CONCEPTUAL DESIGN OF REALITY LEARNING MEDIA (RLM) MODEL BASED ON ENTERTAINING AND FUN CONSTRUCTS

A thesis submitted to the Graduate Studies Unit, Academic Affaifs Department in full fulfillment of the requirement for the degree of

Doctor of Philosophy

Applied Sciences,
College of Arts and Sciences,
Universiti Utara Malaysia

By

Ariffin Abdul Mutalib
April 2009

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Ariffin Abdul Mutalib
15 April 2009

ABSTRACT

Many **e**Learning **m**aterials (**eLM**) have been developed for use in education and training. However, studies report that the investments on the courseware projects do not show good returns. Furthermore, the use and perception of teachers and students on eLM, such as courseware on CDs, are very low. In fact, many schools have stopped using courseware in the classrooms.

Many factors were identified influencing the disadvantages of courseware implementation in eLearning; nevertheless the way learning content in the eLM is blended and presented to learners is seen as one of the reasons. Existing eLM are found to be not entertaining and not invoking fun, making learners feel bored. In Interaction Design, although many guidelines have stated entertaining and fun as two important design elements, many developers still produced contents that failed to include these elements. One possible reason for this is the nature of fun and entertaining that are difficult to be realized without technical skills and creativity. This leads to the following research questions: (1) How to ensure that learning content is perceived entertaining and invoking fun by the end users?, (2) Can entertaining and fun learning material be effective?, and (3) How to enable instructors especially the non-technically-skilled to produce eLM that are considered entertaining and invoking fun?

Answering these questions leads this study to propose a conceptual design model of eLM which is able to ensure content is entertaining and invoking fun as perceived by the end users. Inspired by the famous reality TV shows, the proposed model is called Reality Learning Media (RLM). Therefore, the aim of the study is to propose a conceptual design model of RLM. To accomplish that, four specific objectives are formulated: (1) To determine the components of RLM, (2) To propose the conceptual design model of RLM, (3) To validate the conceptual design model of RLM through prototyping, and (4) To investigate user experience of RLM in terms of entertaining, fun, and effectiveness.

Comparative analysis, peer and expert reviews, content analysis, prototyping, and experimental studies are used to accomplish the objectives and aim. General findings show that RLM is perceived entertaining; in fact it is more entertaining than video and courseware. In addition, hypotheses-specific testings using one sample t-Test, independent samples t-Test, and ANOVA reveal that regardless of gender, academic achievement levels, and other eLM experience (before learning with RLM), respondents perceived RLM as entertaining and fun. Not only that, RLM is proven to be effective in delivering learning contents.

The main contributions of this study are the concept of reality video that has been put forward, the development of the conceptual design model together with the prototypes of the RLM. Apart from these, the recording techniques for RLM and the validated instrument measuring entertaining and fun are also significant contributions to the body of knowledge.

ABSTRAK

Pelbagai bahan pembelajaran elektronik (eLM) telah dibangunkan untuk kegunaan latihan dan pendidikan. Namun, banyak kajian melaporkan bahawa pelaburan terhadap projek-projek pembangunan koswer tidak menunjukkan hasil yang baik. Tambahan pula, penggunaan dan persepsi guru dan pelajar terhadap eLM, seperti koswer, adalah sangat rendah. Malah, kebanyakan sekolah tidak lagi menggunakan koswer dalam pembelajaran.

Beberapa faktor dikenalpasti mempengaruhi kelemahan penggunaan koswer dalam eLearning; termasuk cara bahan pembelajaran diolah dan dipersembah kepada pelajar. ELM yang sedia ada didapati tidak menghiburkan (*entertaining*) dan tidak membuatkan pelajar seronok (*fun*) sebaliknya menyebabkan pelajar menjadi bosan. Dalam Rekabentuk Interaksi (ID), walaupun kebanyakan garis panduan meletakkan *entertaining* dan *fun* di kalangan elemen rekabentuk yang penting, pembangun aplikasi dilihat gagal memuatkan elemen-elemen tersebut. Satu kemungkinan adalah sifat *entertaining* dan *fun* yang sukar dibentuk tanpa kreativiti dan kemahiran teknikal. Keadaan ini membawa kepada persoalan; (1) bagaimana memastikan kandungan pembelajaran *entertaining* dan *fun* dari sudut persepsi pengguna? (2) Bolehkah kandungan pembelajaran yang *entertaining* dan *fun* menjadi efektif? (3) Bagaimanakah cara membolehkan pengajar terutama yang tidak mempunyai kemahiran teknikal menghasilkan eLM yang *entertaining* dan *fun*?

Bagi mencari jawapan, kajian ini mengusulkan satu model rekabentuk konsep bagi eLM yang membolehkan kandungan dilihat *entertaining* dan *fun* dari sudut persepsi pengguna. Mendapat inspirasi dari rancangan TV realiti, model yang dicadangkan diberi nama *Reality Learning Media* (RLM). Maka, matlamat kajian ini adalah untuk mengusulkan model rekabentuk konsep bagi RLM. Untuk mencapai matlamat ini, empat objektif dibentuk iaitu untuk: (1) mengenalpasti komponen RLM, (2) mencadangkan model rekabentuk konsep bagi RLM, (3) mengesahkan model yang dicadangkan melalui pembangunan prototaip, dan (4) mengukur persepsi pengguna terhadap pengalaman menggunakan RLM dari segi *entertaining*, *fun*, dan keberkesanan.

Analisis perbandingan, penilaian oleh pakar dan rakan (*peer*), analisis kandungan, pembangunan prototaip, dan kajian bereksperimen digunakan bagi mencapai objektif. Dapatan umum melalui persepsi pelajar menunjukkan RLM adalah menghiburkan, malah lebih dari video dan koswer. Ujian hipotesis melalui *t-Test, Independent Sample t-Test*, dan ANOVA mendapati bagi sebarang jantina, tahap pencapaian akademik, pengalaman eLM selain RLM, RLM adalah *entertaining* dan *fun*. Lebih dari itu, RLM juga didapati menyampaikan kandungan pembelajaran dengan berkesan.

Sumbangan utama dari kajian ini termasuk konsep video realiti, pembangunan model rekabentuk konsep bagi RLM beserta prototaipnya. Selain itu, teknik merekod bagi penghasilan RLM dan instrumen penilaian aspek *entertaining* dan *fun* yang telah diujisahkan adalah sumbangan yang signifikan kepada bidang ilmu.

ACKNOWLEDGEMENT

On top of everything, The Almighty God knows better...

I feel so grateful for being able to have substance, time, health, strength, and patience to engage in this journey to acquire knowledge; which comes with blessing from the God...

Many thanks to my supervisor, Assoc. Prof. Dr. Norshuhada Shiratuddin, for guiding me to perform at my best in this study. Your swift feedbacks with full of inspirations have made me more motivated and enjoyed with this study from start to finish.

Deep in my heart I realize that my late father and late mother have taught me a lot, to be who I am today. Now, I really value their words...they were good teachers to me and my siblings. To my brothers and sisters: You all are my entertainment. Thank you for raising me with love, courage, and attention. You are my good teachers too.

Thank you, the Malaysian Ministry of Higher Education, and Universiti Utara Malaysia, for providing me with financial support and study leave.

I have many friends to thank to, but am not possible to list all. In short, thank you to those who always laugh with me, play squash, go fishing, go camping, and mount climbing with me; especially Abg. M., Remi, Dr. Osman, Farhan; Those activities really freshen my mind, and accelerated my speed in my study.

A special acknowledgement to my wife, Yuhainis Mohd Yusoff. I may have hidden my gratitude to you but deep in my heart, I appreciate you very much. You are stronger than I am, in many situations. We share difficult moments together, shoulder every pain that we have gone through... This gave me strength a lot, opened up my mind that I really have to work smart. I pray to the God that you have a special place in the hereafter...

To my children; Ahmad Daniel, Nur Qistina (Iman), Nur Batrisyia, and Nur Haifa Mardhiah;: I miss you everyday. You entertain me every time I need. I really appreciate you all for being my very good children...

Ariffin Abdul Mutalib

Universiti Utara Malaysia
15 April 2009

DEDICATION

In the name of Allah, The Most Beneficient, Most Merciful

Al-Fatehah

To my late father, Abdul Mutalib Hj. Arshad
To my late mother, Zawiyah Abu Bakar
To my family and friends, who believe in me…

Ariffin Abdul Mutalib

Universiti Utara Malaysia
15 April 2009

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LIST OF ABBREVIATIONS

Abbreviation	Complete Terminology
ACHA	Analytical, Constructive, and Hypothetico Approach
AICC	Aviation Industry CBT Committee
ANOVA	One Way Analysis of Variance
API	Application Protocol Interface
ATI	Aptitude Treatment Instruction
BTP, KPM	Bahagian Teknologi Pendidikan, Kementerian Pelajaran Malaysia
CAI	Computer-Aided Instruction
CAL	Computer Assisted Learning
CBL	Computer-Based Learning
CBT	Computer-Based Training
CCC	Content Composition Components
CD	Compact Disc
CE	Courseware Engineering
CGPA	Cumulative Grade Point Average
CTGV	Cognition and Technology Group at Vanderbilt
DVD	Digital Video Disc
eBook	Electronic Book
EIDA	Elicitative, Investigative, and Deductive Approach
eLM	Electronic Learning Materials
EPEES	Ensure, Provide, Engage, Establish, Strengthen
ETP	Educational TV Programme
Fh IESE	Fraunhofer Institute of Experimental Software Engineering
HCI	Human-Computer Interaction
HLI	Higher Learning Institution
IADIS	International Association for Development of the Information Society
ICT	Information and Communication Technology
ID	Interaction Design
IMM	Interactive Multimedia
ISO	International Organization for Standardization
JAD	Joint Application Development
KMO	Kaiser-Meyer-Olkin
LCMS	Learning Content Management System
LMS	Learning Management System
LO	Learning Object
MSA	Measure of Sampling Adequacy
MSS	Multiple Sources System
OUM	Open University of Malaysia
PC	Personal Computer
Q-MEF	Questionnaire for Measuring Entertaining and Fun
QUIS	Questionnaire for User Interaction Satisfaction
QVRT	Quick Video Recording Technique
RAD	Rapid Application Development

RLM	Reality Learning Media
RSS	Really Simple Syndication
RTS	Reality TV Shows
SC	Structural Components
SCORM	Sharable Courseware Object Reference Model
SE	Software Engineering
SUMI	Software Usability Measurement Inventory
SUS	System Usability Scale
TAM	Technology Acceptance Model
UNITAR	Universiti Tun Abdul Razak
VBL	Video-Based Learning
VC	Virtual Classroom
VCD	Video Compact Disc
XML	Extensible Markup Language

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Learning is a common process for everybody. Naturally from birth, a person will start to learn, and the learning process will mature together with the cognitive and physical development. As the learning processes mature, the kind of learning methods including formal and informal change and blend, to equip the person with more and more new knowledge. Learning processes and techniques evolve to align with chronicle factors. In this 21st century, learning is closely associated with technology.

Beginning with analog learning method, technology advancement has led to more sophisticated digital learning environments. Benefits of digital technologies can be seen in terms of content diversity; more media can be used more widely including text, graphics, animation, audio, video, and interactivity (Chapman & Chapman, 2000). This gives many impacts to the field of education where teaching and learning are involved. Accordingly, many academics have been carrying out research to investigate how learning and its facilitation can be more effective.

This scenario has given better opportunities for communities to learn. Gradually, not only learning in traditional environment where attending classes is essential, but also communities can learn online with the help of digital technologies. With this, learning can occur anywhere, anytime, and by anybody; a common current scenario which is famously known as electronic learning (eLearning). The motivation of this study is accelerated by the situation as described in the next section.

1.2 MOTIVATION OF STUDY

eLearning is a modern method of learning which is defined by Govindasamy (2002) as delivering content through all electronic media including Internet, intranet, extranet, satellite, audio, video, interactive TV, and CD-ROM. It is not replacing the traditional method, but complementing it. This provides better access to information, because besides accessing the information in traditional ways, information can also be accessed electronically. This is also inline and parallel with methods of storing information, some are in forms of printed and bound, and some are in the form of electronic resources.

eLearning **m**aterials (**eLM**) are used for many purposes such as education (Liaw & Huang, 2002; Halimah, 1995; Halimah, Norhayati, Nor Azan, Tengku Mohd, Mohamad Yusoff, & Munir 2000; Norashiken & Halimah, 2006), manufacturing (Zimmermann, 2005), medication (Qussay, Abdul Rahman, Rozi, & Rahmita, 2004), and collaboration (Turban, Leidner, McLean, & Wetherbe, 2006). There are different approaches of eLM; electronic book (eBook) (Norshuhada, Shahizan, Asmidah, Ariffin, Khairul Bariah, Ruslizam, Syamsul Bahrin, & Zakirah, 2003), courseware, training, intensive assessment, tutorial, and simulation (Sabri & Zainul Akramin, 2001). eLM must be designed suitable to the target learners, so some pedagogical or andragogical aspects and other learning concepts must be considered during the design and development processes.

In those materials, media elements such as texts, images, graphics, animations, audio, and video are important. Blending of these elements creates different learning experiences. However, they must be used only when appropriate. Preece, Rogers, and Sharp (2007) argue that information overload will lead to cognitive overload. One of the reasons that leads to information overload is misused of media elements (Wickens, Gordon, & Liu 1998).

One of the powerful media elements is video. A video scene can contain other media elements such as texts, images, graphics, animations, and audio. More importantly, live motions of real human could also be recorded and presented as part of the main content in eLM. Normally, videos consist of some scenes, joined together following some preplanned flows as storyboarded earlier in the design phase (Chapman & Chapman, 2002). The final products are videos that have been edited. Editing process could include sequencing all clips, cutting undesired parts, and synchronizing the sequence of clips. Applying some forms of transitions will make-up the results better. Videos output from this typical way of composition can be called **cut videos**. An alternative approach of composing video does not require creators to edit the video. Everything captured in the videos is not cut, but is delivered as part of the contents. Videos from this process are referred to as **uncut video**. Inspired from the reality TV shows, the uncut videos could also be referred to as **reality videos** (Ariffin & Norshuhada, 2007).

In other aspect of eLearning issues, Higher Learning Institutions (HLI) are moving towards implementing eLearning in teaching and learning. Initiatives have been carried out by deploying sufficient infrastructures. Online communication among students, administration offices and academics can be seen in all HLI. There are two virtual universities in Malaysia; Open University (OUM) and Universiti Tun Abdul Razak (UNITAR). Another is K-FORCE, a special HLI designed and developed for army, which runs programs and commissioned by UNITAR. They fully run their programs in virtual environments. Those universities provide eLM to students, in the form of slides, notes, and courseware for certain courses. Other HLIs also provide eLM for students in the same formats; notes, slides, and courseware. Obviously, students prefer to download the notes and slides so that they could print and read on paper. These materials are then turned into printed and bound. Meanwhile, few students learn using the provided courseware, especially those in virtual universities. Coursewares in the virtual universities are provided by the department, not by the instructors who take-charge of the particular courses. In the matter of conventional universities, very rare lecturers provide their students with courseware.

Inline with the above situation, it has to be realized that the Learning Object (LO) component of eLearning systems is not made full use by both academics and students. Access to the content in LO is well supported by the sophisticated infrastructures i.e. learning management system (LMS) and learning content management system (LCMS), which means the technologies are ready. In contrast, human factors need to be looked into for making the eLearning system works better in terms of content provision, access, and viewing online. In the previous paragraph, it is stated that very few lecturers or course instructors provide courseware, and not many students access the provided courseware to view the content. The reasons for these should be further addressed.

1.3 PROBLEM STATEMENT

Many eLMs such as courseware have been developed for use in schools at various levels of study, higher learning institutions, and training materials in organizations. In fact, the Malaysian government has invested millions of *Ringgit Malaysia* for developing eLM for use in smart schools by outsourcing the tasks of developing teaching and learning materials for four subjects (i.e. Bahasa Melayu, English, Mathematics, and Science) involving 1,494[1] titles (units) of courseware (Konting, Ismail, Ali, Dali, & Abu Bakar, 2003). However, the study reports that the investment does not show good returns. The use of eLMs is not sustained. Statistics show that the use of courseware is very low (rank 9^{th} of 11^{th}) among teachers in smart schools which is parallel to their perception on the courseware (rank 9^{th} of 11^{th}). Perception among students regarding the courseware is also very low; overall, min is below 2.5 of 5. Furthermore, the use of most eLMs has been stopped in many schools (Konting et al., 2003).

Konting and friends (2003) also found that the eLMs are not utilized repetitively by most users after the first viewing. Many factors were identified influencing the situation; nevertheless, content wrapping could be one of the reasons. Content wrapping is the way learning content in the eLMs is blended and presented to the learners (Vaughan, 1998).

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[1] 117 units for Bahasa Melayu; 408 units – English; 561 units – Mathematics; and 408 units – Science.

To clarify the factors leading to the particular discovery, a preliminary study where a series of interviews involving 15 respondents, who were students of secondary schools and ages vary from 16 to 17 years old was conducted in 2007. In the interview, six questions were asked in a semi-structured format as listed in Figure 1.1.

Q

1. Are you aware of whether your school has [2]courseware?
2. Have you used any courseware in school? (if yes, further questions were asked)
3. Do the coursewares contain audio, graphics, animation, and video?
4. Do the coursewares entertain you when viewing?
5. Do you feel fun when using the courseware?
6. Do you recommend your friends to buy and use the courseware?

Figure 1.1: List of asked questions.

The questions were addressed to investigate the following conditions: (1) whether the respondents realized about the eLMs that their teachers are provided with in course-teaching; the interview was proceeded if the subject was aware of the eLM, (2) whether they have experienced the courseware and could respond with valid answers; the interview was proceeded if the subject has experienced using the eLM, (3) whether the eLM were composed with various media elements, as suggested by design guidelines, (4) whether the eLMs capture respondents' interest when viewing, (5) whether respondents enjoyed viewing the content in the eLMs, and (6) whether respondents feel that it is worth spending money to buy the eLMs like what they use in the course. The interview as described above gathers results as listed in Table 1.1.

Table 1.1: Respondents' opinion on the existing eLMs

Q	*R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
1	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
2	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
3	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
4			√			√			√			√		√	
5						√			√					√	
6			√			√						√			

*R1 ➔ Respondent 1

√ ➔means agreed with the question or provide positive response

[2] Courseware refers to eLM. We used the term courseware because the term is used in schools.

Referring to Table 1.1, all respondents agreed that the eLMs contain multimedia elements (Q3). This indicates that, from actual users' perception, the coursewares are designed according to the design principles of eLMs. However, from Table 1.1, it can also be noticed that majority of the respondents found that the eLMs were not entertaining (Q4), and do not make the respondents feel fun when using them (Q5). It seems that the answers to question 3 are contradicting the answers to questions 4 and 5. This raises a question that needs answer: Why eLMs are not entertaining the learners? So, further questions were asked: '*if you say the courseware are include audio, animation, and video, then what makes you feel the courseware do not entertain you and you do not feel fun, and why don't you suggest your friends to use them?*'. Most subjects responded almost similarly as shown in Table 1.2.

Based on the data in Table 1.1, and comments in Table 1.2, this study found that the coursewares are usable but not entertaining to the real users. Discussions about the results are provided in the next paragraph.

It was found that eLM involved in this study are usable, it has not only been proven in the comparative study, but also through analyzing comments from real users in the interviews. Although the subjects were not sure what to represent their feelings, it could be interpreted that they would be appreciating better if there are applications that do not make them feel tensed when using. In the sense that they learn in leisure environment, applications which trigger laughter through spontaneous content representation might suit their aspiration. In short, users want to learn with eLMs which entertain them. One significant comment is that users prefer to click less so that they could watch more (Ariffin & Norshuhada, 2008).

Previously, Karat, Pinhanez, Karat, Arora, and Vergo (2001) and Pinhanez, Karat, Vergo, Karat, Arora, Riecken, and Cofino (2001) found similar finding. In their study on entertainment website, they found that users prefer to click less and watch more. In addition, MacFarlane, Sim, and Horton (2005), Neal, Miller, and Perez (2006), Kempter (2007), and Spillers (n.d.) and some other researchers found that the joy of use is not ease of use. It has also been found that easy-to-use products are not necessarily joyful, and vice versa. The findings of this preliminary study support these statements in which the coursewares are usable and easy to use, but they are not entertaining and not invoking fun.

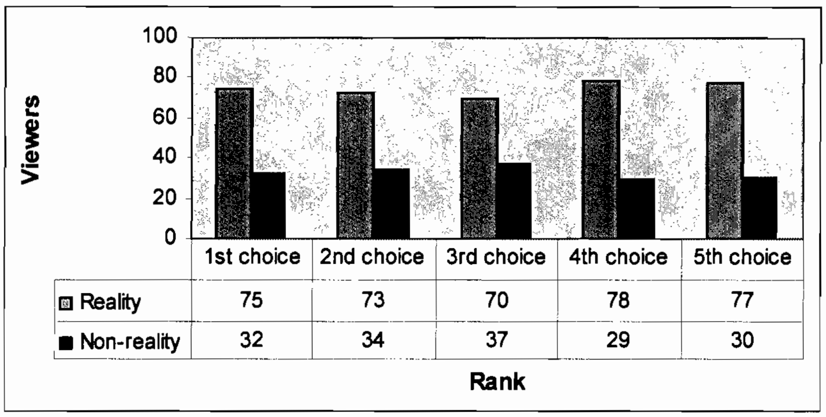
Table 1.2: Subjective feedback

O...yes the coursewares are good and beautiful, but it requires me to really put my fingers on it, click-and-click-and-click continuously. I wish I do not have to click too much when learning something.
Even though the coursewares contain various media, with animations and video, they are interesting, but they do not make users feel relaxed (easy) when learning. The environment in the courseware is really tiring, learning is too formal. Users have to click every time to make the courseware work.
Content can be read from books. You are wrong if you say the coursewares are full of fun and entertaining. We never laugh when learning with the courseware. Yes, it's true the coursewares present contents in many approaches, with different media elements, but they are too formal. They are a bit entertaining, but requires too much from users. Users feel cognitively too tired after using the courseware". An analogy to this is like marching...listen to commands and react...
No comment, the coursewares are beautiful, but I always feel tired after using them. Maybe because I focus too much when they were ON, especially I have to click on buttons very frequently". Aa...one more thing, for me, users would feel more restful if the narration is like conversation. It is good to use the courseware on my own anytime I like, so it is more preferable if the courseware are natural...
It is hard to say, the courseware are OK. They help a lot in searching for content, but I just can not feel fun when using them. They need me to click on buttons all the time.

All information as discussed in the previous paragraphs stand as good encouragement to seek for a concept of eLM that makes learners feel happy to use. Accordingly, entertainment technology was analyzed with the focus on TV because it is the most affordable entertaining technology in Malaysian households. Moreover, TV is almost owned in all households.

Several mailing lists for children and adults were posed with questions asking the members to list five most favorite TV programs with reasons (See **Appendix A**). Valid feedbacks were gathered from 107 respondents. In the analysis, the programs were classified into reality and non-reality. From the classification, it was proven that reality TV shows are placed at the top of the favorite list (see Figure 1.8) and among the main reasons are that they visualized real events, with mistakes and unexpected 'content' included.

In addition, another favorite reason to view reality shows from respondents is "*...it is frequently seen in reality shows that mistakes may come from speeches and actions, while the environment might cause unintended interferences. Feedbacks always come from viewers and actors (in and out of frame). Those are natural reactions and always happen, in fact they also convey information...*".



	1st choice	2nd choice	3rd choice	4th choice	5th choice
Reality	75	73	70	78	77
Non-reality	32	34	37	29	30

Figure 1.2: Distribution of reality and non-reality TV

In Interaction Design (ID), many learning design guidelines emphasize that fun and entertaining are two important aspects included in user experience goals for ensuring that the products are 'usable' (Preece, et al., 2007; Dix, Finlay, Abowd, & Beale, 2004). Wiberg (2001) clarifies the importance of measuring the user experience goals specifically in terms of fun and entertainment successfully. In addition, Wiberg (2005a) proposes new approaches to evaluate entertainment web sites. Her works have been verified and proven to extend the scope of web usability. Furthrmore, Wolf (1999) also states that fun and entertainment are becoming increasingly important in almost all uses of information technology.

Although many guidelines have stated fun and entertaining as two important design elements, many developers still produced contents that failed to include these elements. One possible reason for this is the nature of fun and entertaining that are difficult to be realized without creativity, experience, and technical skills. This leads to the following research questions:

- How to ensure that learning content is perceived entertaining and invoking fun by end-users?
- Can fun and entertaining learning content be effective?
- How to enable instructors especially the non-technically-skilled to produce learning materials that are considered fun and entertaining?

Answering these questions requires urgent investigation, especially on the issues of proposing design models that ensure content is entertaining and invoking fun.

To further support this study[*], in addition to the above discussed issues and questions, it was found during this preliminary study that a consulting company, Echo 360[3] provides a system called EchoSystem, which can produce LO rather easily. With sophisticated technologies, EchoSystem is able to capture lectures as video, edit the video, and store in eLearning system as objects. EchoSystem combines capturing and editing technologies, completed with control room, and integrated with existing in-campus LAN. Figure 1.3 provides the overview of the system architecture. There are three main divisions of EchoSystem operation: capture, publish, and review. Each feature is elaborated below:

Capture

The system captures a lecture from a podium PC, a dedicated classroom computer, or the EchoSystem capture appliance. The EchoSystem works with existing audio-video tools and hardware. Academic staffs need to set the capture schedule for an entire semester with just one operation at the beginning of the semester. Then, Extensible Markup Language (XML) architecture enables smooth integration with university scheduling systems.

[*] The phrase "this study" from this page onwards means the study undertaken to accomplish the aim and objectives of the research described in this thesis.
[3] http://www.echo360.com/

From a central interface, staff can manually stop, start, reschedule, or add captures.

Publish

The captured lectures are posted to existing LMS alongside other learning materials. This system provides hands-off file management, which means lecturers do not have to manually modify or upload web pages. Besides, open Application Protocol Interfaces (APIs) allow for integration with custom portals. In addition, the system applies a built-in support for Really Simple Syndication (RSS), making users are instantly notified of new postings. More interestingly, advanced audio and video encoding standards in this system ensure highest quality media, with compression to meet network capacity.

Review

Any time becomes class time. Students need only a computer and internet connection to review the eLM as it happened. Students can use Podcasts, ideal for audio-intensive classes, play through iPod or MP3 players for study on the go. Also, full-motion lectures play back on Windows, Mac, or Linux. DVD-style controls allow review at any pace. Close captioning ensures access for special needs.

With such architecture, EchoSystem can help in providing students with a large number of eLM in video format. Moreover, lecturers do not have to prepare the video on their own. This means that every class can be provided with video (containing the real content as it happened), regardless of the lecturers' technical ability, specifically in making video or courseware.

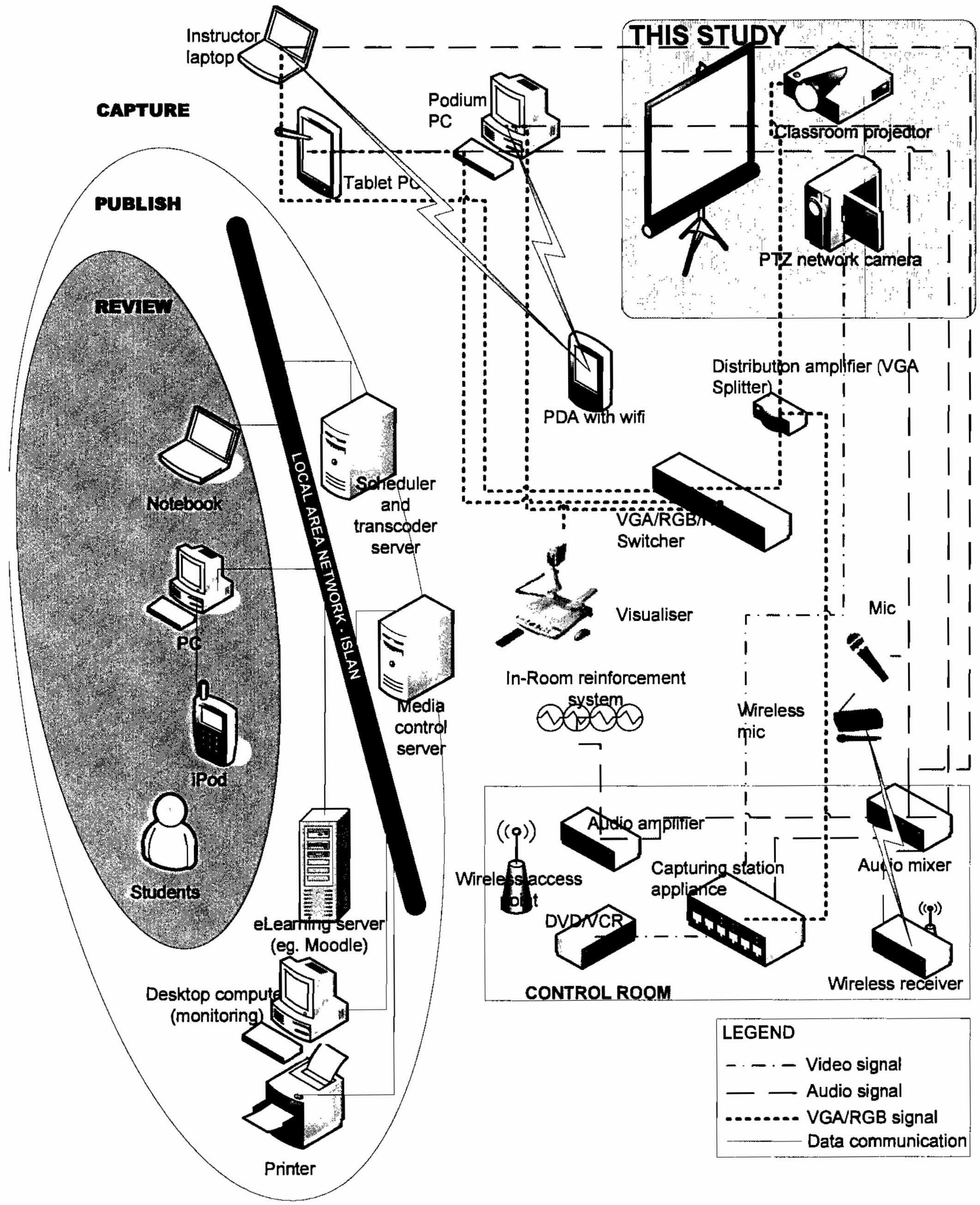


Figure 1.3: Architecture design for EchoSystem

When students review the lectures, they will have three windows in default layout as seen in Figure 1.4. However, students can always toggle the unintended windows to suit preferences.

Since EchoSystem's main input is capturing life lectures as video, a study to explore how such life capturing video is accepted as learning materials is seemed as highly necessary. More importantly, the issue of producing video for academics without videography skills and institutions that cannot afford costly systems such as EchoSystem but still wish to implement captured video lectures, required immediate attention.

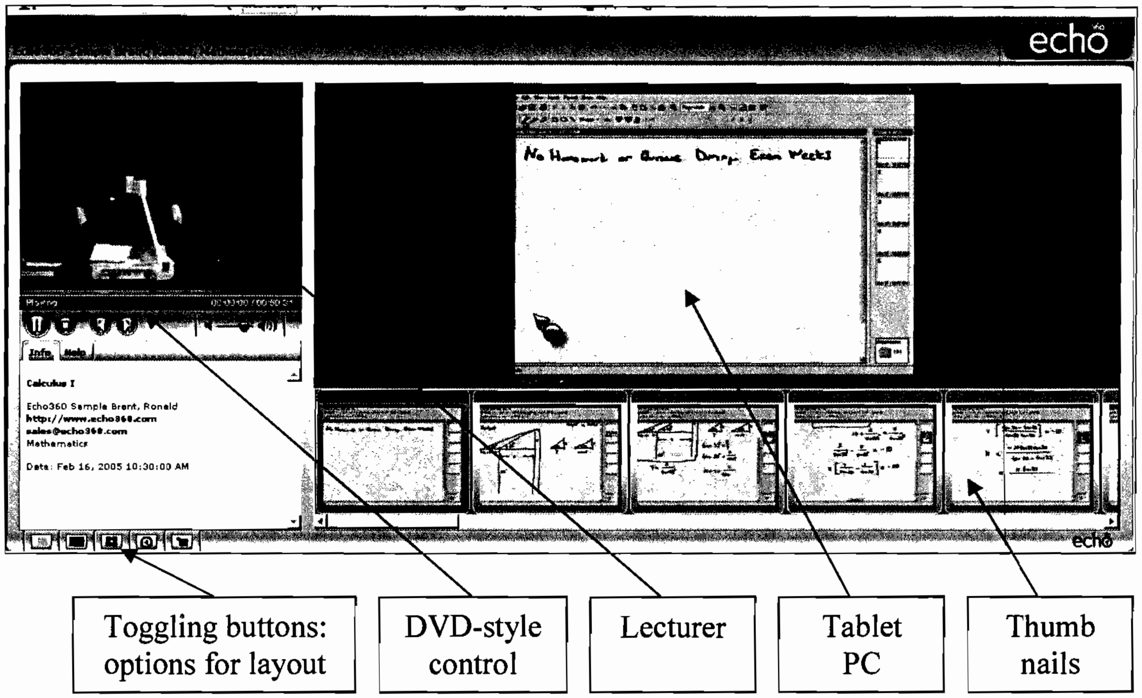


Figure 1.4: Echo360 – default interface

1.4 PROPOSED SOLUTION

Considering the statements of problem including the questions posed previously, this study proposes a conceptual design model of learning materials which are in the form of "live captured video" that should ensure content is entertaining and invoking fun. First, a concept of reality video will be determined, and then a conceptual design model of learning materials that applies the concept of reality video will follow. Implementing the concept of reality video in learning materials is hoped not only to offer better learning experience to learners in terms of feeling entertained and invoking fun, but also to be more effective. In accordance, this study tries to achieve objectives as stated in the next section.

