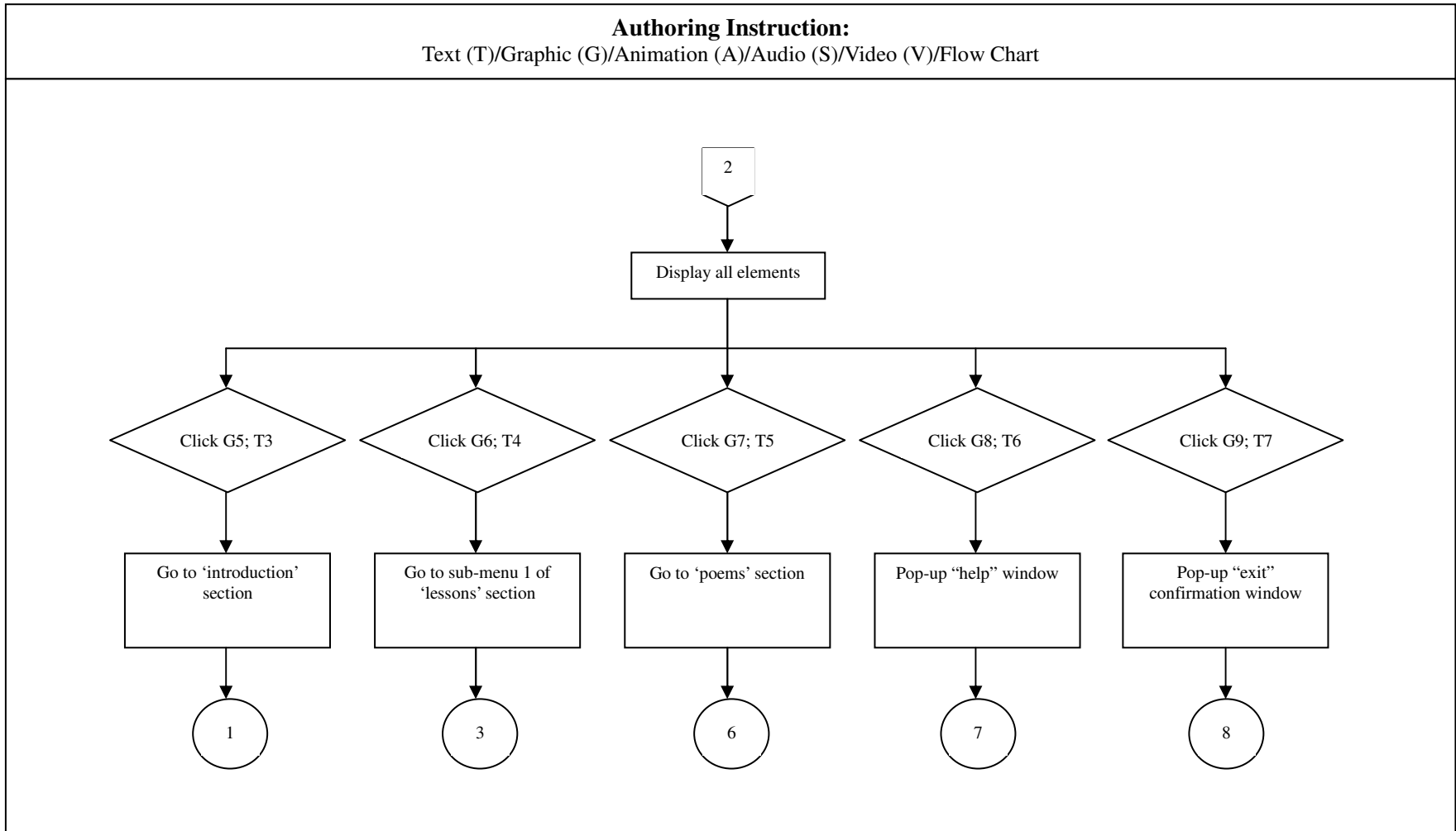


Graphical Instruction: Text (T)/Graphic (G)/ Animation (A)/Audio (S)/Video (V)	Authoring Instruction: Text (T)/Graphic (G)/ Animation (A)/Audio (S)/ Video (V)/Flow Chart
<p>G1 - Graphic “A Chinese landscape painting” as background.</p> <p>G2 - Graphic “bamboos” as shown in the Screen design.</p> <p>T1 - English title: “LEARN CHINESE WITH EASE” (Font type: Lucida Calligraphy; Size: 47; Colour: Black).</p> <p>T2 - Chinese title: “轻轻松松学华语” (Font type: Algerian; Size: 75; Colour: Black).</p> <p>G5; T3 - Graphic “polygon shape” (as shown in the Screen design) and text “INTRO” as INTRO button</p> <p>G6; T4 - Graphic “polygon shape” and text “LESSONS” as LESSONS button</p> <p>G7; T5 - Graphic “polygon shape” and text “POEMS” as POEMS button</p> <p>G8; T6 - Graphic “polygon shape” and text “HELP” as HELP button</p> <p>G9; T7 - Graphic “polygon shape” and text “EXIT” as EXIT button</p> <p>T3 – T7 - Font type: Arial, size: 28, colour: Black.</p>	<ol style="list-style-type: none"> 1. Develop this screen with reference to the Screen design. 2. S1 will be played when displaying this screen. 3. When mouse rolls over G5; T3/G6; T4/G7; T5/G8; T6/G9; T7, T3-T7 will be highlighted. 4. When G5; T3/G6; T4/G7; T5/G8; T6/G9; T7 being click, S2 will be played. 5. Click G5; T3 to go to the introduction section. 6. Click G6; T4 to go to the lessons section. 7. Click G7; T5 to go to the poems section. 8. Click G8; T6 to pop-up “help” window. 9. Click G9; T7 to pop-up “exit” confirmation window.

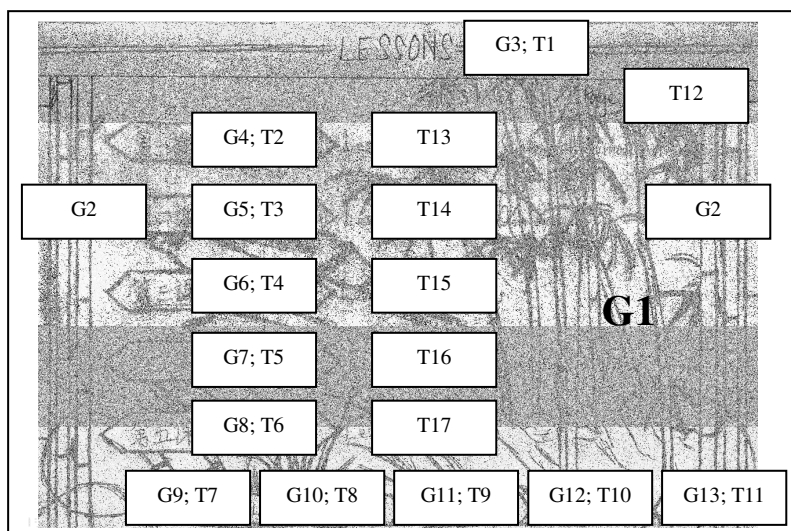
No. of Storyboard : SB (1) F (1) I (1)
Title of Project : Creating a Blended Learning Environment through the use of an Interactive Multimedia E-book for Teaching-Learning Chinese as a Second Language at Tertiary Level
Topic : Main Menu
Title of Screen (if any) : Menu
Remarks : Allow users to select a learning activity
Screen Size : 800 x 600



Graphical Instruction: Text (T)/Graphic (G)/ Animation (A)/Audio (S)/Video (V)	Authoring Instruction: Text (T)/Graphic (G)/ Animation (A)/Audio (S)/ Video (V)/Flow Chart
<p>S1 - Background music; e.g. Piano music.</p> <p>S2 - Sound effect; e.g. sound “pop” when a button is clicked.</p>	

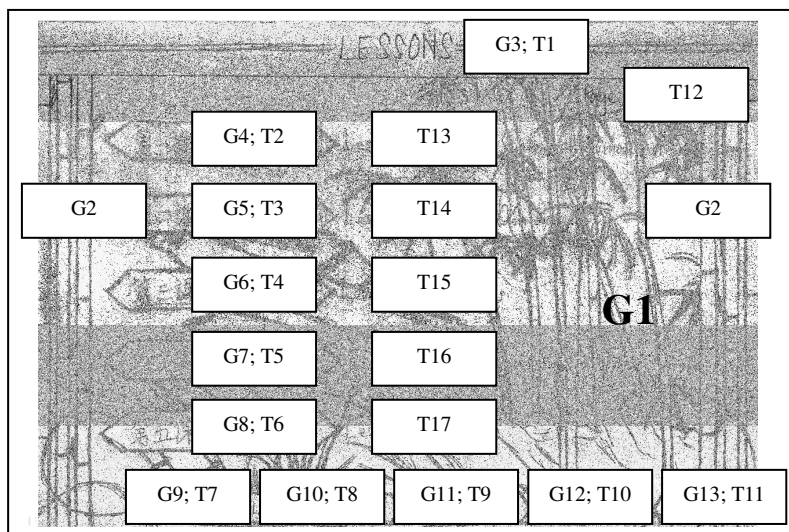


No. of Storyboard	: SB (1) F (1) I (1)
Title of Project	: Creating a Blended Learning Environment through the use of an Interactive Multimedia E-book for Teaching-Learning Chinese as a Second Language at Tertiary Level
Topic	: Sub-menu 1 of 'Lessons' section
Title of Screen (if any)	: Lessons
Remarks	: Allow users to choose a lesson from the Sub-menu 1
Screen Size	: 800 x 600



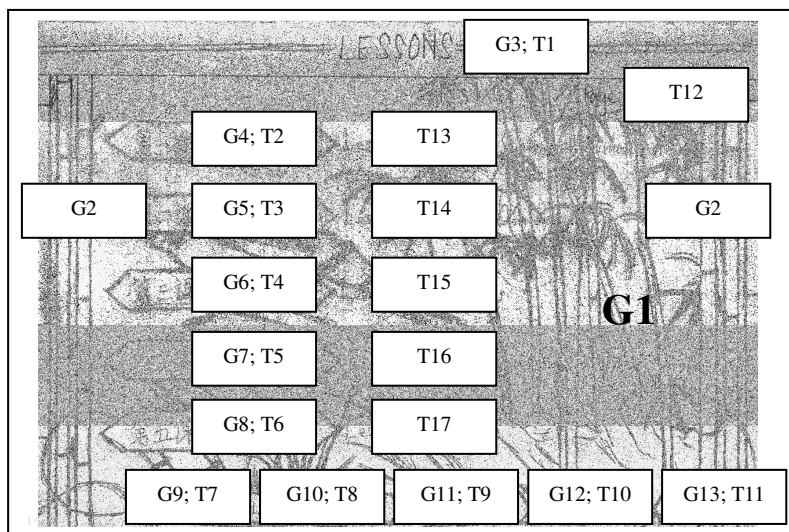
Graphical Instruction: Text (T)/Graphic (G)/ Animation (A)/Audio (S)/Video (V)	Authoring Instruction: Text (T)/Graphic (G)/ Animation (A)/Audio (S)/ Video (V)/Flow Chart
<p>G1 - Graphic “A Chinese bamboo painting” as background.</p> <p>G2 - Graphic “bamboos” as shown in the Screen design.</p> <p>G3; T1 - Graphic “rectangle shape” (as shown in the Screen design) and English title: “LESSONS” (Font type: Lucida Calligraphy; Size: 25; Colour: Black).</p> <p>G4; T2 - Graphic “polygon shape” (as shown in the Screen design) and text “第一课 汉语拼音” as 第一课 汉语拼音 button</p> <p>G5; T3 - Graphic “polygon shape” and text “第二课 汉字” as 第二课 汉字 button</p> <p>G6; T4 - Graphic “polygon shape” and text “第三课 问候语” as 第三课 问候语 button</p> <p>G7; T5 - Graphic “polygon shape” and text “第四课 社交礼貌用语” as 第四课 社交礼貌用语 button</p> <p>G8; T6 - Graphic “polygon shape” and text “第五课 数字” as 第五课 数字 button</p>	<ol style="list-style-type: none"> 1. Develop this screen with reference to the Screen design. 2. When mouse rolls over G4; T2/G5; T3/G6; T4/G7; T5/G8; T6/G9; T7/G10; T8/G12; T10/G13; T11, T2 - T8 and T10 - T11 will be highlighted. 3. When G4; T2/G5; T3/G6; T4/G7; T5/G8; T6/G9; T7/G10; T8/G12; T10/G13; T11 being click, S1 will be played. 4. Click G4; T2 to go to Lesson 1. 5. Click G5; T3 to go to Lesson 2. 6. Click G6; T4 to go to Lesson 3. 7. Click G7; T5 to go to Lesson 4. 8. Click G8; T6 to go to Lesson 5. 9. Click G9; T7 to pop-up “help” window. 10. Click G10; T8 to pop-up “exit” confirmation window. 11. Click G12; T10 to go to the next screen in ‘lessons’ section.