1.5 OBJECTIVE

The objectives are formulated to accomplish the proposed solutions stated in Section 1.4. Hence, the aim of this study is to propose a conceptual design model of learning materials that is able to ensure the learning experience is entertaining, fun, and effective. It is proposed that this type of eLM is called **Reality** Learning **Media (RLM)**. "Reality" in this study is associated with the "live captured video". To achieve that, the following objectives are outlined.

i) To determine the components of the conceptual design of RLM model.
ii) To develop the conceptual design of the RLM model.
iii) To validate the conceptual design model of RLM through prototyping.
iv) To investigate user experience of RLM in terms of:
   - Entertaining,
   - Fun,
   - Effectiveness.

This study defines the terms as:

- Entertaining – *the characteristics of a product that capture interest, lead to feeling entertained. It is broad because many aspects of life can be considered entertaining, not only about the feeling of happiness.*
- Fun – *the feeling of amusement, enjoyment, and pleasure. It can cause someone to laugh, feel release during performing something.*
- Effectiveness – *the characteristics of a product in which it does what it is supposed to do.*

Note: more detailed characteristics of entertaining products are outlined in Chapter 3.

A number of hypotheses have been formulated for the purposes of achieving this objective, which are listed in Chapter 3.

The definitions and concepts of entertaining and fun are discussed further in Chapter 2. Definitions of terminologies are outlined in the section below.

1.6 DEFINITION OF TERMINOLOGIES

This section describes the terminologies related to research which lead to the operational terminologies.

1.6.1 eLearning Material (eLM)

In eLearning environment, the learning contents are provided in the electronic forms that are called eLM. In eLM, the pedagogical aspects as in preparing non-electronic-based learning materials such as books, modules, and notes are among emphasis. This is important in response that the learners in electronic environment are similar to learners in non-electronic environment in terms of their cognitive structure. The difference arises is in the forms of knowledge transfer method. So, developers should ensure that eLM convey right learning content to the learners as it is desired. In this study, the pedagogical aspects are associated with the learning media, presentation styles, the content delivery, and styles of flow.

1.6.2 Conceptual RLM Model

A newly proposed application is sometimes hard to imagine. However, the understanding could be supported with a kind of representation such as grammar notation, tables, and diagrams. These representations are referred to as the conceptual model of the application, where in this study it is conceptual RLM model. In the conceptual model, the big picture of the application is included. In RLM, it contains the components of RLM which is holistic; divided into the process of developing RLM, structural components, and content composition components. It illustrates the flow and generic components from start to finish learning contents in the RLM.

1.6.3 Conceptual Design Model of RLM

Conceptual design model is a representation which contains no process or flow. It states the idea of the RLM in terms the attributes, its working environment, technologies, theories underlying, and learning approaches.

1.6.4 Content Analysis

In gathering information, previous sources were visited. Existing model were also analyzed to investigate related information. It was intended to grab the content for adaptation into this study. It comes with qualitative data, very rich and meaningful, and is called content analysis. It could be carried out at various stages, simultaneously with other activities, either alone or with help of other parties. In this study, the content analysis is referred to the efforts in gathering founding information at early stages of the study. It involved document searching, existing models, working system, and discussions with other parties.

1.6.5 Comparative Analysis

There are existing models compared in this study, with only one objective; to identify their common components. Other aspects are not within the concern. This is called comparative analysis.

1.6.6 Expert

Expert in this study are people who are highly experienced in their respected fields. Not only they have certified knowledge in their area of expertise, but also they are equipped with at least five years of experience in their fields. Experts who involved in this study are busy people, including academia and practitioners in the industry.

1.7 RESEARCH CONCEPTUAL FRAMEWORK

The research conceptual framework helps to illustrate the big picture of the research to be carried out. It provides answers to complex operational questions such as what to do and how to do it. Figure 1.5 depicts the conceptual framework of this study.

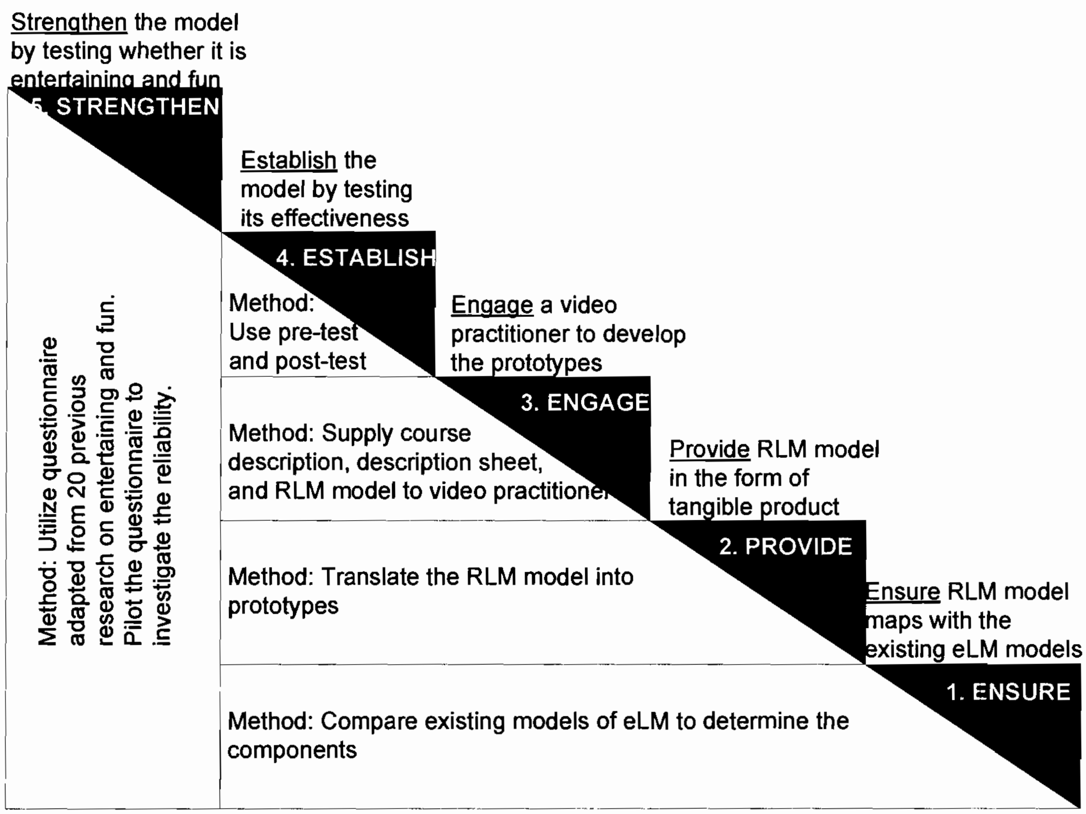


Figure 1.5: Research conceptual framework

There are five tasks to carry as shown in Figure 1.5: Ensure, Provide, Engage, Established, and Strengthen; which forms an acronym EPEES. The following is a list describing each task in terms of the aim and respective applicable method.

1. Ensure	Aim: To ensure the RLM model maps with the existing models of eLM. It is complex to develop a model of a newly proposed eLM. The model should contain components similar to the existing eLM, share similar genre, so that it is recognizable as a type of eLM. Method: a comparative analysis of the existing models of eLM.
2. Provide	Aim: To represent the RLM model in the form of a tangible product. It is

	difficult to understand the model, in the forms of what context it is used, how it works, how learners can utilize the RLM, who can develop the RLM, and etc. These are complex questions. Learners are able to digest the model with help of a tangible product that is developed based-on the model. Method: The model should be transformed into a working prototype.
3. Engage	Aim: To verify that the model can be understood and transformed into a form of prototype. The model should be transformed into working prototypes by engaging a video practitioner, because RLM shares similar genre with video. Method: The video practitioner is supplied with course description, description, and the RLM model. Based on these three artifacts, the video practitioner develops the RLM.
4. Establish	Aim: To ensure that RLM is effective in delivering learning content. Method: The pre and post-test procedures are utilized.
5. Strengthen	Aim: To ensure that RLM is entertaining and fun. As indicated in the problem statement, the existing eLMs are not entertaining, so the RLM should be entertaining, and learners feel fun. Entertaining and fun are two aspects that strengthen the RLM besides being effective. Method: User testing is carried out, where data are collected through an instrument. The instrument testing elements are adapted from the previous studies on entertaining and fun.

1.8 THEORETICAL FRAMEWORK

This study is carried out based on some theories and concepts related to learning and Interaction Design. Figure 1.6 visualizes the theoretical framework, in which analysis, design, implementation and testing are covered. In the analysis stage, theories analyzed include the existing models of eLM, video-based learning, learning approaches, learning theories, reality TV concepts, video production techniques, user experiences in terms of entertaining and fun, and evaluation. In the design stage, the existing theories and models of eLM are used as the basis to determine the components of RLM. The components of RLM are then lead to the development of the RLM model, which consists of structural, content composition, and the process of making.

When developing the RLM model, the theories and implementation of video-based learning, learning approaches, and reality TV concept were analyzed so that the context of implementation is clear. Learning theories were analyzed as the basis of model development, so that the components in RLM are mapped accordingly. In the implementation and testing stage, the RLM model is tested with the real users to measure perceptions in terms of entertaining, fun, and effectiveness. The testing involves the RLM and the instrument.

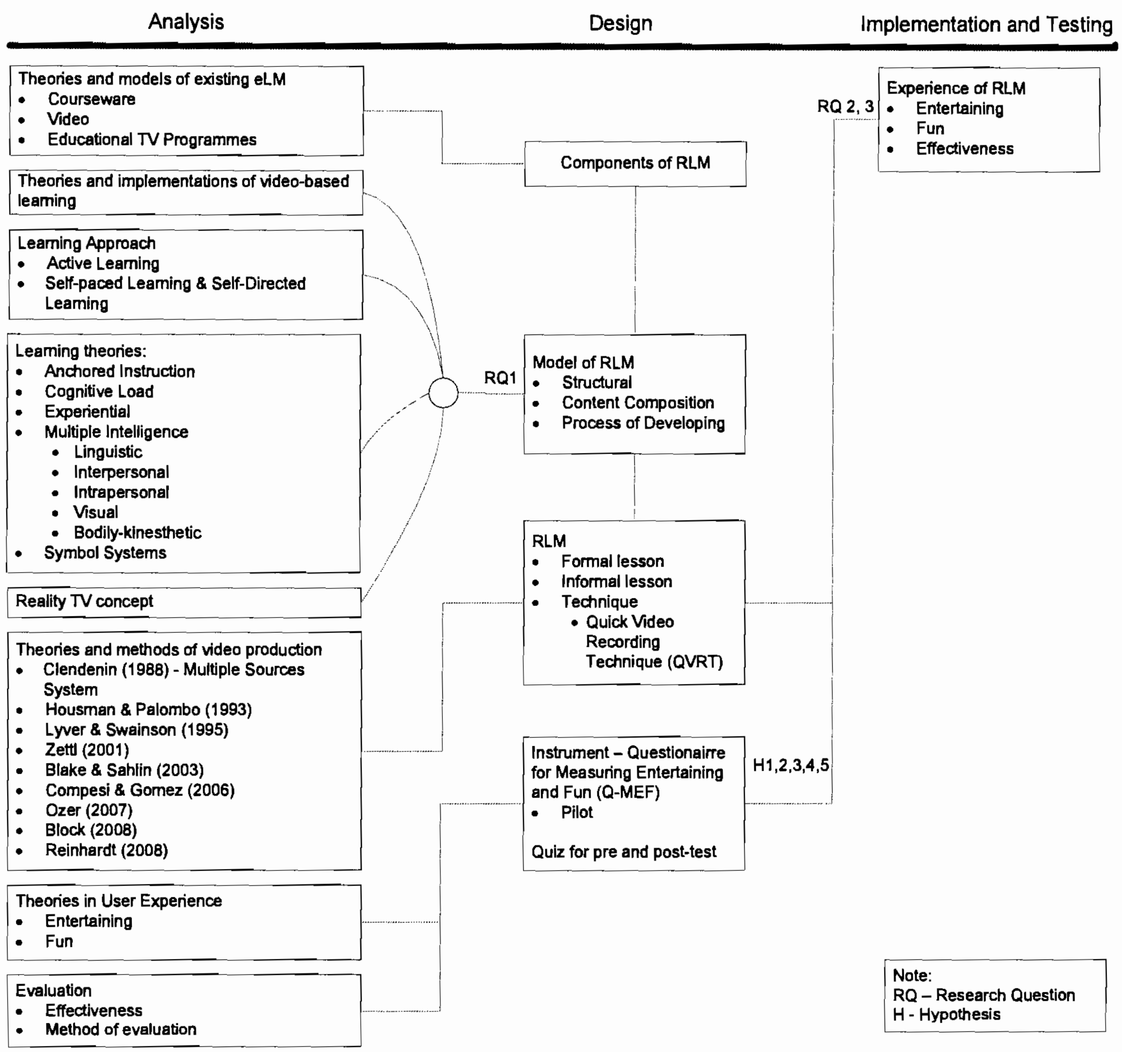


Figure 1.6: Theoretical framework

Artifacts of analysis stage are reviews of literatures. In design stage, the artifacts include the components of RLM, the conceptual design model of RLM, and the RLM model, the prototype of RLM, and the instrument to measure entertaining and fun. While, in the implementation and testing stage, the artifacts are results of the tests which particularly measure users' perceptions of RLM in terms of entertaining and fun, and also RLM's effectiveness.

In Figure 1.6, it is stated that research question 1 is answerable when the model of RLM is developed based on theories and implementation of video-based learning, learning approaches, learning theories, and reality TV concepts. Research questions 2 and 3, and all hypotheses are answerable when testing is accomplished.

1.9 SCOPE

This study is carried out to propose a model of eLM that applies the concepts of reality video. To ensure the focus of study is clear, the eLearning system, respondents, and application domain are restricted as described in the following subsections.

1.8.1 eLearning system

In the eLearning system, referring to the architecture in Figure 1.3, this study focuses on the capturing, editing, and publishing for student access. Other parts such as publishing, reviewing, and in-room controlling are beyond the scope of this study. The parts focused in this study are illustrated in Figure 1.7.

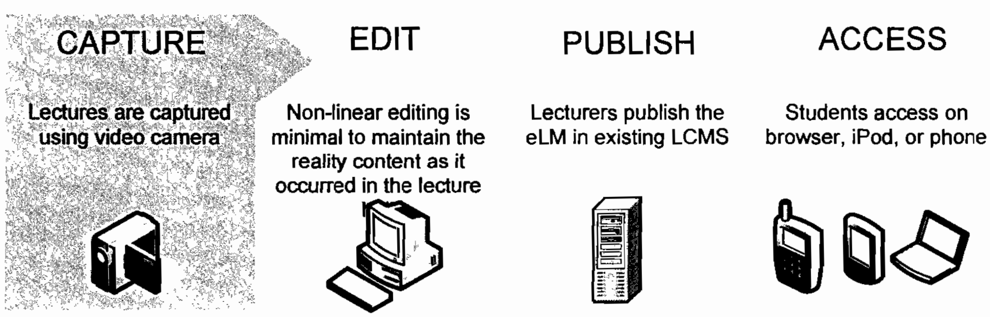


Figure 1.7: Processes involved in this study

Lectures will be captured using digital video camera. Quick Video Recording Technique (discussed in detail in Chapter 3) is applied where single or multiple video cameras are optional. The captured lectures are then edited non-linearly. This process is not intended to change the nature of the lecture, but to incorporate some additional instructional aspects such as section separator and text (discussed in detail in Chapter 4). Next, the edited lectures are published in the existing LCMS, and finally the lectures are ready for access.

1.8.2 Respondents

RLM developed in this study are focused for young adult learners, especially young adults who want to learn formally and informally. There is no specific criterion required to qualify any young adult to involve in this study because learning is for everyone. However, due to limited resources and research duration, there are two constraints; (first) the content in the developed RLM are tailored for adults age between 16 and 20, and (second) one of the RLM is developed for use at higher education level. In accordance, the respondents of this study were between 16 and 20 years old. They are generally eLM learners and also developers.

1.9 CONTRIBUTIONS OF THE STUDY

This study is inline with the current scenario in education and learning technologies where electronic media is utilized to make learning more entertaining and meaningful. Therefore, the theoretical and empirical studies that lead to the design and development of RLM which ensure learning is entertaining, fun, and effective is timely. The research contributions can be summarized as in the following subsections, and represented diagrammatically in Figure 1.8.

1.9.1 The Concept of RLM

This study puts forward the idea of reality video as a learning media. This should complement the existing concepts in eLearning, and opens up opportunities for researchers to further researching in the field of electronic learning. A comprehensive literature review on the 'state-of-the-art' of the area were studied comprises the theoretical fundamental knowledge on eLM design, and the theoretical and empirical-based research method used on RLM. There are two important results of the preliminary studies. First, the existing coursewares were found usable, but not entertaining. Participants of a series of interviews agreed that learning with the courseware were cognitively too tiring, requires continuous mouse-click; besides the content presentation was too formal. This can be interpreted as the learners prefer to learn with eLM that is effective and entertaining them while learning. The second findings show that TV viewers prefer to watch reality programmes more than the non-reality because they feel the reality programmes are more entertaining. Combination of these two findings makes up the concept of RLM.

1.9.2 Conceptual Design Model of RLM

The conceptual design model contains components which were derived from the existing eLM models. Fifteen existing models were compared to determine components for RLM. Later, the conceptual design models were discussed in a number of venues (such as conferences, and small group discussions) with peers, and verified by experts. The model is holistic, comprising the process of developing RLM, structural components, and content composition components which is based on the learning theories. It can be referred to by anyone with or without technical skills who aims to produce a learning material that applies the concepts of RLM. The conceptual design model is important, to guide the RLM developers (the developers may either be people with or without technical skills in video production) to produce RLM. The proposed conceptual design model in Chapter 4 was validated through prototyping, where two prototypes were produced.

1.9.3 Prototypes of RLM

There are two prototypes of RLM produced in this study. One of the prototypes (Videography) contains contents for formal lessons, learned at diploma and degree levels. Another (How to make VCD) contains contents for informal lessons. The entity which best benefits from the prototype is the community. The Videography gained positive feedbacks from students who have learned related courses (such as Digital Video) during user testing at the end of the study. Learning videography concepts is made easier with RLM. Based on their feedback, the RLM will be proposed as a complementary learning material for appropriate courses (such as Digital Video) in HLI.

1.9.4 Quick Video Recording Technique

An adapted technique to shoot video is proposed in this study, and named Quick Video Recording Technique (QVRT). The technique is proposed as suitable for making RLM, where the cost is minimized, as well as the technical part is not within the concern. In validating the conceptual design model of RLM, the engaged video developer used QVRT to produce the RLM. The researcher found that the video developer, by implementing QVRT technique in producing the RLM, was able to perform appropriate tasks smoothly. Moreover, it resulted in the desired RLM. This situation expresses an understanding that the QVRT, which is adapted from an old video production technique, is workable as a technique for developing RLM. The technique is significant for RLM developer, because it is not expensive, and does not require high technical skills. The benefits of low cost and low technical skills can assist in producing many eLMs in teaching and learning of formal lessons.

1.9.5 Experience Instrument That Measures Fun and Entertaining

The instrument for measuring fun and entertaining aspects of the prototypes are developed originally in this study. In the instrument, the items in entertaining and fun dimensions were adapted from previous studies by popular researchers such as Malone (1984), Carroll (2004), and Wiberg (2005), which have earlier evaluated either entertainment or fun. This also contributes significantly to the body of knowledge, complementing the existing various instruments that measure various aspects of learning materials. The instrument was found highly reliable in the pilot study, with Cronbach's Alpha for each dimension was greater than 0.81.

1.9.6 Test Results of The Prototypes

The whole study was carried out based on the Iterative Triangulation Method using the Elicitative, Investigative, and Deductive approach (EIDA) and Analytical, Constructive, and Hypothetico approach (ACHA). The results were obtained, showing the RLM is effective, entertaining, and fun.

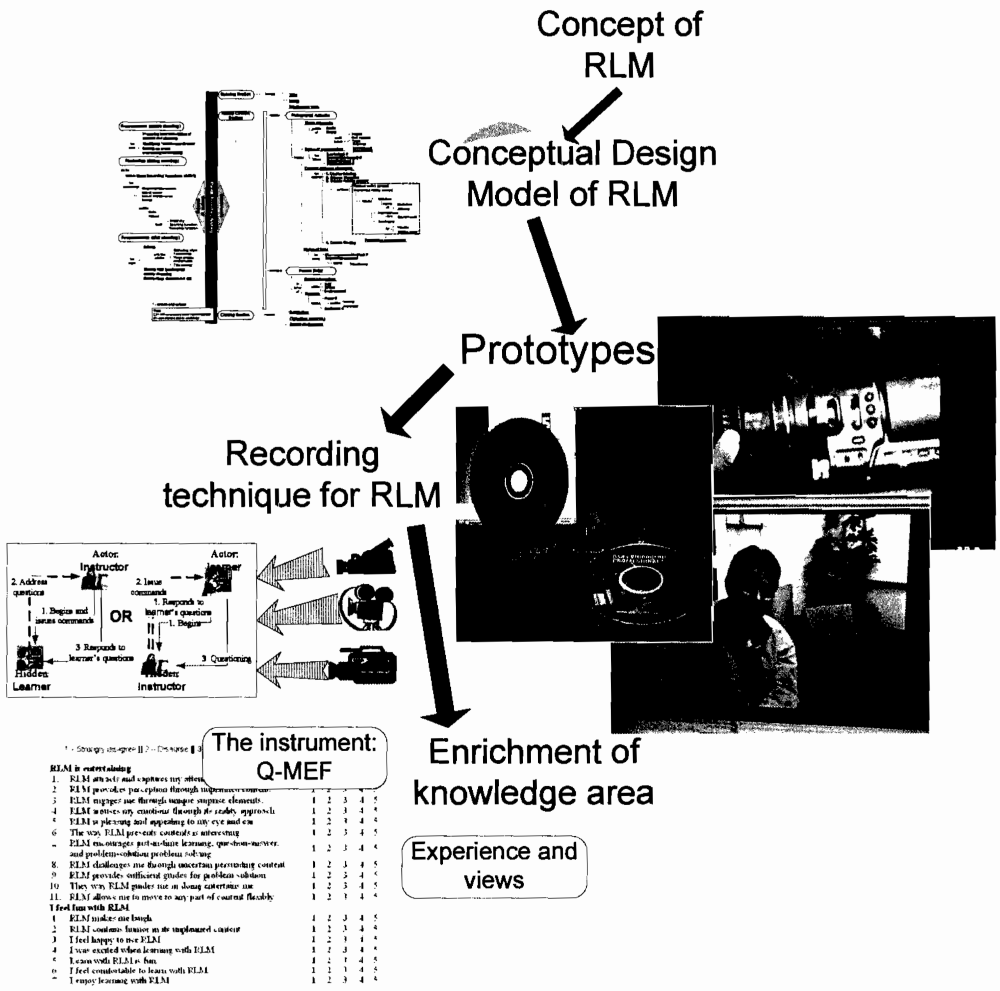


Figure 1.8: Flow of contributions of the study with relationships

1.10 THESIS STRUCTURE

This thesis comprises seven chapters. This chapter outlines the whole contents of the thesis. Reviews on related works are provided in the following chapters. In that chapter, some learning-related concepts and theories are discussed in spite of definitions of and previous works on the main study in this thesis; entertaining and fun. All reviews are followed with descriptions on how they implicate to this study.

Chapter three describes; from the beginning to the end; how the objectives stated in Chapter one are achieved. The research works are divided into four phases, where each phase is discussed in this chapter. In Chapter four, the works in achieving objectives one and two are discussed. The chapter explains the process involved in coming out with the proposed conceptual design model of RLM, which is the output of the chapter.

The prototypes developments are discussed in Chapter five, which is next. In the chapter, the RLM is elaborated, translated from the conceptual design model which is discussed in Chapter four. Besides, the methods in developing the courseware used in this study are also elaborated. At the end, this chapter outputs the prototypes of RLM and the courseware. In Chapter six, the prototypes testing are explained at length, comprehensively, in seeking answers for the hypotheses stated in Chapter three. It also contains the methods used in constructing the instrument used in testing the aspects of entertaining and fun in RLM. There are two major parts in this chapter. The first part is the procedures involved in testing, while the second part is the results.

Finally, Chapter seven continues concluding the whole works in this thesis. It outlines how RLM can be used in teaching and learning, with relation to the learning theories. Also, it discusses the results obtained in the testing in Chapter six, and relates them with the objectives.

CHAPTER 2

REVIEWS ON ELMS, CONCEPTS, AND THEORIES

2.1 INTRODUCTION

A study on past research in related subjects is appropriate before proceeding to developing the model of reality videos for assisting learning to do-it-yourself projects. It is important to ensure that the model is outcome with good learning needs. Two important expectations from the model include ensuring improved learning experience and learning is made effective. Among the topics covered in this chapter will be learning, past studies on video-based learning, eLearning, computer-aided learning, self-paced learning, active learning, reality learning, related learning theories, and aspects of entertaining and fun.

2.2 LEARNING

There are many definitions of learning. The definitions evolve as the knowledge expands through time. Newer definitions somehow relate the learning to technologies that support the processes.

Learning can be defined as a process of acquiring new knowledge through a set of processes and proper medium that facilitates to change of behavior (Merriam &

Caffarella, 1998). In other words, learning is approached as an outcome – the end product of some processes.

There are various learning modes that learners can choose. In conjunction, theory of multiple intelligences by Gardner (1993) addresses that one may have different ways of effective learning modes than the others. This relates to time, place, and kind of materials learners employ. It is suggested that the learners have to identify their own strengths, in terms of their most effective learning time, most effective learning place, and kind of material or elements that they are interested most.

In addition, some learners perform best when they learn alone, but some would do better if they are learning in groups, and perform tasks together, some learn best while listening to music while some may expect to learn in silent. There is no right or wrong mode of learning because it depends on the learners' personality (Gardner, 1993).

Besides, Brown, Collins, and Duguid (1989) also promote various learning styles such as self-paced learning and active learning. This idea is supported by Laurillard (1995) and Elizabeth (1997).

Also, methods of learning evolve. Gradually evolved from the Behaviorist paradigm, Cognitivist paradigm, and later Constructivist paradigm, the methods of learning were incorporated with timely technologies. Primitive books and pencils, followed by better learning aids including some electronic apparatus like calculators and now learning happens in all electronic environment. From traditional method, where learners have to attend classes, meeting instructors and colleagues, and all physical learning aids and materials, today learners can learn without attending classes, and require lesser presence of instructors. Not only learning is made easy by help of electronic learning aids and materials, but also learning can happen anywhere, at anytime. The learning facilities are very ubiquitous (Greenfield, 2006), highly fostering the lifelong learning concepts.
Without needs to physically move, a disabled person will also be able to learn, only by the help of computer technologies. Often, the use of interactive multimedia helps

learners to understand learning content better. Interactive multimedia applications mostly use text, images, graphics, and animations and can also contain video clips as part of the content. However, the video alone can be used to assist learning because it can contain all other media elements including text, images, graphics, animations, and simulations.

2.2.1 Importance of Learning

From the definition and evolving implementation concepts, learning has engaged some impacts to the ways of information transfer. The pedagogical strategies remain as important issues. This study tackles the pedagogical strategies in which it discusses about media elements, styles of flow and presentation, and content delivery. Since the early nineties, there are many studies discussing pedagogical strategies for online learning in constructivist approach (such as Rieber, 1992; Duffy & Jonassen, 1992; Papert, 1993), and are inline with this study. Consequently, this study adopts their suggestions.

Also, learning implicates to some kinds of formative assessment. In classroom learning, the assessment would be highly interactive, however in this study; the formative assessment is designed differently. On the learners' own pace, there is no possibility for the assessment to be marked and scores are given. It is determined by the learners themselves whether they know or not about the solutions to questions posed. In short, the assessment method follows practices in *Jasper Woodbury Problem Solving Series* (CTGV, 1992) where questions are posed to learners and let them discover the answer on their own.

Besides, human entities are also part of the implications of learning concepts. Learners and instructors are two main entities involved in learning. These two entities are the actors in this study and need to socialize themselves, with self, in groups, and also the environment (Rey-Lopez, Diaz-Redondo, Fernandez-Vilas, & Pazos-Arias, 2007). In this study, when learners are posed a question, they will seek for answers through discussions among themselves; while the content can be paused. When the discussion takes place, complex explanation would require the learners to draw, present, discuss upon the drawing, and think. Interaction among learners can be of many reasons including, for laugh, sharing ideas, provoking statements or questions, and constructive comments. Without the space for social interaction, all these activities could not take place (Harboe, Massey, Metcalf, Wheatley, & Romano, 2007).

Besides the actors, viewers are another entity which this study considers. Viewers are the subjects who view the RLM, for the purpose of learning from the contents. Section 2.4 discusses further the roles of viewers.

2.3 ELECTRONIC LEARNING

The use of technologies in learning has changed the way people learn. At the same time, the concepts of lifelong learning are getting more attended, inline with the advancements of eLearning; learning method that is supported strongly by the technology.

Jones and Jo (1998) stated that contents can be stored in or retrieved from the Internet or CD. Internet stores most information that one is looking for. Sufficient Internet technologies and infrastructures both on server side and client side will ensure satisfaction on the response time. This is highly dependent on technologies, because users have no control to avoid transmission failure.

Rainsford (2005) also points this technology-related issue out as a very influencing factor to technology-enhanced learning. In this environment, contents are usually stored on a server, which is normally located in a remote area. Learners will access the content from a client computer, for viewing and browsing. Besides the Internet technology, most eLMs have also come in the form of CDs. Using this technology, the spread of content is not as wide as using the Internet. However, the response times will only depend on the computer that runs the CD. On the other hand, if the Internet technology is opened to network failure, using CD is free from it, and can be operated at anytime.

eLearning offers lots of advantages to users. Mainly, information can be retrieved at anytime, by anybody and from any locations, especially if the information is located on networked machines and client computers are connected to the network. eLearning decreases needs for papers and pens. It also promotes and encourages learners to learn without attending classes and instructors being at present (Williams, 1998). These two examples of advantages can reduce lots of tangible and intangible costs as listed in e-LearningGuru Web site (Kruse, 2004).

Besides, learners can always learn without regard to their inconveniences, no matter they are students, employees, housewives or healthcare practitioners, who always have something to do. Physical geographical barrier is also eliminated in eLearning because basic infrastructure required for performing actions is only computers. CD or the Internet comes second, and are options for learners. In fact, the numbers of Internet users are increasing drastically from years to years (Rahmah & Arfah, 1999), and the Internet can be accessed from almost every part of the world.

Many researches have proven that eLearning offers better learning experiences to learners (Greening, 1998; Pitman, Gosper, & Rich, 1999; Brown, 1997; Oliver, Omari, & Herrington, 1997, Halimah, et al. 2000, Faridah Hanim & Halimah, 2008). Part of the reasons is because eLearning can incorporate many media elements to convey and deliver information (Preece, Rogers, & Sharp, 2002; Preece, et al., 2007; Dix, et al., 2004). There are various definitions of eLearning.

Besides, eLearning may also cause some drawbacks: unmotivated learners or those with poor study habits may fall behind; lack of familiar structure and routine may take getting used to; students may feel isolated or miss social interaction; instructor may not always be available on demand; slow or unreliable Internet connections can be frustrating; and some courses such as traditional hands-on courses can be difficult to simulate.

The concept of eLearning is mostly applied to Computer-Assisted Learning (CAL), Computer-Aided Instruction (CAI), Computer-Based Learning (CBL), and Computer-Based Training (CBT) (Doherty, 1999).

2.3.1 Definition of eLearning

Rosenberg (2001) says that eLearning refers to learning methods that use Internet applications and technologies to deliver learning materials, and this idea is supported by Gunasekaran et al. (2002) and Henry (2001). This suggests that the Internet technologies are essential in eLearning. However, Stockley (2003) simply defines eLearning as learning using aids of electronic appliances to access electronic learning contents. This could mean that eLearning can be performed without Internet technologies.

Govindasamy (2002) agrees with Stockley (2003) by defining eLearning as delivering content through all electronic media including Internet, intranet, extranet, satellite, audio, video, interactive TV, and CD-ROM. In addition, Kozma (1991), Paivio (1971), Salomon (1979), and Salomon (1984) include learning through TV and video tapes as part of eLearning.

Halimah, Norhayati, Tengku Mohd, and Azlina (2005) propose a more sophisticated eLearning definition, in which they perceive eLearning as the use of ICT in supporting teaching and learning process, and managing lifelong learning. The definition reflects that there is no restriction for resources, instructor, time, and location.

2.3.2 Dissimilarities Among eLearning, Online Learning, and Computer-based Learning

The concepts of online learning and eLearning are actually different. Urdan and Weggen (2000) have identified that eLearning reflects to learning that happens in electronic modes, while online learning only refers to learning that are based on web technologies. This supports that online learning is a subset of eLearning. Understanding further, eLearning can occur without the present of web technologies, and appropriate enough if the learners have access to the technology appliances to view contents in storage mediums such as Video Compact Disc (VCD), Digital Video Disc (DVD), video tapes, interactive TV, or others.

Online learning is only part of technology-based learning, and highly depended on the Internet, intranet, or extranet technologies. It can not occur when the web technologies are not present. Also, levels of sophistication vary from low to high. Low sophisticated online learning usually contains text and graphics for the course, assessment, marks, and bookmark. High sophisticated online learning would embed animation, simulation, audio and video, chatting room, meeting room, forum, and bulletin board. A study reveals that students learn with online technologies score better than those learn traditional collaborative where they met and discussed in face-to-face mode (Norhayati, Dayana, Mohd. Fadzil, Halimah, Azlina, 2005).

Urdan and Weggen (2000) also states that CBL is part of eLearning. Next paragraphs describe the components that build-up eLearning.

2.3.3 Components of eLearning

Many literatures classify eLearning into components[4]. Classifications across authors are quite dissimilar. However, most authors use the same terminologies, such as learning management system (LMS), learning content management system (LCMS) (Greenberg, 2002), learning object (LO), virtual classroom (VC), and content.

Lennox (2001) includes LMS, LCMS, and VC as sub-components of the infrastructure component. Besides the infrastructure, there are other two components of eLearning, i.e. services and content, while LO is included in the LCMS. Lennox's classification is illustrated in Figure 2.1

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[4] Components of eLearning are not discussed extensively because it is not part of the focus of this study.

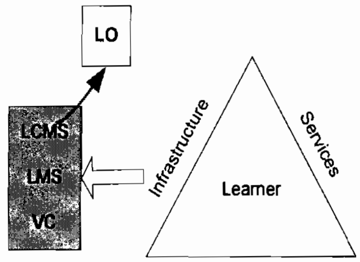

Figure 2.1: Lennox's classification of eLearning components.

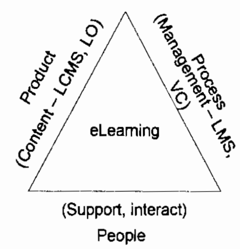

Figure 2.2: eLearning components proposed by Colace et al.

Colace, De Santo, and Mascambruno (2007) who studied standardization of eLearning for disabled people have included people in the components of eLearning. Besides people, there are products that include LCMS and LO, and process which comprises of LMS and VC. Summary of the components is illustrated in Figure 2.2.

To ensure reusability and reliability of learning content on different applications, there are standards[5] to follow (Careertech Learning Network, 2006). Kanendran, Savarimuthu, and Durga Kumar (2005) and Finke (2004) when discuss about issues in eLearning standards have suggested two standards for interoperability; Aviation Industry CBT Committee (AICC) and Sharable Courseware Object Reference Model (SCORM). Kanendran, et al. (2005) agrees with Lennox (2001) and Colace, et al. (2007), which LOs are designed to be reusable in different context, and can be used in many composites learning components (Fallon & Brown, 2000).

2.3.4 Implications of eLearning To This Study

The concepts of eLearning provide the foundational basis of this study. The foundations are further clarified through the discussions on the dissimilarities between eLearning, and online learning and CBL; where this study is classified as an eLearning topic. As a subset of learning, eLearning inherits the implications that learning has on this study, especially on the pedagogical strategies. In this study, RLM becomes part of the

[5] Standards of interoperability are not a concern of this study, and thus are not discussed at length.

eLearning, specifically as the LO. There are many types of LO, such as courseware, video, slides, and notes. RLM is proposed to overcome the disadvantages of the existing eLM as discovered in the preliminary study (Chapter 1).

2.4 ELECTRONIC LEARNING MATERIALS

eLMs are the contents provided for the use in CAI, CAL, CBL, CBT, and TV. Usual approaches of eLMs include tutorial, intensive assessment, simulation, and games (Sabri & Zainul Akramin, 2001; Norhashim, Mazenah, Rose Alinda, 1996).

Tutorial refers to applications where learners are provided with learning content and are required to accomplish assessments successfully. There are different levels of assessment for different levels of content. The objective of this approach is to ensure that learners are prepared with sufficient knowledge before proceeding to a higher level. Refer to works by Tutorialized (2008) and Sun Microsystem Inc. (2009).

Intensive assessment tends to evaluate learners understanding and knowledge on absorbed topics. Questions are provided for learners to answer based on topics for learners own initiatives. All answers are recorded while learners are performing the assessment. Total scores are only revealed after learners finished answering all questions. Works by Scalise and Giffordare (2006) and Masura and Madihah (2007) are examples of such assessment.

Simulation is used to visualize complex concepts, such as dental surgery. The objective is to ensure that learners can see and have exact understanding of complex concepts. In simulation, the real world situations are copied into computing object representations, using such as virtual reality technologies. Computing objects can react in real time to requests from human. Good examples can be found in Halimah (2007), and Nilsson and Johansson (2007).

Games are referred to a situation where learners learn through attempting to win contests. The games are physically entertaining, however there are rules to follow, some would limit sessions with time, and some would be subjected to error. The objective of this approach is to motivate learners to learn on their own, especially by trial and error. This develops their mental, logic, decision making and knowledge. Examples of this can be seen in Nabi & Krcmar (2004) and Bernhaupt, Schwaiger, Riegler, and Enthaler (2007). Recently, terms such as eLectronic Book, (eBook), Interactive Multimedia (IMM), courseware, and educational TV programmes have also been considered as popular eLMs.

2.4.1 Electronic Book

There are many definitions of electronic book (eBook) which was started with the efforts in converting paper books to digital form (Carvajal, 1999) usually through digitization processes which allow them to be displayed on computers. Later, the locus of eBook types was expended. Recent definition of an eBook has been extended to include book titles that are available online, can be read as email, can be retrieved by a portable electronic reading device, or as a file that can be downloaded onto a computer (Carvajal, 1999). Previously, Landoni (1997) classified an eBook according to three different criteria:

- Portable eBook, which can be taken everywhere and whose main purpose is to reproduce the portability of paper books. These are normally used for referenced publications, dictionaries, and thesauri;
- Books those are more concerned with preserving the logical structure that is the organization of a book in chapters, sections, and subsections. These provide full-text indexing, links, navigation, and orientation through dynamic tables of contents and multi-window text displays;
- Books which support both the logical and physical aspects of a book.

The eBooks can be read either on hardware-based reader and software-based reader (Norshuhada & Landoni, 2003). Hardware-based readers are machines produced specifically for reading downloaded electronic contents. They are lightweight devices, with utilities to duplicate the familiar experience of reading the paper book. On the other hand, software based-readers function in a similar way to the hardware-based readers but no special hardware is required. Microsoft Reader, Adobe Acrobat Reader, and Adobe Acrobat eBook Reader are examples of such software (Norshuhada, Landoni, Gibbs, & Shahizan, 2003). Besides, The International Children Digital Library has developed the software-based reader applications for reading their eBooks (Sobihatun-Nur, Asmidah, & Ariffin, 2006).

2.4.2 Interactive Multimedia

The philosophy of interactive multimedia is to help in creating knowledge, besides, it should be able to act as a tool for cognitive, collaborative, and communicative by providing surrounding that fosters teaching and learning; in which it supports, guides, and widens the locus for thinking. With the ability to allow learners to click-and-browse; view animations, simulations, and real videos; inquiry-and-feedback; self-determined order of navigation, the interactive multimedia applications are reported by Norhayati (1999) as able to increase learners rate of understanding. The comparison or learning methods in terms of the level they affect understanding rates is tabulated in table 2.1 (Norhayati, 1999).

Table 2.1: Relationships of learning methods and their rates of understanding.

Learning methods	Rate of understanding (%)
Realizing real projects	100
Learning through interactive multimedia	**90**
Simulating the real situations	90
Making live performances	90
Delivering messages through speeches	70
Learning by involving in active discussions	70
Learning from live performances	50
Learning from exhibitions	50
Learning from films	50
Learning from pictures	30
Reading	20
Listening	10

From the data in table 2.1, it is observable that activities involving interactivities such a making live performances, simulating real situations, interactive multimedia, and realizing real projects give sufficient effects to the rate of understanding (at least 90%). It can be concluded that interactivity is important to create environment that fosters learning and understanding. Interactive multimedia combines two words; multimedia and interactivity. Defining these two words could help understanding the word interactive multimedia.

Oblinger (1993) defines multimedia as a combination of two or more communication media such as texts, graphics, images, animations, video, and audio with special characteristics to come out with a presentation. This definition is agreed by many other definitions (Halimah, 1996; Agnew & Kellerman, 1996; Peck, 1998; Hillman, 1998; Elsom-Cook, 2001; and Scala Inc., 2004). In short, by referring to their definitions, multimedia is a combination of media elements that convey information and knowledge to learners efficiently.

Meanwhile, Oxford advanced learner's dictionary (2000) defines interactivity as allowing the transfer of knowledge in two directions continuously between human and computer. Carter and Burgess (2004), Hillman (1998), and Kruse (2004a) support this definition, which can then be concluded that, interactivity is a characteristic of a program that allows users to do something for supporting computer system's understanding and provision of feedbacks.

Interactivity could be designed at various levels. Norhayati (1999) classifies interactivity into three levels; low, intermediate, and high. Similarly, Rhodes and Azbell (1985) also classify the interactivity into three levels; reactive, coactive, and proactive, but they term the levels differently. Table 2.2 includes the levels by Norhayati and Rhodes and Azbell.

Table 2.2: Levels of interactivity

	Level of interactivity	Description
Norhayati	Low (navigation)	Focuses on navigating through the application. User needs to do minimum tasks to retrieve the intended information.
	Intermediate (functionality)	There are certain goals to achieve, and users are required to control the application.
	High (adaptive)	Users are allowed to control the application creatively. They could tailor the application to meet their preferences.
Rhodes and Azbell	Reactive	Users have little control over the application, and the feedbacks from application are direct.
	Coactive	Users can determine sequences, style, and steps to perform.
	Proactive	Allows users to control application's content and structure.

In addition, interactivity has its own characteristics. As a consequence, Borsook and Higginbotham-Wheat (1991) identify the common characteristics of interactivity. The characteristics are listed below:

- *Instant and quick feedback* – feedback could be retrieved with a single mouse-click, or a press on a button. Users are also expecting for ways to overcome error if it happens.
- *Non-sequence information retrieval* – users could access information as they desire.
- *Adaptable preferences* – applications need to be customizable to support user's preferences.
- *Options* – users feel honored to choose from provided options; so application needs to provide options.
- *User control* – users need to control the application, such as navigation, so avoiding application making control over the users is important.
- *Appropriate grain-size* – the duration required for application to be disturbed. Users do not like to wait for many minutes, so the grain-size needs to be short.

2.4.3 Courseware

Coursewares are developed for access through the web, or for use on CD. For instance, Baloian, Berges, Buschmann, Gaßner, Hardings, Hoppe, & Luther (2002) use courseware in their computer-integrated classroom as the content repositories. Among the advantages of courseware, in which hypertexts are utilized, is the ability for learners to read in different orders. Every page contains links to a number of different pages which can be read next. Basically in courseware, the 'browse and click' is the main interaction approach. Regan and Sheppard (1996) classify the purposes of courseware as follows:

- to illustrate some design, development, and/or failure of devices/structures/systems; and to show relationships among design issues and devices.
- to contain exercises aimed at helping learners to better understand concepts through visual thinking.
- to serves as a guide, stepping learners through the various aspects (e.g. theory, physical setting) of performing physical experiments.
- as resources and references to complete assignment homework.

2.4.4 Educational TV Programme

Meanwhile, eLM for TV or popularly known as educational TV programmes (eBook) are reported to begin more than 40 years ago (Kodaira, 2005). By definition, ETP are specially programmed for learning, to disseminate various contents in various formats. Previously, ETP were broadcasted during schooling hours and viewed in school (Aufenanger, 2005). However, sophistication in broadcasting technologies has been initiated. In Malaysia, ASTRO[6] provides more than five channels containing ETP.

[6] ASTRO is a broadcasting and telecommunication company which provides channel on demand services in Malaysia. International channels such as CNN, BBC, ESPN, and Star Movie are included in subscription packages. Programmes are broadcasted 24 hours a day.

Currently, ETP are integrated with interdisciplinary curricula such as environmental and life education that transcendent conventional school subject[7] (Kodaira, 2005). As mentioned above, there are channels on TV allocated specifically for ETV, so that audiences can always view at any time. Besides, formats of ETV are also changed, combining both entertainment and intellectual contents. Regardless of the type of eLMs, the roles of learners and instructors are important.

Meisel (1998) adds video as another learning material. This opens up another new learning paradigm; the video-based learning. Next section elaborates about video-based learning.

2.4.5 Implications of eLMs to The Study

There are different approaches of eLM used in teaching and learning. Course instructor should select the best one, suitable with the objective to achieve. It is deduced that eLM is a core element in eLearning system, because it contains the contents of the course. The approaches include eBook, IMM, courseware, ETP, and video. The presentation styles for the approaches are different. In addition, RLM is a type of video, where learners could perform less interactivity. In relation, it could be seen in video making processes (Chapter 4) that scripts drive the production, to cater for the content. Accordingly, RLM should be incorporating components that make learning more entertaining through partly the styles of presentation, and the content inclusion. In addition, the contents in RLM will also include the unplanned ones.

2.5 VIDEO-BASED LEARNING

Video-based learning (VBL) is a concept referring to the learning method where learners view the content via video display. Anchored Instruction theory has suggested the use of an "anchor" for learners to explore learning content. That "anchor" could be a video

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[7] There are many more that broadcasted on many channels today such as National Geographic, Discovery, rather than special channels provided for educational TV programmes.

(CTGV, 1993). In that situation, learners pay attention more to the anchor, not to the instructor.

2.5.1 Past Studies On VBL

Peterson (1996) addresses that studies have shown that there have been huge gains in understanding of subject matter using video and CBT as well as significant gains in content retention, which is very low with on site classes. Peterson also adds, video can reduce training time, and has shortened the learning curve under certain circumstances. Williams (1998) adds that the classroom learning is obsolete, especially now that the prices for technological devices are continually dropping. This encourages CD-ROM, video and audio-graphics as well as all sorts of conferencing become preferential to traditional, institution-based approach to learning.

Maier (1998) has listed some of very encouraging responses from industries upon an "*A Major Malfunction...The story behind the space shuttle challenger disaster*", which contains three videocases. The videocases contain many real events such as the flaws, interviews, tragedy, and negative behaviors. The videocases have been used as learning aids by industries and tested on user responses. Among significant responses include the realistic and relevance aspects, the implicit motivational component, the use of multimedia, and the clarity of purposes. Besides, learners are recommended to 100% distill the lessons themselves. Respondents also stressed that the videocases provide more than the desired information. Trainees were highly interested with video learning, especially when the reality is depicted as part of the cases.

Marx (1998) elaborates the positive impressions among managers and educators upon use of video in teaching and learning, especially on the ability to engage learners and the instructors. He also elaborates the advantages of video which include the "window of cognitive engagement" (Kozma, 1991). This window refers to the visual attention learners' focus on the video's content. Compared to books, videos can contain more than texts and pictures, including audio and visual. However Clark (1983) argued that the selection of information and how it is organized determine student achievement, not whether the information is presented in books, videos, or computers.

In terms of mental efforts, Cennamo (1993) finds that learners' preconceptions of video viewed it as an easy medium, requiring little mental effort, resulting in little learning. In a related study, Cennamo (1992) finds that among college students, video is an easier medium for learning psychomotor skills and attitudes compared to learning intellectual and verbal material. Thus, students' perception on the difficulty of learning using video depends on the skills to be learned.

Consistent with the above research findings and recommendations, the video learning sequence offers a promising approach to raising learners' interest, effort, and content comprehension.

2.5.2 Classifications of VBL

Meisel (1998) classified video-based learning into seven categories; The video sleeper, Hollywood highlights, shrink-wrapped and bundled, video prices from hell, discover Rohm and Haas – the corporate infomercial, mining for video gold, and home grown. Table 2.3 briefly describes each category.

Table 2.3: Videotypes: different categories of VBL

Category	Description
1. The video sleeper	In this category, videos are produced in-house to offer an opportunity to see 'not-for-prime-time' lectures or speeches. Usually this type of video leads to boredom and fails to engage viewers' interest and attention. It is only used occasionally in distance learning when there is no option and to allow lecture review.
2. Hollywood highlights	This category generally includes the use of movies of TV segments, but often misused in the following ways: • Too lengthy for class or training events. • Not propped properly with appropriate assignment,

	discussion questions, and references. • Some nagging ethical or legal problems.
3. Shrink-wrapped and bundled	This type refers to the packaged videos with textbooks. Some tends to be 'talking head' like the video sleeper, and are often found not interesting. Instructors have to see the video with audience, to facilitate the attention. Often, the contents are incomplete and instructors must be prepared with more knowledge about the content.
4. Video prices from hell	In this category, instructors will rent or purchase videos for audiences' viewing. The aims are corporate and money. Some are good quality but often are dull and slow. Usually the video will come with discussion guides and extensive support materials meant for corporate training. Instructors' preparation must be as recommended in types 1 and 2.
5. Discover Rohm and Haas	Videos in this category are produced to tell the audience about the organization. It is often referred to as infomercial – commercial information about an organization. Videos are usually of high quality, pitched to potential employees, legislative bodies, and communities. All information is taken from the organization, and editing process is highly required to maintain good quality. Contents are filtered by representatives of the organization.
6. Mining for video gold	The videos are of special purposes, or are independently produced, yet they are hard to get. They are often marketed independently, or advertised in trade journals, and training resources. Usually, videos in this category are used to introduce topics of discussion. Learners must first read about the topics to discuss, as required in type 5.
7. Home grown	Creators can make full use of video recorder technologies to create videos that suit the objective and target audience. Level of technical skills is not a matter, everyone can do the tasks. Creators have full freedom to tailor the content. Learners can use the video that has been created in-class or anywhere, in groups or individually for their core competencies (teamwork, communications, creativity, adapting to change, etc.) development.

In his classifications, Meisel refers the actors as either learners or instructors. These terms are defined and elaborated in the next section.

2.5.3 The Learners And The Instructors

Laurillard (1993) presents a conversational framework in teaching and learning. In her model, she includes learner and instructor as the main stakeholders in conversations. Learner is defined as the entity to acquire knowledge, while the instructor will disseminate knowledge to the learner. Many names associated with learner such as student, pupil, and audience; while instructor is called lecturer, teacher, or facilitator.

Roles of learners and instructor in this digital age are diversified. Approaches include stimuli (Aufenanger, 2005), reflective practice, intrinsic feedback on action, contextualization of tasks in discourse, adaptation of tasks to discourse, adaptation of discourse to tasks, and contextualization of discourse in tasks are found suitable; these approaches are commonly implemented among learners and instructors (Lee, 2006). The modes of interactions are also expanded, in which they could be *content-to-learner, learner-to-instructor, learner-to-learner,* or *instructor-to-content* (Tuovinen, 2000).

However, the roles of learners and instructors are highly context-dependent. Change in roles might happen if change in the level of learning formality occurs. Learners can be an instructor in informal learning, while an instructor could learn from a learner (of a formal class).

Among all types in Table 2.1, home grown is the category that leads more to facilitating learning. It cuts away the technical skills of video editing on creators' part and enabling everybody to share knowledge. This calls up the creation of reality video, one that has been applied partly in the videocases of "*A Major Malfunction...*" (Maier, 1998).

2.5.4 Implications of VBL To This Study

Concepts and past studies on VBL show that some benefits have been drawn in previous works in support of learning. These advantages could be some good basis for works in this study. The classifications of VBL also provide sufficient guidance to further explore the potentials of opportunities in technology-based learning. This study matches with home-grown category, where level of technical skills is not important for making video projects. Also, the objective and content of the project could be tailored for matching with the target audience.

In addition, the VBL also implicates human entity aspects. The viewer (audience) part has been discussed at length in the previous section. To define the actor(s), VBL starts by taking the application as the anchor to convey the contents. There are actors in the video application playing roles as either an instructor or a learner. The roles of learner and instructor in this study are discussed further in Chapter 3.

In relation to Aufenanger (2005)'s statement about the learners and instructors, they also implicate the styles of presentation in this study; lecturing, instruction-based, documentary, and demonstration. Lecturing style inherits the traditional classroom teaching. Instructor speaks in front of a group of learners, sometimes with the help of teaching aids, such as whiteboard, projector, and slide presentation. Instruction-based refers to a style where the actor performs tasks on a command-dependent basis. Many question-and-answer interactions initiated to complete a particular milestone. In demonstration-style, tasks are performed by someone who is good at the particular task, where s/he starts performing the tasks from begin to finish and explain the steps at the same time. Not many question-and-answer interactions occurred, but the flow on explanation is much smoother. In contrast, the documentary-style is applied to visualize the content of a process, or a chronology of an event, or a cycle of a system; in short it is applicable to convey knowledge of something that has a timeline, sequence, or chronology.

2.6 REALITY VIDEO

Reality video adapts the concepts of home grown video category. They can be created by anybody who wants to share knowledge, on any topics and able to operate video recorder. Also, it is inspired by the Reality TV Shows (RTS).

In the early of the 21st century, one of the TV companies in the United Kingdom (UK) has introduced a reality TV Program. It was a genre which has no comprehensive script to follow either for dramatic or humorous situations. It documented actual events and featured ordinary people where there was no professional actor. This genre, even though has existed in some form or another since the early year of TV, the term "reality TV" has been mostly used to describe programs produced since 2000. Today, reality TV program becomes more popular, and has been introduced and practiced in many countries including Malaysia. Examples of reality TV programs in Malaysia include *Akademi Fantasia, Casa Impian, Cari Menantu,* and *Amazing Race*. There are many categories of reality TV programs. Table 2.4 lists the categories with brief descriptions.

Table 2.4: Categories of RTS

Category	Description
Documentary-style	In this type of show, viewers and cameras are passive observers following people going about their daily and professional activities. Often the plots are constructed via editing or planned situations. Usually, no task is given to the casts, situations are unscripted and locations are real. It has three subcategories; (1) Special living environment, (2) Celebrity reality, and (3) Professional activities
Elimination/Game shows	Usually participants are filmed to win prizes in this type of show which is also famous as "reality TV show". Participants are removed until one person or group remains, to be the winner. Normally the audience will have opportunities to vote for the remaining or removing ones. It has three subcategories: (1) Dating-based competition, (2) Job search, and (3) Sports.
Self-improvement/ makeover	A group of people or individuals are filmed improving their daily life. Shows are segmented into before improvement, during improvement, and after the improvement of the live. It could be a room to be improved, or anything.
Dating shows	Shows out people going out for a date, no elements of competition.
Talk shows	Host interviewing guests on topics that have been advertised prior to the show. Topics are outrageous and are chosen in the interest of creating on-screen drama, tension or outrageous behavior.
Hidden cameras	Hidden cameras rolling when passerby encounter a staged situation.
Hoaxes	The entire show is a prank played on one or more cast members,

	who think they are appearing in a legitimate reality show. The rest of the cast are in on the joke. Cameras are out in the open, participants know they are appearing in a TV show.

Table 2.4 depicts that the elimination/game shows is a category of reality TV program that requires involvement from the audiences as juries. Other categories do not require any action from the audiences. Dating shows, talk shows, hidden camera, and hoaxes are categories where the subjects or the 'actors' do not realize that they are captured to be on TV. All actions and speeches are real without screening. However, the reality concepts in this study are in a different sense. It could be seen in most reality TV programs that mistakes, interference, and feedbacks are included as parts of the contents. These components are not planned, but they occurred spontaneously.

As discussed by Meisel (1998), reality videos are very useful to sharpen skills of process observation. In addition, learners can use the reality videos to perform reflective exercises. Elements including role-play, simulations, and negotiations are recommended in learning through reality videos. This provides learners with not only the content, but also interpersonal skills, which is highly required in the workplace. Besides, the learning can be entertaining as reality videos has the potential to persuade learners to learn from mistakes, which might come from speeches and actions; interferences which might rise from the environment; and feedbacks which might come from the viewers and unseen actors.

An interesting point to ponder is, in different aspect, gaining more knowledge in less time has been an issue in this digital age. A Strategic Planning Director of Ogilvy One, USA has identified that most individuals are increasingly likely to complaint about lack of time (Henry, 2001). Henry (2001) also stresses that people tend to be more stressful if more things are packed into less time. This is because information technology that presents too much information will confuse rather than clarify. In conjunction, this suggests that time saving products are in high demand. Studies by Hae-Kyong, Ellinger, Hadjimarcou, &

Traichal (2000) and Petruccelli (1996) found that the information for learning must be very short and simple units, rather than long explanation.

2.6.1 Implications of Reality Video To This Study

Elaborations above clarify the concepts of reality TV show. Undoubtedly, the term reality in this study was inspired by the reality TV shows. However, the term 'reality' in this study really refers to the process of creating videos with no editing. The uncut videos are recorded with no technical video editing required on the creators' part. Anything that occurs during the process of recording is not cut, no matter either the actions or the speeches. This approach could blend together the content with many elements of natural feelings including entertainment, humor, and undesired mistakes. The uncut approach of making videos is used to produce reality video. This is where the term 'reality' in this study is referred to. As reality TV shows can be mainly for entertainment, the focus in this study is mainly for assisting learning, while at the same time making learning enjoyable and improving learning experience. In short, the reality TV implicates to the uncut or unedited contents, and is important to this study.

Considering the above-discussed aspects, the videography techniques implicates this study, in which the process is not similar to the one occurred in producing typical normal video projects. The steps in each pre-production, production, and post-production are lessened because the need for technical expertise is simplified in this study. Also, because of the reality element, as inspired by the reality TV show, it implicates that the styles of presentation among different RLM vary, as discussed in the previous section.

2.7 ACTIVE LEARNING

In electronic environment, learners are promoted to enjoy active learning. Bonwell and Eison (1991) define active learning as a process that requires learners to engage in learning by performing tasks. Not only learners listen to speeches but they also write, discuss, read, and solve problems. They are also encouraged to think at high levels;

analysis, synthesis, and evaluation. In 1996, Dodge (1996) refined the definition by addressing that in active learning, learners are required to read, speak, listen, think deeply, and write in proper manner. Dodge (1996) adds that active learning encourages learners to self-determine their learning objectives. This promotes various learning styles, and could differ from one person to another.

McKinney (2004) states that active learning can be implemented by anyone regardless of age and in or out of classrooms. He adds that there are four characteristics of active learning including:

- Learners involve in more than listening, with emphasis is more on the learners' skills development.
- Learners involve in thinking at high levels such as analysis, synthesis, and evaluation.
- Learners involve in activities reading, discussing, and writing.
- More emphasis is on the learners' discovery of their own attitude and value.

All definitions above are inline with an active learning model proposed by Fink (1999). Fink says that all learning activities involve some experiences and dialogues. Dialogues can be divided into either with oneself or with other party, while experience could either be through doing or observing.

Dialogue with oneself occurs when a person speaks to him/herself, in silence. It means the dialogues happen in the mind. Learners usually dialogue with oneself about the topics being discovered; anticipating what happens next, or trying to relate the discussions with previously discussed topics.

Dialogues with other people always happen if learners are in groups of many people. The dialogues maybe happen with live human or with characters in videos, or animations. Dialogue with live human is common. Dialogues with characters in videos happen when a person speaks to address his/her wander anticipation, questions, or suggestions. Sometimes, the character in the video speaks something related to the viewer's anticipation or guess. Characters in video for learning can ask learners some questions;

trigger learners' reactions; stimulate learners' thinking; and provide solutions for anticipated learners' ambiguities. Observing occurs when a person sees and/or listens to other people doing something that he/she has learned. A person can observe other people do in teaching, observe and listen to a professional giving talk, or observe a phenomenon. Observation could either be through imagination or direct observation. In direct observation, the person will observe the true event, while in observation through imagination the person will observe the event using simulation.

Doing refers to a style of learning where a person will do something, such as drawing, experimenting, writing, criticizing, exploring, discovering, asking, and shaping. Doing can also be performed through imagination, such as simulation and case studies. Ellerman and Denning (2001) further clarifies the concept that in active learning, when learners are active, it does not mean that the instructors are passive. In fact, the roles of instructors are becoming more dynamic, has a much more subtle role of indirectly fostering, enabling, and catalyzing learning in the learners. In short, active learning requires learners to perform more than listen or look. In conjunction, activities in the model proposed by Fink (1999) are important to ensure that learning takes place in active learning.

2.7.1 Implications of Active Learning To This Study

Concepts of active learning, that suggests learners must do, observe, and perform dialogues besides drawing, experimenting, writing, criticizing, exploring, discovering, asking, and making shapes are important to be incorporated in this study. In addition, this study agrees with the suggestions in Fink's (1999) model, and the development of prototypes must integrate those suggestions.

Originally, the activities to gain experience through doing and observing are recommended in this study. The eLMs could be paused to allow learners do tasks after observing the actions in the eLMs. Also, learners have full freedom to make dialogues, because they learn on their own pace; no restriction to obey. Those activities are in short part of the roles of learners and instructors which are part of the human entities, as elaborated at length in Section 2.2.

2.8 SELF-PACED AND SELF-DIRECTED LEARNING

Self-paced learning is also referred to as self-directed learning by many researchers such as Knowles (1975), Lowry (1989), Hiemstra (1994), and Smith (1996). Hiemstra (1994) also addresses that the similar concepts in Russia is referred to as self-education.

Knowles (1975) brings the idea that learning in self-paced allows the learners to determine preferences on their own. Questions regarding the learning outcomes, learning resources, learning needs, and learning styles are among subjects that learners would come with the options. Knowles's ideas have been agreed by many definitions.

Hiemstra and Judd (1978) quotes from Knowles (1975) that self-paced learning describes "a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes" (Knowles, 1975, p. 18).

Mateik (2000) stresses that learners should be allowed to learn on their own preferred time, with self-determined sequence of contents, and using their own options of materials. This means that learners will determine what, when, why, and how they will learn a certain topic.

Peterson (1996) also defines self-paced learning as allowing learners the flexibility of choosing when, where, why, and how they learn certain topics. He adds that self-paced learning could be building learners' self reliance, such being less dependent on help desk but searching for solutions of problems from many resources. Lowry (1989) and Smith (1996) both address self-paced learning as learning process where learners initiate with or without assistance from other people to diagnose their learning needs, summarize learning goals, identify learning resources, select and implement learning strategies, and evaluate learning outcome.

Houstis, Joshi, Atallah, Weerawarana, and Elmagarmid (1996) look into self-paced learning from the speed of learning perspective. In a way, self-paced learning helps everyone to gain knowledge. Commonly, learning is aimed at the average learners, but in self-paced, slow learners and fast learners can choose their own ideal learning preferences. This gives advantages of learning to them to achieve the learning goals.

The active learning and self-paced learning concepts could be applied in both formal and informal learning.

2.8.1 Formal And Informal Learning

Learning in the information age cannot be restricted to learning formally in learning institutions; it is moving out of schools into the home, the community, and the workplace, in fact everywhere (Fischer, 1997). With the wireless technology and mobile devices ready, learning activities can occur in the restaurants, bus, field, on the move, and in any places else (Benyon, Stone, & Woodroffe, 1997). Moreover, with the implementation of unlimited addressing in IPv6[8] addressing system, learning activities could also be initiated on mobile devices such as cell phones and personal digital assistants on fixed IP address. This gives opportunities for supporting lifelong learning activities (Fischer, 1999).

Formal learning is referred to learning process with particular syllabus to follow. As mentioned above, formal learning can be referred to the activities of knowledge transfer and acquisition in schools and other learning institutions, including professional training and corporate training. Strohecker and Ananny (2003) discuss dissimilarities concerning formal and informal learning, and are summarized in Table 2.5.

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[8] IPv6 is an addressing system, deployed to overcome insufficient addressing space in current IPv4. In IPv6, all electronic devices such as cameras, laptops, watches, cars, and home appliances can have fixed IP address, so that they can communicate with each other continuously.

Table 2.5: Attributes of formal and informal learning

Formal learning	Informal learning
Tells what the learner should learn and how to go about learning it	People can experiment ideas, create things using computational materials, and make their creations publicly retrieved.
Found in schools, other learning institutions, and training premises.	Learning through life, in which learning activities happens through lifetime and day-to-day living situations.
Learners come because they are told they should	Learning is initiated based on learners' curiosity; they come because they want to.
Learners are tied with schooling syllabus	Learners have freedom to pursue their ideas in their own ways.
The learning activities are performed in fixed environment.	It is on learners' decision to perform learning activities such as in homes, museums, zoos, clubhouses, community centers, airports, shopping areas, and workplaces.
Part of lives period	Lifelong

From the comparison above, it is seen that both approaches in learning are important. Clearly, one approach is complementing another. Literatures outline four reasons underlying the importance of informal learning as supports to better equip learners with sufficient needs. The reasons are as follow:

- *Creativity and innovation* are essential in future (Drucker, 1994), so how can these capabilities be learned and practiced? An implicit assumption is made, where the lifelong learning model and self-directed (self-paced) learning can influence the creativity and innovation potentials of learners, no matter alone or in groups.
- Most people see schooling as a period of their lives that prepare them for their first profession in career. This view limits their ability for adapting to the situations concerning coping with change.
- The world of working and living rely on collaboration, creativity, and framing of problem; deal with uncertainty, change, and distributed cognition; and empower humans with powerful technological tools. The world of schools and other learning premises needs to prepare learners with sufficient abilities to function in this world. It is said that the industrial-age models of education and work are in

adequate, so lifelong learning principles are aiming to reduce the gap between schools and workplaces (Fischer, 1999).

The transcendent of the theory by B.F. Skinner[9] and F.W. Taylor[10] are also discussed by Fischer (1999), to address that learning is becoming complex yet is more flexible. This study believes strongly with these ideas. Figure 2.3 contains the important aspects.

To summarize, Sachs (1995) states that learning new skills and acquiring new knowledge cannot be restricted to formal education setting. By integrating working and learning, people learn within the context of their work on real world problems. Learning does not separate the place and phase, but does integrate everything in work processes.

2.8.2 Implications of Self-paced and Self-directed Learning To This Study

Understanding the concepts of self-paced learning including the formal and informal contents really implicates this study. The videography techniques should be suitable for the contents as discussed in Section 2.6. Concepts of reality video are inline with the self-paced learning, in which learners can always learn on their own preferences. In RLM, there are no specific time and place determined. This determines that the contents should be presented in many styles, as discussed in Section 2.5.

As the roles of formal and informal learning are quite dissimilar, in fact informal learning is seen as complementing the formal learning, this study suggests that topics for both types of learning are important. However, the theories by Skinner and Taylor are used as guidelines; they are transcended beyond.

[9] Operant Conditioning Theory.
[10] Theory of motivation

Skinner / Taylor	Beyond Skinner / Taylor
There is a scientific, best way to learn and do.	Real problems are ill-defined and wicked.
Separation of thinking, doing, and learning.	Integration of thinking, doing, and learning.
Task domain can be completely understood.	Understanding is partial, while coverage is impossible.
Objective ways to decompose problems into standardizable actions.	Subjective, situated personal interests, need for iterative explorations.
All relevant knowledge can be explicitly articulated.	Much knowledge is tacit, and relies on tacit skills.
Teacher or manager as oracle.	Teacher or manager as facilitator or coach.
Operational environment: mass market, simple products and processes, slow change and, certainty.	Customer orientation, complex products and processes, rapid and substantial change, uncertainty and conflicts.