No. of Storyboard : SB (1) F (1) I (1)
Title of Project : Creating a Blended Learning Environment through the use of an Interactive Multimedia E-book for Teaching-Learning Chinese as a Second Language at Tertiary Level
Topic : Sub-menu 1 of 'Lessons' section
Title of Screen (if any) : Lessons
Remarks : Allow users to choose a lesson from the Sub-menu 1
Screen Size : 800 x 600

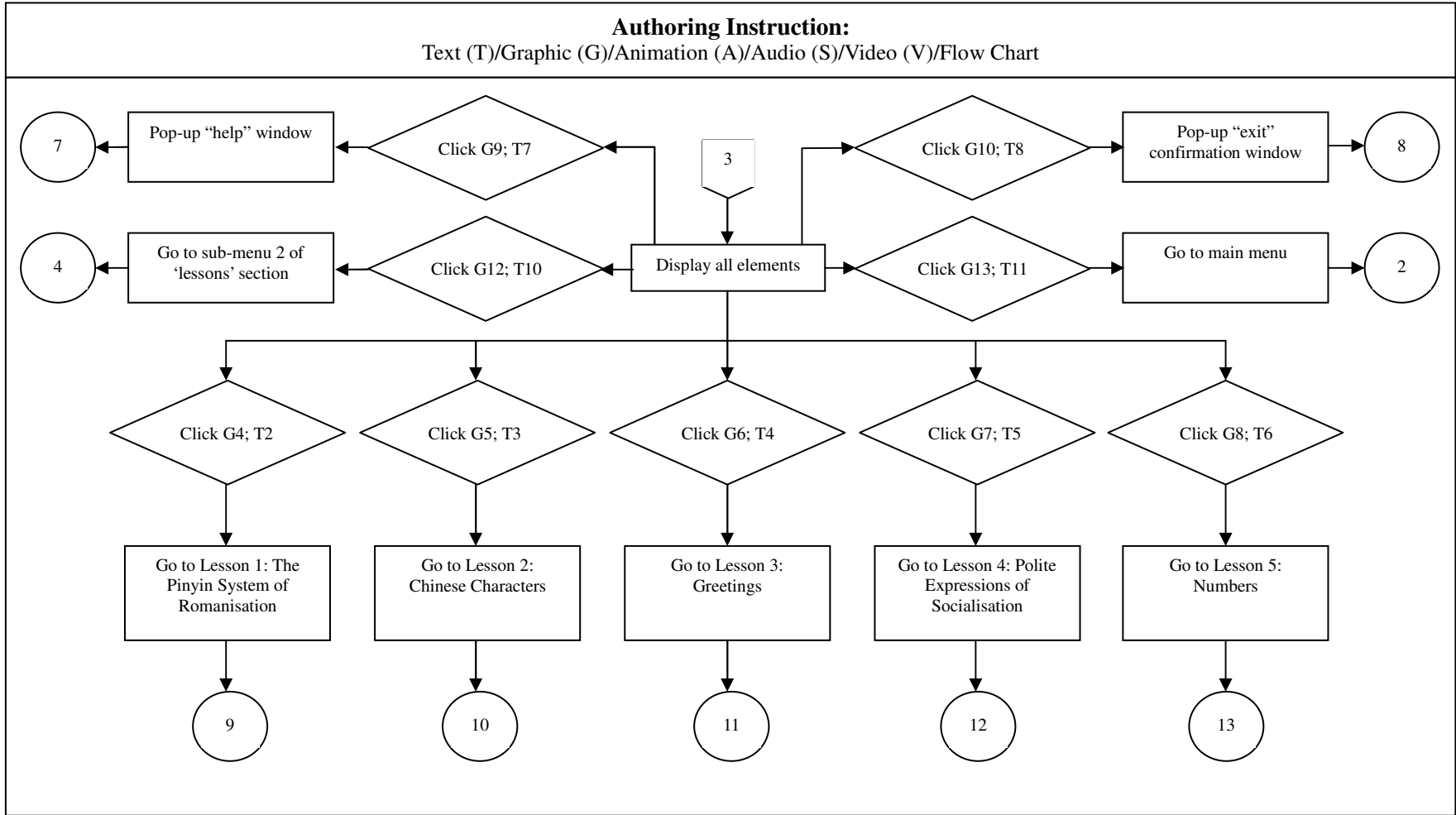


Graphical Instruction: Text (T)/Graphic (G)/ Animation (A)/Audio (S)/Video (V)	Authoring Instruction: Text (T)/Graphic (G)/ Animation (A)/Audio (S)/ Video (V)/Flow Chart
<p>T2 – T6 - Font type: Algerian, size: 20, colour: Black.</p> <p>G9; T7 - Graphic “polygon shape” and text “HELP” as HELP button</p> <p>G10; T8 - Graphic “polygon shape” and text “EXIT” as EXIT button</p> <p>G11; T9 - Graphic “polygon shape” and text “PREVIOUS” as PREVIOUS button</p> <p>G12; T10 - Graphic “polygon shape” and text “NEXT” as NEXT button</p> <p>G13; T11 - Graphic “polygon shape” and text “MAIN” as MAIN button</p> <p>T7 – T11 - Font type: Arial, size: 16, colour: Black.</p> <p>T12 - Text “Page 1 of 3”</p> <p>T13 - Text “Lesson 1 The <i>Pinyin</i> System of Romanisation”</p> <p>T14 - Text “Lesson 2 Chinese Characters”</p> <p>T15 - Text “Lesson 3 Greetings”</p> <p>T16 - Text “Lesson 4 Polite Expressions of Socialisation”</p>	<p>12. Click G13; T11 to go to Main Menu.</p>

No. of Storyboard : SB (1) F (1) I (1)
Title of Project : Creating a Blended Learning Environment through the use of an Interactive Multimedia E-book for Teaching-Learning Chinese as a Second Language at Tertiary Level
Topic : Sub-menu 1 of 'Lessons' section
Title of Screen (if any) : Lessons
Remarks : Allow users to choose a lesson from the Sub-menu 1
Screen Size : 800 x 600



Graphical Instruction: Text (T)/Graphic (G)/ Animation (A)/Audio (S)/Video (V)	Authoring Instruction: Text (T)/Graphic (G)/ Animation (A)/Audio (S)/ Video (V)/Flow Chart
<p>T17 - Text "Lesson 5 Numbers"</p> <p>T12 – T17 - Font type: Arial, size: 18, colour: Black.</p> <p>S1 - Sound effect; e.g. sound "pop" when a button is clicked.</p>	



Appendix D

User Manual

USER MANUAL



E-Book for Chinese Learning (ECLearn)

TABLE OF CONTENTS

CONTENT	PAGE
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F. HOW TO USE ECLEARN.....	11

A. DESCRIPTION

ECLearn (**E**-book for **C**hinese **L**earning) is an interactive multimedia e-book transformed from the existing “Learn Chinese with Ease” textbook which containing a variety of educational activities. It serves as an additional teaching aid tool to teach the basis of Chinese language pronunciation, writing, speaking and reading to non-Chinese educated students in TCSL (Teaching-learning Chinese as a Second Language) classrooms. These students are undertaking Bachelor Degree of Communication, either majoring in Advertising, Graphic Design and Multimedia, Broadcasting, Journalism, English Language or Public Relation who are necessary to take the elective subject called “Introduction to Chinese Language I” offered by the Department of Languages and Linguistics (previously this subject was offered by the Department of Chinese Studies), Universiti Tunku Abdul Rahman (UTAR).

B. FEATURES OF ECLEARN

- **Explicit Chinese writing instruction:** ECLearn provided explicit instruction on how a Chinese character is composed in proper stroke order to help guide learners in learning the Chinese writing effortlessly. Besides, there is a space for learners to practice the character writing. In addition, step by step stroke order with animation on how a character should be written is also provided to supplement the learning process.

- **Vocabulary learning:** The vocabulary information in ECLearn is presented in visual text, graphics, images, spoken text, and video to create an authentic, attractive, and multi-sensory language context for learners.
- **Pronunciation instruction:** Sound icons are embedded in ECLearn to ease the pronunciation learning. Learners can click on a sound icon multiple times as needed to listen and practice the pronunciation of a Chinese character, word or sentence until they successfully learn the pronunciation correctly.
- **Oral communication skills instruction:** Videos on self introduction or conversation between individuals or groups of people are integrated in ECLearn to help a learner improve his or her listening and speaking ability. Each dialogue is offered in characters and *Pinyin*, a Romanisation system used to assist non-natives with pronunciation of characters.
- **Interactive exercises:** Interactive exercise (multiple-choice questions with built-in feedback) is provided in ECLearn to help learners to test their understanding of one lesson before proceeding to the next lesson.

C. **HARDWARE REQUIREMENT**

- At least 1.73GHz Intel Pentium M processor
- At least 512MB RAM
- At least Intel Graphics Media Accelerator 900
- At least 40GB hard disk

- Monitor
- Speaker
- Keyboard
- Mouse
- CD-ROM drive

D. SOFTWARE REQUIREMENT

- Flash Player 8 or above

E. INSTALLATION OF CHINESE FONT

For user whose computer is able to display Chinese character, please skip this section. The following are step by step instructions for the installation of Chinese font as required to run ECLearn. Please follow all the steps from 1 to 6 as follows:

1. Click “start” as shown in Figure 1.



Figure 1: A screenshot showing “start”

2. Go to “Settings” as shown in Figure 2.

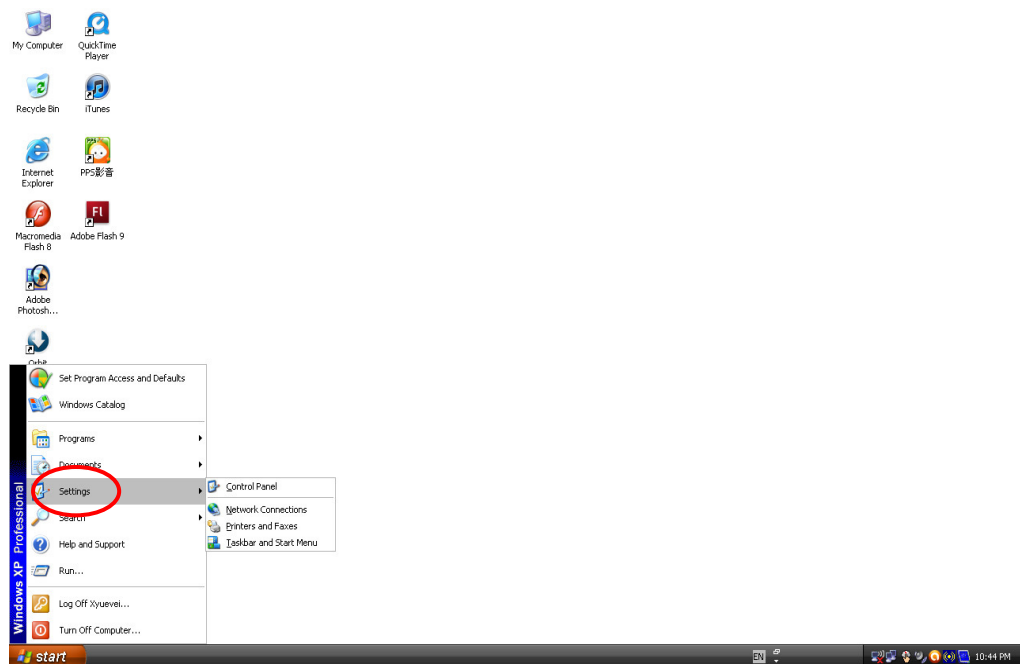


Figure 2: A screenshot showing “Settings”

3. Go to “Control Panel” as shown in Figure 3 and click on it.

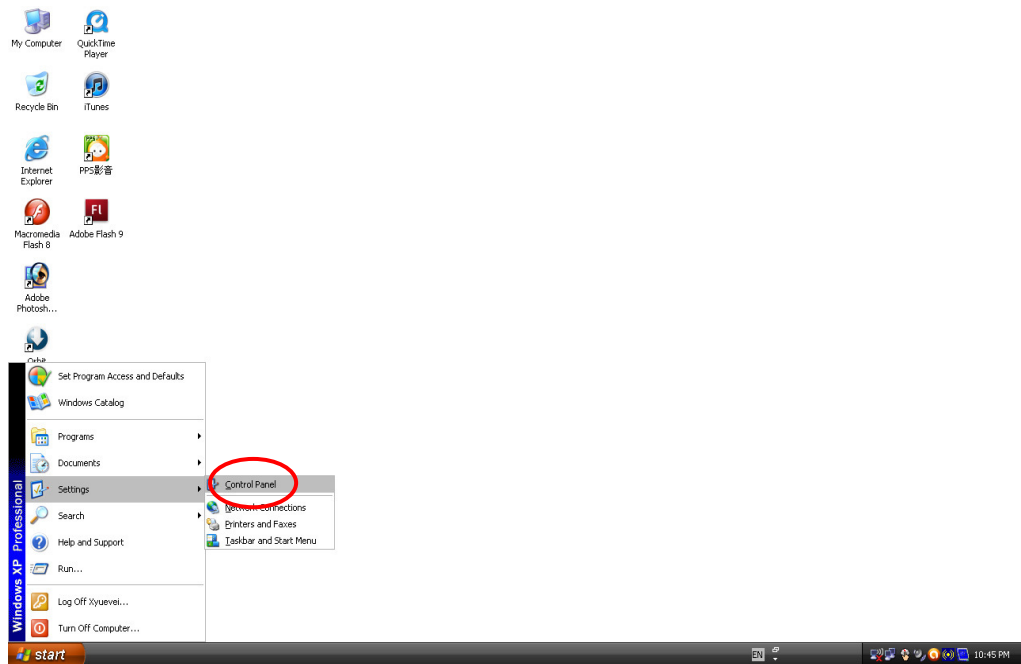


Figure 3: A screenshot showing “Control Panel”

4. Double click the “Regional and Language Options” in the “Control Panel” window as shown in Figure 4.

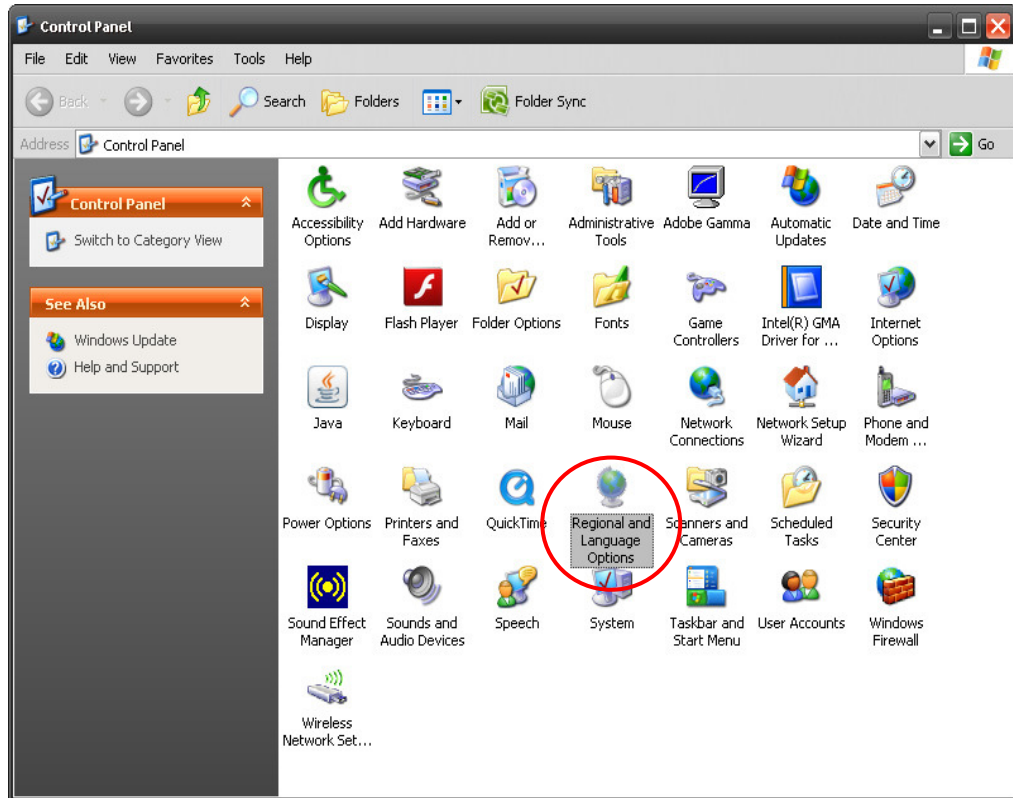


Figure 4: A screenshot showing “Regional and Language Options”

5. As shown in Figure 5, click on the “Languages” tab in the “Regional and Language Options” window. Tick the box for “Install files for East Asian languages” in the “Supplemental language support” section. Then click the “Apply” button.