Figure 2.3: Transcending Skinner and Taylor

2.9 LEARNING THEORIES

Part of the objectives of this study can only be accomplished through the prototype of learning materials that apply the concepts of reality video. To determine these learning materials that apply the concepts of reality video deliver content sufficiently to learners, appropriate learning theories were studied as the basis. Following are the related learning theories to this study.

2.9.1 Anchored Instruction

Anchored Instruction is a major paradigm for technology-based learning that has been developed by the Cognition & Technology Group at Vanderbilt (CTGV) under the leadership of John Bransford. The initial focus of the work was on the development of interactive videodisc tools that encouraged students and teachers to pose and solve complex, realistic problems. The video materials serve as "anchors" (macro-contexts) for all subsequent learning and instructions. CTGV also explained:

"The design of these anchors was quite different from the design of videos that were typically used in education...our goal was to create interesting, realistic contexts that encouraged the active construct ion of knowledge by learners. Our anchors were stories rather than lectures and were designed to be explored by students and teachers."

(1993, p.52)

Anchored Instruction also recommends that the use of interactive videodisc technology makes it possible for students to easily explore the content. According to Bransford and Stein (1993), Anchored Instruction is a theory that is applied in elementary reading, language arts, and mathematics skills. However, the anchored instruction paradigm is based upon a general model of problem-solving. There are two principles of Anchored Instruction; (1) learning and teaching activities should be designed around an "anchor" which should be some sort of case-study or problem situation, and (2) curriculum materials should allow exploration by the learner.

2.9.2 Aptitude Treatment Instruction

Aptitude Treatment Instruction (ATI) suggests concepts that everyone has special interest and preferences upon learning which are referred to as specific abilities; as suggested by other intelligence theories. The optimal learning results when the instruction is exactly matched to the aptitudes of the learner.

According to Snow (1989), the aim of ATI research is to predict educational outcomes from combinations of aptitudes and treatments. He summarizes the main conclusions of Cronbach & Snow (1977) as: (1) aptitude treatment interactions are very common in education, (2) many ATI combinations are complex and difficult to demonstrate clearly, and no particular ATI effect is sufficiently understood to be the basis for instructional practice. Furthermore, Snow identifies the lack of attention to the social aspects of learning as a serious deficiency of ATI research. He states:

"Learning style differences can be linked to relatively stable person or aptitude variables, but they also vary within individuals as a function of task and situation variables."

(1989, p.51)

Snow (1989) also states that the best supported ATI effect involves treatments that differ in the structure and completeness of instruction and high or low "general" ability measures. Highly structured treatments (e.g., high level of external control, well-defined sequences/components) seem to help students with low ability but hinder those with high abilities (relative to low structure treatments).

There are three basic principles of ATI (Snow, 1989), including (1) aptitudes and instructional treatments interact in complex patterns and are influenced by task and situation variables, (2) highly structured instructional environments tend to be most successful with students of lower ability; conversely, low structure environments may result in better learning for high ability students, and (3) anxious or conforming students tend to learn better in highly structured instructional environments; non-anxious or independent students tend to prefer low structure.

2.9.3 Cognitive Flexibility

Cognitive Flexibility theory focuses on the nature of learning in complex and ill-structured domains. Spiro and Jehng (1990) states:

"By cognitive flexibility, we mean the ability to spontaneously restructure one's knowledge, in many ways, in adaptive response to radically changing situational demands...This is a function of both the way knowledge is represented (e.g., along multiple rather single conceptual dimensions) and the processes that operate on those mental representations (e.g., processes of schema assembly rather than intact schema retrieval)."

(p.165)

The theory is largely concerned with transfer of knowledge and skills beyond their initial learning situation. For this reason, emphasis is placed upon the presentation of information from multiple perspectives and use of many case studies that present diverse examples. The theory also asserts that effective learning is context-dependent, so instruction needs to be very specific. In addition, the theory stresses the importance of constructed knowledge; learners must be given an opportunity to develop their own representations of information in order to properly learn.

Cognitive flexibility theory is especially formulated to support the use of interactive technology (e.g., videodisc, hypertext). Its primary applications have been literary comprehension, history, biology and medicine. There are four principles of the theory (Spiro, 2008), including (1) learning activities must provide representations of content, (2) instructional material should avoid over simplifying the content domain and support context-dependent knowledge, (3) instruction should be case-based and emphasize knowledge construction, not transmission of information, and (4) knowledge sources should be highly interconnected rather than compartmentalized.

2.9.4 Cognitive Load

Cognitive load theory suggests that learning happens best under conditions that are aligned with human cognitive architecture. Human cognitive is divided into working memory, short-term memory, and long-term memory. Everything that is within our vision will be processed by the working memory. If the information is attended to, that short-term memory will process it, otherwise, the information decays. Information in long-term memory is sophisticated structures that allow us to think, perceive, and solve problems (Sweller, 1988). This means that cognitive load theory suggests not to apply problem-solving approach in learning for efficient outcome.

This theory concerns that the working memory loads must be reduced to facilitate schema acquisition in long-term memory that leads to changes. Schema is the structures that make up knowledge base, and are constructed over a lifetime of learning. Novice is different than expert because the schemas that novice has do not meet the schemas that the expert have. The change happens because while the learner gets more familiar with the content, the working memory can handle it more efficiently.

There are four principles of cognitive load theory (Sweller, 1988), including (1) change problem solving methods to avoid means-ends approaches that impose a heavy working memory load by using goal-free problems or worked examples, (2) eliminate working memory load associated with having mentally integrate several sources of information by physically integrating those sources of information, (3) eliminate working memory load associated with unnecessarily processing repetitive information by reducing redundancy, and (4) increase working memory capacity by using auditory as well as visual information under conditions where both sources of information are essential to understand.

2.9.5 Constructivist

Learning is an active process in which learners construct their knowledge based upon their current/past knowledge. The learner selects and transforms information, constructs hypotheses, and makes decisions, relying on a cognitive structure to do so. Cognitive structure (i.e. schema, mental models) provides meaning and organization to experiences and allows the individual to "go beyond the information given" (Bruner, 1973). Instructor should try and encourage students to discover principles by themselves. The theory also recommends active dialogue among learners and instructor. The role of instructor is to translate information into appropriate format.

There are three principles of the theory (Bruner, 1973; 1986; 1990), that instruction should be (1) concerned with the experiences and contexts that make the student willing and able to learn, (2) structured so that it can be easily grasped by the student, and (3) designed to facilitate extrapolation and or fill in the gaps.

2.9.6 Experiential

Experiential theory classifies two types of learning, either cognitive learning that is academic knowledge such as vocabulary, multiplication table or experiential learning that is more to applied knowledge such as how to repair engines. Experiential learning has special qualities in which it promotes learners' personal involvement, learners' self-initiated progress, outcome evaluated by learner, and pervasive effects on learner (Rogers, 1969). The important role of instructor is to facilitate learning. Learning is facilitated when: (1) learner participates completely in the learning process and has control over its nature and direction, (2) it is primarily based upon direct confrontation with practical, social, personal or research problems, and (3) self-evaluation is the principal method of assessing progress or success. Rogers and Freiberg (1994) states that the theory is also suitable for classroom learning.

It also emphasizes the importance of learning to learn and an openness to change. The theory applies primarily to adult learners and has influenced other theories of adult learning. There are four principles of the theory (Rogers, 1969), that learning (1) takes place significantly when the subject matter is relevant to the personal interests of the student, (2) which is threatening to the self (e.g., new attitudes or perspectives) are more easily assimilated when external threats are at a minimum, (3) proceeds faster when the threat to the self is low, and (4) is the most lasting and pervasive in self-initiated mode.

2.9.7 Minimalism

The minimalism theory is a framework for designing instructions for computer users, especially in training. It is based upon studies of people learning to use a diverse range of computer applications including word processing, databases, and programming. It is also applied in computer documentation (van der Meij & Carroll, 1995). The theory outlines five suggestions:

i. all learning tasks should be meaningful and self-contained activities,
ii. learners should be given realistic projects as quickly as possible,

iii. instruction should permit self-directed reasoning and improvising by increasing the number of active learning activities,
iv. training materials and activities should provide for error recognition and recovery and,
v. there should be a close linkage between the training and actual system

The theory also emphasizes the necessity to build upon the learner's experience. Carroll (1990) states:

> *"Adult learners are not blank slates; they don't have funnels in their heads; they have little patience for being treated as "don't knows"... New users are always learning computer methods in the context of specific preexisting goals and expectations."*
>
> (p. 11)

Carroll (1990) also identifies the roots of minimalism in the constructivism theories. The critical idea of minimalist theory is to minimize the extent to which instructional materials obstruct learning and focus the design on activities that support learner-directed activity and accomplishment. The theory states that training developed on the basis of other instructional theories is too passive and fails to exploit the prior knowledge of the learner or use errors as learning opportunities.

There are four principles that support the implementation of the theory (Carrol, 1990; 1998): (1) allow learners to start immediately on meaningful tasks, (2) minimize the amount of reading and other passive forms of training by allowing users to fill in the gaps themselves, (3) include error recognition and recovery activities in the instruction, and (4) make all learning activities self-contained and independent of sequence.

2.9.8 Multiple Intelligence

The theory of multiple intelligences suggests that there are a number of distinct forms of intelligence that each individual possesses in varying degrees. Gardner in 1983 adds cultural intelligence to the existing of his multiple intelligence consists of linguistic, musical, logical mathematical, spatial, body-kinesthetic, intrapersonal (e.g., insight, metacognition) and interpersonal (e.g., social skills). Gardner (1983) also says that the implication is that learning/teaching should focus on the particular intelligences of each person. Another implication is that the assessment of abilities should measure all forms of intelligence. There are three principles of the theory of multiple intelligences (Gardner, 1993): (1) individuals should be encouraged to use their preferred intelligences in learning, (2) instructional activities should appeal to different forms of intelligence, and (3) assessment of learning should measure multiple forms of intelligence.

2.9.9 Situated Learning

Situated learning theory argues that learning happens as a function of the activity, content, and culture in which it occurs. This argument contradicts with the behavior of classroom learning, that involves knowledge which is abstract and out of context. The theory stresses that social interaction is important to ensure learners' participation within the "boundaries". The "boundaries" is elaborated as the "community of practice" by Smith (2006). There will be some beliefs and behaviors to be acquired in the community of practice, no matter it is at work, school, or in civic and leisure interests. In some groups, learners could be the core, in some other groups the same learners could just be at the margins. Many researchers support this theory such as Brown et al. (1989).

Situated learning is usually unintentional rather than deliberate, and the theory stands as a general theory of knowledge acquisition and has been applied in the context of technology-based learning activities that focus on problem-solving skills. The principles of situated learning are (1) knowledge needs to be presented in an authentic context, i.e., settings and applications that would normally involve that knowledge, and (2) learning requires social interaction and collaboration (Lave & Wenger, 1990; Brown et al., 1989).

2.9.10 Symbol System

Symbol system theory intends to explain the effects of media on learning. The theory stresses that each medium is capable of conveying content via certain inherent symbol system. Salomon (1979) states that symbol system partly determines different learners will get different percentage of knowledge from different kinds of media. This is due to the number of ways symbol system affects knowledge acquisition including:

- they highlight different aspects of content
- they vary with respect to case of recording
- specific coding elements can save learners from difficult mental elaborations by overtly supplanting or short-circuiting specific elaborations
- symbol systems differ with respect to how much processing they demand or allow
- symbol systems differ with respect to the kinds of mental processes they call on for recording and elaboration.

For example, Salomon (1979) suggests that television requires less mental processing than reading and that the meanings secured from viewing television tend to be less elaborating than those secured from reading (i.e., different levels of processing are involved).

The meaning extracted from a given medium depends upon the learner. Thus, a person may acquire information about a subject they are familiar with equally well from different media but be significantly influenced by different media for novel information. This theory is supported primarily by research conducted with film and television. More recent work has extended the framework to computers.

The principles of symbol systems are (1) the symbolic coding elements of particular media require different mental transformations and hence affect the mastery of specific skills, (2) the level of knowledge and skill that an individual possesses will affect the impact of specific media sequences, (3) the nature of the learning/information processing tasks can affect the impact of specific media sequences, (4) the social context of media presentations can influence what message is perceived, and (5) there is a reciprocal relationship between media and learner; each can influence the other (Salomon, 1981; Salomon, Perkins, & Globerson, 1991).

2.9.11 Implications of Learning Theories To This Study

Learning theories are important base to this study. The theories elaborated in this section were referred to for better understanding of the learning itself. There are some suggestions to promote the use of problem-solving method, apply different media to support different learners, and understand the different categories of intelligences. Those are some examples of how theories affect this study. Anchored Instruction is a specific theory that suggests the use of specially developed videodisc to assist learning. Specifically, each theory has certain implications to this study.

Anchored Instruction, Aptitude Treatment Instruction, Cognitive Load, Multiple Intelligence, and Symbol Systems are theories that promote the variety of media elements to support learning on learners' part, because they understand that there are varieties of learner types who have unique characteristics. So, using different elements including texts, graphics, images, animations, simulations, real object representations, and audio could support different types of learning preferences. Besides, Cognitive Load also influences the styles of flow, which are related to human cognitive representation. Social interaction, which is discussed in Section 2.2 as part of human entities are emphasized in Constructivist and Situated Learning theories. These two theories concern about the social aspects that support the learning processes.

The theories of Cognitive Flexibility and Experiential implicate the content delivery strategies, which stands at the heart of the pedagogical component of learning processes. Also, Cognitive Flexibility emphasizes on styles of presentation. Minimalism theory outlines that learners should be presented with real projects, and activities should provide for error recognition and recovery. The error recognition and recovery are obvious when they are real. This implicates that the uncut or unedited contents are important; hence this study focuses on them.

2.10 ENTERTAINING AND FUN

Currently, issues to design products that entertain users while using has become a major concern. Designers are not only designing products to ensure products work well (functionality – task-focused) and usable (usability – user-focused), but also to go beyond those aspects, so that the products satisfy (satisfactory – experience-focused) the intended users. Every aspect has its own attributes, but somehow has certain influences over the others. As an illustration, it is undeniable that a system with multiple functions such as a portal is more usable and satisfying as compared to a static web. The tri-focus of computer systems' components is illustrated in Figure 2.4, and described in the subsections.

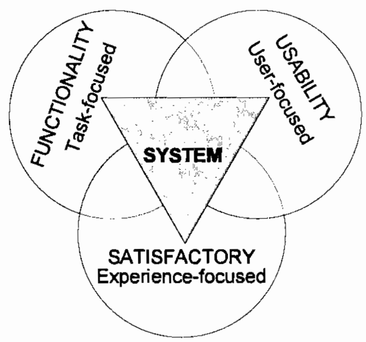


Figure 2.4: Conceptual framework of components of a computer system

2.10.1 Task-focused

A system is developed with its functions in mind. It is extremely important to make all functions work well as they are intended to. In the design phase, the functions are determined through outlining certain diagrams such as data flow and entity relationships. More specific functions are outlined in the screen-sketch design. The system designer and developer which may consist of programmers and project managers pay critical attention to the functions to ensure their worthiness. Those functions that support users' tasks are classified as task-focused. When the functions are not well-designed; such as calculator does not calculate accurately, or entered data are stored in incorrect format in the database; users' tasks might be influenced, and difficulties might arise in the sense that functions may not be performed as they are expected. As a consequence, the system which is unable to come out with expected results will not be used for a sufficient period relative to the investment put upon. In the development cycle, this task-focused part is essential for full-determination. In evaluating the task-focused part, the development team will validate the systems from the standpoint of utility, such as (1) quality assurance, (2) zero defects, (3) utility to design features, and (4) intrinsic in the systems.

2.10.2 User-focused

Besides the task-focused, there are also aspects that do not really concern about the utility, but more on the users. These aspects are grouped into concerns relating to how users perceive on issues like how ease a system is, how easy the system is to learn, how intuitive the product is, and how usefulness the product is (Wickens et al., 1998; Newman & Taylor, 1999; Wiberg, 2001; Barnum, 2002; Dix et al., 2004; Hornbaek, 2005; Preece et al., 2007), in which they are studied for system's usability.

In general, usability concerns about the system interface; how well the system interface serves the users in performing tasks, and is classified as user-focused. There are of course many issues to observe including content, structure, layout, and navigation. Systems' ease of use, usefulness, and interface are found very important. So, researchers have constructed and established some instruments for evaluation. Perceived Ease of Use is widely used for evaluating how easy a system is to use; while Perceived Usefulness is adoptable to evaluate how useful a system is to use. In addition, Questionnaire for User Interaction Satisfaction (QUIS) is available for evaluating systems' interface in terms of their physical look and feel. These usability issues are generally not the responsibility of the programmers, but the system interaction designers. Interaction designers are people who plan for the best ways to support users' tasks.

2.10.3 Experience-focused

Beyond usability, however, is the critical criterion of satisfaction, which no amount of validation testing or quality assurance testing would reveal (Barnum, 2002). The measure could only come from users, using many techniques of data collection (Carrol & Thomas, 1988; Wickens et al., 1998; Kwon & Chidambaram, 2000; Barnum, 2002; Dix et al., 2004; Preece et al., 2007). It sounds almost similar with those discussions in previous paragraphs: usability. However, researchers defined these two as different aspects of a system. Those works which discussed about satisfaction focused on how users experience the system, and classified as experience-focused aspect of a system.

There were few researches carried out on measuring satisfaction despite the aspects of ease of use and effectiveness (Carroll & Thomas, 1988). However, in recent literatures, attempts are found to research in the subject (Evans, 1993; Harrison & Rainer, 1996; Mahmood, Burn, Gemoets, & Jacquez, 2000; Chin & Lee, 2000; Lindgaard & Dudek, 2003). Besides, attempt to shift from usability alone to user experience which is analogous to an iceberg (Berry, 2000) is also included in work by Wright, McCarthy, and Marsh (2000). Probably, their works could rationalize the statement by Monk, Hassenzahl, Blyth, & Reed (2002), who state that designing for enjoyment is not as designing for usability. Then, Wiberg (2001; 2005) further explored the satisfaction. Later, the work in investigating user satisfaction was extended by Kaye (2007). In addition, experience is closely related to feelings and emotions. Using heuristics may help in recognizing emotions (Lera & Garreta-Domingo, 2007). In relation, works investigating users feeling and emotions can be found in Malone (1980; 1981, 1984), Amory, Naicker, Vincent, & Adams (1999), Pinhanez et al., (2001), Karat et al., (2001), Asgari and Kaufman (2004), Neal et al., (2004), MacFarlane et al., (2005), Kempter (2007), and Spillers (n.d.). Also, they are found in Malone and Lepper (1987), Sanders and Ayayee (1997), Perry (2001), Carroll (2004), Pikkarainen, Pikkarainen, Karjaluoto, and Pahnila, (2004), Mandryk, Inkpen, and Calvert, (2006), and Chesney (2006).

The above sections discuss three high level components of a computer system. This paragraph and the following elaborate the definition of entertaining and fun. Entertainment is a general expression, and has many interpretations. Most people have the idea of what entertainment is. It is not easy to define just because everyone seems to know what it is. Furthermore it is somewhat common sense. However, this study relates the entertaining factors with the use of software application: IT application. So a closer definition should be formulated. Below are some general definitions.

Entertaining is an adjective, comes from the word "entertain". Merriam-Webster[11] defines entertain as *to show hospitality to and to provide entertainment for*. Those definitions are exactly similar as definitions by The Free Dictionary by Farlex[12] and answer.com[13]. Besides the same definition, Reader's Digest (2006) adds another definition to it as *to amuse or interest someone*.

Merriam-Webster online dictionary defines fun as *what provides amusement or enjoyment*. Another definition by Merriam-Webster is *violent or excited activity or argument*. Other two online dictionaries, The Free Dictionary and answer.com define fun as *a source of amusement, enjoyment, or pleasure*. Also, Reader's Digest (2006) defines fun as *enjoyment or amusement, and causing laughter*.

From the above definitions, which present some similarities, an investigation into the relationship between entertaining and fun is necessary. When standard dictionaries and thesaurus (such as Webster's New World Dictionary. (1996), Oxford Dictionary & Thesaurus. (2007), Collins Cobuild (2007), and Houghton Miffin (2007)) were consulted, the definition of both entertaining and fun were found not similar as presented in Figure 2.5.

[11] http://www.webster.com/cgi-bin/dictionary
[12] http://www.thefreedictionary.com/fun
[13] http://www.answers.com/topic/fun

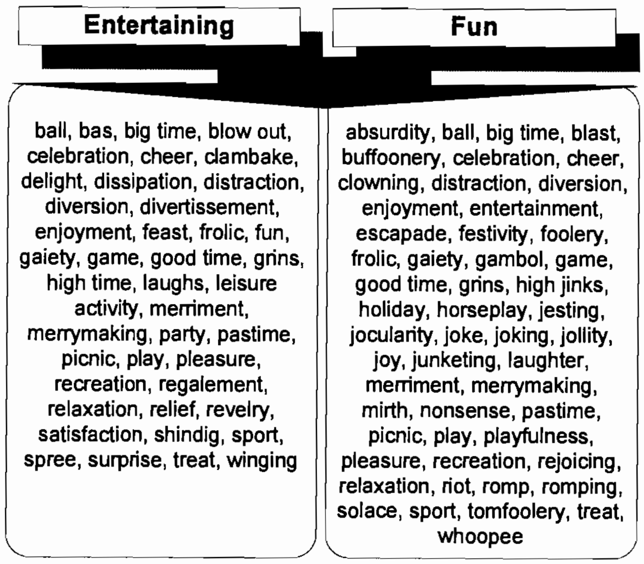


Figure 2.5: Synonyms for entertaining and fun

It is noticed that both words are somewhat overlapping in meaning. There are 22 common terms in both words, which makes up 51% of 43 synonyms for entertaining and 42% of 52 synonyms for fun. This indicates that both words are correlated at 40 to 50 percent. However, the remaining percentages are not known, and in some cases, the notions differ in meaning. It has been addressed a while ago by Langer (1977), who stated that:

> *"...entertainment is not essentially frivolous... Amusement is a temporary stimulus, the 'lift' of vital feeling that normally issues in laughter. It is generally pleasant, and sometimes erroneously sought as a cure for depression. But entertainment is any activity without direct practical aim, anything people attend to simply because it interests them. Interest, not amusement, nor even pleasure, is its watchword."*
>
> (Langer, 1977; p.404)

Entertainment in Langer's definition is the noun for the verb entertaining, so they are significantly correlated, and can be used intertwined. Also, to further differentiate the words entertaining and fun, this study considers entertaining in relation to comedy and tragedy. Both are understood as entertainment, but not necessarily situations where entertainment and fun are seen as equal. Here, comedy and tragedy are entertainment, but tragedy is not fun. In regards to this, Langer (1977) adds that

> *"...Shakespear's tragedies were written for an entertainment theater in which people sought not amusement but the exhilaration of artistic experience, overwhelming drama."*
>
> (page 404)

Up to this end, this study sees both words as differing in meaning. Originating from the definitions and concepts discussed above, this study traversed some of previous works such as Amory et al. (2004), Malone (1980), and Carroll (2004) to search for criteria for entertaining and fun. In addition, this study emphasizes an approach; entertaining as the characteristics of RLM, while fun is referred to human feeling when using RLM. So in many cases throughout this thesis, it is phrased as RLM is entertaining and invoking fun, which means the entertaining characteristics of RLM makes learners feel fun. Figures 2.6 and 2.7 present criteria for both terms. Elaborated explanation on obtaining the criteria is provided at length in Chapter 6.

	Criteria	Characteristics
1	Attracting and capturing attention	Attracting and capturing attention, Iteration
2	Provoking perceptions	Stimulating, Visualization, Provoking perceptions, Curious, Sparks discussions
3	Arousing emotions	Fantasy, Freedom, Arousing emotions,
4	Interesting	Interesting, Not boring,
5	Challenge	Challenging, Uncertainty, Challenging interpretations
6	Appealing	Pleasant, Appealing to the eye and ear, Pleasing
7	Encouraging	Curiosity, Privilege, Fortune, Encouraging
8	Entertaining	Entertainment,
9	Guiding	Not confusing, Sufficient feedback, Control, Reflection, Confident, Providing guidance, Adequate feedback
10	Engaging	Engaging, Opportunity to engage
11	Flexible	Different look and feel, flexible

Figure 2.6: Criteria for entertaining

	Criteria	Characteristics
1	Laugh	Laugh
2	Humor	Humor
3	Relax	Easy, Comfortable, Relax
4	Happy	Happy
5	Fun	Fun
6	Enjoyable	Not frustrating, Enjoyable, Delighted
7	Excited	Exciting, Excited, Surprising

Figure 2.7: Criteria for fun

2.11 CONCLUSION

Based on the study of literature, an understanding about the learning styles and approaches, eLearning and related topics, and learning theories has been gained. Those concepts will be incorporated in the prototype of the learning material that applies the concepts of reality video. Figure 2.8 summarizes the related literatures. Relationships between these related literatures and the components implied in RLM are illustrated in **Appendix B**.

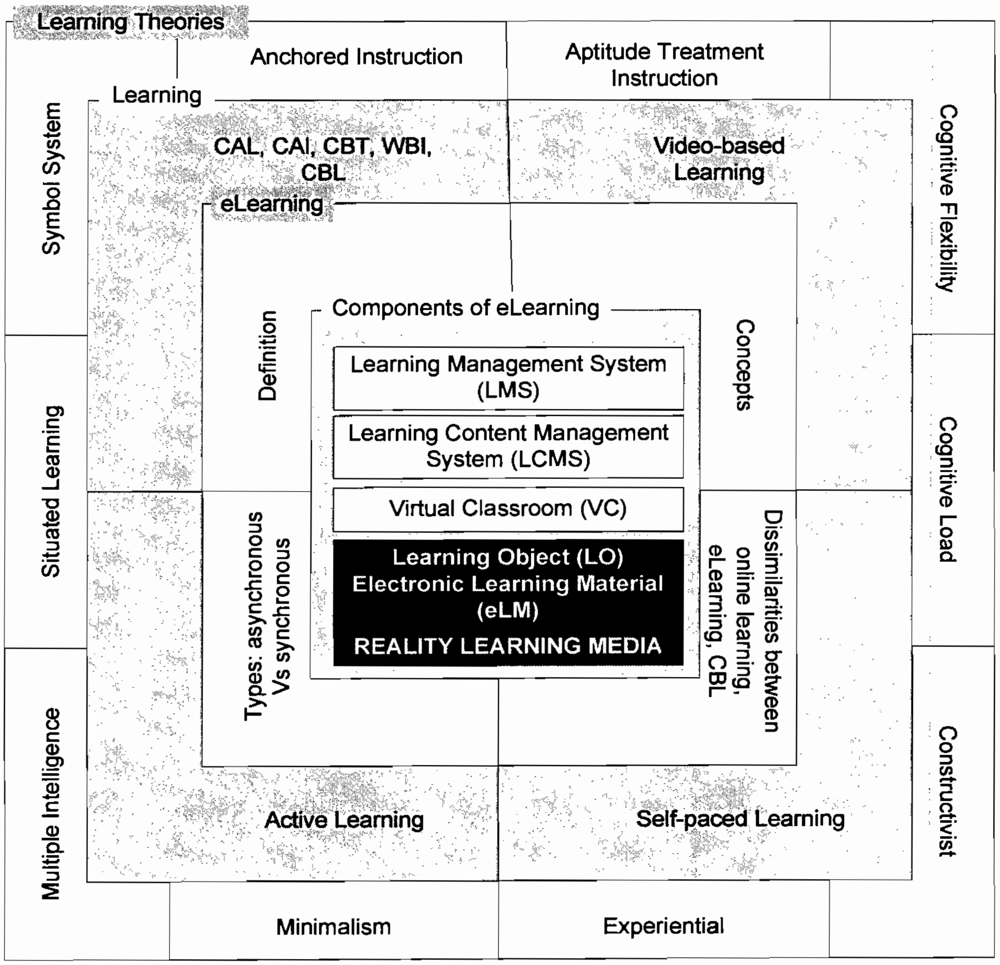


Figure 2.8: Summary of related literature

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter describes the processes required for achieving all objectives as stated in chapter 1. This study involved three parts; theoretical, development, and evaluation; which require iterations of processes. In fact, there are a number of iterated data sources, methods, theoretical, and data analysis applied. To fit these requirements, this research adapted the triangulation research method. In relation to the above statements, Marianne (1998) in her research utilized the Iterative Triangulation Methodology, which has also been found in works by other researchers such as Downward and Mearman (2005), Yazrina and Mohamed (2005), Gluer (2006), and Bailey-Beckett and Turner (2009). The methodology is adapted in this study and Figure 3.1 depicts the research methodology of this study which is the Iterative Triangulation Development Methodology.

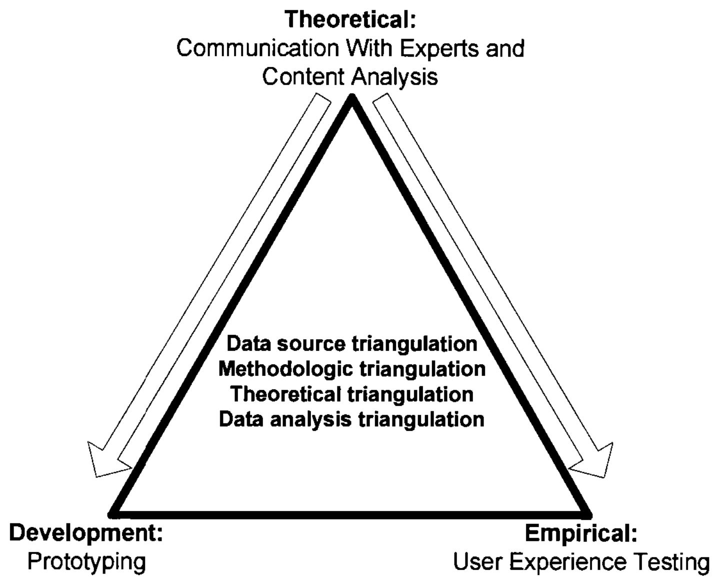


Figure 3.1: Basis of methodology

Figure 3.1 describes that there is a third party between development and empirical testing, that is the theoretical which consists of communication with experts and content analysis. Instead of straightforwardly testing the prototypes, inputs from experts and existing information were considered to support the prototypes development and user testing procedures. In addition, in those activities, triangulation is applied in terms of data source, method, theory, and data analysis.

- Data source triangulation – this study gathers data from different time, space, and persons. This increases the possibility of revealing a typical data or the potential of identifying similar patterns, thus increasing confidence of the findings.
- Methodologic triangulation – could also be called mix-method or multi-method, and can be seen in both data collection method and research method. Use of different methods provides richer information to the study.
- Theoretical triangulation – use of multiple learning theories and hypotheses when examining a phenomenon to conduct the study with multiple lenses and questions in minds.
- Data analysis triangulation – there are different questions to answer in this study, so different types of data analysis were utilized.

Based on the Iterative Triangulation Development Methodology, the study was addressed by adopting two approaches as suggested by Sekaran (1992) and Barnum (2002). Additionally, these approaches have been adopted by Norshuhada, Shahizan, Syamsul Bahrin, Zakirah, Ariffin, Asmidah, Khairul Bariah, & Ruslizam (2004). The approaches are known as:

- investigative, elicitative, and deductive approach; and
- analytical, constructive, and hypothetico approach.

The scheme of relationships between the Iterative Triangulation Methodology and the approaches are depicted in Figure 3.2. Consequently, the techniques for each approach are further discussed in detail in the subsequent sections of this chapter. Relevant prototyping techniques and evaluation techniques are also outlined.

3.2 THE ELICITATIVE, INVESTIGATIVE, AND DEDUCTIVE APPROACH

In the elicitative, investigative, and deductive approach (EIDA), relevant literatures on learning styles and theories, teaching and learning issues, and accomplishments of VBL were studied and reviewed. After it was decided to focus on RLM, related literatures were further reviewed, in order to extract important features for RLM in improving learning experiences.

The existing eLMs such as courseware, videos, and TV-based learning programmes are examined. They were collected covering different topics and intended for different groups of users to cater for the focus of this study, which has not limited the users to certain age groups.

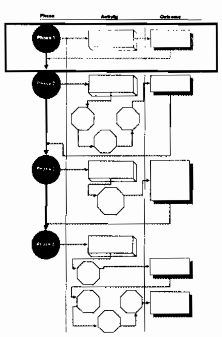
Besides, emphasis was also given to the source of inspiration for the RLM which was the reality TV shows. It was determined that the elements of fun and entertaining are two factors that attract audiences to spend times on the reality-style TV shows. These two elements were later confirmed to be the main focus of the study.

In teaching and learning, there must be at least two entities taking roles actively to ensure the interchanges of knowledge and information (Laurillard, 1993). These two entities are known as learners and instructors. Learners are referred to as students, trainees, and subject; while instructors are commonly referred to as teachers, facilitators, and leaders (Laurillard, 1993). Learners and instructors have certain roles to play in the processes of interchanging the deliverables. The roles will depend highly on many factors such as place, time, and context of discussion. The detailed discussion on the learners and instructors are provided in Section 2.5.3.

The teaching and learning can occur in different states of formality. Normally, they are referred to as either formal learning or informal learning (Fischer, 1997). Detailed discussion on formal and informal learning is provided in Section 2.8.1.

In EIDA, the first two phases in this study involved communication with experts and content analysis. These are described in the subsequent sections.

3.2.1 Communication With Experts



As to ensure the concept of RLM addresses what it should, expert reviews step is important. This is especially because the RLM is a concept, proposed for creating eLMs that are fun and entertaining. Experts' review on the concept of RLM will determine that the concept is reliable and can be referred to when designing and developing eLMs that can help improve learning experiences specifically on aspects related to fun and entertaining. Experts determine these aspects based on their existing knowledge.