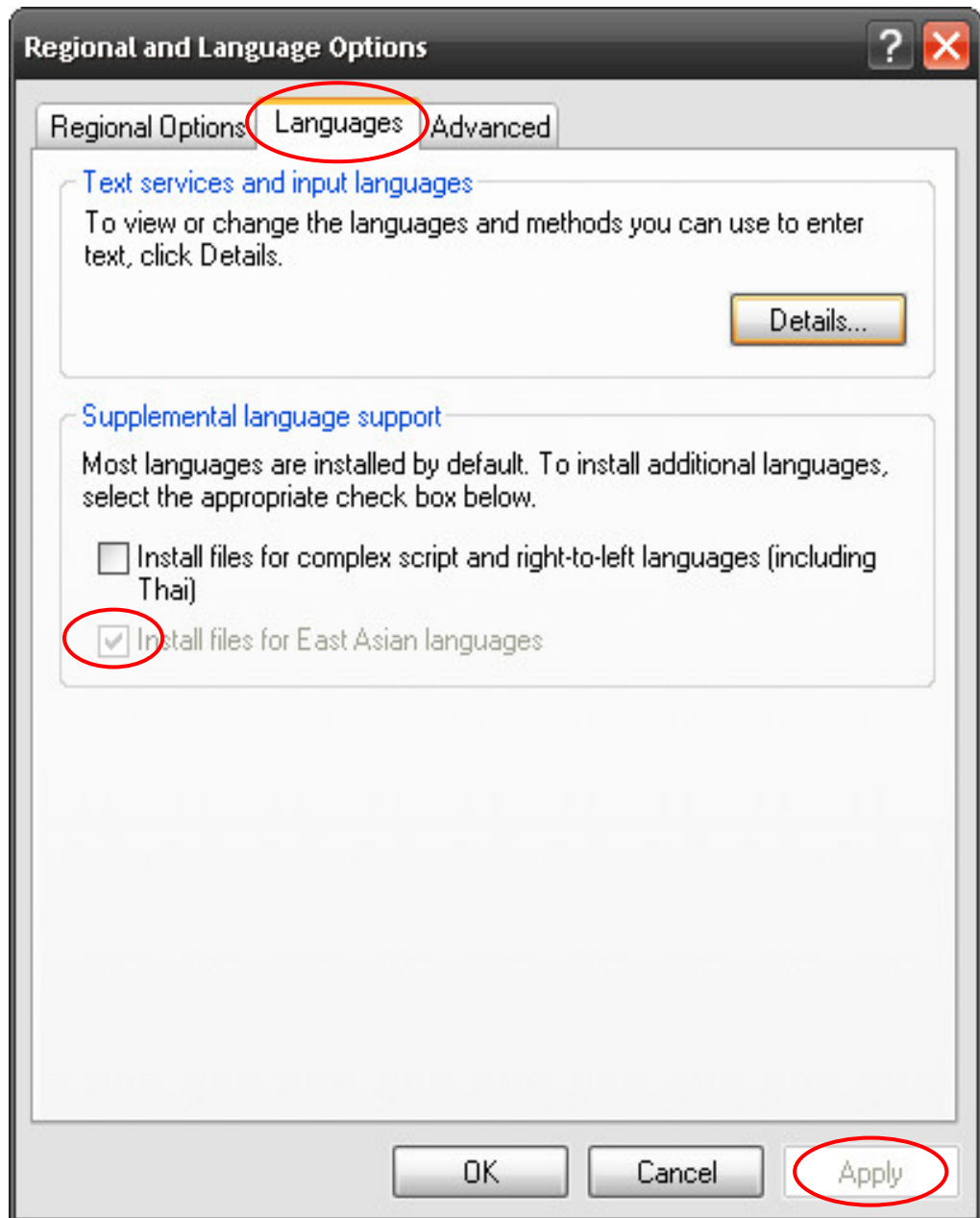


Figure 5: A screenshot showing the “Languages” tab in “Regional and Language Options” window

6. As shown in Figure 6, click on the “Advanced” tab in the “Regional and Language Options” window. Select “Chinese (PRC)” in the “Language for non-Unicode programs” section. Click the “Apply” button and then click the “OK” button.

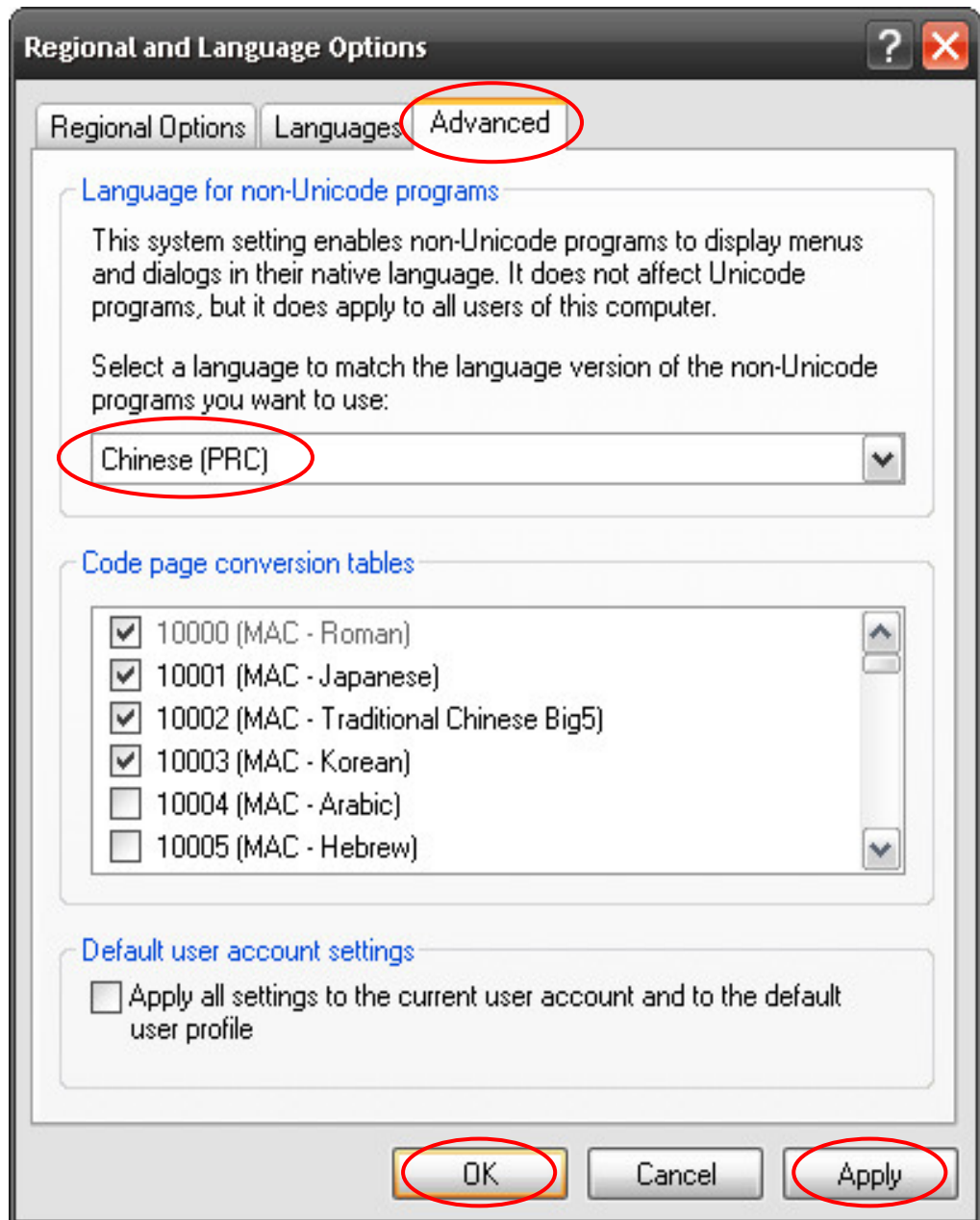


Figure 6: A screenshot showing the “Advanced” tab in “Regional and Language Options” window

F. HOW TO USE ECLEARN

1. Insert ECLearn CD into the computer. Then double click the “ECLearn” folder in the “ECLEARN (F:)” window as shown in Figure 7.