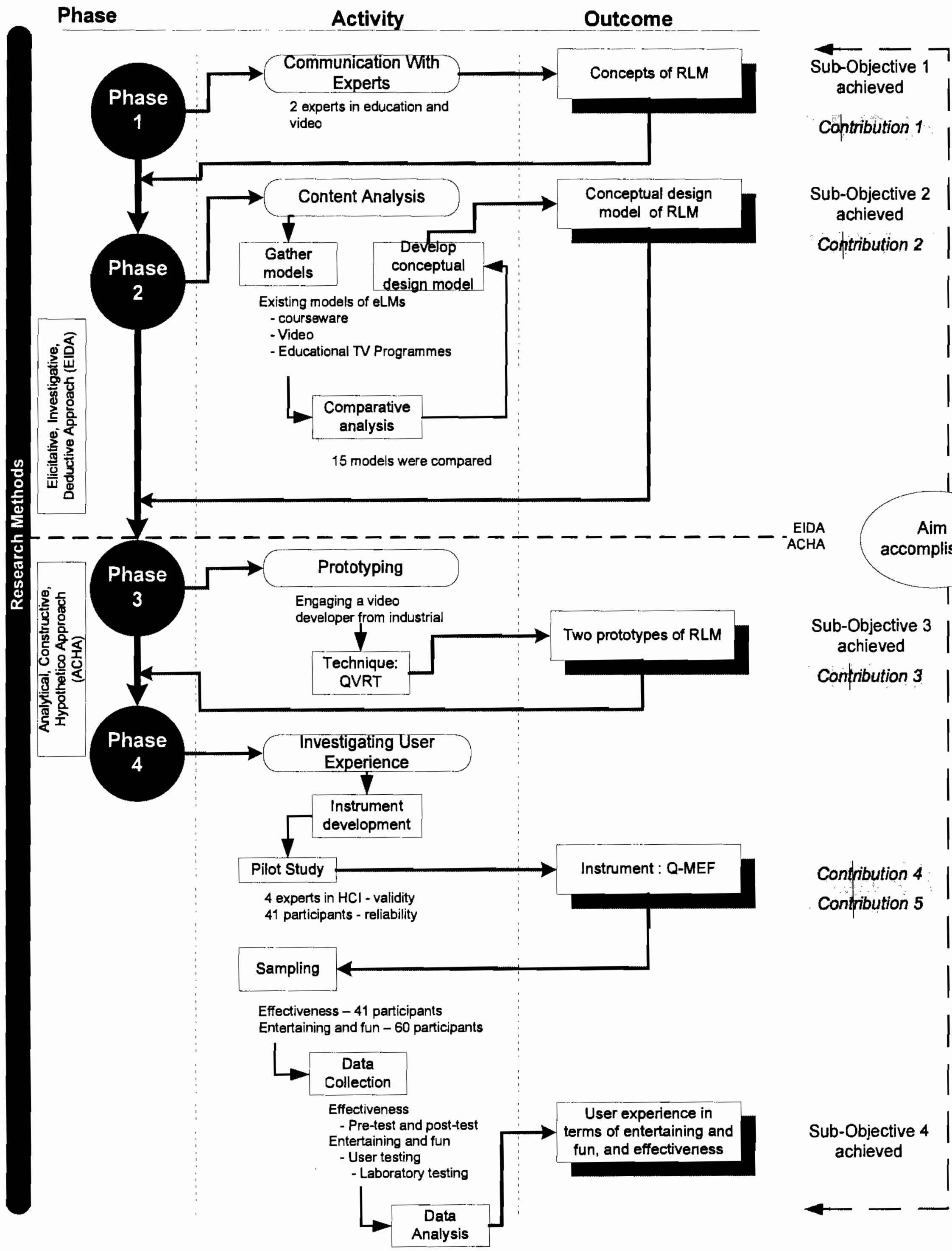
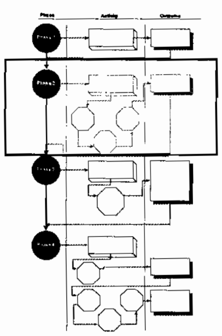


Figure 3.2: Relationships among approaches and activities

In this step, the input from elicitation activities including reading from articles and books especially regarding eLMs and examining the existing eLMs were utilized to draft the concept of RLM. The drafted concept of RLM was then issued to two experts for reviewing, one from Malaysia and one from the United States of America (USA). These two experts are highly-experienced in their fields in which the Malaysian (**Appendix C**) has a PhD in Instructional Design and has been teaching and researching in the field since the last ten years. He was asked to look into the instructional design aspects. Meanwhile, the American (**Appendix C**) is the person who classified the VBL into 7 categories (see Table 2.3) and was responsible to investigate the concept from his perspective on VBL. Both experts are academia at HLI, and have been teaching in their fields since early nineties. The results from the experts at this stage were comments for improving the concept based on the form provided (as shown in **Appendix D**).

Communications with the expert in the USA were made through the emailing services. Meanwhile, communications with the expert from Malaysia were on face-to-face basis. However, telephone calls were also conducted.

3.2.2 Content Analysis



Content analysis is a process to elicit knowledge about the intended study, where content can be acquired from many sources of information, including text, video, audio, and other forms elements (Preece et al., 2002). In this study, the aim of content analysis phase is to propose a conceptual design model of RLM. It is determined that techniques such as literature study, interview, peer review, and expert review are appropriate.

All techniques involved in the processes of coming out with the conceptual design model are described in the following subsections. First, the existing models were gathered, they were then compared, and later the results of the comparative study were used as guidelines for proposing the conceptual design model for RLM.

A. Models gathering

Existing conceptual models were used as the basis for understanding the requirements for designing and developing eLMs. Similarities and dissimilarities of the models were tabled for comparison. These were gathered through examining the relevant literatures on courseware, VBL, and ETP. Chapter 4 discusses the outcomes of this stage, where 15 eLMs were compared.

Having gathered the existing conceptual models, the features and components of each conceptual model need to be analyzed. The following subsection describes the comparative study of the models.

B. Comparative analysis of the models

Conceptual models for different applications have special requirements over the others. This is because they are used with different technologies, in different contexts, and probably by different groups of users. Norshuhada et al. (2004) applies the comparative analysis of existing models to gather features appropriate for an online bookstore. The features of all compared models are tabulated, separated in columns.

In this study, the technique by Norshuhada et al. (2004) was adopted. First, the models were presented in figures. Then, tables containing features followed. The results from the comparative study of the three conceptual models (i.e. courseware, video, ETP) were compiled and used as the input for developing the conceptual design model of RLM. Their entities, components and details are discussed in Chapter 4.

C. Development of conceptual design model of RLM

Outcome from the comparative analysis are used to further develop the conceptual design model of RLM (Preece et al., 2002). Conceptual design model as defined by Mayhew (1992) is the general conceptual framework through which the functionality is presented.

Another definition of conceptual model is provided by Johnson and Henderson (2002), which says a conceptual model is a high-level description of *how a system is organized and operates.*

Preece et al. (2007) clarify the definitions of conceptual models by addressing that a conceptual model is an abstraction that outlines what people can do with a product and what concepts are needed to understand how to interact with it. It is important to note and stress that it is not a description of user interface but a structure outlining the concepts and relationships between them that will form the basis of the product or system (Preece et al., 2007). In a nutshell, a conceptual model provides a working strategy; a framework of general concepts and their interrelations. Preece et al. (2007) and Johnson and Henderson (2002) propose that a conceptual model should comprise the following components:

- The major metaphors and analogies that are used to convey to the users how to understand what a product is for and how to use it for an activity.
- The concepts that users are exposed to through the product, including the task-domain objects they create and manipulate, their attributes, and the operations that can be performed on them.
- The relationships between those concepts, such as whether one object contains another, the relative importance of actions to others, and whether an object is part of another.
- The mappings between the concepts and the user experience the product is designed to support or invoke.

In conjunction with the definitions and components described above, the conceptual design model of RLM is aimed at providing guidelines appropriate for designing and developing an RLM. In other words, it helps anyone who puts efforts to design and develop an RLM formulating the requirements. The four components as suggested by Preece et al. (2007), and Johnson and Henderson (2002) were considered in the conceptual model of RLM. Chapter four elaborates on the conceptual design models, which have undergone an iteration loop and discussed with peers (Ariffin & Norshuhada, 2007a, 2009).

To validate the design model of RLM, some evaluation techniques must be applied. It starts with hypothesizing. Hypotheses of this study were constructed before constructing the prototypes that apply the RLM concept (Sekaran, 1992). Section 3.3.3.5 lists all hypotheses constructed for achieving objective 4 and to gain additional information from collected data.

D. Hypothesizing

A hypothesis is defined by Sekaran (1992) as an educated guess about a problem's solution. Reviewing further Sekaran's (1992) works, hypothesizing is further described as follows. The hypotheses must be testable, logically conjecturing *relationships* between two or more variables. In addition, hypotheses can also test whether there are *differences* between two groups with respect to any variable(s). There are null and alternate hypotheses in which the null hypotheses are given more emphasis to express that there is no relationship between variables or no difference between groups. If the results of the tests reject null hypotheses, then all permissible alternative hypotheses relating to the particular relationship or difference tested could be supported.

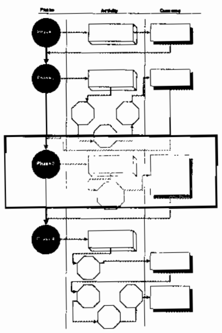
Next step in the process of validating the design model of RLM is to apply the concept into prototypes.

Finally, in this elicitative, investigative, and deductive approach, all information through the elicitation activities are deduced and concluded. The outputs of these processes are used as the input for the analytical, constructive, and hypothetico approach.

3.3 THE ANALYTICAL, CONSTRUCTIVE, AND HYPOTHETICO APPROACH

The activities in the analytical, constructive, and hypothetico approach (ACHA) start with analyzing possible alternatives to the proposed conceptual design model. A number of alternatives were drafted before a final one was selected. This final one was then applied to develop prototypes.

3.3.1 Prototyping



Wickens et al., (1998) addresses that prototypes are initial versions of the real systems, and usually contain the 'look and feel' of the real system. To support interface design, usability testing, and other human factors activities, prototypes are developed at the early of designing processes (Schön, 1983; Norman, 1988; Nielson, 1994; Liddle, 1996).

Prototypes could be built using any materials such as foam or cards. These types of prototypes are known as low-fidelity prototypes. More detailed low-fidelity prototypes could be a design or the screen layouts using hand sketching or computer software. Further, versions of prototypes can be more detail, after inclusion of attributes, the system could be prototyped using working system, but with limited functions. This version of prototype is known as high-fidelity prototype. In this version, the interface requirements are usually already applied (Preece et al., 2002; Preece et al., 2007; Dix et al., 2004).

The use of prototypes during the design processes has a number of advantages. Wickens et al. (1998) list the advantages as follow:

- Support of the design team in making ideas concrete.
- Support of the design team by providing a communication medium.
- Support for heuristic evaluation
- Support for usability testing by giving the subjects something to react to and use.

Two development philosophies separate prototypes into either *evolutionary prototyping*, which involves evolving a prototype into a final product; or *throwaway prototyping*, in which a prototype is thrown away to start building a final system from scratch.

In this study, the semi-working systems are used as prototypes. Decision was made to use the evolutionary approach. Nevertheless, prior to developing the high-fidelity prototypes for evaluation, the low-fidelity prototypes especially storyboarding using hand sketching were performed. In fact, video materials have less interaction complexities (Clendenin, 1988) which make the selected approach as appropriate to this study. All processes in developing the prototypes are included in a software lifecycle.

A. Software lifecycle

Dix et al. (2004) suggests that designing and developing prototypes requires iterations before evaluation takes place. The iterations are included in software lifecycle and information system development (Avison & Fitzgerald, 1985; Checkland & Scholes, 1999). Preece et al. (2007) defines the lifecycle models as the models used to represent activities and how they are interrelated. There are many lifecycle models developed in Software Engineering (SE) and Human-Computer Interaction (HCI). Table 3.1 lists three lifecycle models in SE and HCI.

Table 3.1: Classification of lifecycle models

Software Engineering (SE)	Human-computer Interaction (HCI)
1. Waterfall lifecycle model	1. Star lifecycle model
2. Spiral lifecycle model	2. Usability engineering lifecycle
3. Rapid application development	3. ISO 1340 Human-centered design process for interactive systems

Waterfall lifecycle model does not include iterations. It is basically a linear model, starting with some requirement analysis, moves into design, then coding, then implementation, testing and finally maintenance. **Spiral lifecycle model** has been introduced by Boehm (1988). In this model, ideas are allowed to be progressed; risk analysis and prototyping are repeatedly occurring (suggesting for checking and evaluating) in the product lifecycle. User involvements are important in identifying and controlling risks. **Rapid Application Development (RAD)** was proposed in 1990s, where lifecycle models start to incorporate user involvements in the iterations. Millington and Stapleton (1995) developed the model as response to the inappropriate nature of linear lifecycle model such as the waterfall. RAD projects stand on two key features:

- Time-limited cycles of approximately six months.
- Joint Application Development (JAD) workshops[14] in which users and designers come together to thrash out the requirement of the system.

Basic RAD lifecycle comprises five phases beginning the processes with project initiation, then JAD workshop, iterative design and build, engineer and test final product, and finally implementation review.

Star lifecycle model was developed at the time when people were looking for alternative to the linear lifecycle by Hartson and Hix (1989). This model suggests that the activities involved in developing products should not follow any sequence ordering. As a result, the model proposes that any activity can move to any activity provided that it first goes through the evaluation activity. In such, the evaluation is central to all activities (requirement specification, task analysis/functional analysis, conceptual design/formal design representation, prototyping, and implementation). **Usability engineering lifecycle model** was developed by Mayhew (1999) comprising three tasks; requirement analysis, design/testing/development; and installation. The model is complex and highly structured. Considering some systems are less structured, Mayhew suggests that designers can skip any non-required tasks. **ISO 1340 Human-centered design process for interactive systems** provides guidance on human-centered design activities throughout the lifecycle of an interactive product. This standard compliments another standard, the ISO 9241[15].

[14] These are intensive workshops. Wood and Silver (1995) suggests these workshops for gathering requirements in which difficult issues are faced and decisions are made.

[15] For detailed descriptions refer to ISO (1998)

The intention of this study is to investigate about human perceptions over the use of certain technology-based products. This can be accomplished by adopting the star lifecycle model (see figure 3.3), where the evaluation is at its core. By adopting the star lifecycle, the activities involved are not influenced by any sequence ordering. In fact the activities are highly interconnected; such as from requirement, the activity could move to prototyping through an evaluation. Other models (i.e. Waterfall, Spiral, RAD, Usability Engineering, and ISO 1340) were not selected for adoption because they are not flexible enough to integrate the whole processes (refer Figure 3.3).

From the performed tasks in the star lifecycle model, appropriate components of the RLM were established. These components for RLM, led to the development of working prototypes, where certain eLearning systems methodologies should be adapted.

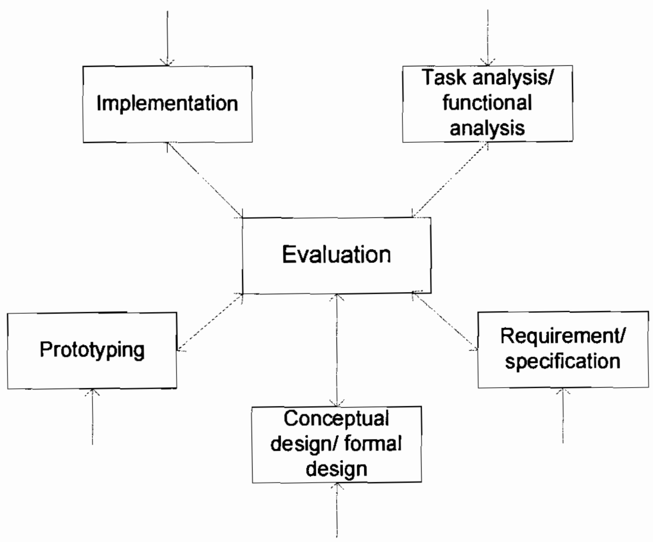


Figure 3.3: Star lifecycle

B. E-Learning systems methodologies

ELearning systems have been developed with various methodologies. However, much of the constructions were carried out without a systematic approach to the development process (Kay & Knaack, 2005).

To discuss the examples, the method applied by Krauss and Ally (2005) who took a pragmatic approach to the development of LO and a combination of learning theories, with participation of instructional designer, cannot be considered as a system development approach on the basis of SE and HCI principles. Next, Cohrane (2005) used participatory action research as a methodology for developing LO, involving successive cycles of reflection and feedback between researching and developing LO. This approach is important for collecting and analyzing data using qualitative methods. Action research is of paramount importance for educational research, but is not a system development approach relying on SE and HCI criteria.

In addition, other works could be hardly considered as eLearning development methodologies. MacDonald, Stodel, Thompson, Muirhead, Hinton, & Carson (2005) adopt a collaborative approach to LO. They involved collaboration among subject specialist, technology experts, and researchers for assessment. Their work was divided into three phases; (1) creating a paper-based document for face-to-face class; (2) re-purposing the document into electronic resources for online course; and (3) creating rich and interactive LO. This approach even though is divided into different phases and documented like a system development process, is not proposing activities in developing the interactive LO itself.

Also, Varlamis and Apostolakis (2006) demonstrate a good life cycle of eLearning process and contribute to the development of eLearning. Their life cycle aimed to minimize development and development cost, facilitate re-usability of content and increase it. To achieve that, they divide the process into four phases namely design, production, deployment, and assessment. In this model, the development of application is more elaborated, containing steps commonly found in general system development life cycle. Still, steps involved in producing the application are not explained.

Besides, Salas and Ellis (2006) were contributing with their five-phase approach in developing LO in higher education setting. However, their approach is more instructional and technological. The phases include (1) develop clear learning objectives,

(2) model all existing content, (3) split all existing content into discrete objects, (4) identify common elements of content across courses, and (5) develop a LO for each discrete content element.

Hadjerrouit (2007) proposed a model which is grounded in the pedagogical, educational, and engineering considerations. The model includes nine phases and named as evolutionary development process model. The phases are (1) system scope, (2) requirements determination, (3) requirements specification, (4) architecture design, (5) user interface design, (6) implementation, (7) delivery and use, (8) pedagogical evaluation, and (9) evolution. This model is comprehensive, containing steps from the beginning until the eLearning project is used.

Besides the methodologies in eLearning system development, this study considers a discipline that adapts and applies methods of SE to develop courseware, called Courseware Engineering (CE). CE is not a new issue, in which it has been discussed by a number of researchers (Bostock, 1998; Owens & Cooper, 2001). It aims to make courseware development methods equally rigorous and reliable as SE methods. In developing new courseware, the initial design and ultimate implementation can be critical to its success. Therefore, a structure and formally documented approach reveals the constructs and can provide a 'clear roadmap' for new courseware development which should lead to successful implementation and a competitive advantage being achieved. New courseware success cannot and should not be measured in absolute terms. It should be defined and interpreted according to realistic goals and objectives that reflect the new product's specific situation. Chapter 5 elaborates the CE method adapted in this study.

Although these methodologies are suitable for developing eLearning applications, which provide functionalities for making transactions at complex level, which requires high level of interactivity (Jayaratna, 1994), this study, however, requires a method that is specific for developing video application.

C. Video production methodologies

In the literatures, the processes of producing a video project are divided into several phases. Rubin (2002) proposes four phases, namely preparation, shooting, editing, and finishing. Chapman and Chapman (2000) classify the processes into pre-production, editing, and post-production. Even though these two authors name the phases differently, they actually speak about similar concepts. In video production, generally, the phases are referred to as pre-production, production, and post-production (Hausman & Palombo, 1993).

In pre-production phase, activities such as planning, storyboarding, designing the functional features, and cost-benefit analysis are performed. The deliverables of this phase should help the designer or developer in handling the project smoothly. Production phase is where all recording works take place. During this time, the designer or developer records the scenes intensively for use as the artifacts in the post-production phase, where editing jobs are given full attention. Post-production phase includes all tasks from after-editing processes until the product is promoted in the market. Video production can adapt the techniques listed in Table 3.2.

Table 3.2: Video production techniques

Author	Description of technique
Clendenin (1988)	The author provides guidance to lay out the equipments in the production works. The emphasis in the technique is on the production stage, with enough descriptions on the pre-production and post-production. The technique is suitable for video project developers who are not deeply into post-production works.
Housman & Palombo (1993)	Highlights on the production techniques with some tips on operating tools in the production processes. Preproduction techniques such as storyboarding and scripting as well as talents identification were are also discussed. Post-production works were not emphasized. People who want to seriously learn videography at production are recommended.
Lyver & Swainson (1995)	Gives a rapid insight into the complex process of TV, without getting bogged down in technical terms. There is some guidance on production techniques; especially it visualizes the layout in a production house. The production equipments are just part of the

	house. At the pre-production preparation, scripting and storyboarding are outlined with some tips. The post-production works are not explained. The technique is recommended for anyone wishing to learn about video production, but not to work on video projects.
Zettl (2001)	Classes the processes in making video into pre-production, production, and post-production. In the production works, the techniques are focused on the tips to outcome good results such as camera effects, lens, framing, and the shot and camera movement. Also, the methods in laying out the equipments in indoor and outdoor settings are discussed briefly. In the pre-production phase, some scripting and storyboarding tips are discussed. However, there is no guidance on the post-production works. The author may expect people who are really into videography works to appreciate this technique.
Blake & Sahlin (2003)	There is very little guidance on the pre-production and production works. Moreover, there is no guide on laying out the production equipments. The technique emphasizes on the post-production works such as trimming, adding still pictures, timeline, and transitions. The author probably suggests the technique for people who have enough experience in production works.
Compesi & Gomez (2006)	Like Zettl (2001), this technique emphasizes on the technical parts of the equipments: how to make shots good using the video recorder by manipulating the features. The equipments lay out is not discussed. Besides, the guides on pre-production works and post-production are very little. This technique is suitable for people who involve deeply in video project with expertise in the production art.
Ozer (2007)	The contents are only on the post-production works. The author tailor this technique for people who have no problem in video shooting or people who are specialized in the post-production works only.
Block (2008)	As discussed in Zettl (2001), this technique also discusses about techniques to outcome quality results in video shooting. But, there is no guidance on laying out the equipments. Also, there is a long comprehensive discussing on the post-production works. The technique is suitable for people perform post-production jobs only.
Reinhardt (2008)	The technique contains a complete process from pre-production to post-production. However, the guides on pre-production and production works are very little. In contrast, the technique emphasizes deeply on the post-production works, with special reference to specific software. The technique is preferred by video makers at the post-production phase.

The works in this study aim to guide developers to come out with RLM, in which the production phase is emphasized. In addition, this study helps developers to layout their equipments while doing the shooting. So, by referring to Table 3.2, the old techniques are more preferable because the newer techniques tend to emphasize on the post-production phase. After analyzing the techniques, this study selects the technique by Clendenin, called Multiple Sources System because the technique is more general.

i) Multiple Sources System

Multiple Sources System (MSS) technique is proposed for shooting live events dedicated for TV programmes such as talk shows and documentaries. In MSS, whether the production is taking place in a permanent installation or in a remote location, the area is divided into two sections; the studio and the control room (Clendenin, 1988). Figure 3.4 depicts the locations of peripherals involved in MSS.

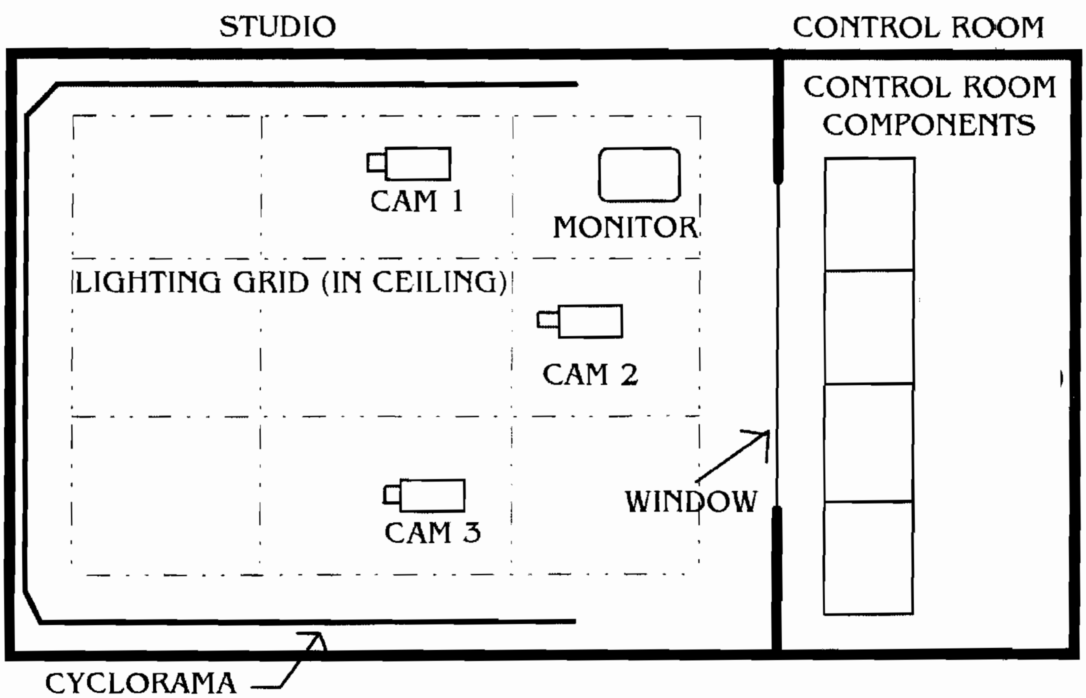


Figure 3.4: Division of areas in MSS (*source: Clendenin (1998) p246*)

In Figure 3.4, the lights, video recorders, and microphones are placed. A monitor is also provided for monitoring scenes. These equipments are required in the area where actions take place. In the control room, all technical equipments and personnel are located. The studio needs not be exactly the same as in the figure, but it highly depends on the event (Clendenin, 1988). A permanent installation can imitate the illustration in Figure 3.4;

with the control room separated in a special room. When using a remote truck, the remote truck will serve as the control room, and the location serves as the studio. In short, one must improvise to accommodate the event's context of environment in setting-up the control room (Clendenin, 1988).

This study totally ignores the area of control room. Another change is that, it is sufficient to have at least one video recorder for shooting. If there is only a video recorder used, creativity element is essentially required to ensure the quality of the outcome. On top of that, other technical aspects in MSS are also eliminated. The adapted MSS is named **Q**uick **V**ideo **R**ecording **T**echnique (**QVRT**) and is illustrated in Figure 3.5.

ii) Quick Video Recording Technique (QVRT)

As stated in the subsection above, the MSS is developed intended for shooting events for TV programmes (Clendenin, 1988). This QVRT adopts the technique to create reality videos. The works outcome from MSS and QVRT are similar in context, i.e. reality. However, implementing the MSS raises some issues, as listed below:

- Equipment – MSS requires special equipments. The control room is complete with high technology editing machines.
- Technical skill – The equipments involved in MSS are highly technical. The person in charge should have appropriate technical skills to operate and manage.
- Cost – budget for implementing the MSS is high, control room that locates all equipments are expensive. Not only the budget to buy, but also the maintenance part is also considered.

Based on these issues, MSS is assumed as suitably implemented for projects with big budgets for buying highly technical equipments to be operated and managed by people with technical skills. This is the reason why it is suggested for recording events for TV programmes.

In contrast, this study aims at projects with small budget, without any special equipment, and can be operated by anybody with or without technical skills background. QVRT is appropriate enough to cater for the needs of RLM, which are basically:

- to record **live events**
- in the **original fields**
- by **technical or non-technical** people
- with **small budget**
- to come out with **eLM.**

Figure 3.5 illustrates the QVRT. In the figure, there are two divisions, on the left is the location for the subject, and on the right are the recording video cameras. However, in the original setting the video recorders can be placed at any locations that are best to capture contents. The video recorders can also be held by the persons in charge and move around the subjects. This technique is applicable especially for shooting special parts in the subject. An example to ponder is to shoot the action to connect cables to a personal computer (i.e. backside of the computer).

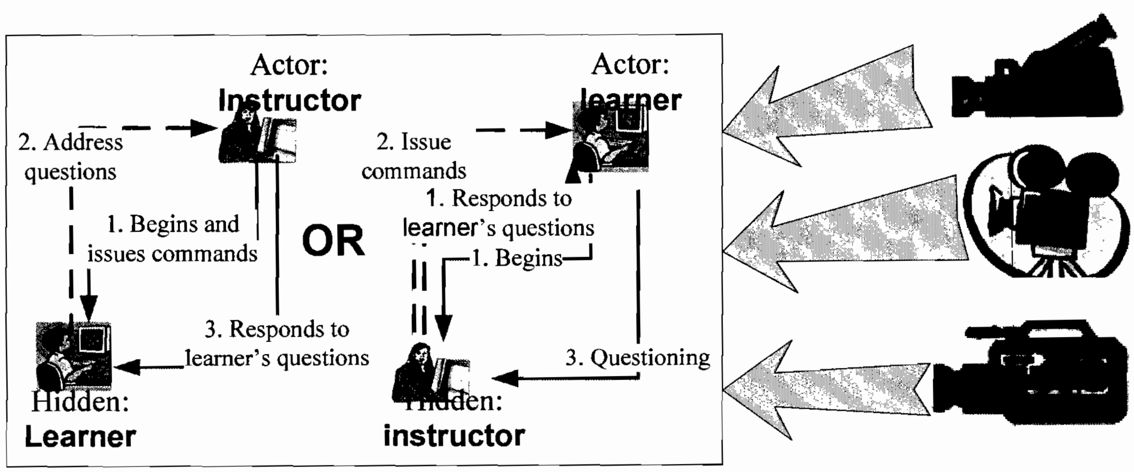


Figure 3.5: The Quick Video Recording Technique (QVRT)

In the subject area where the content is presented, the actor(s) plays role appropriate to the preplanned objectives to achieve. In the figure above, it is noted that the actor could either be a learner or an instructor. In RLM, there is only a main role played by the actor(s), another is invisible, but the voice is recorded and presented as part of the contents. Discussions on roles of learner and instructor have been described in section 3.2.2. However in RLM, the roles of learner and instructor played by the actor are specified. Figure 3.6 depicts the flow of conversation, which takes the conversational framework by Laurillard (1994) as the guidance.

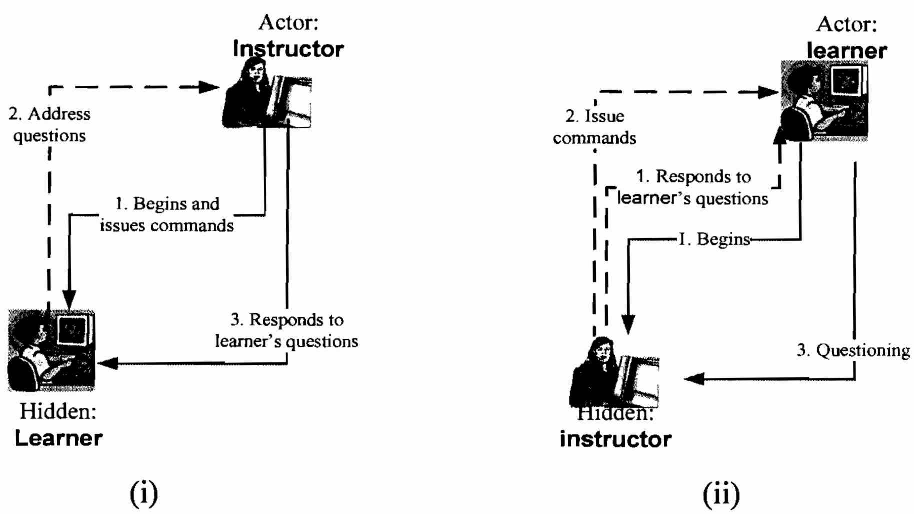


Figure 3.6: Different roles of actor; (i) actor as instructor, (ii) actor as learner

Different approaches of actors (i.e. instructor and learner) gives dissimilar context of learning environment. Actor as an instructor will show his/her expertise directly, describing contents as feedbacks to (hidden) learners. The actor will begin the learning session, demonstrating and describing actions simultaneously. If the learners have any queries, they will address their questions, as well as expressing the understanding. Learners' feedbacks will only be on voice basis, because they are physically invisible.

On the other hand, actor as a learner will always perform tasks based on an (hidden) instructor's command. Usually, any of the entities either the learner or the actor could begin the session. The actor might begin the learning session by asking what should be done, while in the case that the learner begins the session, s/he could ask how to do this or that. The flow of content delivery is on instruction-based basis, where the learner will ask questions to the actor and take actions as instructed in the feedbacks in response to the questions.

Demonstrations of activities are not included in Figures 3.6 (i) and (ii). However, it is understandable that the demonstrations are provided throughout the content from the beginning to the end in both approaches.

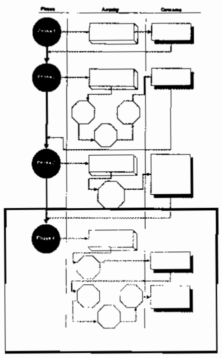
To test the conceptual design of RLM, prototypes of learning materials that apply the concepts of RLM were developed. A set of two eLMs were developed, one is for formal education – entitled the "VideoGraphy"; another is for informal learning – entitled the "How to develop VCD".

The "VideoGraphy" is considered as an eLM for formal education because many of the multimedia courses include Videography as part of the syllabus. The "VideoGraphy" can then be promoted for use in class. Meanwhile, the "How to make VCD" is considered as an eLM for informal learning that teaches any interested individual in making VCD. Furthermore, there is no formal education identified to include developing VCD as part of the syllabus.

Besides prototyping the RLM, this study also requires a conventionally-approached courseware and video on "VideoGraphy". These are used for a comparative study to accomplish the research objective. Chapter 5 discusses the courseware development at length, in which an expert in instructional design was engaged in making sure that the design contains desired instructional elements. The expert is a PhD holder in instructional design, with more-than-ten-year research and teaching experience in related fields.

Having got the prototypes ready, evaluation processes could begin, following certain evaluation techniques. In this study, the evaluation seeks for level of user acceptance of the proposed RLM. The available evaluation techniques are examined to select appropriate and practical evaluation techniques for the RLM. The next section covers the available evaluation techniques, followed by subsections detailing steps involve in this study.

3.3.2 Investigating User Experience



In Interaction Design and related fields, the focus of attention over a technology is the user (Preece et al., 2002; Preece et al., 2007, Dix et al., 2004; Wickens et al., 1998; Barnum, 2002). When a technology is developed for users, then users' feedbacks on their perception is sufficient for identifying whether the technology is serving their needs and leading to their satisfaction at appropriate levels.

The above-described kinds of evaluation techniques are known as usability evaluation. Barnum (2002) begins the definition of usability by addressing that it is not: (1) quality assurance, (2) zero defects, (3) utility to design features, and (4) intrinsic in products. The presence of these qualities saying too little about products' usability, but validate the products from the standpoint of utility. In contrast, usability focuses on the user, where products' usability is determined by users' perception on issues like ease of use, ease of learning, products' intuitiveness, and users' appreciation over the products' usefulness (Preece et al., 2002; Preece et al., 2007, Dix et al., 2004; Wickens et al., 1998; Barnum, 2002; Wiberg, 2003; Hornbaek, 2005; Newman & Taylor, 1999).

Usefulness is defined in terms of user needs in the context of users' goals, in which usability must be understood as matching the needs of a particular user for a particular use (Preece et al., 2002; Preece et al., 2007, Dix et al., 2004; Wickens et al., 1998). Beyond usefulness, however, is the critical criterion of satisfaction, which no amount of validation testing or quality assurance testing would reveal (Barnum, 2002). The measure could only come from users, using many techniques of data collection (Preece et al., 2007, Dix et al., 2004; Wickens et al., 1998; Barnum, 2002; Carrol & Thomas, 1988; Kwon & Chidambaram, 2000).

The above paragraphs define the terms usability, usefulness, and satisfaction. There are more general issues regarding software evaluations and are presented in the following paragraphs.

A. General issues of evaluation

In the fields of Interaction Design, *Usability testing* is an approach of evaluation. Other approaches of evaluation are *analytical evaluation* and *field study* (see figure 3.7) (Preece et al., 2007). The techniques for each approach are presented in Table 3.3.

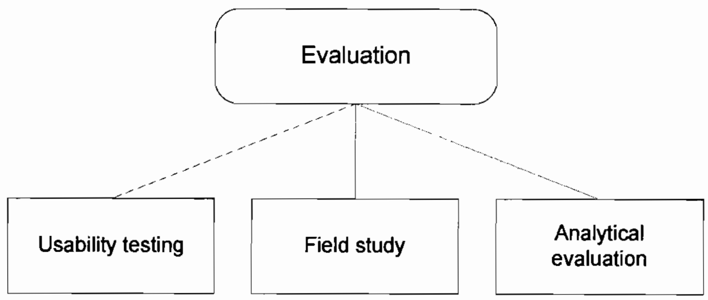


Figure 3.7: Approaches of evaluation

Table 3.3: Techniques of evaluation for each evaluation approach

Usability testing		Field study	Analytical evaluation	
Questionnaire		Interview	Inspection	• Heuristics • Walkthrough
User test	• Observation • Interaction log • Laboratory testing • Interview	Observation	Theoretically-based models	• GOMS • Keystroke levels • Fitt's Law

From Table 3.3, the techniques for usability testing vary from questionnaires that are always applied together with user test. In user tests, techniques such as observation, interaction logging, laboratory testing and interview are applicable for the purposes of data collection. Further, in observation, data collection methods could be notes taking, audio and video recording, or pulse measurement and skin effects using body-worn sensors[16]. Interview sessions could be structured, semi-structured or unstructured, depending on the type of data required.

Usability testing are usually carried out at later state of design to ensure the consistency of navigation structure, standardization of terms used, and effectiveness of systems' responses. Typical user performance such as time to complete a task, number of errors, and type of errors are among data that are tried to be captured. For this reason, optimal and minimal levels of acceptance are specified, and current levels are noted. The outcomes of usability testing are documented as the usability specification for the later evaluation's reference.

Field study consists of techniques like interview and observation. The main aim in carrying out field studies is to see what and how people do naturally and how products mediate their activities. In field studies, the subjects of study will be visited at their original locations.

In analytical evaluation, inspection and theoretically-based models (or user modeling) are applicable, in which inspection could be made through heuristics evaluation and walkthrough. The theoretically-based models involved in analytical evaluations are GOMS, Keystroke-level, and Fitt's Law. Analytical evaluation involves only experts, where they apply their existing knowledge to evaluate the applications being tested. Heuristic evaluations and walkthroughs are carried out to identify usability problems, while user modeling techniques are carried out to predict user performance.

The techniques as described in previous paragraphs could be implemented in two types of evaluations: the formative and summative evaluations (LTDI, 1998). The formative evaluations are performed along the processes of development starting from the first step through the final prototype with the aims to gather data about the system being developed

[16] For detailed explanations on measuring emotions using body-worn sensors please read from Mandryk et al. (2006). Basically, Galvanic Skin Response, Cardiovascular measures, Respiratory measures, and Electromyography are among the techniques applied.

for the purposes of increasing its effectiveness. It is an essential part of software development. Evaluating the final products falls in the summative evaluation. Reeves (1993, 1994) states that educational software can be classified into five categories for the purpose of evaluation. The categories are listed below:

- evaluating a newly-developed program – New_p
- selecting from among alternative programs – Sel_{ap}
- implementing a program – Imp_p
- deciding to continue using existing program – $Cont_p$
- modifying existing program – Mod_{ep}

This study suggests from the classifications above, it can be noted that when evaluating a newly-developed program or modifying the existing program, the formative evaluation is appropriate, while the rest of the evaluation purposes are linked to summative evaluation. This precept is summarized in Figure 3.8.

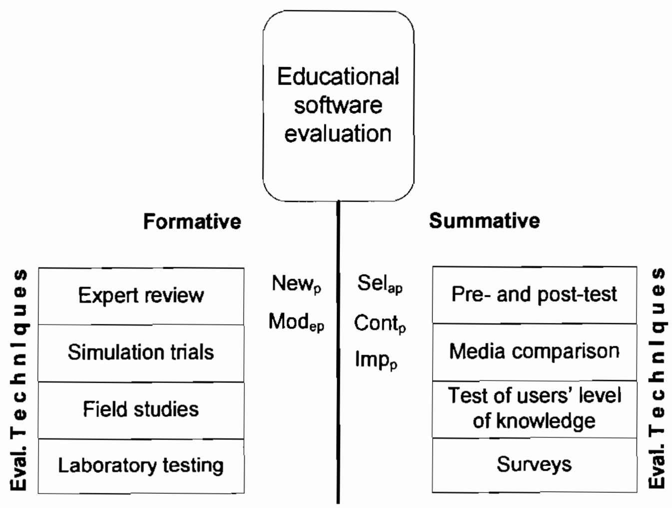


Figure 3.8: Classifications of educational software education categories

B. Evaluation techniques for RLM

This study aims to propose a conceptual design model of a concept coined as RLM. In conjunction, as mentioned and can be seen in Figure 3.7, laboratory testing was opted for this study. Also, as suggested by typical textbooks (Preece et al., 2002; Preece et al., 2007, Dix et al., 2004; Wickens et al., 1998), these techniques, in user test, can be coupled with questionnaire which is also known as the instruments. Sampling technique, data collection method, and data analysis activities are described next in the following subsections.

i) The instrument

The International Organization for Standardization defines usability by three aspects: effectiveness, efficiency, and satisfaction (ISO, 1998). These aspects have been generally discussed earlier. Zaman and Shrimpton-Smith (2006) further report that evaluating usability requires inputs from experts. The experts observe usability problems, which users cannot describe, to explore the aspects of effectiveness and efficiency.

However the problems observed cannot be interpreted without understanding what the users experience, feel, think, and expect. Without entering the world of their inner feelings, one would not be able to assess the satisfaction of a product (Zaman & Shrimpton-Smith, 2006). To help achieving this, the think-aloud protocol can be used (Nielsen, Clemmensen, & Yssing, 2002). These are applicable after users have experienced the product. Kaye (2007) refers this domain of discussion as experience-focused human-computer interaction (HCI). He addresses that it is a growing trend in contemporary HCI where technologies are focused for more experiential and less task-focused needs. Accordingly, measurement of the experience as the reflection of satisfaction on users' part is essential.

Meanwhile, it is reported that there are fewer research carried out on measuring satisfaction despite the aspects of ease of use and effectiveness (Carroll & Thomas, 1988). However, in recent literatures, attempts are found to research in the subject (Evans, 1993; Harrison & Rainer, 1996; Mahmood et al., 2000; Chin & Lee, 2000; Lindgaard & Dudek, 2003). Besides, attempt to shift from usability alone to user experience is also included in Wright et al.'s (2000) work. Wiberg (2001, 2005a) further explores the satisfaction, and mentions that fun and entertaining are to some extents related to user satisfaction.

Earlier, Malone (1980, 1982) has tried to measure questions related to fun and entertaining, but his work was not followed by other researchers (Carroll & Thomas, 1988). Next, Hassenzahl, Platz, Burmester, and Lehner (2000) stated that perceived fun and enjoyment were found to contribute to software system acceptance.

Therefore, it is noted that Wiberg (2005a), Carroll and Thomas (1988), and other research (Wolf, 1999; Malone, 1980, 1982; Cherney, Clanton, & Ostrom, 1997; Mandryk et al., 2006) have supported objective 4 of this study (see objectives in Chapter 1) which is to measure fun and entertaining of RLM.

ii) Measurement dimensions

Exploring Hassenzahl et al.'s (2000) statement will lead to studies in Technology Acceptance[17] (Chesney, 2006). Also, Cherney et al. (1997), state that entertaining as part of human factors, relates fun to intrinsic motivation. Works by Malone (1980, 1981, & 1982) are again referred to as the evidences. Carroll (2004) then listed the characteristics of entertaining (see Table 3.4) to compliment the knowledge.

Table 3.4: Characteristics of entertaining

Things are entertaining	when they • attract • capture, and • hold users' attention	by • provoking new perceptions, • provoking unusual perceptions, • arousing emotions
	when they • surprise users	when they • do not feel like they look • do not sound like they feel
	when they • challenge puzzles	when we try to • make sense and construct interpretations

[17] Studies in technology acceptance use a famous model called Technology Acceptance Model (TAM)

	when they • transparently suggest what can be done • provide guidance in the doing • provide instantaneous and adequate feedback • provide task closure

Characteristics as listed in Table 3.4 above are used as items for testing in this study. The construction of instrument was also based on studies extending TAM[18] to incorporate fun by Kwon and Chidambaram (2000), Lee, Cho, Gay, Davidson, and Ingraffea (2003), Pikkarainen et al. (2004) and Chesney (2006). Components of fun are discussed in detail in Chapter 2.

When the instrument involved in this study was initially constructed, with inclusion of fun and entertaining dimensions, it was first validated by four experts (listed in **Appendix N**). Also, the same experts validated the final version instrument. All experts have experienced in researching and teaching in HCI-related fields for not less than five years. This shows that they were capable of understanding the items in the drafted instruments from the respondents' perspectives.

To ensure that the instrument is reliable, it was piloted before collecting real data. Chapter 6 elaborates the pilot study, which resulted in high reliability reading (i.e. Cronbach's Alpha is greater than 0.7). This recommends that the instrument is able to collect intended data.

iii) Effectiveness

Literatures have shown many works investigated effectiveness of certain applications (Drucker, Glatzer, De Mar, & Wong 2002; Hassenzahl et al., 2000). Many instruments such as Questionnaire for User Interaction Satisfaction (QUIS)[19], System Usability Scale

[18] TAM is a widely studied model of information system (IS) usage and IS acceptance behavior. The TAM has been widely adopted in a variety of field settings and across a broad range of IS applications.
[19] See http://lap.umd.edu/QUIS/

(SUS)[20] and Software Usability Measurement Inventory (SUMI)[21] tend to measure satisfaction aspects of the user interface and system functions. This study however tends to measure effectiveness of the RLM, i.e. whether the learners learn effectively from the contents in the RLM. To measure that, a pre-and-post test session was carried out among the intended users. They learned with RLM containing contents for both formal and informal learning. In the session, 41 students of HLI answered the test before and after learning with RLM. Scores were recorded to analyze the difference. Learning with RLM is effective if the scores in the post test are higher than in the scores in the pre test. The elaborated procedures and results of the test are discussed in Chapter 6.

In short, the two aspects (i.e. fun and entertaining) are combined together, including demographic and additional information aspects in a single instrument, while test of effectiveness were using quizzes. The design of the instrument of this study is presented in Figure 3.9.

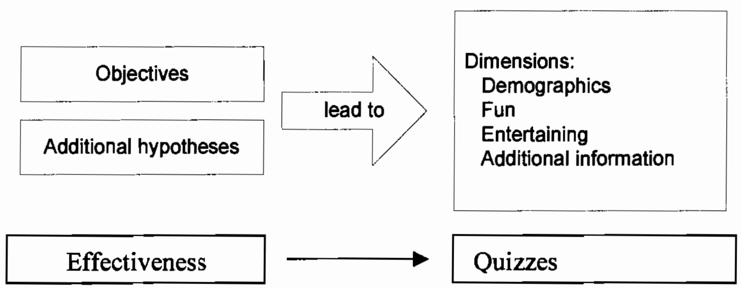


Figure 3.9: Design of the instrument

The instruments were distributed in the user testing. In this study, the user testing involves a sample of respondents.

(iv) Sampling

Selection of subjects in this study should match with the contents and purpose in the RLM prototypes. There are two titles in which one contains contents for formal lesson at

[20] See http://www.usabilitynet.org/trump/documents/Suschapt.doc
[21] See http://www.ucc.ie/hfrg/questionnaires/sumi/index.html

diploma and degree levels, and another contains contents for informal lesson designed for adults.

To meet the above conditions, students of HLI between 18 to 20 years old who were taking videography-related courses were considered as samples. At the early state of this research, a group of secondary school students; between 16 and 17 years old; were interviewed to gather appropriate data for discovering disadvantages in existing courseware (See Chapter 1). Although these two groups of subjects differ in terms of class (school students Vs HLI students), but in terms of age, they are often classified in the same age group. So, this study does not consider these two subject groups as showing the age gap.

In addition to the above conditions, it was also decided to compare results in terms of different academic achievement to user satisfaction upon RLM. That makes up three groups of academic achievements:

- Highly achieving – Cumulative Grade Point Average (CGPA) between 3.50 and 4.00
- Moderately achieving – CGPA between 3.00 and 3.49
- Less achieving – CGPA between 2.00 and 2.99

The classification of academic achievement groups were based on commonly-referred-to academic performance. Usually CGPAs below than 3.00 are considered as not very good. CGPAs above than that are considered strong, in which it is always ruled as the bottom-line for job or higher-level academic entries. In most cases, CGPAs 3.50 and above are considered as excellent, although the CGPA for the first class are at east 3.67. Selecting students with CGPA above 3.67 to represent a group is not possible because there are only very few students hold the CGPA.

Paragraphs above identify some conditions for selecting subjects. Next paragraph outlines some sampling techniques, and followed with paragraphs describing the sampling technique applied in this study.

There are a number of sampling techniques practicable to represent the population. Careful selection of sample would help obtaining as accurate results as would be gathered from population tests. Sekaran (1992) argues that researchers could use a sample to represent the population because the elements[22] of population are too many and they are scattered in a wide geographical locations.

Sampling techniques are divided into two major types of sampling design; probability and non-probability. In a probability sampling, each member of the target population has a chance of being sampled. There are several techniques to select samples; random, systematic, cluster, stratified, area, and double. Convenience, judgment, and quota are techniques for non-probability sampling design, in which representativeness of sample is not critical to the study, making the elements do not have a predetermined chance of being selected as subjects (more information on sampling techniques can be obtained from Emory and Cooper (1991) and Sekaran (1992))

Bouma and Atkinson (1995) suggest that if the population that is to be sampled is fairly homogeneous (i.e. the relevant characteristics are fairly evenly distributed), a small sample can be relied on than if the population is highly variable.

In this study, due to conditions to consider i.e. the in-class achievement levels, so the stratified random sampling was utilized. The requirements of elements were:

- Aged between 18 to 20 years old
- Have knowledge on videography topics or currently taking videography-related courses
- Experienced using computer

The requirements above were easily met, and considered as homogeneous. So, small number of subjects was assumed to be adequate. As a consequence, 60 students of HLI at degree level were selected to participate. This study first identified videography-related courses. Having collected that information, participating subjects for each academic achievement level were then selected randomly from student lists. The samples

[22] Element refers to each member of the population.

were divided into two groups where 30 samples used RLM and video and other 30 used RLM and courseware. They were divided to gather information on whether use of video and courseware influence the feedbacks on RLM.

Samples for testing effectiveness were not included in these groups. They were identified among students who did not have knowledge on videography. 41 students were selected to participate in the pre and post tests. The subjects (41 students) who were involved in the pre and post tests were different than the group involved in piloting the instrument constructed for testing entertaining and fun. So, overall, this study managed to gather 101 answered feedbacks using the instrument for testing the entertaining and fun dimensions, making it justifiable for testing the factor analysis (Hair, Black, Babin, Anderson, & Tatham, 2006). This study ensured anonymity to get sincere response in return. During testing, subjects were observed and supervised as described in the next section.

C. Data collection

Data for this phase was collected in different settings and period. There were two types of data collections, i.e. to gather data about the effectiveness and the entertaining and fun. First, the effectiveness was tested using the pre and post-test method. The 41 samples involved in investigating effectiveness only used RLM, for both formal and informal lessons. In the pre and post test, first, they answered a ten-question quiz. Then they used the RLMs to learn the contents. After learning with the RLMs, they answered again the same ten-question test. Scores for the pre and post tests were recorded for comparison and analysis. A detailed explanation on the procedure is stated in Chapter 6.

Next, the testing on user experience is described. Table 3.5 lists the descriptions about experiment procedure, apparatus, and techniques of logging.

Table 3.5: Summary of procedure, apparatus, and techniques of the test of entertaining and fun.

Experiment procedure	• Appointment: were fixed before the experiment • Control: conditions for each participant during the experiment were ensured fully controlled; avoid disadvantages caused by factors such as application failure, noise, and places were determined by the participants. • Flow of the experiment: Participants have options to view any one learning material first, and answer appropriate questionnaire, as outlined in Figure 3.10. The experiment for a person lasted in a few hours, depending on the participants' readiness to proceed.
Apparatus	• Learning material: RLM, conventionally-approached courseware, and video on same topic. The RLM and courseware are developed in this study, while video is selected from the well-published materials. Hence, the video is not discussed in this thesis. • Appropriate questionnaires. • Pencil, pen, eraser, blank papers (act as diaries). • Souvenir for each participant.
Techniques of logging	• Participants answered the questionnaire. • Participants did the think-aloud protocol. • Participants were interviewed.

All participants were allowed to start and stop browsing all learning materials at their own convenience. They were also allowed to skip parts that do not interest them. Figure 3.10 illustrates the flow of the experiment.

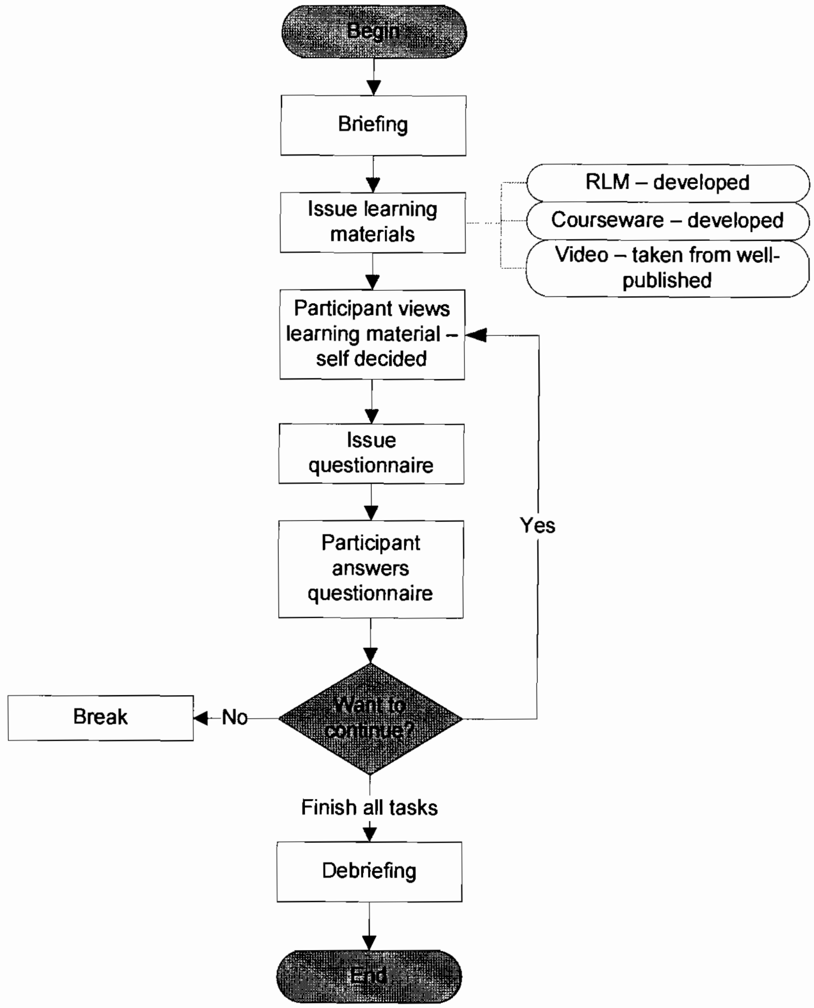


Figure 3.10: Flow of the experiment for entertaining and fun.

During the experiment, first the user was briefed about the purpose of study, and mentioned about anonymity. Then eLMs[23] were issued to the user, s/he selected which one to view first. Having viewed the eLMs, appropriate questionnaire was issued, and answered by the user. Decision on whether or not to continue with viewing next eLM was on the user's hand. A break was allowed if the user needed. The processes comprising of viewing eLMs, to answering questionnaire repeated until the two eLMs viewed, and questionnaires answered. Finally, the user was acknowledged for participating, a token of appreciation was a sufficient recognition.

[23] The term eLM is used because the experiments involve also traditionally-approached eLM.

Collected data are input into statistical package for analyzing. Analysis is driven towards deriving results for assumptions as hypothesized in the following subsection.

D. Data analysis

For the purposes of achieving objective 4, which is to investigate user acceptance of the RLM in terms of entertaining and fun, the following hypotheses have been formulated:

H_1: RLM is perceived more fun and entertaining compared to video or courseware.

In addition, the following hypotheses were also formulated as to mine additional information. This supports the richness of findings, besides the descriptive analysis about demographic information and its relation with the mined information. Cross-tabulation is another kind of test that helps mining additional information.

H_2: There is no significant difference between responses by subjects learning with video and subjects learning[24] with courseware towards RLM on entertaining aspects.

H_3: There is no significant difference between responses by subjects learning with video and subjects learning with courseware towards RLM on fun aspects.

H_4: There is no significant difference between genders on their perceptions of fun and entertaining of RLM.

H_5: There is no significant difference among academic-achievement groups on their perceptions of fun and entertaining of RLM.

3.4 CONCLUSION

This chapter describes the processes involved in this study to achieve all objectives. It starts with the framework of the research methodology. Each phase is described starting

[24] Subjects involved in this study learn in merely two hours; a duration similar to most classroom learning duration. This study considers the subjects learn something with the RLM.

with the communication with experts to achieve objective 1, content analysis which involves works in developing the conceptual design model (objective 2), prototyping (objective 3), and investigating user acceptance. Hypotheses are also stated in this chapter, as supports of achieving objective 4.

CHAPTER 4

CONCEPTUAL DESIGN OF RLM MODEL

4.1 INTRODUCTION

Chapter 1 lists the objectives of this research. Then, Chapter 3 describes the processes involved along achieving all objectives. Briefly, the processes are divided into four phases. It starts with the identification of components for the conceptual design model of RLM. Consequently, this chapter provides descriptions about the components of the conceptual design model of RLM, which serves to validate the first and second objectives of this study. It is suggested that in developing a proposed concept, the conceptual model should first be laid out. This conceptual model treats to state and present the ideas effectively.

In Chapter 2, the existing eLMs i.e. courseware, video and ETP have been discussed as examples of conventionally-approached eLM. They are selected as part of discussions in this study on the basis that they are used inline with the RLM; to convey learning contents electronically with the use of various media elements. Printed books and audio-based applications are not selected as part of discussion because books are not in electronic form and audio-based applications do not contain various media elements.

RLM extends the ideas of courseware, video, and ETP. So, most ideas in the eLM category could be used as the basis. However, contents in RLM applications are not cut and not edited. In addition, the focus of RLM is to ensure that the applications are not only usable, but also entertaining. These two factors lead to the development of new ideas for RLM. Since RLM focuses on entertaining the learners while viewing, a significant approach needs to be designed in making sure that learners are engaged to the content and at the same time learning occurs.

As mentioned earlier in Section 1.3, design does not invoke fun merely because it incorporates colors and animations, sound and music, or graphical fantasy contents. Also, distractions may surprise audiences, may capture attention, but are annoying and not fun. It is believed that the possibility of fun arises when one is both aroused and intrigued, and at the same time recognized an intention to communicate through a design. Therefore, the proposed RLM model gives particular attention to delivering contents which serves to entertain learners when learning.

Prior to proposing the components of RLM, a comparison of existing eLM was conducted. It involved fifteen samples (i.e. five for each courseware, video, and ETP) covering various topics including Sciences, Mathematics, Nature, Language, Sports, and Religious. These topics cover both formal and informal lessons, and have been decided by referring to the lists of ETP produced by Bahagian Teknologi Pendidikan, Kementerian Pelajaran Malaysia (BTP, KPM) as the basis. Sample of the list of ETP is provided in the form of 'on-air' schedule for August 2007 as in **Appendix E**. This study selects the fifteen eLMs after considering appropriate arguments as discussed in the following subsection.

4.1.1 ELM Selection

This subsection lists all samples of eLMs that were compared in seeking for generic components. They were selected as samples based on certain arguments which work not only for structural components but also for content composition components. For making the components to be generic, samples were selected from those targeted for different age groups (from children o adults); covering various topics, and by publishers from different countries. All justifications can be found in Table 4.1.

Table 4.1: Justification for selecting eLM

Courseware	Justification
C1: Biology – Form 4	It was selected to represent science subjects whose learners are 16 years old. Furthermore, this courseware is the latest eLM provided by the Ministry of Education.
C2: Mathematics	All students learn mathematics. Generally students perceive mathematics as a tough subject, so the content should be developed coping with different levels of difficulties.
C3: Kesan haba terhadap jirim	This courseware contains only a single topic of science with multiple complex concepts. The presentation of such concepts is of interest.
C4: Matematik Tingkatan 1 – Pepejal dan isipadu	Content in this courseware is very little but the interaction style is made easy.
C5: Kesan rumah hijau	It was selected to represent topic in nature. The interaction style in this courseware is different from C1 to C4.
Video	
V1: English for business management programme1 **Publisher**: Guild Learning International	Published for use in various levels of education by an International publisher. Approach in learning linguistic is slightly different than learning technical topics, such as mathematics and science. These are the reasons to select this video.
V2: Carbon Monoxide **Publisher**: Safety Projects International Inc.	This video is selected because it is a general topic, which could interest anyone; especially the content is tailored towards safety. Also, this video is published by a professional body.
V3: Using Media in Learning: Still Pictures & Photography **Publisher**: Learning Resources Center, Virginia	The content is quite technical, but presented in the form of video. This study purposely selects American publisher for this type of content since they have up-to-date technologies.
V4: Perjalanan Hidup Manusia **Publisher**: Pustaka Al-Manar	Pustaka Al-Manar has published a number of video series on religious topics. Their experiences are enough in coming out with a good video production. This study considers that factor.
V5: How To Play Squash **Publisher**: Robert Page	This topic contains tips, demo, and theories in squash, which means there must be a combination of presentation styles. Robert Page blends the styles properly, and tailors the content for adults. These reasons make this video suitable for selection.

Eucational TV Program	
ETP1: Pengaruh Cuaca Dan Iklim **Channel**: TV Pendidikan	Contents are suitable for all ages
ETP2: Snips and Snaps **Channel**: TV Pendidikan	This topic is tailored for young children, at primary level. So, the approach in pedagogical aspects is a bit simplified. This factor interests this study.
ETP3: Science of The Deep: Aquarius – Living Beneath The Sea **Channel**: ASTRO – Learning (Discovery Science)	This topic contains general knowledge. It serves to provide information for different levels of knowledge, experience, and age groups. Besides these factors, this study purposely selects a topic from this channel because it is one of the popular channels on ASTRO.
ETP4: 20 Steps to Better Management **Channel**: ASTRO – Family (TVIQ)	TVIQ is provided for educational productions only. This means the topics on this channel are designed specifically with pedagogical aspects in mind. On top of that, the management topic is important for anyone, and could be presented in many effective ways.
ETP5: Megamaths **Channel**: ASTRO – Family (TVIQ)	This study purposely selects mathematics topic played on TVIQ channel, because it tackles audiences worldwide. The producer changes bad perceptions upon mathematics with interest among the audiences.

In short, selection of eLMs involved in this study was made based on a number of reasons, which are uniquely seen. Some samples interest this study through the interaction styles, some with their publishers, some with the contents, and some were selected on their content basis. Again, it is stressed that the samples of eLMs were selected in order to produce generic suggestions.

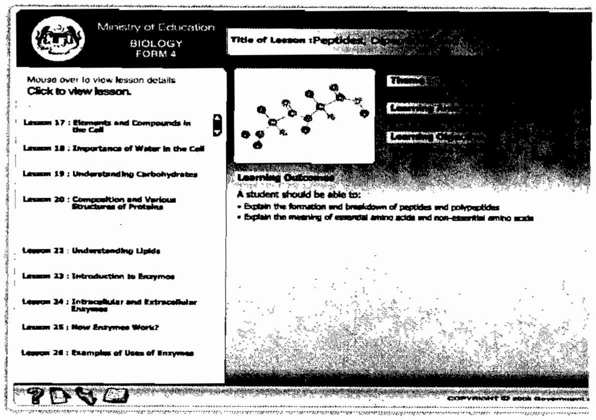
The following sections describe the components that gradually make-up the conceptual design of the proposed RLM model. The components are defined separately in terms of structural components (SCs), content composition components (CCCs), and the process for making RLM.

4.2 STRUCTURAL COMPONENTS (SCs)

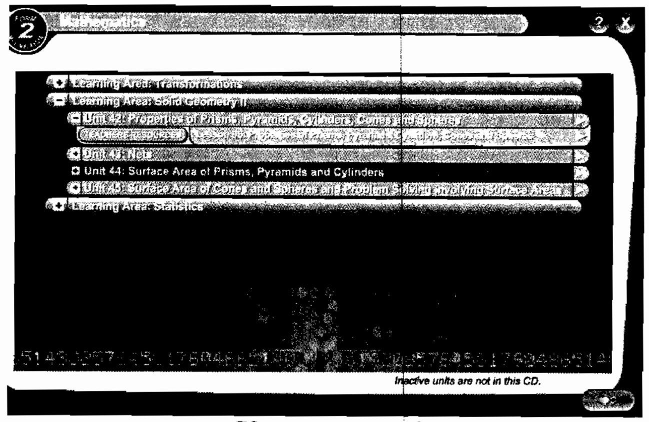
RLM defines a program as following a video metaphor when it contains opening and closing sections, content section, story-telling, and actor and viewers. Maintaining video features such as the use of metaphors, dialogues, and question and answer supports is important in increasing the level of learning rates, and found as lessening mental efforts and cognitive load (Norhayati, 1999). Norhayati reports that learning rate will increase with the help of interactive elements such as animations, learning by doing, and handling projects as opposed to passive activities such as reading words and listening to voices (see chapter 2).

To seek for the components of RLM, two methods were employed; first, content analysis (with expert review); second, comparative analysis. There are many types of models, and this study made use of working applications as the models for preliminary analysis. Results from the early observations suggest that eLMs generally have three sections with breakdowns (with descriptions) as in the list below:

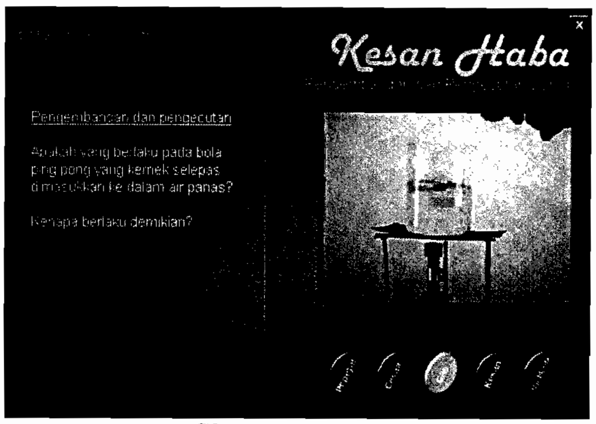
1. Opening section – contains information about the course, not the content.
    a. Title – title of the course.
    b. Verso – meta-information about the course such as year published and synopsis.
    c. Development team – list of individuals or/and organizations involved in the making of the RLM.
2. Content section – contains the actual contents.
    a. Objective of course – objectives that learners will achieve at the end of the course.
    b. Section separator – separator between sections, such as unit and chapter.
3. Closing section – as a signal of approaching the end of course, can contain a summary of the course.
    a. Debriefing – signal of approaching the end of the course.
    b. Thanking remarks – as a token of appreciation to those involved in the making of RLM and to the audience for learning with RLM.
    c. Acknowledgement – acknowledging the content contributors whom their contents are used in the course.