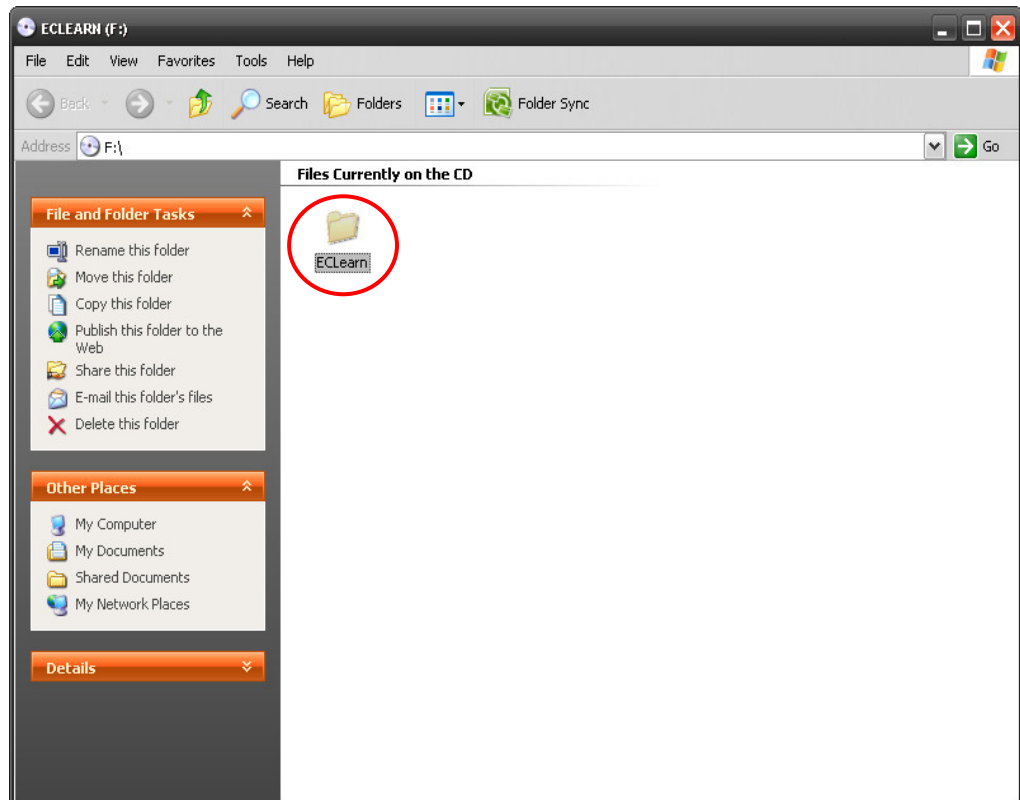


Figure 7: A screenshot showing “ECLearn” folder in the “ECLEARN (F:)” window

2. Double click the “ECLearn” icon in the “ECLearn” folder as shown in Figure 8 to run ECLearn.

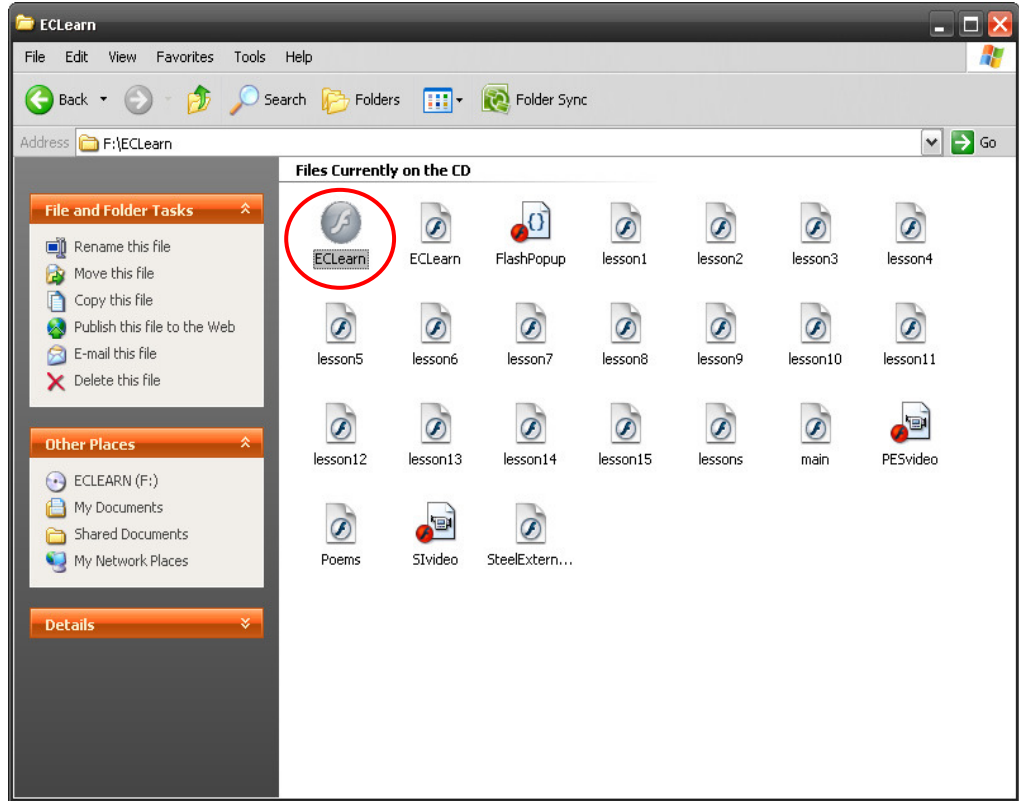
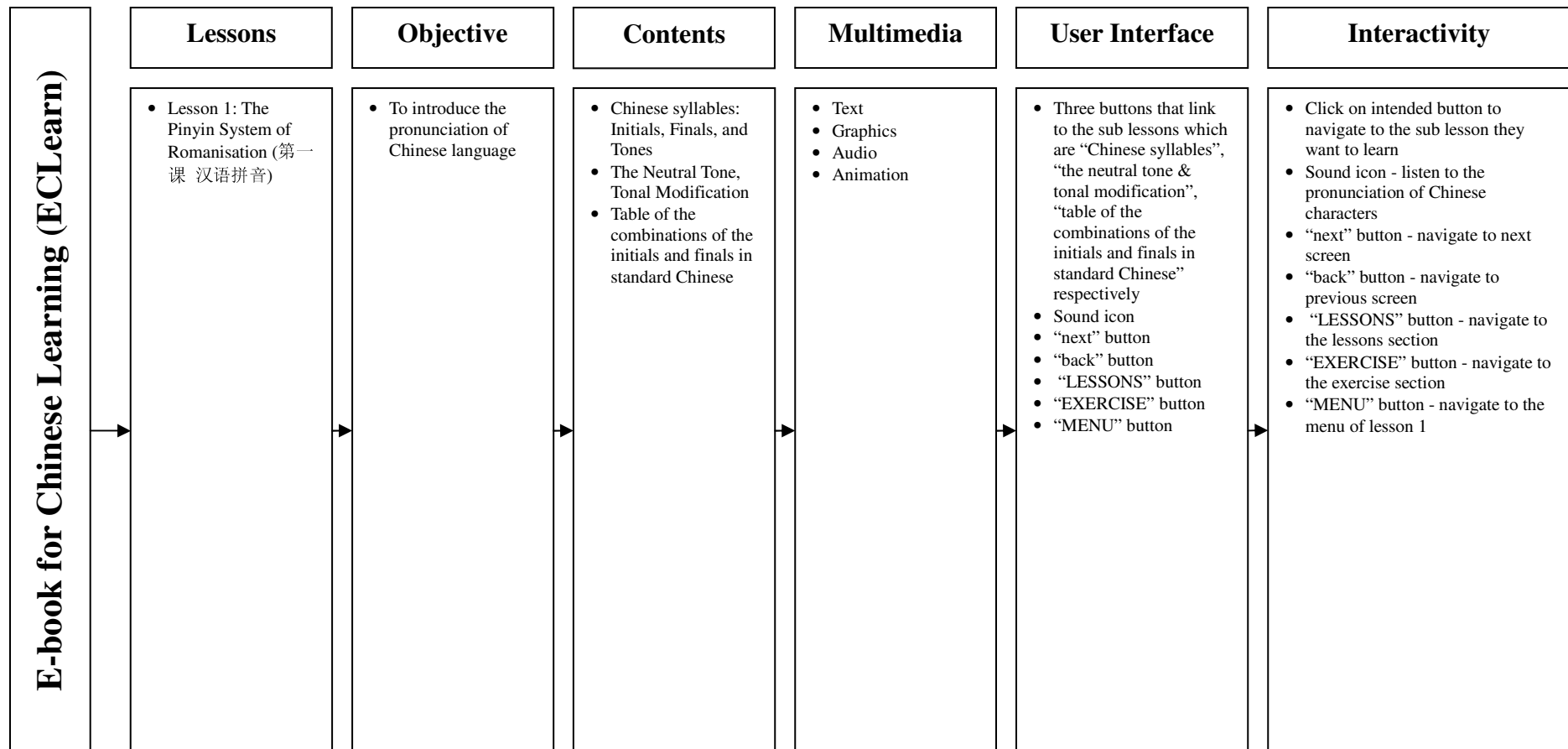


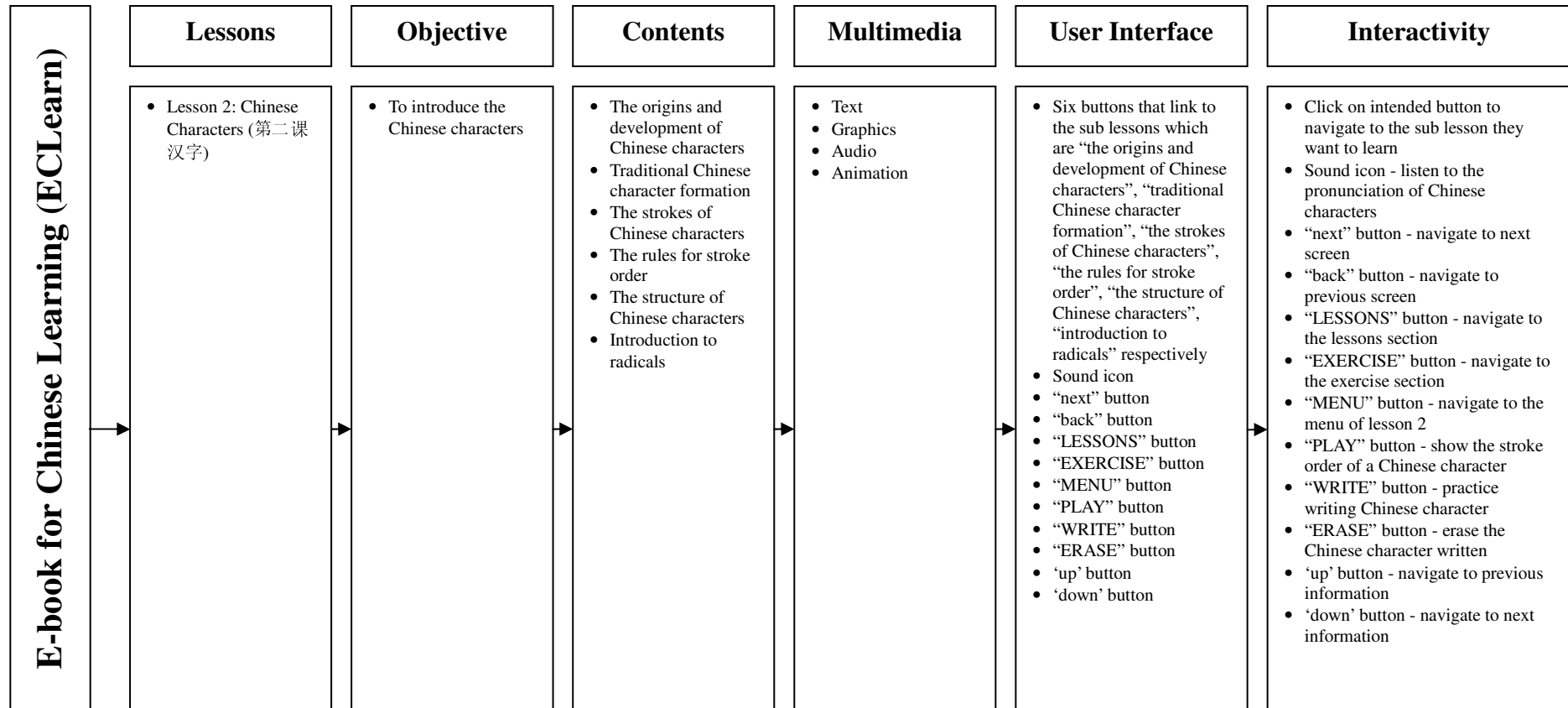
Figure 8: A screenshot showing ECLearn in the “ECLearn” folder

Appendix E

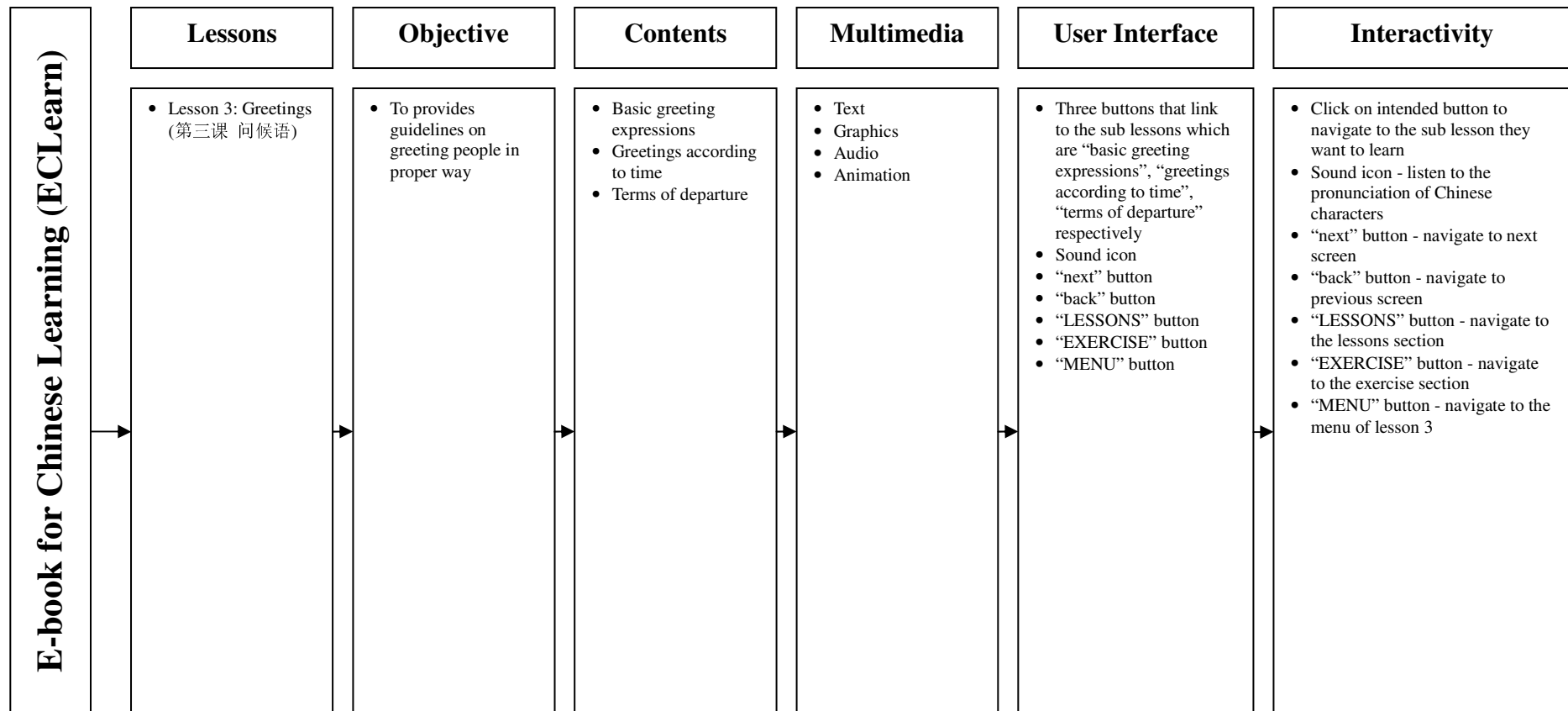
Learning Contents Design Model



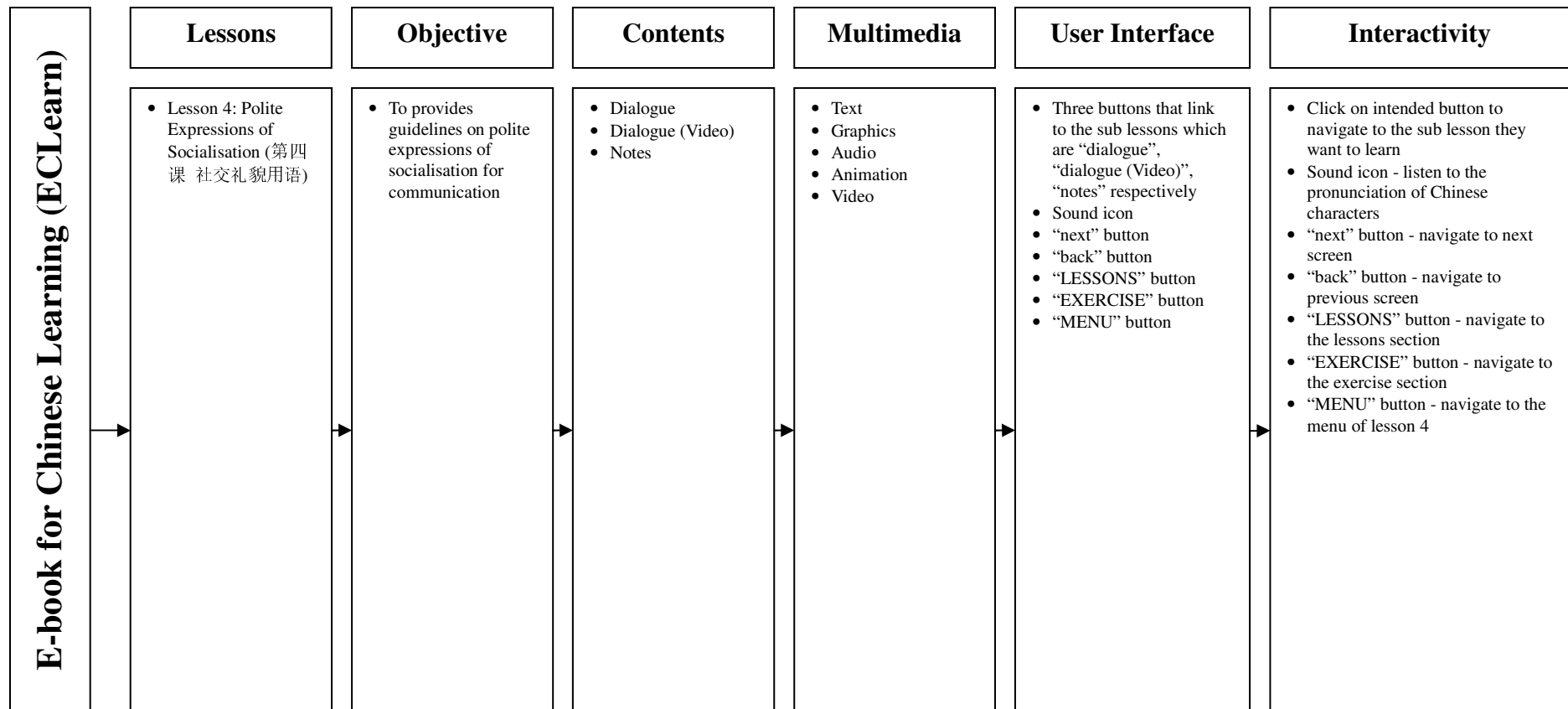
Learning contents design model of ECLearn



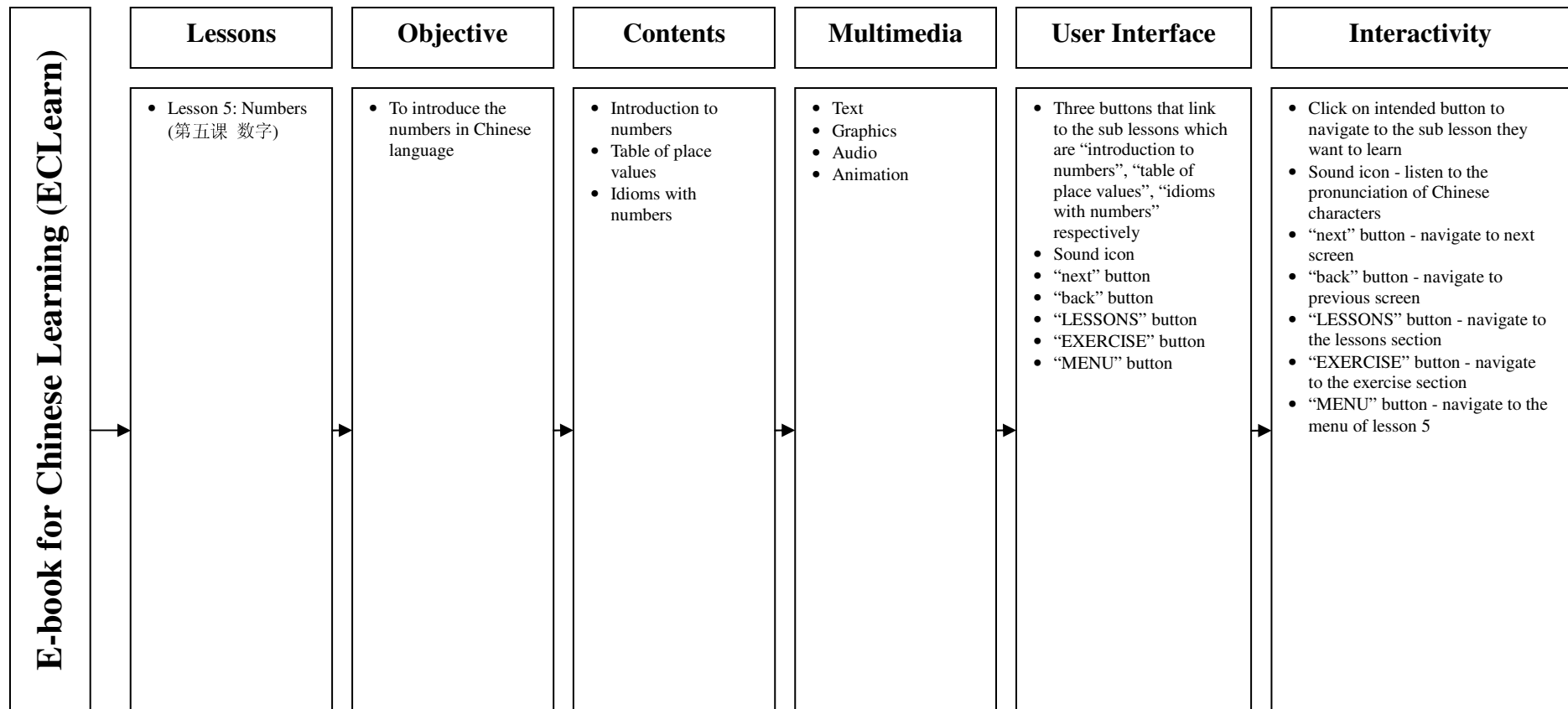
Learning contents design model of ECLearn (Continued)



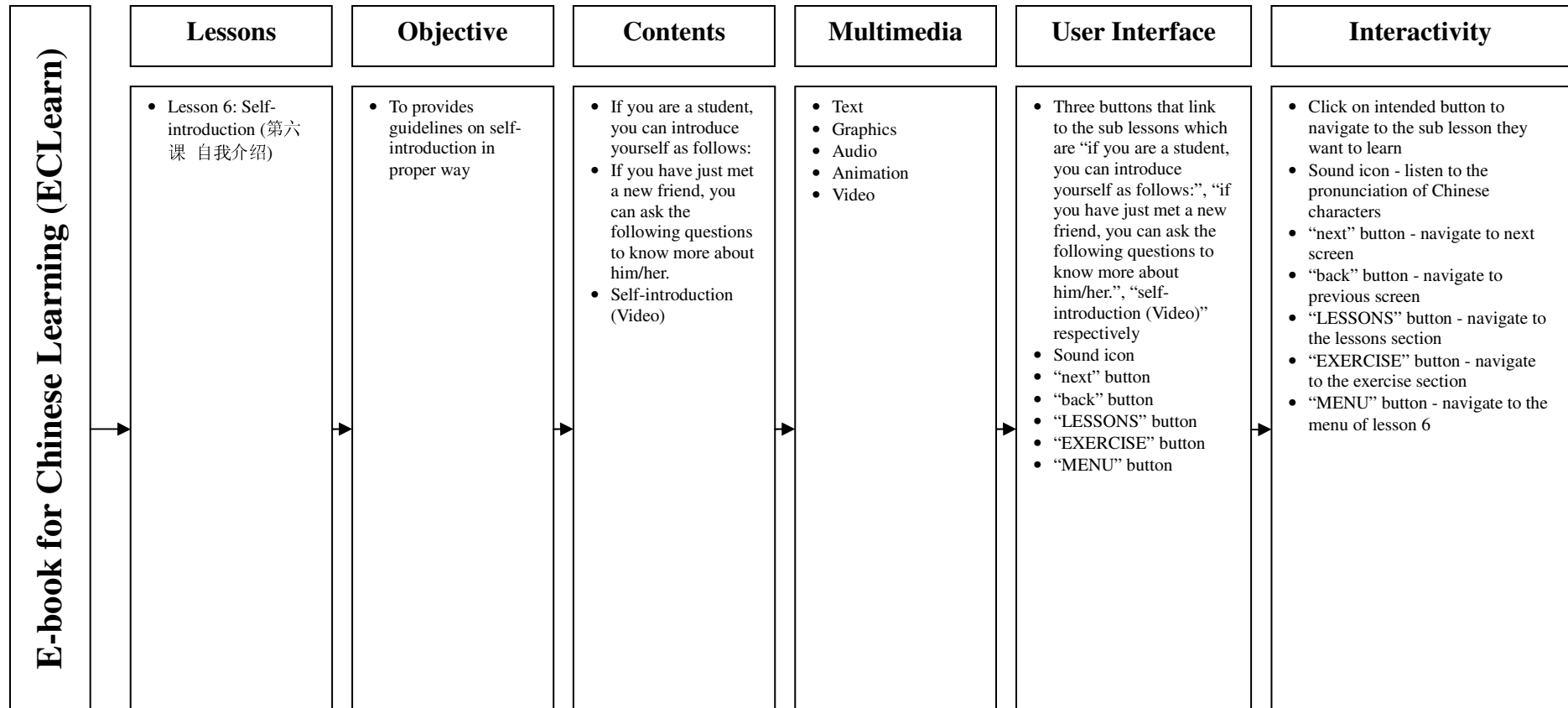
Learning contents design model of ECLearn (Continued)



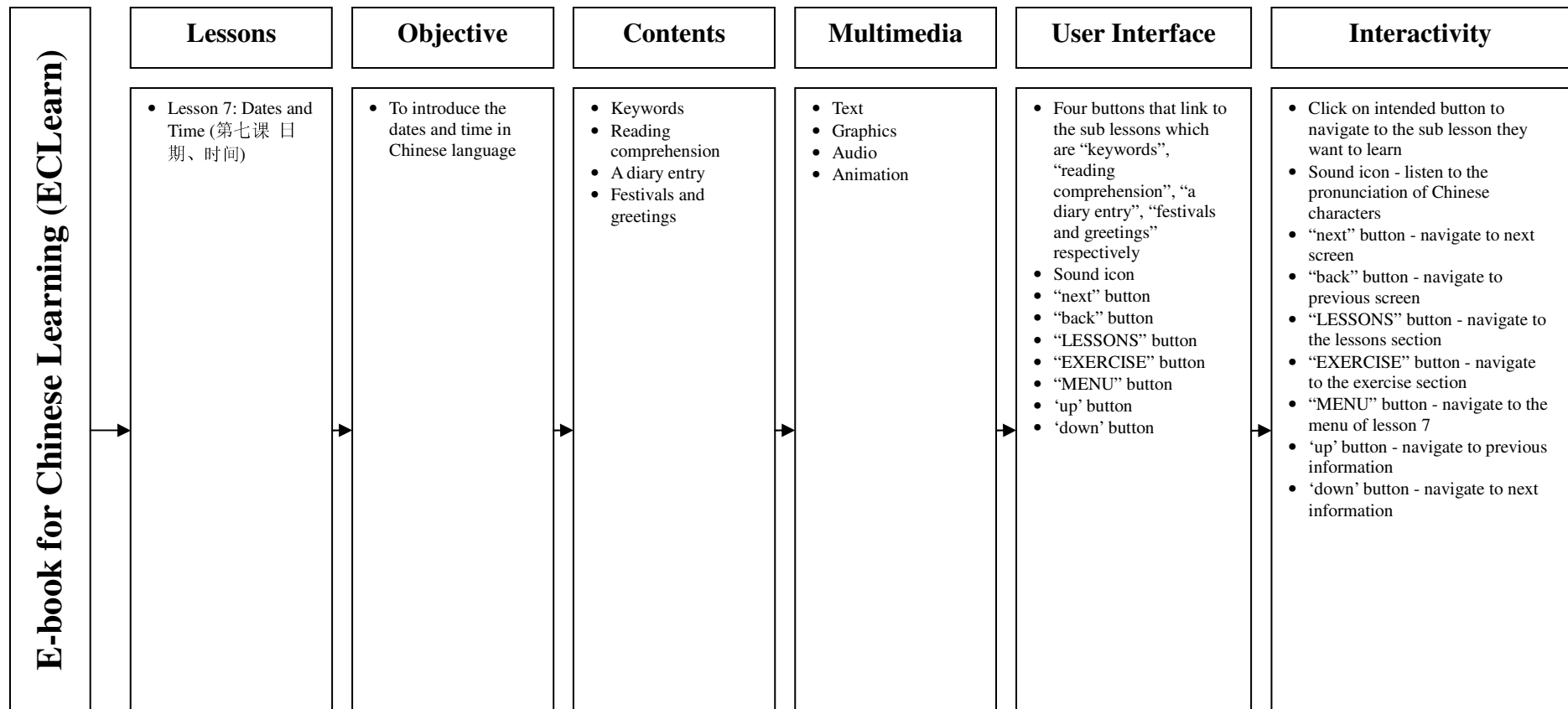
Learning contents design model of ECLearn (Continued)



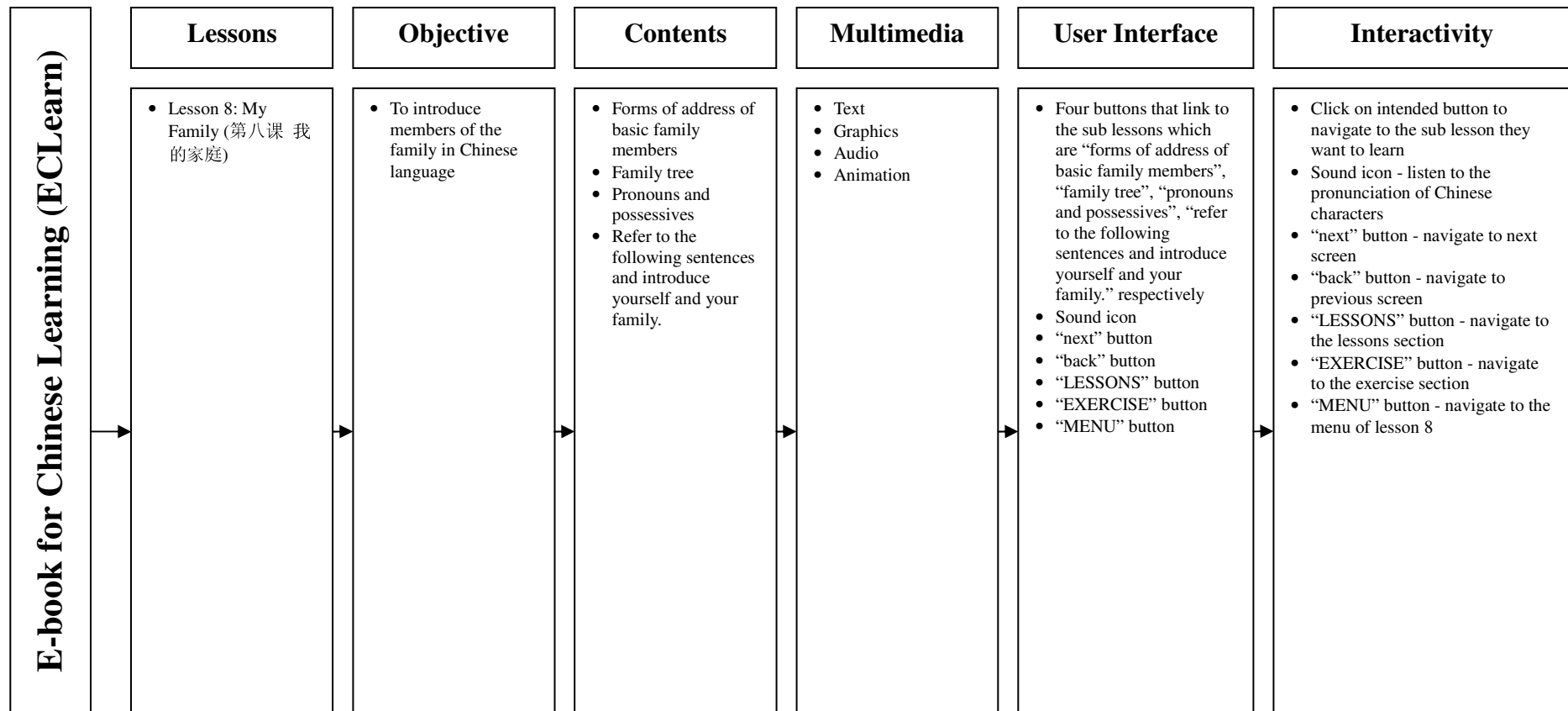
Learning contents design model of ECLearn (Continued)