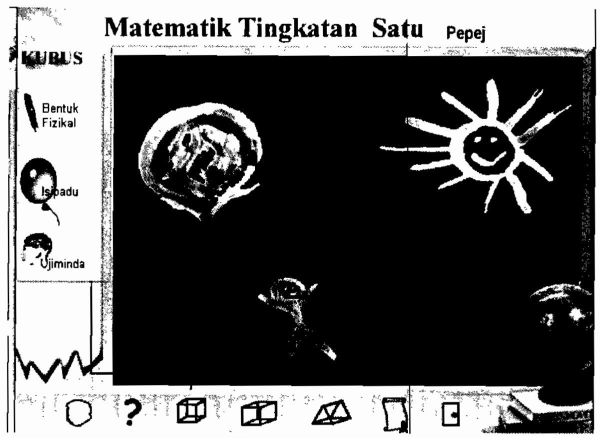
C1 – courseware 1



C2 – courseware 2



C3 – courseware 3



C4 – courseware 4

C5 – courseware 5

Figure 4.1: User interface of the selected courseware

Structure of eLMs refers to the organization of information flow from start until the eLMs reach the end. In RLM, it is important to base ideas on how developers will compose the content, which means the SCs are not made during taping. It is analogous to the structure of a web site, and the structure of a building. In web site development, structures help developer to arrange contents in proper place. While in building construction, structures must be concrete first to support other materials. It could be seen in both analogies that structures are important as the basis for subsequent development. In addition to these, in RLM, SCs are age independent, in which the structure suits all groups of ages. So, selection of existing eLM was done to cover as many age levels as possible. Descriptions about the comparison are provided in subsequent paragraphs.

First, each sample for all categories was analyzed. It started with the courseware. To ensure that the selected coursewares are highly reliable in terms of their standards as well as accessibility (i.e. widely distributed and owned by all schools), they are selected from items produced by the BTP, KPM. Details of all selected courseware are provided in Table 4.1. Figure 4.1 shows snapshots of the courseware. The SCs of courseware across the implementation in all samples are recorded as in Table 4.2.

Table 4.2 Structural components of courseware

Section	Component	C1	C2	C3	C4	C5
Opening section	Title	✓	✓	✓	✓	✓
	Verso	✓	✓	✓	✓	✓
	Developing team			✓	✓	✓
Content section	Objective of course	✓	✓	✓	✓	
	Section separators	✓	✓	✓	✓	✓
Closing section	Debriefing	✓	✓	✓	✓	✓
	Thanking remarks					
	Acknowledgements			✓	✓	✓

Note: ✓ means contained in the courseware/video/ETP

Having analyzed the samples of the selected courseware, the SC of video was analyzed next. The details of videos involved in this study can be found in Table 4.1. SC found in the samples of video are as tabulated in Table 4.3.

Table 4.3 Structural components of video

Section	Component	V1	V2	V3	V4	V5
Opening section	Title	✓	✓	✓	✓	✓
	Verso	✓	✓			✓
	Developing team	✓		✓		✓
Content section	Objective of course			✓	✓	✓
	Section separators	✓	✓	✓		✓
Closing section	Debriefing	✓	✓	✓	✓	✓
	Thanking remarks			✓		✓
	Acknowledgements			✓		✓

Finally, the SCs of ETP were analyzed. The ETP selected in this study were taken from various TV channels, such as TVIQ, Discovery Science, and local TV Pendidikan channel[25]. The details of selected ETP are provided in Table 4.1. Samples of ETP have SCs as listed in Table 4.4.

Table 4.4 Structural components of ETP

Section	Component	ETP1	ETP2	ETP3	ETP4	ETP5
Opening section	Title	✓	✓	✓	✓	✓
	Verso	✓	✓	✓	✓	✓
	Developing team	✓	✓	✓	✓	✓
Content section	Objective of course	✓	✓		✓	
	Section separators	✓	✓	✓	✓	✓
Closing section	Debriefing	✓	✓	✓	✓	✓
	Thanking remarks			✓	✓	✓
	Acknowledgements	✓	✓	✓	✓	✓

Tables 4.2 through 4.4 list SCs of all samples for all categories of the selected eLM. It is now necessary to summarize the components to represent each category. The summary of SCs is provided in Table 4.5, where the classification of components follows the rules in Figure 4.2.

[25] Also provided for streaming at http://tvp.moe.edu.my/

Category	Description	Condition (where statement)
A	All samples apply.	All samples apply.
M	Majority of samples apply.	There are four samples applying.
F	Few samples apply.	There are between one to three samples applying.
⊗	Not applied in any sample.	There is no sample applying.

Figure 4.2: Categories of components

Table 4.5: Summary of structural components of eLM

Section	Component	C'ware	Video	ETP
Opening section	Title	A	A	A
	Verso	A	F	A
	Developing team	F	F	A
Content section	Objective of course	M	F	F
	Section separators	A	M	A
Closing section	Debriefing	A	A	A
	Thanking remarks	⊗	F	F
	Acknowledgements	F	F	A

As stated earlier, the components of existing eLM will be used as a guide to propose the components of RLM. Accordingly, from the summary of SCs in Table 4.5, it is necessary to propose a list of SCs of RLM. The conditions for determining compulsory and recommended components are as stated in Figure 4.3:

The component is compulsory (●) when there is any A OR there is at least one M with no ⊗ in the row.

The component is recommended (☺) when there is only F and ⊗ in the row.

Figure 4.3: Conditions for classification

Based on the rules above, the SCs of RLM are proposed and provided in Table 4.6.

Table 4.6: Proposed structural components of RLM

Section	Component	RLM
Opening section	Title	●
	Verso	●
	Developing team	●
Content section	Objective of course	●
	Section separators	●
Closing section	Debriefing	●
	Thanking remarks	☺
	Acknowledgements	●

Description of symbols

● Compulsory to apply

☺ Recommended to apply

The components in Table 4.6 are commonly contained in the eLM. It can be seen that some of the components are contained in all eLMs, but some are contained in at least one type of eLM, in which these fit the conditions. From the proposed components in Table 4.6, the model for RLM structure could be obtained, and illustrated as in Figure 4.4.

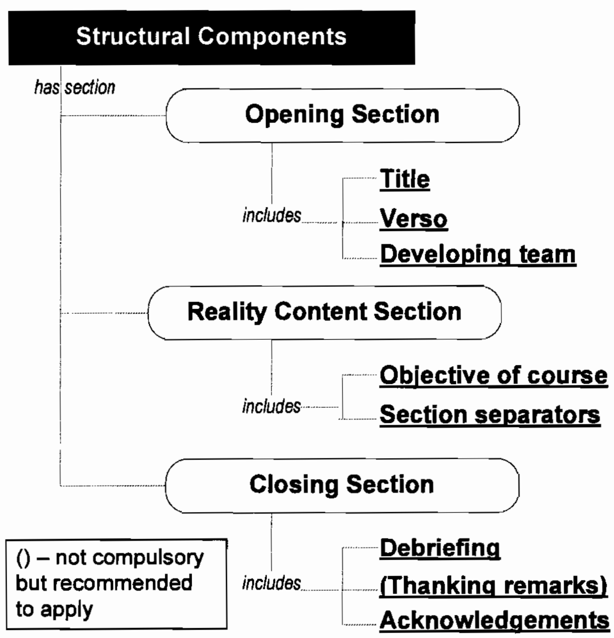


Figure 4.4: Model for structural components of RLM

From the above definition, **opening section** should contain information about the development team. This is particularly important because in promoting user experience[26], branding has been tackled as one of the strategies (Rubinoff, 2004). So, the development team can reflect the brand of the RLM. Figure 4.4 states developing team as one of the components to show that the information is sufficient for inclusion, but that element could always be in the opening or closing section, such as in the thanking remarks. This study changes the content section in Table 4.6 with *reality content section* to reflect the nature and content type to deliver. In the **reality content section**, the separators between sections should not be necessarily in slide-based form, but they could also be created using speeches (speech-based). Having described the SCs, it is now appropriate to discuss the CCCs.

4.3 CONTENT COMPOSITION COMPONENTS (CCCs)

Designing RLM needs sufficient efforts to be directed at the presentation of video contents since this will partly determine that the contents are entertaining and invoking fun. So, it is important to deliver the content to suiting to Carroll's (2004) suggestions. As in his definition, briefly things are entertaining when they are arousing emotions, provoking perceptions, surprising through the look and feel, and challenging puzzles. All these characteristics, in which the details are listed in Chapter 2, should be catered in RLM contents. So, in terms of content composition, RLM based its components on the existing eLM. The existing eLMs generally contain components as listed below (with their descriptions in relation to this study):

1. Pedagogical strategies:
    - A. Media elements
        - i. Audio – all audio effects such as narration, dialogue, and question.
        - ii. Visual -
            - a. Images – representation of certain units of discussion with photos.
            - b. Real objects – representation of units of discussion with the real objects such as video camera, computer, and car engine.
            - c. Texts – text such as titles, descriptions, and captions.

[26] See details in Jesse (2000), McCarthy & Wright (2003), and Morville (2004)

d. Graphics – sometimes graphics are helpful to represent complex concepts, usually composed with special characteristics.

e. Animations – understanding some abstract and complex concepts would be helpful with the help of animation, such as the bus system on motherboard.

f. Simulations – change in values of different variables would result in change in the outcome, this can be visualized with help of simulations, such as the heat and thermostat.

B. Styles of presentation

i. Lecturing – conventional teaching style, instructor speaks to the learners. Sometimes run with help of special aids such as whiteboard, projector, and slide presentations.

ii. Instruction-base – tasks are performed on command-basis, usually exists in practical-based contents.

iii. Documentary – like story-telling, there is beginning and ending points, usually to visualize events such as a process, a chronology, and an aspect of living.

iv. Demonstration – more on exhibiting a process such as how to do something, how to recover from a disaster, and good and bad practices in marketing.

C. Content delivery strategies include these components:

i. Briefing – short descriptions about something to be experienced.

ii. Objectives of course – the expected content to be discovered in the course.

iii. Content – the part where the actual contents are delivered.

iv. Closing – the end part of the course; could contain a summary of the course content.

D. Styles of flow

i. Separated – there are separators between sections such as topics, chapter, and time.

   ii. Non-separated – the course is presented continuously from start to finish with no transition and is usually applied in demonstrating a process or task.

2. Human entities

   A. Actor – people who act in the course, or only the voice, in which actors who apply only voice in the course are referred to as unseen actors.

      i. Instructors – actors who teach the viewers about something.

      ii. Learners – actors who learn in the course.

   B. Audiences/viewers – the real learners for the course.

As in the processes of identifying SCs, similar steps were also carried out in identifying the components for content composition. All samples used in identifying SCs were also used in this particular task. The identical processes started with analyzing the components for courseware, followed with video, and finally the ETP. Tables 4.7 through 4.9 list the CCCs of all samples. Also the tables have grouped the components into two main categories namely pedagogical strategies and human entities; the pedagogical strategies part is further broken into four sub-categories i.e. styles of presentation, content delivery strategies, styles of flow, and media elements. The pedagogical strategies are influenced by discussions in learning theories as discussed in Chapter 2.

The idea to propose the four sub-categories of pedagogical strategies is inline with the learning theories, which suggest that pedagogical aspects remain important in eLMs. Emphasis on styles of presentation and content delivery strategies are stressed in Cognitive Flexibility theory. Experiential theory also influences decision in designing for content delivery. Cognitive Load theory which emphasizes on human memory representation tackles the styles of flow in which they could influence the memory load. Besides, media elements are among discussions in many theories including Anchored Instruction, Minimalism, Multiple Intelligence, and Symbol System.

The components of all sub-categories in pedagogical aspects (media elements – 7; styles of presentation – 4; content delivery strategies – 4; and styles of flow – 2) were obtained through comparison of existing eLMs as described in the remaining paragraphs. On top of that, the literatures on learning concepts, eLearning, and learning theories as discussed in Chapter 2 have strong influence to the formation of these components in RLM.

All media elements are employed in RLM because all eLMs employ multiple media elements. In terms of content presentation, it is notice in reality TV shows, different categories (detail in Table 2.2) are presented in different styles; documentary-style – documentary; elimination/game shows – game/competition; self-improvement/makeover – demonstration, game/competition, and instruction-based; dating shows – documentary; talk shows – demonstration, forum; hidden camera – candid/documentary. Besides, in eLearning, in spite of these styles, there are still lecturing method appropriate, especially in formats like video and ETP. From the list of presentation styles above, RLM does not adopt all, to consider that RLM is a learning media. So selection is based on the presentation styles employed in existing eLMs.

In addition, the learning philosophy suggests that eLMs should begin with a briefing session, followed with objective, then content, and finally closing. Coursewares do not follow the chronology because they make use of hybrid flow styles. However, all components in content delivery strategies are included in most coursewares. In this case, RLM adopts the chronology as implemented in most video and ETP, because they share similar format.

Also, RLM does not consider hyperlinks, hypertext, hypermedia, and other navigational buttons for the styles of flow because RLM utilizes video metaphor. However, they are bound with the factor whether different sections in the eLMs are separated or not. The arguments above determine that this study classifies styles flow into two.

Table 4.7: Content composition components for courseware

		Components	C1	C2	C3	C4	C5
Pedagogical strategies	Media elements	Audio	✓	✓	✓	✓	✓
		Visual:					
		Images	✓	✓		✓	✓
		Real objects			✓	✓	
		Texts	✓	✓	✓	✓	✓
		Graphics	✓	✓		✓	
		Animations	✓	✓	✓		
		Simulations	✓	✓	✓		
	Styles of presentation	Lecturing					
		Instruction-based		✓			
		Documentary					✓
		Demonstration	✓	✓	✓	✓	
	Content delivery strategies	Briefing	✓	✓			
		Objectives	✓	✓	✓	✓	
		Content	✓	✓	✓	✓	✓
		Closing	✓	✓			
	Styles of flow	Separated	✓	✓	✓	✓	✓
		Non-separated					
Human entities		Actor:					
		Instructor	✓	✓	✓	✓	✓
		Learner					
		Audience/viewers	✓	✓	✓	✓	✓

Table 4.8: Content composition components for video

		Components	V1	V2	V3	V4	V5
Pedagogical strategies	Media elements	Audio	✓	✓	✓	✓	✓
		Visual:					
		Images	✓	✓	✓		✓
		Real objects	✓	✓	✓	✓	✓
		Texts	✓	✓	✓		✓
		Graphics	✓	✓	✓		✓
		Animations					
		Simulations			✓		✓
	Styles of presentation	Lecturing			✓	✓	
		Instruction-based					
		Documentary		✓			
		Demonstration	✓				✓
	Content delivery	Briefing					✓

	strategies	Objectives			✓		✓
		Content	✓	✓	✓	✓	✓
		Closing	✓	✓		✓	✓
	Styles of flow	Separated	✓	✓	✓		✓
		Non-separated				✓	
Human entities		Actor:					
		Instructor	✓	✓	✓	✓	✓
		Learner	✓				✓
		Audience/viewers	✓	✓	✓	✓	✓

Table 4.9: Content composition components for ETP

		Components	**ETP 1**	**ETP 2**	**ETP 3**	**ETP 4**	**ETP 5**
Pedagogical strategies	Media elements	Audio	✓	✓	✓	✓	✓
		Visual:					
		Images	✓	✓	✓	✓	✓
		Real objects	✓	✓	✓	✓	✓
		Texts	✓	✓	✓	✓	✓
		Graphics	✓	✓	✓	✓	✓
		Animations			✓	✓	✓
		Simulations	✓		✓		✓
	Styles of presentation	Lecturing					
		Instruction-based		✓			
		Documentary	✓		✓		✓
		Demonstration		✓		✓	✓
	Content delivery strategies	Briefing	✓	✓	✓	✓	✓
		Objectives	✓	✓		✓	
		Content	✓	✓	✓	✓	✓
		Closing	✓	✓	✓	✓	✓
	Styles of flow	Separated	✓	✓	✓	✓	✓
		Non-separated			✓		
Human entities		Actor:					
		Instructor	✓	✓	✓	✓	✓
		Learner		✓			✓
		Audience/viewers	✓	✓	✓	✓	✓

The details of all samples as tabulated in Tables 4.7 through 4.9 are summarized to represent the CCCs of each category. Based on the same rules as in classifying the SCs (see Figure 4.2), the CCCs of each category is provided in Table 4.10.

Table 4.10: Summary of content composition components of eLMs

		Component	Courseware	Video	ETP
Pedagogical strategies	Media elements	Audio	A	A	A
		Images	M	M	A
		Real objects	F	A	A
		Texts	A	M	A
		Graphics	F	M	A
		Animations	F	⊗	F
		Simulations	F	F	F
	Styles of presentation	Lecturing	⊗	F	⊗
		Instruction-based	⊗	⊗	F
		Documentary	F	F	F
		Demonstration	M	F	F
	Content delivery strategies	Briefing	F	F	A
		Objectives	M	F	F
		Content	A	A	A
		Closing	F	M	A
	Styles of flow	Separated	A	F	A
		Non-separated	⊗	F	F
Human entities		Actor	A	A	A
		Audience/viewers	A	A	A

Descriptions of symbols

A	All samples apply.	F	Few samples apply.
M	Majority of samples apply.	⊗	Not applied in any sample.

The CCCs were derived from the summary in Table 4.10, and provided in Table 4.11 based on the same conditions as in the SCs (see Figure 4.3).

Table 4.11: RLM content composition components based on the analyzed eLMs

		Component	RLM
Pedagogical strategies	Media elements	Audio	●
		Images	●
		Real objects	●
		Texts	●
		Graphics	●
		Animations	☺
		Simulations	☺
	Styles of presentation	Lecturing	☺#
		Instruction-based	☺#

		Documentary	☺ #
		Demonstration	☻ #
	Content delivery strategies	Briefing	☻
		Objectives	☻
		Content	☻
		Closing	☻
	Styles of flow	Separated	☻ #
		Non-separated	☺ #
Human entities		Actor	☻ #
		Audience/viewers	☻ #

means can be either one mode or combined modes. For Human entities, audience/viewer mode alone is discarded

Description of symbols

☻ Compulsory to apply

☺ Recommended to apply

RLM maintains the components of existing eLM (i.e. listed in Table 4.11) because they were found as important, and have been reported by many researchers as leading to positive effects in terms of reducing cognitive load (Norhayati, 1999), catching learners' attention (Norman, 1988), and addressing pedagogical issues (Brown, 1997). In addition, RLM extends the content part to ensure that the learning contents are entertaining and arousing, causing laughter, and fun to use.

In accordance, the components of RLM in Table 4.11 are reviewed for extension, with the amendment is focused on the content part to include features that are much closer to human nature. Earlier, Chapter 2 discussed reality TV programs, which include mistakes, interferences, and feedbacks as part of the content, and can be termed as unplanned content. Empirical data have been obtained to show that reality TV is more preferred by viewers (discussed in the problem statement – Chapter 1).

In the survey, their comments are inline with early discussion in the previous paragraph, and in Chapter 2. However, existing eLMs do not include them. Based on these arguments, Table 4.12 lists the extended content composition components of RLM to include the unplanned reality content. The unplanned reality content components (together with its breakdowns) are underlined. This study proposes that the term entertaining and fun are reflected in these components.

Table 4.12: Proposed RLM content composition components

		Component	RLM
Pedagogical strategies	Media elements	Audio	☻
		Images	☻
		Real objects	☻
		Texts	☻
		Graphics	☻
		Animations	☺
		Simulations	☺
	Styles of presentation	Lecturing	☺ #
		Instruction-based	☺ #
		Documentary	☺ #
		Demonstration	☻ #
	Content delivery strategies	Briefing	☻
		Objectives	☻
		Reality content	☻
		Planned	☻
		Unplanned	☻
		Mistakes	☻
		Interferences	☻
		Feedbacks	☻
		Formative assessment	☻
		Closing	☻
	Styles of flow	Separated	☻ #
		Non-separated	☺ #
Human entities		Actor	☻ #
		Audience/viewers	☻ #

means can be either one mode or combined modes. For Human entities, audience/viewer mode alone is discarded.
Note: underlined are components associated to entertaining and fun

The reality content part with the breakdowns were proposed as the components of RLM that are expected to invoke fun and to trigger the feel of being entertained after being inspired by the reality TV shows. The components listed in Table 4.12 were represented as the model for content composition (see Figure 4.5) and discussed with peers in IADIS eSociety Conference (Ariffin & Norshuhada, 2009). It was found that the colleagues were able to understand the model well.

4.3.1 CCC Elaboration

This paragraph and the subsequent ones elaborate the diagram in Figure 4.6. The strategies for content composition include human entities and pedagogical strategies. Further, human entity is extended to include social interaction aspects; and the pedagogical strategies component are broken down into four, namely media elements, styles of presentation, content delivery strategies, and styles of flow.

Human entities

Besides the audience and the actor, another component that constructs human entities is the social interaction. This is important to ensure that learners learn actively on their own pace, involving mental construction as suggested by Situated Learning and Constructivism theories. Learners will interact with self, group (community of practice), and the environment (such as time, place, and tools). Revising the reality TV shows gives an influence that RLM must consider the audience, as the viewers. The actor(s) of RLM could be playing role as either a learner or an instructor. These approaches are found relevant with current implementation in CAL and VBL.

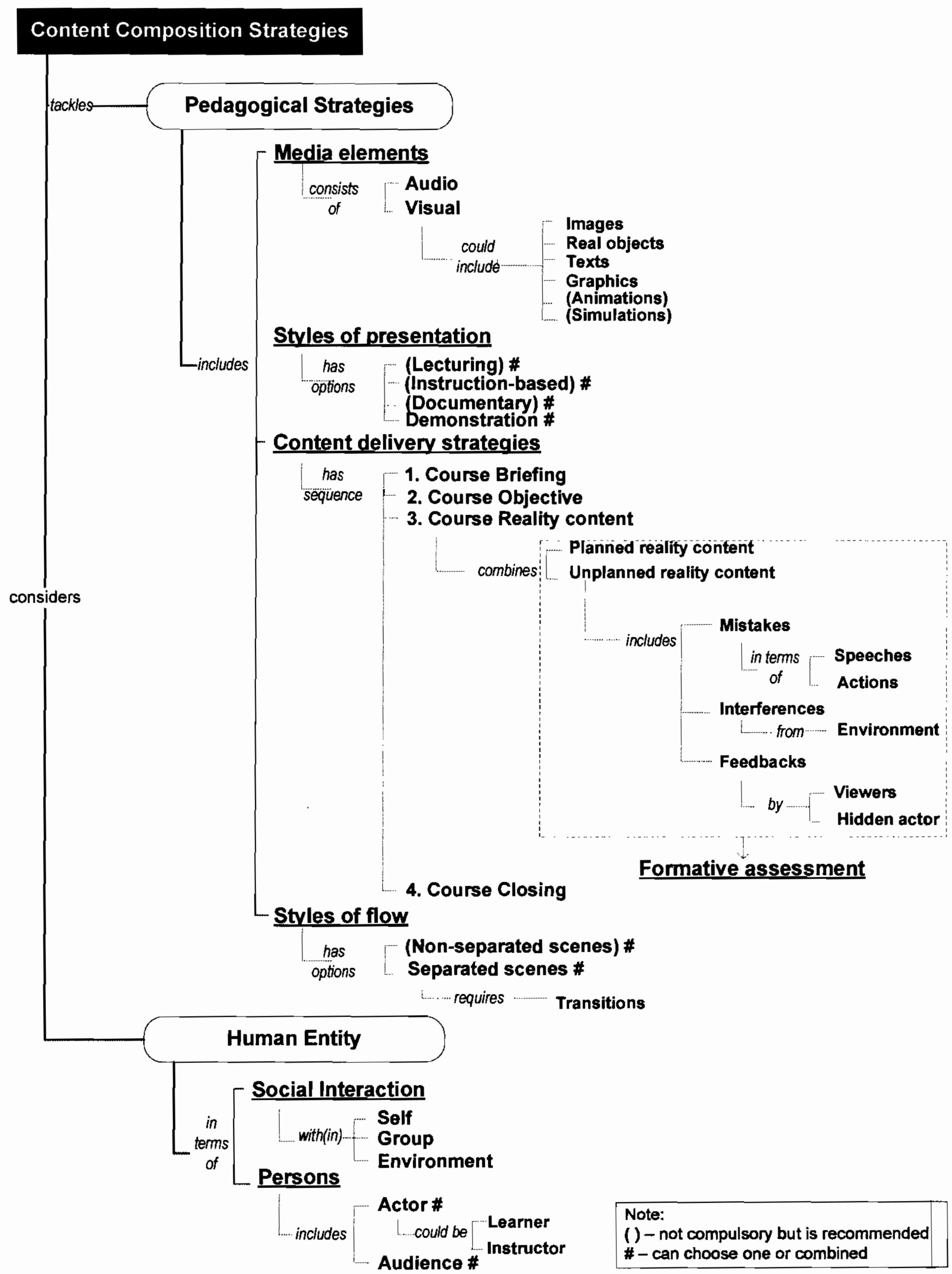


Figure 4.5: Model for content composition components of RLM

Pedagogical strategies

There are strategies to tackle when preparing learning content. Issues such as media elements, styles of presentation, content delivery, and styles of flow should be made appropriate for the target learners, suit with the learning context. These are considered as pedagogical strategies.

Media elements: Pedagogical strategies in RLM have to consider the discussions on eLearning. It starts with the media elements. It is suggested that audio and visual are used. In visuals, simulations and animations are highly recommended to use. Other elements including images, real objects, text, and graphics are compulsory. The audio visual elements are defined as (1) those composed by the RLM maker and (2) those exist in the environment where the production takes place. As an example of introducing a video recorder, this means the RLM maker could make use of the labels on the recorder as text element of the RLM. However, it is not necessary that all elements are used in one RLM. The use of various media elements are inline with suggestions by a number of learning theories such as Anchored Instructions, Aptitude Treatment Instruction, Cognitive Load, Multiple Intelligences, and Symbol Systems.

Styles of presentation: Contents on RLM can be presented in four styles; lecturing, instruction-based, documentary, and demonstration. The type of actor of RLM has implication over the styles of presentation. Lecturing is applied to imitate classroom teaching. The instructor will speak to the learners with the help of teaching aids. If the actor is a learner, then instruction-base is recommended. This style means that the learner performs tasks as ordered by a hidden actor[27]; the instructor. In contrast, if the actor is an instructor, then documentary and demonstration styles are recommended besides lecturing. Demonstration-style works well when describing about things, while documentary-style could help conveying information about living aspects effectively. However, the above discussion stands as general guidelines to illustrate the suitability between actor and styles of presentation. There are also cases where both instructor and learner appear in one RLM. So, the key point to ponder is that styles of presentation are not bound by the roles of the actor.

[27] Hidden actor refers to an actor who only speaks, no appearance in the RLM

Content delivery strategies: Cognitive Flexibility and Experiential theories; which stress that the learning content must be context-dependent and assessment is made by the learners themselves; are used as the basis to propose the content delivery strategies. In RLM, the strategies map classroom's teaching approach; begins with briefing or ice-breaking, then the objectives of the topic, next reality content, and lastly closing.

In RLM, the contents are in the form of moving pictures and lively, where they are not cut and not edited. This comprises planned and unplanned contents in which the planned contents are the intended one, while the mistakes in terms of actions and speeches, interferences from the environment, and feedbacks from viewer(s) and hidden actors are considered as unplanned contents. This reality content part is supported by the Minimalism theory, where RLM allows learners to start immediately on intended point, minimizes the amount of reading and other passive forms, include error recognition and recovery activities, and make all learning activities self-contained and independent of sequence. Also, the discussion on formal and informal learning has certain influences on the reality content. The reality content should provide the learners with some forms of formative assessment as outlined by Minimalism and as part of learning definition. The model in Figure 4.5 outlines the reality content part with a dotted-line rectangle.

Finally, the RLM should have a closing section. At all parts of RLM where sound is used, the power of 'emphasis', 'stress', examples, and terminologies must be considered. It is important ensuring that the learners are always engaged with the content.

Styles of flow: The contents of RLM could be delivered in different styles of flow. They can follow typical implementation where the scenes are separated. In this case, the use of 'transition' is essential and can cater for contents that combine scenes in different locations. The separators between sections are not necessarily be in obvious form, but could also be utilizing less obvious elements such as speech. Alternatively, the scenes could be non-separated from start to finish. This means there is no cut at all and is best practiced for contents that are shot in a single location. As an example, topics covering different discussions could be separated, while topics focusing only on one discussion are not separated. In some ways, the styles of flow are influenced by the styles of presentation.

Having obtained and elaborated the components and models in terms of structure and content composition, next process of making RLM is described. It follows the steps in making video with some modifications.

4.4 THE PROCESS OF MAKING RLM

The structural and content composition components were derived through studying the existing eLMs. In contrast, the process of making RLM has been determined through analyzing typical video production processes. Co-operation with external party has given the opportunity to propose the process of making RLM, which is simpler then the typical video project methods. The following paragraphs explain steps involved in proposing the processes of making RLM.

In RLM, the content making process; even though are divided into pre-production, production, and post-production; are not as complicated as in regular video production. Identifying appropriate technical tasks in producing an RLM from scratch to finish was accomplished by engaging a video expert (Mr. Hishamudin Mohd Amin) of one video practitioner company (Aspati Sdn. Bhd.) (later is referred to as 'video producer'), who has developed and produced many video applications for training organizations and for commercial. The steps involved are described in the subsequent paragraphs.

First, a list of typical technical and non-technical tasks in video production was determined (see **Appendix F**) (Zettl, 2007; Rubin, 2002; Clendenin, 1998; and Utsumi, 1982). The list was posted to the video producer for reviewing together with the description about the RLM environment. The list was first agreed upon by both the researcher and the video producer. Next, the video producer examined the list again, to decide the tasks required in making an RLM. Secondly, the recommended required tasks in making RLM were determined by both the researcher and the video producer.

The list of tasks in making typical video projects contains 169 aspects. However, RLM requires only 40 aspects (see Table 4.13), which is only 23.67% of the aspects in making a typical video with existing methods.

The typical video shooting list was shortened to support non-technically skilled people in video production's understanding and motivation. The video producer proposed the following processes in making RLM.

Table 4.13: Video aspects involved in developing RLM

Pre-production	Program objectives:	
	Angle	1*
	Evaluation	2
	Medium Requirement:	
	Script	3
	Producer – budget	4
	Director	5
	Talent (actor)	6
	Art director	7
	Floor plan	8
	Storyboard	9
	Technical personnel	10
	Facilities and equipment	11
	Studio production or Field production	12
	Single-camera production	13
	Multi-camera production	14
Production	Schedule and timeline	
	Camcoders	15
	Studio cameras	16
	Basic camera movements:	
	Pan – turn the camera 'lift-right' horizontally.	17
	Tilt – make the camera point up or down.	18
	Cant – tilt the camera sideways.	19
	Pedestal – to elevate or lower the camera on the center column of a tripod or pedestal.	10
	Dolly – move the camera towards or away from an object.	11
	Truck – or 'track', move the camera laterally by means of a mobile camera mount.	12
	Arc – move camera in a slightly curved dolly or truck movement.	13
		14
	Crane – or 'boom', move camera up and down on a camera	

	crane or jib arm.	15
	Tongue – move the whole camera from left to right (vice versa) with the boom of a camera crane or jib arm.	16
	Zoom – change the focal length of a lens	
	Camera mounts:	17
	Tripod supported cameras	
	Operational features:	18
	Focus and shutter speed	19
	Calibrating the zoom lens	
	Framing a shot:	20
	Field of view:	21
	Medium shot (MS)	22
	Close-up (CU)	23
	Extreme close-up (ECU)	24
	Psychological closure	
	Light:	
	Types of light:	25
	Directional light	26
	Diffuse light	
	Shadows:	27
	Attached, cast, and fall off shadows	
	Lighting techniques:	28
	Studio Vs field lighting	29
	Photographic principle OR triangle lighting	
	Talent, clothing, and makeup	30
	Eye contact	31
	Close-ups	32
	Microphone techniques	33
	Floor manager's cues	34
	Cue cards	
Post-production	Linear editing	
	Single-source linear system	35
	Assemble editing	36
	Insert editing	37
	Nonlinear editing	
	Phase 1: Capture	38
	Phase 2: Editing	39
	Phase 3: export to videotape or disc	40

*indicates number of aspects.

The pre-production stage requires ideally an hour for set-up, discussion, and briefing making sense that all talents (actors and crews) and the director are ready. There is no tight script required, but is adequate with a brief description of what is to be delivered to the audience. During production, the QVRT is applied. In that technique, multiple or single camera production techniques are optional. The use of tripod is necessary, as well as wireless microphones, boom microphones, and microphones suitable for use by the talents. Sometimes, the cameraman acts as an actor too. Shooting could either be in automatic or manual mode. For the manual mode, functions zoom and focus are recommended. Also some of creativity is required. Creativity is a noun of the verb creative; where a creative work is both novel and appropriate (Naiman, 2006). There is no one correct answer in creativity perspective, but trial-and-error is a good basis for it. Some personal qualities associated with creativity include tolerance for ambiguity, sensible risk-taking, being open to new experiences, and defying the crowd or being untraditional (Qatar Supreme Education Council, 2006). Kaufman, one of the founding directors of Learning Research Institute at California State University says "*...everyone has the same capacity to be creative...*". He also states that people who are creative achieve more, are successful, more likely to persist in difficult situations, and tend to be happier (Qatar Supreme Education Council, 2006).

Finally, in the post-production stage, the materials are non-linearly edited involving software and hardware. In RLM, editing works are minimal. There is no special software and hardware required. Windows Movie Maker is an example of software that is workable. Figure 4.6 illustrates the process of making RLM. When the RLM is finished, previewing is essential to check the quality. This quality checking is similar to testing activities in the system development in which the developer may self-check or may recruit other people. Distribution of RLM could be made either in the form of CD or download.