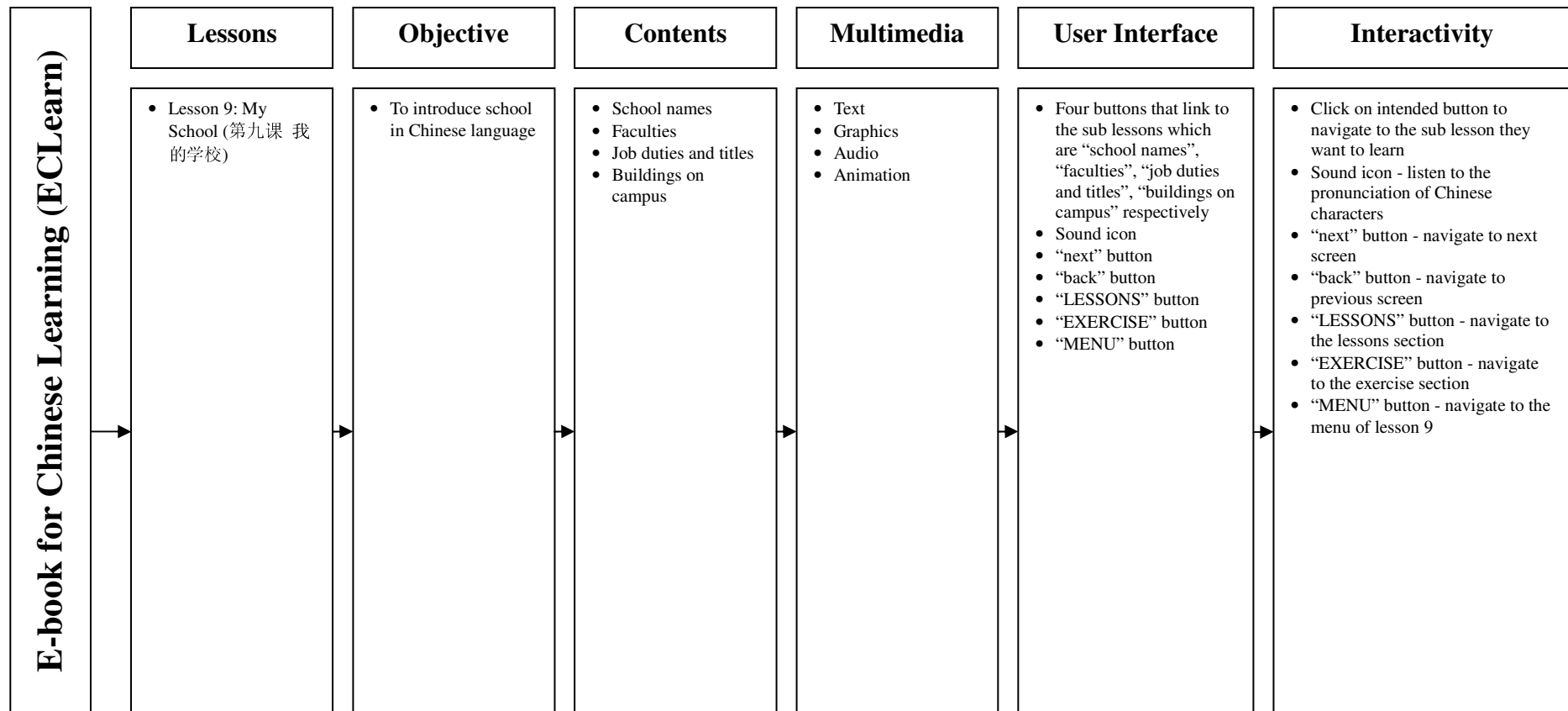
Learning contents design model of ECLearn (Continued)



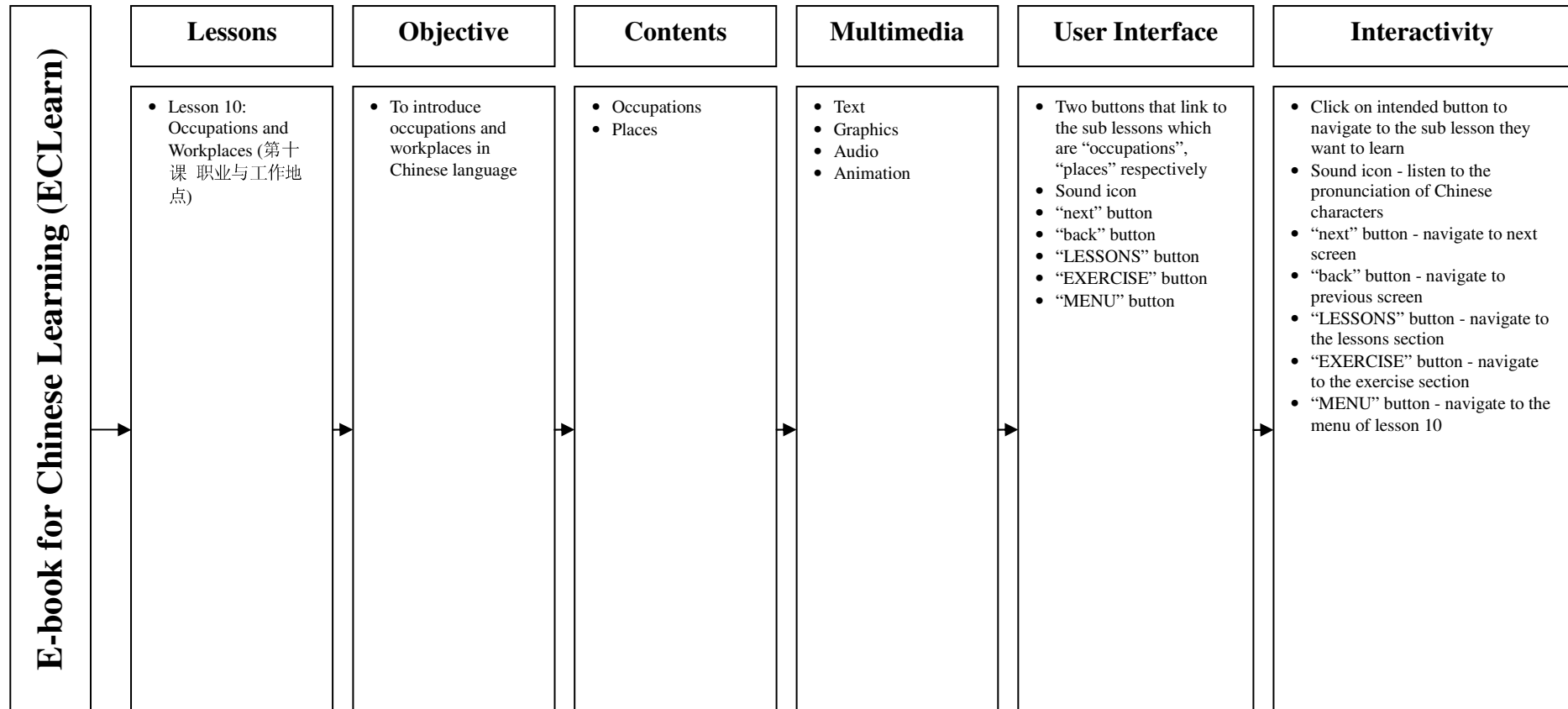
Learning contents design model of ECLearn (Continued)



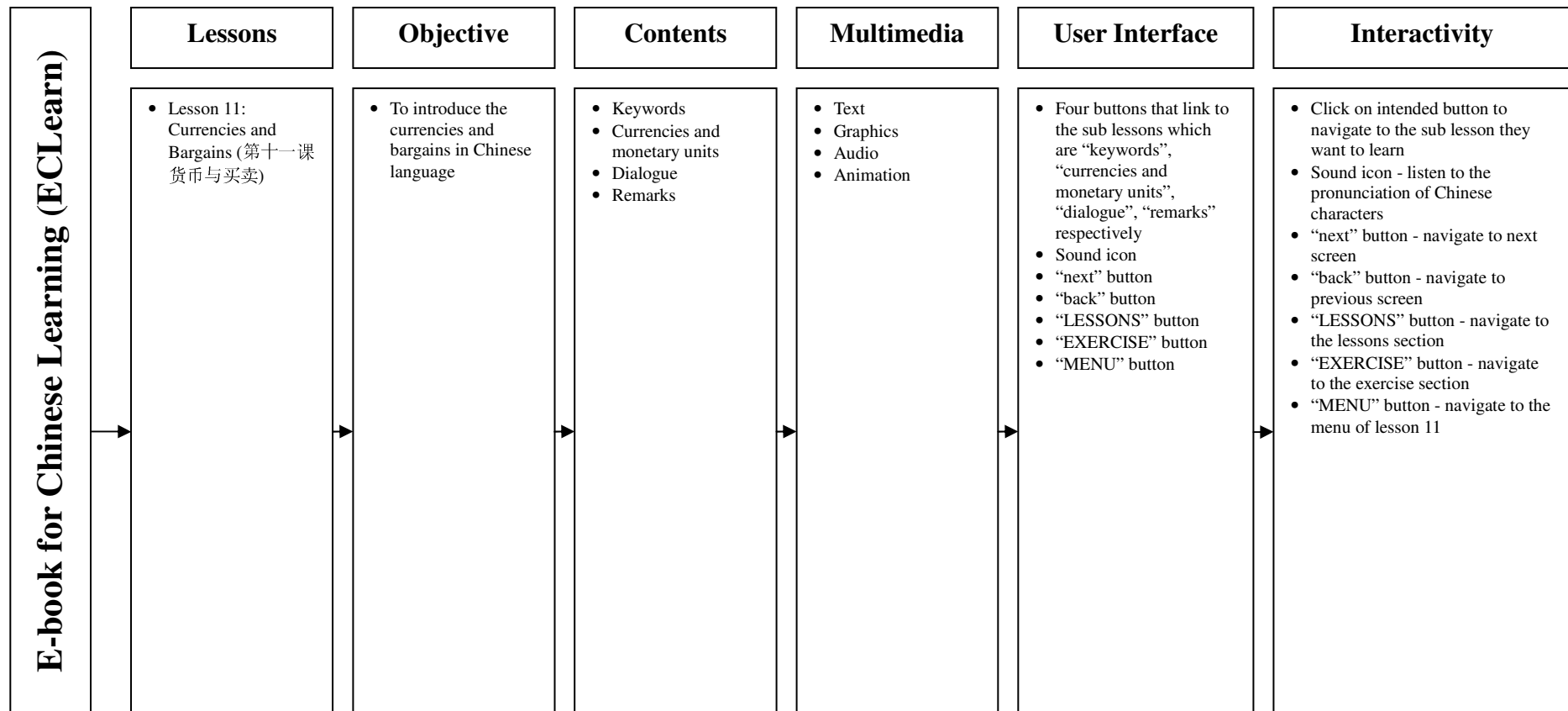
Learning contents design model of ECLearn (Continued)



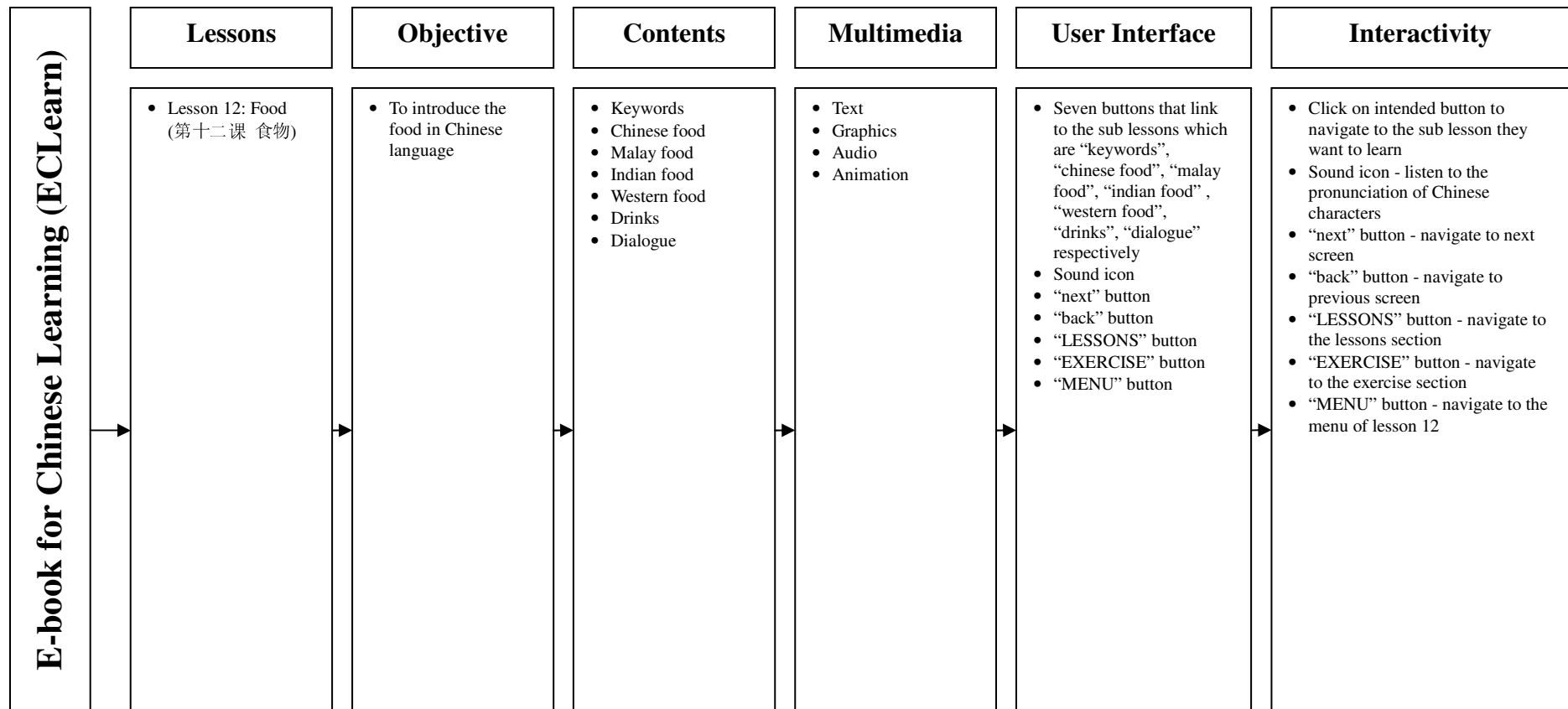
Learning contents design model of ECLearn (Continued)



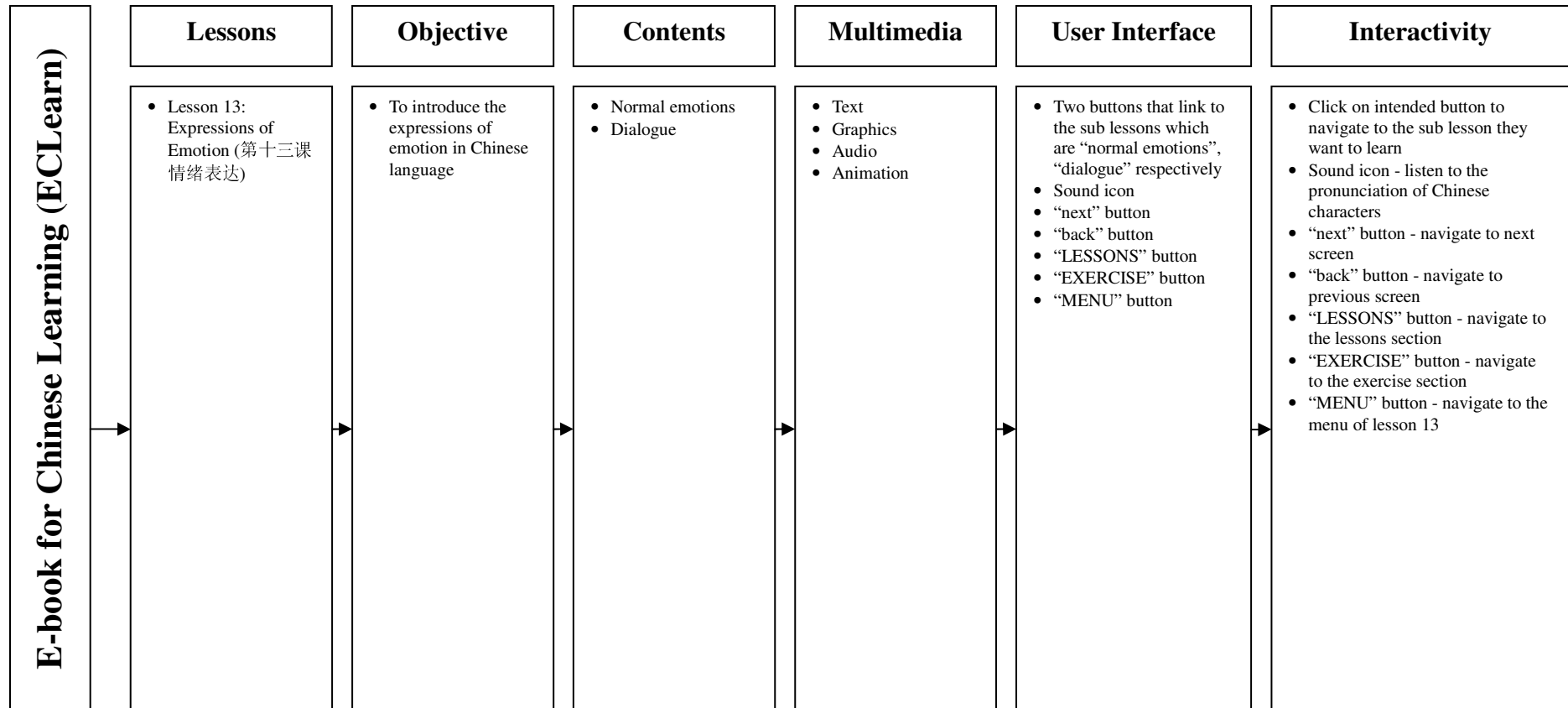
Learning contents design model of ECLearn (Continued)



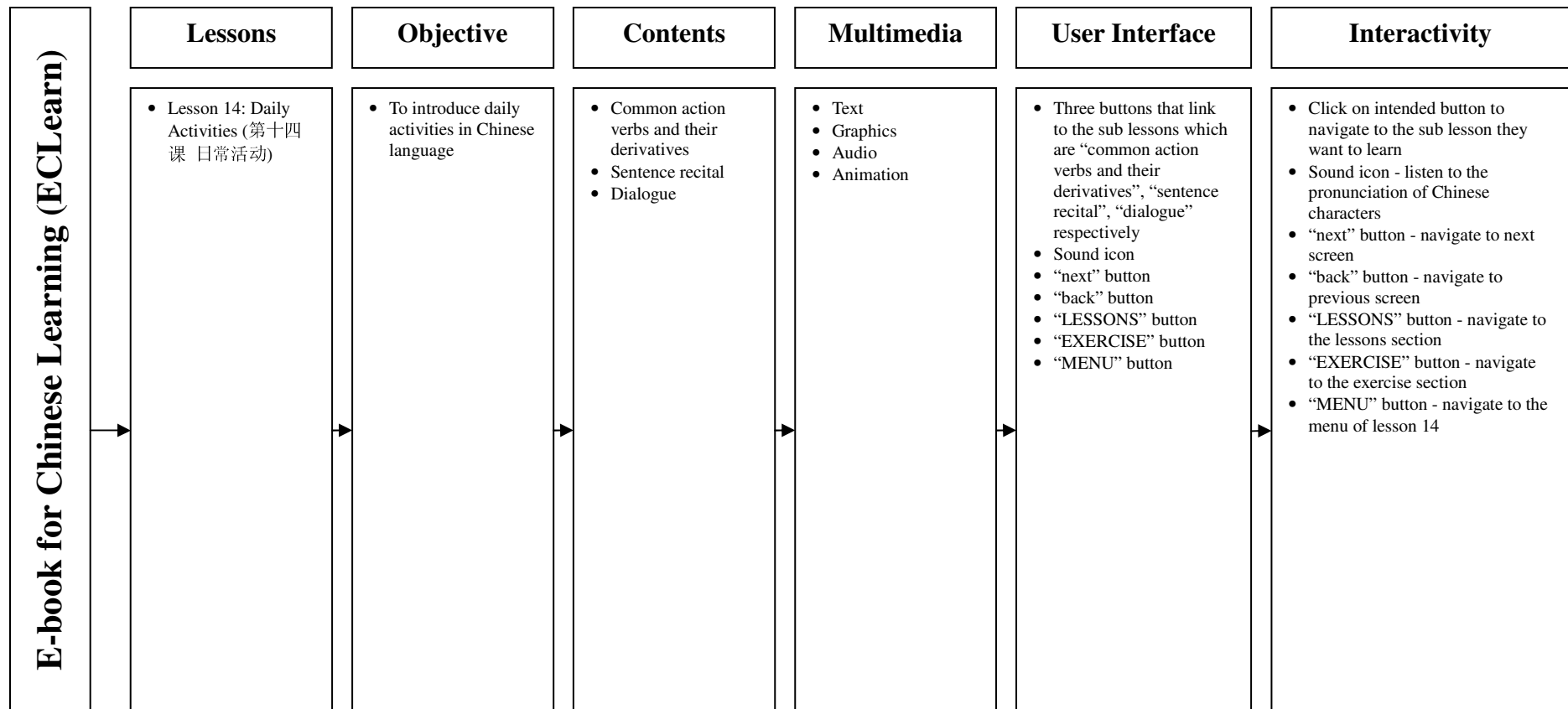
Learning contents design model of ECLearn (Continued)



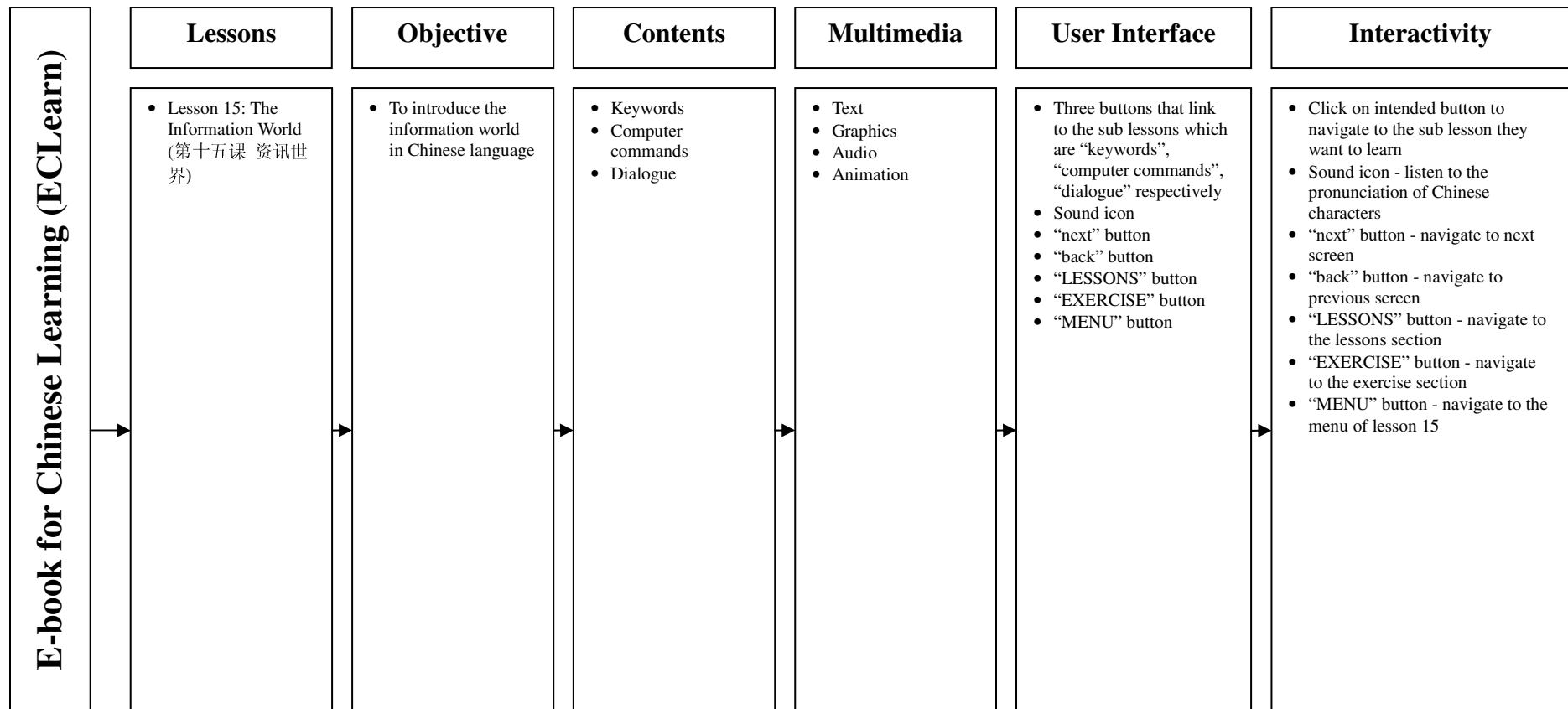
Learning contents design model of ECLearn (Continued)



Learning contents design model of ECLearn (Continued)



Learning contents design model of ECLearn (Continued)



Learning contents design model of ECLearn (Continued)

Appendix F

The Usability Evaluation Questionnaire



UNIVERSITI TUNKU ABDUL RAHMAN

Dear Participant,

My name is Pang Set Weei and I am a Master student at Universiti Tunku Abdul Rahman. For my Master's project, I am examining the efficacy of a blended learning environment through the use of an interactive multimedia e-book in teaching-learning Chinese as a second language. Because you are taking the elective subject "Introduction to Chinese Language I", I am inviting you to participate in this research study by completing the attached surveys. In order for the results of this survey to truly represent your thinking, it is important that you fully complete the enclosed questionnaire.

The following questionnaire will require approximately 30-min to complete. The answers to this questionnaire are absolutely confidential. Your name will never be placed on the questionnaire. No individual responses will be reported. Please answer all questions as honestly as possible with reference to the interactive multimedia e-book given and return the completed questionnaires promptly to your lecturer who helps me to conduct the survey.

Thank you for taking the time to assist me in my educational endeavours. The data collected will provide useful information regarding the ease-of-use of functionalities provided in the e-book. If you require additional information or have questions, please contact me at the number listed below.

Sincerely,

Pang Set Weei

Pang Set Weei
Tel: 016-6334047
E-mail: xuewei_86@hotmail.com

Instruction: Please tick [✓] the relevant column whether you Strongly Disagree, Disagree, Neither Agree nor Disagree (Neutral), Agree or Strongly Agree with each of the following statements.

Note:

Score Value	1	2	3	4	5
Indicator	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Section A: User Interface Design						
No.	Item Questions	1	2	3	4	5
A1.	Screens designed in a clear and understandable manner.					
A2.	The presentation of information can captivate the attention of students.					
A3.	Text usage is suitable in the contents.					
A4.	Graphics usage is suitable in the contents.					
A5.	Colour usage is suitable in the contents.					
A6.	The sound is of good quality and enhances the presentation of information.					
A7.	The sound is an alternative means of presenting information and not a necessity.					
A8.	The video enhances the presentation of information.					
A9.	Animation helps in understanding the contents presented.					
A10.	Design for every module is consistent.					

Section B: Navigation and Interactivity						
No.	Item Questions	1	2	3	4	5
B1.	This e-book provides opportunities for interaction with standardised icons.					
B2.	The navigation buttons used are easily identified according to their functions.					
B3.	The navigational buttons are consistently placed in each lesson.					
B4.	Able to move from one page to another easily.					
B5.	Help information in the e-book provides useful guide to the user.					

Section C: Content						
No.	Item Questions	1	2	3	4	5
C1.	Information of sufficient scope and depth.					
C2.	The content is interesting.					
C3.	Systematic presentation of contents.					
C4.	Easily understood examples given.					
C5.	The content is structured in a clear and understandable manner.					
C6.	The structure allows learners to move around freely in different units.					

Section D: Students' Perception towards the Use of Interactive Multimedia E-Book in Chinese Learning compared to Printed Textbook in a Blended Learning Environment						
No.	Item Questions	1	2	3	4	5
D1.	I prefer to learn Chinese with an interactive multimedia e-book instead of using textbook.					
D2.	Learning Chinese with an interactive multimedia e-book that provides interactive exercises and activities is more interesting than using textbook.					
D3.	The activities provided in this interactive multimedia e-book are more effective compared to classroom activities.					

Thank you for completing this questionnaire

Appendix G

Achievement Test Questions for Pre- and Post- Tests

Pre-Test Questions

Instructions: CIRCLE the letter of the correct choice for each of the following questions.

- yǐ xià nǎ yī gè shì de hàn yǔ pīn yīn
1. 以下 哪一个 是 “梨 (Pear)” 的 汉语 拼音?
- Which of the following is the *Hanyu Pinyin* of “梨 (Pear)”?
- A. lī
B. lí
C. lǐ
D. lì
- yǐ xià nǎ yī gè hàn zì de fā yīn wéi
2. 以下 哪一个 汉 字的 发音 为 “guó”?
- Which of the following Chinese character is pronounced as “guó”?
- A. 过 (To cross)
B. 果 (Fruit)
C. 国 (Country)
D. 锅 (Pot)
- péng zì de bǐ huà shì duō shǎo huà
3. “朋 (Friend)” 字 的 笔画 是 多少 画?
- How many strokes is the Chinese character “朋 (Friend)”?
- A. 6
B. 8
C. 10
D. 12
- yǐ xià nǎ yī gè hàn zì de bǐ huà shì huà
4. 以下 哪一个 汉 字的 笔画 是 6 画?
- Which of the following Chinese character having the number of strokes equal to 6?
- A. 人 (People)
B. 外 (Outside)
C. 回 (Return)
D. 森 (Forest)

yǐ xià nǎ yī gè shì de hàn yǔ pīn yīn
5. 以下 哪一个 是 “早安 (Good morning)” 的 汉语 拼音?
Which of the following is the *Hanyu Pinyin* of “早安 (Good morning)”?

- A. zāo ān
- B. záo ān
- C. zǎo ān
- D. zào ān

yǐ xià nǎ yī gè hàn zì de fā yīn wéi
6. 以下 哪一个 汉字 的 发音 为 “zài jiàn”?
Which of the following Chinese character is pronounced as “zài jiàn”?

- A. 再聊 (Talk to you later)
- B. 晚安 (Good night)
- C. 再见 (Goodbye)
- D. 午安 (Good afternoon)

yǐ xià nǎ yī gè shì de hàn yǔ pīn yīn
7. 以下 哪一个 是 “对不起 (Sorry)” 的 汉语 拼音?
Which of the following is the *Hanyu Pinyin* of “对不起 (Sorry)”?

- A. duī bù qǐ
- B. duì bu qǐ
- C. duì bù qǐ
- D. duī bu qǐ

yǐ xià nǎ yī gè shì de hàn yǔ pīn yīn
8. 以下 哪一个 是 “谢谢 (Thank you)” 的 汉语 拼音?
Which of the following is the *Hanyu Pinyin* of “谢谢 (Thank you)”?

- A. xiē xie
- B. xié xie
- C. xiě xie
- D. xiè xie

yǐ xià nǎ yī gè hàn zì de fā yīn wéi
9. 以下 哪一个 汉字 的 发音 为 “kè qi”?
Which of the following sentence is pronounced as “kè qi”?

- A. 我们 (We)
- B. 麻烦 (Trouble)
- C. 水果 (Fruit)
- D. 客气 (Polite)

qǐng jiāng zhuǎn huàn chéng hàn zì
10. 请 将 “90” 转 换 成 汉 字。
Please change “90” into CHINESE CHARACTERS.

- A. 九
- B. 九十
- C. 九百
- D. 九千

qǐng jiāng zhuǎn huàn chéng shù zì
11. 请 将 “六百三十五” 转 换 成 数 字。
Please change “六百三十五” into NUMBERS.

- A. 635
- B. 6350
- C. 653
- D. 6530

yǐ xià nǎ yī jù bú shì zì wǒ jiè shào de jù zǐ
12. 以下 哪 一 句 **不是** 自 我 介 绍 的 句 子?
Which of the following sentence is **not** self-introduction sentence?

- A. 我今年二十一岁。
- B. 我的朋友住在沙巴。
- C. 我是一名学生。
- D. 我在吉隆坡工作。

yǐ xià nǎ yī jù shì “May I know where you live?”
13. 以下 哪 一 句 是 “May I know where you live?”
Which of the following sentence is “May I know where you live?”?

- A. 请问你在哪里念书?
- B. 请问你今年几岁?
- C. 请问你住在哪里?
- D. 请问你在哪里工作?

zhè gè jù zǐ zěn me dú
14. “我喜欢过生日 (I like birthday parties)”, 这个 句 子 怎 么 读?
“我喜欢过生日 (I like birthday parties)”, how to read this sentence?

- A. wǒ xǐ huan guò shēng rì
- B. wǒ xǐ huan guò shēng rì
- C. wǒ xǐ huan guǒ shēng rì
- D. wǒ xǐ huan guò shèng rì

Post-Test Questions

Instructions: CIRCLE the letter of the correct choice for each of the following questions.

- yǐ xià nǎ yī gè shì de hàn yǔ pīn yīn
1. 以下 哪一个 是 “哥哥 (Brother)” 的 汉语 拼音?
Which of the following is the *Hanyu Pinyin* of “哥哥 (Brother)”?
- A. gē gē
B. gē gé
C. gē gě
D. gē ge
- yǐ xià nǎ yī gè hàn zì de fā yīn wéi
2. 以下 哪一个 汉字 的 发音 为 “xí fù”?
Which of the following Chinese character is pronounced as “xí fù”?
- A. 女婿 (Son-in-law)
B. 媳妇 (Daughter-in-law)
C. 妹夫 (Brother-in-law)
D. 弟媳 (Sister-in-law)
- yǐ xià nǎ yī gè shì de hàn yǔ pīn yīn
3. 以下 哪一个 是 “教授 (Professor)” 的 汉语 拼音?
Which of the following is the *Hanyu Pinyin* of “教授 (Professor)”?
- A. jiāo shòu
B. jiáo shòu
C. jiǎo shòu
D. jiào shòu
- yǐ xià nǎ yī gè hàn zì de fā yīn wéi
4. 以下 哪一个 汉字 的 发音 为 “shì tīng guǎn”?
Which of the following Chinese character is pronounced as “shì tīng guǎn”?
- A. 图书馆 (Library)
B. 博物馆 (Museum)
C. 体育馆 (Stadium)
D. 视听馆 (Audio-visual centre)

yǐ xià nǎ yī gè shì ní shuǐ jiàng de gōng zuò dì diǎn
5. 以下 哪一个 是 泥水匠 的 工作 地点?
Which of the following is the workplace of bricklayer?

- A. 街道
- B. 菜园
- C. 木板厂
- D. 建筑工地

yǐ xià nǎ yī gè hàn zì shì
6. 以下 哪一个 汉字 是 “Italy”?
Which of the following Chinese character is “Italy”?

- A. 新加坡
- B. 意大利
- C. 加拿大
- D. 菲律宾

yǐ xià nǎ yī gè shì de hàn yǔ pīn yīn
7. 以下 哪一个 是 “盾 (Indonesian Rupiah)” 的 汉语 拼音?
Which of the following is the *Hanyu Pinyin* of “盾 (Indonesian Rupiah)”?

- A. jiǎo
- B. dùn
- C. xiān
- D. fēn

yǐ xià nǎ yī gè hàn zì de fā yīn wéi
8. 以下 哪一个 汉字 的 发音 为 “gǎng yuán”?
Which of the following Chinese character is pronounced as “gǎng yuán”?

- A. 港元 (Hong Kong Dollars)
- B. 令吉 (Ringgit Malaysia)
- C. 韩圆 (Korean Won)
- D. 马克 (Deutsche Mark)

yǐ xià nǎ yī gè hàn zì de fā yīn wéi
9. 以下 哪一个 汉字 的 发音 为 “niú pá”?
Which of the following Chinese character is pronounced as “niú pá”?

- A. 牛扒 (Steak)
- B. 羊扒 (Mutton chop)
- C. 猪扒 (Pork chop)
- D. 鸡扒 (Chicken chop)

yǐ xià nǎ yī gè shì de hàn yǔ pīn yīn
10. 以下 哪一个是“果汁 (Juice)”的汉语拼音?
Which of the following is the *Hanyu Pinyin* of “果汁 (Juice)”?

- A. nǎi chá
- B. qì shuǐ
- C. měi lù
- D. guǒ zhī

yǐ xià nǎ yī gè shì de hàn yǔ pīn yīn
11. 以下 哪一个是“生气 (Angry)/ 愤怒 (Resented)”的汉语拼音?
Which of the following is the *Hanyu Pinyin* of “生气 (Angry)/ 愤怒 (Resented)”?

- A. shēng qì / fén nù
- B. shēng qí / fēn nù
- C. shēng qǐ / fèn nù
- D. shēng qì / fèn nù

yǐ xià nǎ yī gè hàn zì de fā yīn wéi
12. 以下 哪一个汉字的发音为“kāi xīn”?
Which of the following Chinese character is pronounced as “kāi xīn”?

- A. 兴奋 (Excited)
- B. 开心 (Cheerful)
- C. 平静 (Calm)
- D. 难过 (Upset)

yǐ xià nǎ yī gè shì de hàn yǔ pīn yīn
13. 以下 哪一个是“吃饭 (Eat rice)”的汉语拼音?
Which of the following is the *Hanyu Pinyin* of “吃饭 (Eat rice)”?

- A. kàn xī
- B. xiě zì
- C. chī fàn
- D. hē shuǐ

zhè gè jù zǐ zěn me dú
14. “打架是不良的行为 (Fighting is a bad behaviour)”, 这个句子怎么读?
“打架是不良的行为 (Fighting is a bad behaviour)”, how to read this sentence?

- A. dǎ jià shì bù liáng de xíng wéi
- B. dá jiǎ shí bù liàng de xǐng wèi
- C. dǎ jià shì bù liáng de xíng wéi
- D. dà jiǎ shí bù liàng de xǐng wèi

yǐ xià nǎ yī gè shì diàn nǎo zhǐ lìng zì cí
15. 以下 哪一个 **是** 电 脑 指 令 字 词?
Which of the following *is* computer command?

- A. 电脑
- B. 复制
- C. 网站
- D. 软件

Appendix H

Results of Cronbach's Analysis

Reliability of User Interface Design

RELIABILITY ANALYSIS – SCALE (ALPHA)

Item	Mean	Std Dev	Cases
A1	3.60	0.516	10
A2	3.30	0.675	10
A3	3.20	0.919	10
A4	2.80	0.919	10
A5	3.60	0.516	10
A6	3.40	0.699	10
A7	3.90	0.568	10
A8	3.50	0.527	10
A9	3.70	0.675	10
A10	3.80	0.422	10

No. of cases = 10

Reliability Coefficients 10 items

Alpha = 0.835 Standardised item alpha = 0.850

Reliability of Navigation and Interactivity

RELIABILITY ANALYSIS – SCALE (ALPHA)

Item	Mean	Std Dev	Cases
B1	3.70	0.483	10
B2	3.70	0.823	10
B3	3.90	0.316	10
B4	3.90	0.316	10
B5	4.00	0.667	10

No. of cases = 10

Reliability Coefficients 5 items

Alpha = 0.849 Standardised item alpha = 0.897

Reliability of Content

RELIABILITY ANALYSIS – SCALE (ALPHA)

Item	Mean	Std Dev	Cases
C1	3.60	0.516	10
C2	3.30	0.675	10
C3	3.40	0.516	10
C4	3.70	0.675	10
C5	3.50	0.527	10
C6	3.60	0.516	10

No. of cases = 10

Reliability Coefficients 6 items

Alpha = 0.822 Standardised item alpha = 0.821

Reliability of Students' Perception

RELIABILITY ANALYSIS – SCALE (ALPHA)

Item	Mean	Std Dev	Cases
D1	3.30	0.675	10
D2	3.80	0.422	10
D3	3.70	0.823	10





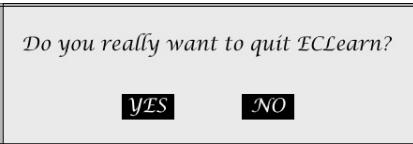
No. of cases = 10

Reliability Coefficients 3 items

Alpha = 0.809 Standardised item alpha = 0.852

Appendix I

Samples of ActionScript

Navigational Button	ActionScript
 <p>“LESSONS” button</p>	<pre>on(release) { stopAllSounds(); btnSound.start(); _level0.loadMovie("lessons.swf"); }</pre>
 <p>“HELP” button</p>	<pre>on(release) { btnSound.start(); popup.displayPopup("popup_help"); }</pre>
 <p>“NEXT” button</p>	<pre>on(release) { btnSound.start(); nextFrame(); }</pre>
 <p>“EXERCISE” button</p>	<pre>on(release) { btnSound.start(); gotoAndPlay(20); }</pre>
 <p>“YES” button</p>	<pre>on (release) { btnSound.start(); fscommand("quit"); }</pre>