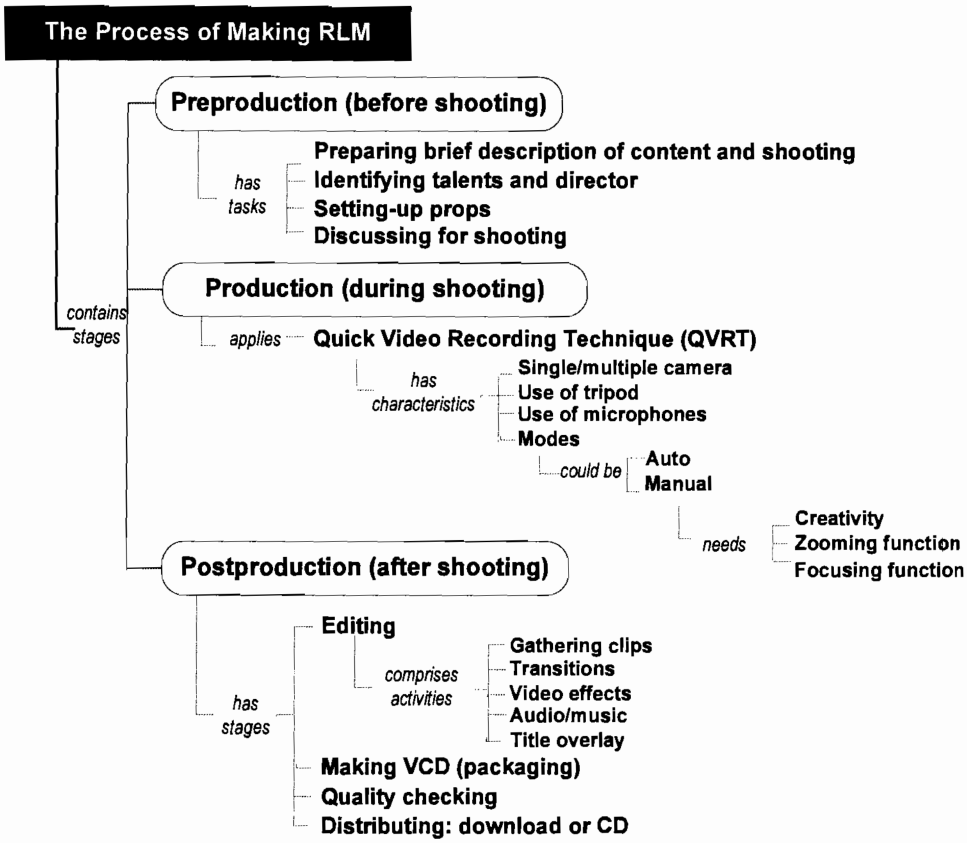


Figure 4.6: Model for the process of producing RLM

In Section 4.2, the proposed structure of RLM has been outlined, by addressing the components appropriate for opening, content, and closing sections of the RLM. The next section continues by addressing the CCCs, appropriate for the creators to look into when designing and developing the RLM. In this model, all components are aligned with literatures elicited in Chapter 2 and are proposed to support the needs as suggested by those literatures. This section compliments the models by proposing the processes involved in making RLM.

Next, the three models are integrated to serve as the finalized proposed conceptual design of the RLM model. The following section visualizes and explains the proposed model illustratively.

4.5 THE PROPOSED RLM MODEL

The proposed RLM model is made up of three components: Structural Components, Content Composition Components, and The Process of Making. The model describes that in terms of structure, content components is inserted at the reality content section. Figure 4.7 depicts the model. In the process of developing RLM, three stages of activities are involved which are pre-production, production, and post-production. In the pre-production stage, tasks that may involve include preparing brief description of content and shooting, identifying talents and director, setting-up props, and discussing for shooting. In the production stage, QVRT is applied. In the QVRT, single or multiple camera can be used, tripod, microphones, and either auto or manual mode. In manual mode, creativity, zooming and focusing are applied. In post-production stage, editing is required only to gather clips, make appropriate transitions, apply some video effects, insert audio/music, and add titles. Additionally, the stage includes making VCD including packaging, quality checking, and distributing.

In the RLM, it has three sections; opening, reality content, and closing. The opening section contains title, verso, and developing team of the course. Closing section comprises of debriefing, thanking remarks, and acknowledgement. Reality content section tackles pedagogical aspects and considers human entities. In pedagogical aspects, media elements, styles of presentation, content delivery strategies, and styles of flow are included. In human entities, social interaction (with self, group, or the environment) and the persons (actor: learner/instructor or audience) are addressed. In terms of media elements, audio, text, images, real objects, graphics, animation, and simulation could be included. Options for styles of presentation are lecturing, instruction-based, documentary, and demonstration. In terms of content delivery, it starts with course briefing, course learning outcome, course reality content, and course closing. In the course reality content, planned and unplanned reality content are combined and includes mistakes, interferences, and feedbacks. Options for styles of flow are separated and non-separated.

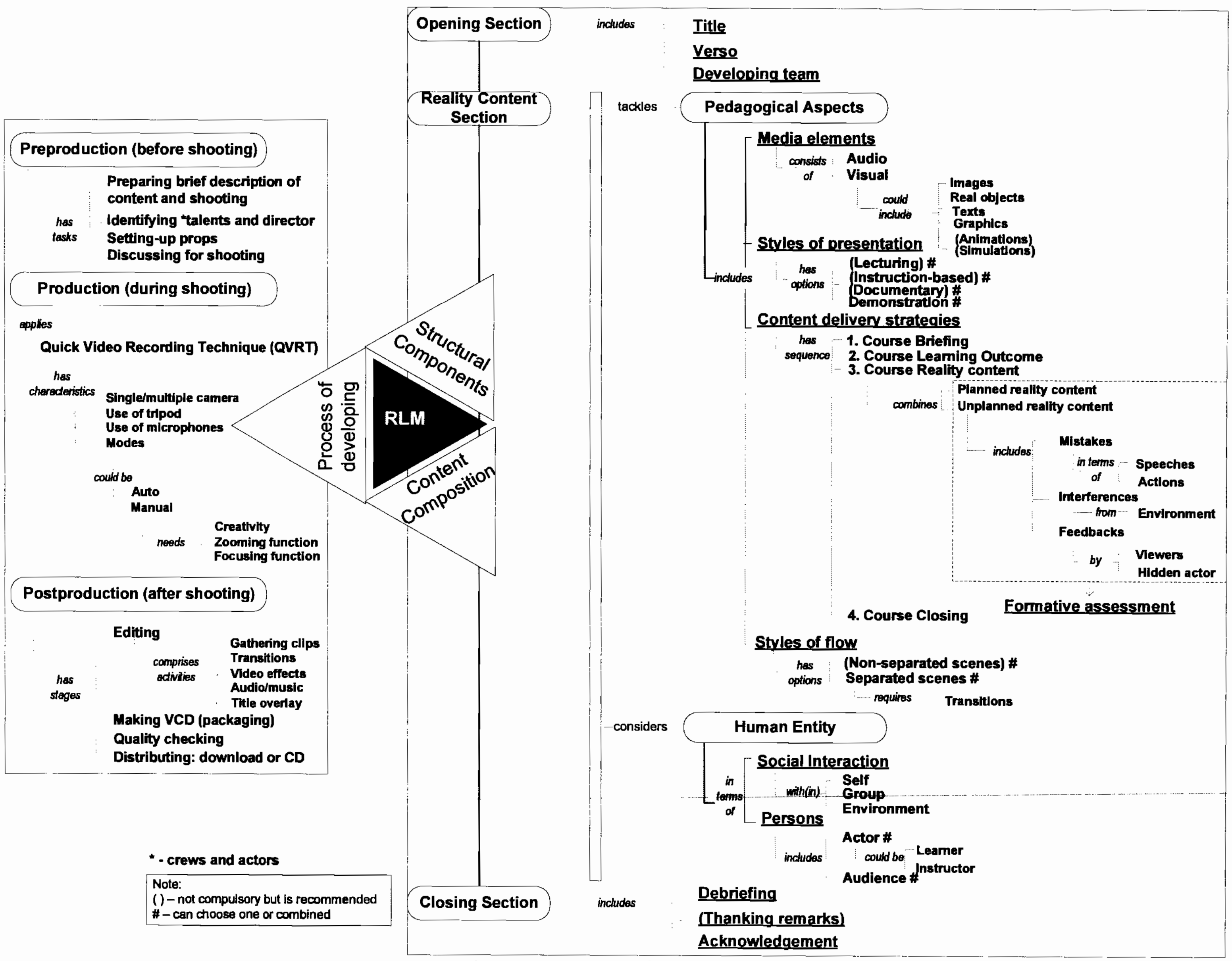


Figure 4.7: Proposed RLM model

4.5.1 Conceptual Design Model of RLM

In addition to the proposed RLM model, a conceptual design model of RLM was also produced. Figure 4.8 shows how the conceptual design model of RLM is extended from the proposed RLM model. In Figure 4.8, RLM is associated with its major attributes combined with the process of making and the components. The conceptual design model of RLM is different from the RLM model. RLM model contains components and detail flow of process in the RLM. In contrast, conceptual design model of RLM displays the attributes of the RLM, without emphasizing on any flow of process or components.

In fact, the conceptual design model is built based-on the RLM model and theoretical framework of this study. When designing an RLM, the conceptual design model can be utilized as the guide. Figure 4.8 illustrates the conceptual design model, which has been discussed and assessed iteratively with an expert in model development. The expert is a professor at the Technical University of Munich, Germany, and the head of the Model-based Systems and Qualitative Reasoning Group., Prof. Dr. Peter Struss. Generally, RLM has six major attributes; learning theories, structural components, content composition components, learning approaches, technologies, and process of developing.

In designing an RLM, Figure 4.9 suggests that a number of learning theories are considered. Those learning theories include Anchored Instruction, Experiential, Cognitive Flexibility, Symbol System, and Multiple Intelligence (linguistic, intrapersonal, interpersonal, visual, and bodily-kinesthetic). In terms of structure, RLM should comprise opening (contains information about title, verso, and developing team), reality content (includes learning outcome and section separator), and closing sections (includes debriefing, thanking remark, and acknowledgement). In the content composition components, pedagogical strategies and human entities (learner or instructor) are addressed. Media elements (audio, texts, images, graphics, real objects, animations, and simulations), styles of presentation (lecturing, instruction-based, documentary, and demonstration), content delivery strategies (course briefing, course learning outcome, course reality content, and course closing), styles of flow (separated or non-separated) are the attributes of pedagogical strategies. Course reality content combines planned and unplanned reality content and includes mistake, interferences, and feedback.

Suggested learning approaches are self-paced, active learning, and can be applied as a video-based learning. The technologies that are recommended for RLM are TV programme, CD or DVD, and streaming or download from the Internet. The developing process of RLM is divided into three; preproduction, production, and post-production. It may take only half an hour to prepare in the pre-production stage. The production stage utilizes the QVRT, and the post-production stage is just to insert text, effects, and transition and no tedious task is required.

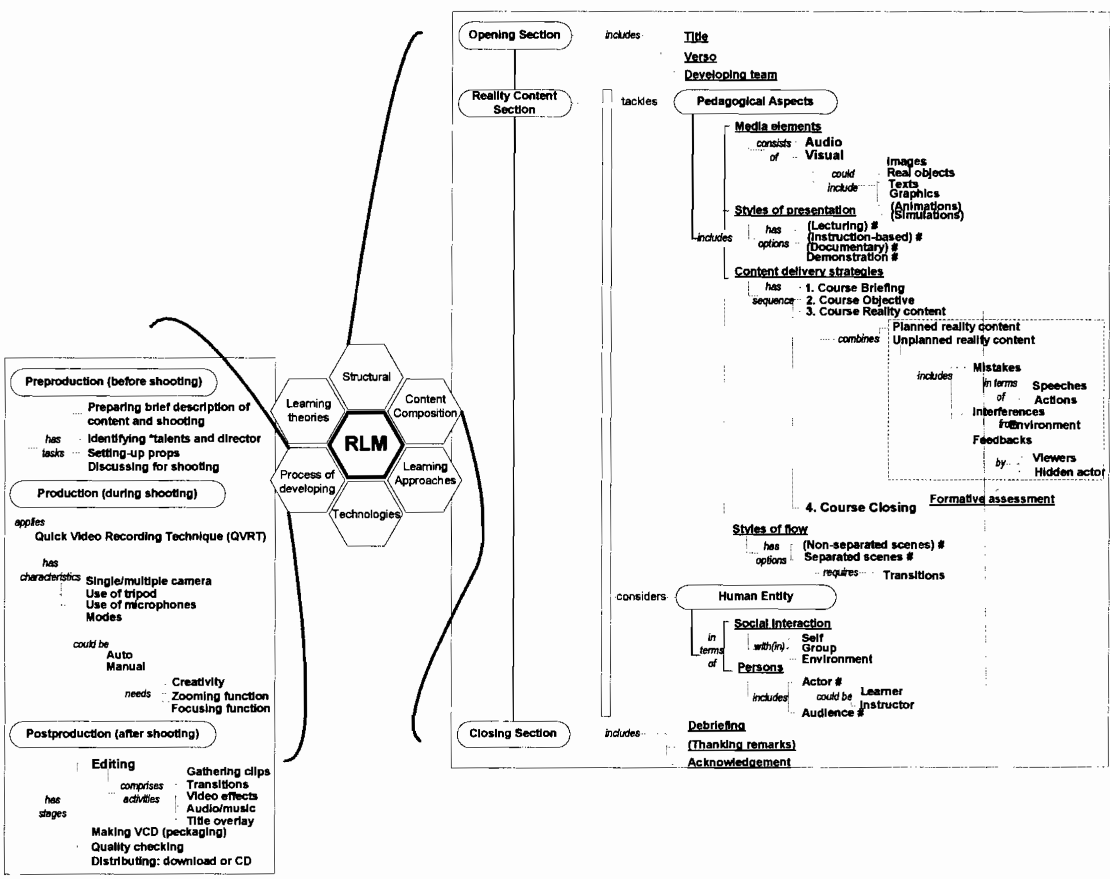


Figure 4.8: Conceptual design model of RLM in relation to RLM model

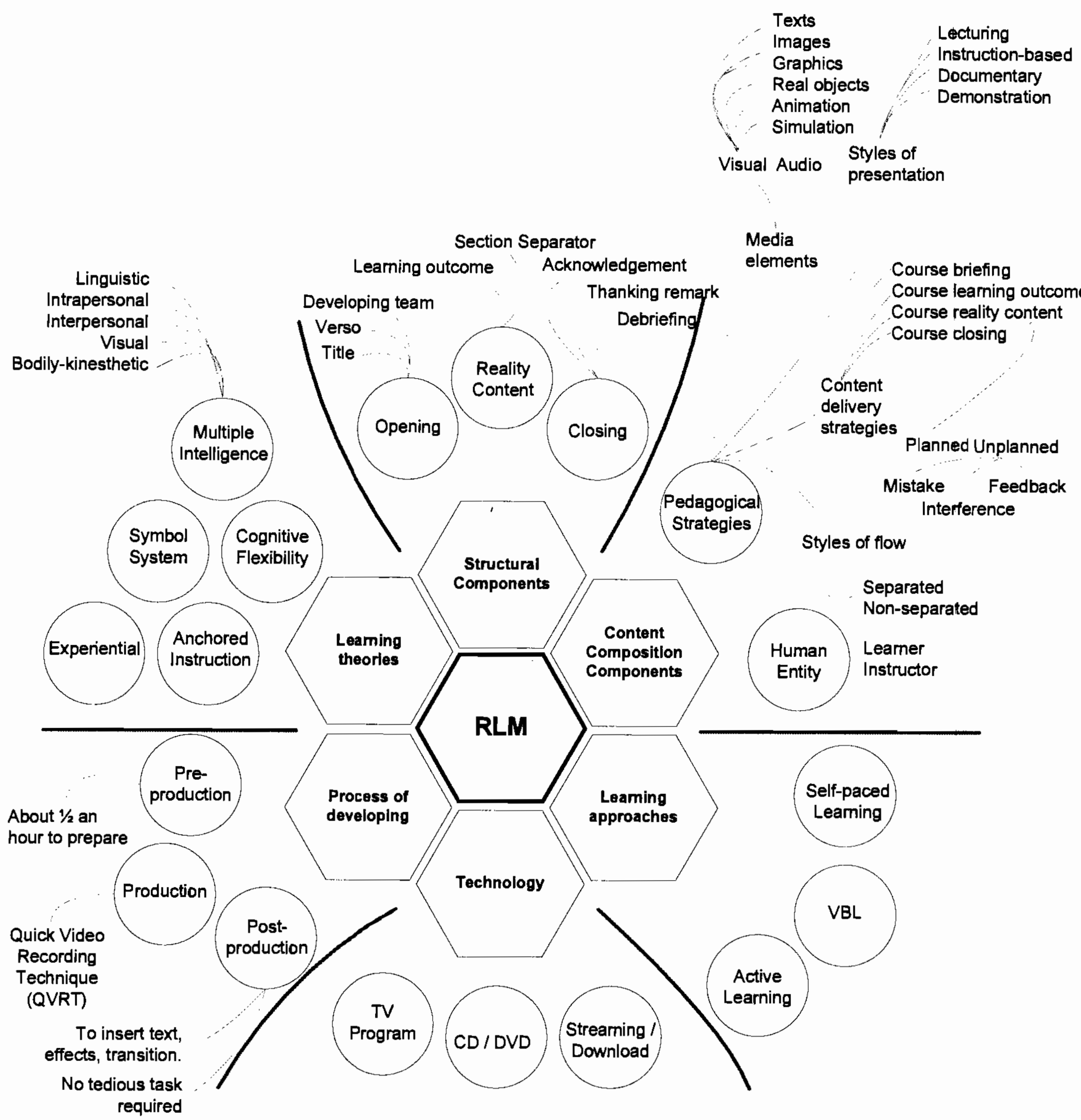


Figure 4.9: Proposed conceptual design model of RLM

4.6 CONCLUSION

This chapter starts with a comprehensive definition of RLM. The components of RLM are divided into SCs and CCCs, both are models that conceptualize the RLM. These components have been derived from a series of comparative study on existing eLM: the courseware, video, and ETP. Also, the proposed processes involved in making RLM were outlined. Next, the conceptual design models of the making, SCs, and CCCs were formalized, and discussed. These outcomes serve to support the objectives one and two of the study. Also the components were expected to be supporting the needs of entertaining and fun educational technologies as identified in related literatures in Chapter 2.

To examine whether the expectation as stated in objective four and readdressed in the paragraph above is met, this study needs to develop two types of prototypes i.e. the RLM and typical courseware. This study translates the model in Figure 4.7 into RLM. The following chapter discusses the prototypes design and development. Next, a comprehensive experiment procedures carried out in this study is described in Chapter 6.

CHAPTER 5

PROTOTYPES DESIGN AND DEVELOPMENT

5.1 INTRODUCTION

The previous chapter outlines the tasks performed to create a conceptual design model of RLM. Considerable times were spent on comparing existing models and communication with two experts (one in instructional design area and one in VBL area – both experts are described in Chapter 3). As a result, models of RLM structure and content composition were constructed, which were then merged as a proposed conceptual design model of RLM. As stated in Chapter 1, the objective 3 of this study is to validate the conceptual design model through prototyping.

Accordingly, this chapter elaborates the prototyping tasks, to achieve objective 3 of this study. In Chapter 3, it has been stated that there are two types of prototypes involved i.e. RLM and courseware. These two types of prototypes were designed differently utilizing different methods.

This study intended to justify that RLM is more entertaining and making more fun than the existing technologies. Literatures suggest that for this kind of expected outcome, a comparison should be made with other existing eLM. Then, results of both eLM can be interpreted, rather than testing the RLM alone. There are many types of eLM including notes, slides, courseware, ETP, and video. This study selected video and courseware for these reasons:

- Notes and slides are widely used in HLI, but are not comparable with RLM because they do not contain rich media elements.
- ETP are published nationwide, but are not referred to frequently.
- Video is widely referred to in formal and informal lessons. So, it is worth comparing RLM with video. Furthermore RLM inherits video metaphor.
- Coursewares are developed by many publishing companies for multiple educational levels including school, HLI, corporate organizations, government sectors, and training consultants; and are used frequently as compared to other listed eLMs.

The above-described limitations in certain eLM led to the selection of video and courseware for comparison. Based on the argument, this study expects that the outcomes of comparisons would be significant.

It is appropriate to start off this chapter by elaborating the general information about the prototypes, and is provided in the following section. The designs of both types of prototypes are provided in separated subsequent sections. This chapter is then concluded in another section.

5.2 THE PROTOTYPES

There are two titles appropriate in this study; "Introduction to videography professional" and "Develop VCD/DVD yourself"; to cater for formal and informal lessons (to investigate whether RLM is effective for both formal and informal lessons). This section starts with emphasizing the learning outcomes of the courses and target audience in the following lists.

- Course 1 – Videography
  - Learning outcomes – after learning the course, learners will be able:
    - to name the features of video recorder.

        - to use and operate the features.
        - to use microphone when shooting.
    - Target audience – students of HLI who are currently taking videography course or have previously taken the course.
- Course 2 – How to develop VCD
    - Learning outcomes – after learning the course, learners will be able:
        - to do the 'shooting'.
        - to do the 'editing'.
        - to transfer video project into VCD, and packaging.
    - Target audience – anyone aged above 16.

Based on the above information, a brief description of the whole courses was provided. The description contains information about the type of actors involved, whether the courses are intended for formal or informal content, and the concept of the prototypes. As a result, the descriptions for both titles were prepared and in summary they contain information as in Table 5.1. The learning outcomes and target audience were also included in the **course description** (See **Appendix G**).

Table 5.1: Descriptions of the prototypes

	Videography	How to make VCD
Learning outcomes	The eLM will be able to equip learners with: ▪ Knowledge about the features of video recorder. ▪ Ability to use and operate the features. ▪ Ability to use microphone when shooting.	The eLM will be able to equip learners with: ▪ Knowledge and ability to do the 'shooting'. ▪ Ability to do the 'editing'. ▪ Ability to transfer video project into VCD, and packaging.
Target audience	Diploma and degree students of private and public colleges and universities.	Anyone aged above 16.
Type of actor	Instructor	Learner
Type of content	Formal lesson	Informal lesson
Concept	Leisure	Leisure

In addition, this section also determines the contents for each title. The learning outcomes were referred to in making sure the contents are inline with the goals learners should achieve. The prototypes were developed in Malay to suit the target audience. Table 5.2 lists the contents for each title.

Table 5.2: Contents for each title

Videography	How to make VCD
1. Introduction of video recorder features.	1. Using the video camera and video shooting.
2. Operating battery, tape, and lens.	2. Connecting cables.
3. Operating LCD screen and ON button.	3. Importing clips from recorder into computer.
4. Operating zooming function.	4. Editing video clips.
5. Operating focusing function.	5. Inserting transition into video clips.
6. Setting automatic mode.	6. Inserting video effects into video clips.
7. Operating Shuttle Speed, Iris, and Gain functions.	7. Inserting audio/music into video clips.
8. Operating Indoor/Outdoor functions.	8. Inserting picture into video clips.
9. Operating White Balance function.	9. Inserting text into video clips.
10. Operating ND Filter function.	10. Saving video project in computer.
11. Operating Zebra function.	11. Transferring video project into VCD/DVD.
12. Using microphones in shooting.	

5.3 THE DEVELOPMENT OF RLM

RLM is a video application. It is important to note that RLM involves very little work in the design phase. The model in Chapter 4 states that the development of RLM is based on the course description, in which the sheet could be considered as the content design in RLM. This section elaborates the development parts of RLM which are classified into pre-production phase, production, and post-production.

5.3.1 Pre-production Phase

First, the RLM developer prepared the description sheets. The *description sheets* as can be observed in **Appendix H** were used as guidance for the director, actors, and crews during the production phase. This is taken as an advantage in developing RLM because it requires no comprehensive script and storyboarding. By studying the description sheets, the actors and crews know their character and how to react. The *director* was a video practitioner, who has been selected to translate the Conceptual Design Model into prototypes based on his [28]expertise. The director selected the *crews and actors* among people in the industry who were engaged in IT-related business. Also, *setting up the props* was easy, because always in a reality environment, the natural setting is more meaningful. Figure 5.1 displays a few props used in developing the prototypes.

Figure 5.1: Preparing and setting-up props

In terms of props setting, both RLMs utilize the office metaphors. In making 'Videography', a sofa and side table were used, where the actor appear, together with the actual object of discussions (Figure 5.1). No special lighting used and microphones were used. While, in making the other RLM, a small video recorder, computer set, and microphones were used. In short, there was no additional budget incurred. Before shooting, it was observed that the director discussed with the crews and talents about the

[28] The practitioner has developed a number of eLMs for Ministry of Education

outline in the description sheet. The flow of shooting was also clarified so that everybody understands. When the actors, crews, and props were ready, then the production took place.

5.3.2 Production Phase

This phase involves the activities during shooting, at the location. Operations at the locations are highly dependent on the instructions and information included in the description sheet which is decided in the pre-production phase. The production phase was carried out using QVRT.

A. Applying QVRT

This section describes on how QVRT is applied in making RLM. As outlined in the Conceptual Design Model in Chapter 4, single or multiple cameras (recorder) could be used, with help of tripod and use of microphones. In addition, recording could be in auto or manual mode. These conditions are sufficient to make an RLM.

(i) Video recorder

Single video camera (JVC GR-D293AG – retail cost is less than RM1500[1]) was used for shooting. The recorder as sown in Figure 5.2 is affordable and light weight, and has good fidelity to capture the scenes. All captured clips were stored on mini digital tapes (Figure 5.3) at retail cost less than RM30[29].

Figure 5.2: Video recorder

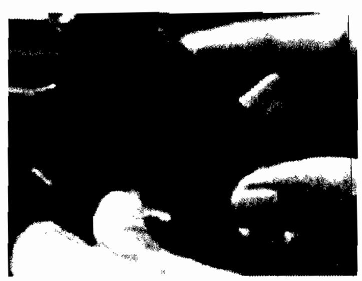


Figure 5.3: Digital tape

[29] Costs for video recorder and tapes as on the market shelves in December 2007

(ii) Tripod

The cameraman used tripod when necessary such as in wide spaces where no special movements are required. The use of tripod is highly recommended to avoid technical problems such as vibrating shots. Samples of shots using tripod can be seen in Figure 5.4. However, when any special shot is required such as the computer ports, the use of tripod is not useful, so holding the camera freely might help better, as can be seen in Figure 5.5.

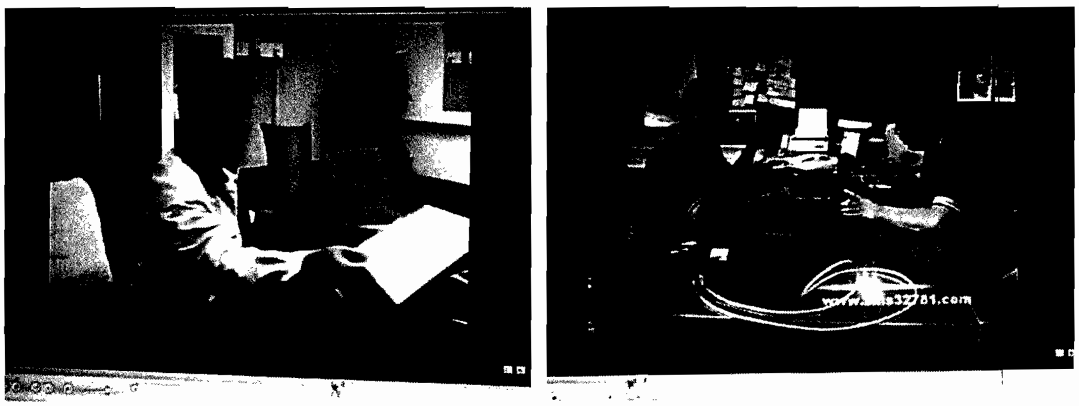


Figure 5.4: Samples of shots with use of tripod

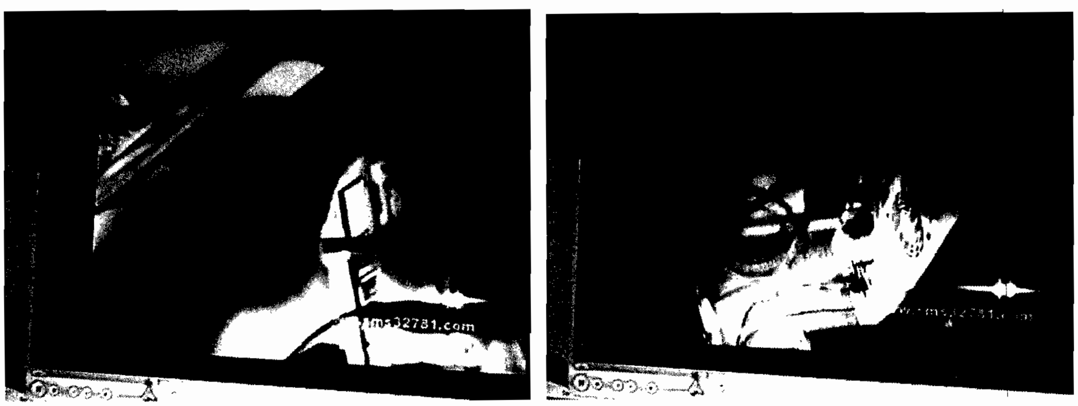


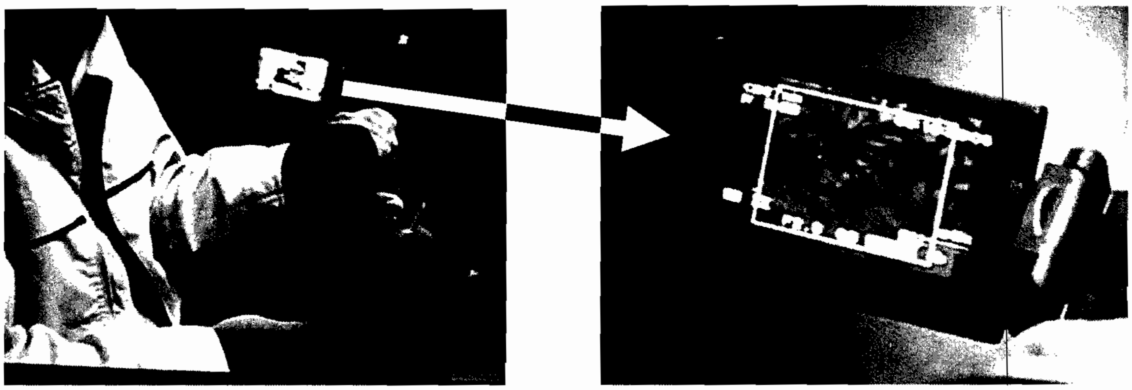
Figure 5.5: Samples of shots without use of tripod

(iii) Microphones

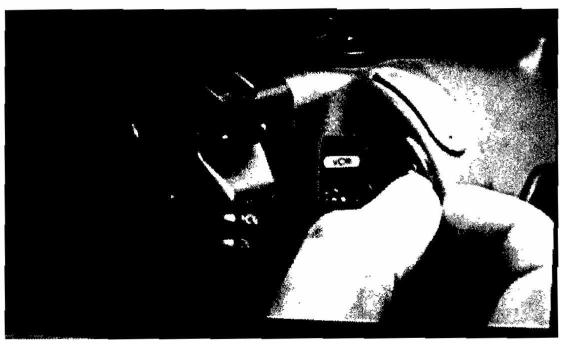
In this project, all talents used microphones. Besides, the boom microphone was also used. It is necessary to utilize the microphones because in reality content, real audio is helpful, making the content fully natural.

(iv) Modes

Both prototypes apply auto and manual modes depending on necessity. If special functions such as zooming and focusing are appropriate (Figure 5.6), then manual mode is applied. In both prototypes, zoom and focus functions are used intensively. With both functions, small text on the real objects could be clearly seen. This is important in making RLM because the video recorder is on the tripod (as listed in Table 4.13).



a. Zooming and focusing the LCD screen



b. Zooming and focusing the recording button

Figure 5.6: Zooming and focusing

In addition, the lack of manpower in this project leads to a situation where the cameraman also functioned as the actor. Referring to the model in chapter 4, they are called hidden actors, where only their voice and very minimal physical appearance are recorded. All shots were collected for the post-production jobs.

5.3.3 Post-production Phase

In post-production stage, there were no tedious editing required, the most concern were on putting some transitions and appropriate texts. Texts were used to highlight some main points, to create and visualize separators between chapters, and to acknowledge the supporters and developing teams. All post-production jobs were carried out with Windows Movie Maker.

As stated earlier in this chapter, the model developed in Chapter 4 is translated into the RLM prototypes. So, the final products after the post-production stage are RLM. Next section describes how the prototypes implement the Conceptual Design Model.

5.3.4 The RLM

Having gone through the tree-stage RLM production process, two prototypes of RLM titled as mentioned earlier in this chapter were produced. Figure 5.7 depicts the prototypes. This section maps the prototypes with the Conceptual Design Model developed in Chapter 4. In this context, the RLM becomes the anchor which maps to the Anchored Instruction theory.

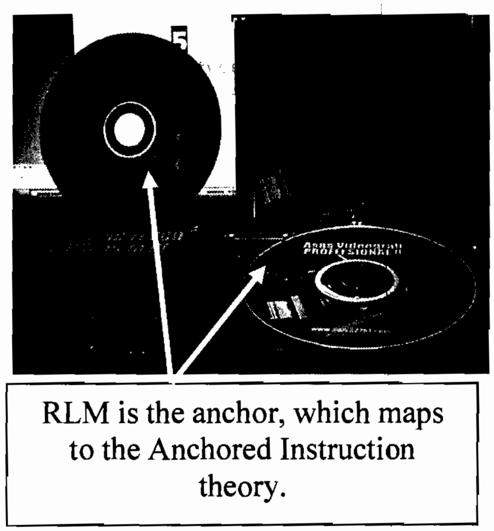


Figure 5.7: The prototypes

A. The opening section

In the opening section, title, verso, and development team are addressed. Figure 5.8 displays the titles for both prototypes. Text is used to address the titles, with some graphics helping in making attraction.

Use of visual elements to address Symbol System theory and visual intelligence in Multiple Intelligence theory.

Figure 5.8: Title element

The prototypes in this study provide verso in speech form. In the verso element, the actors relate briefly the content in the prototypes with other references. This study suggests that versos of RLM consider a list of RLM maker, copyright statement, and publisher name for inclusion, no matter in the form of speech, text, or combination both types. Figure 5.9 shows a snapshot of the actor addressing verso elements in the prototypes.

Addressing the verso maps to interpersonal intelligence, linguistic, and Experiential theory.

Figure 5.9: The actor addressing the verso element

The development team is also important for inclusion. The SC in Chapter 4 places the development team in the opening section. It actually conveys meaning that the component is important, but it was also stated that the component could either be in the opening or closing section. In this study, Course 1 addresses the developing team together with the verso in speech form, while Course 2 lists the developing team in closing section, as shown in Figure 5.10.

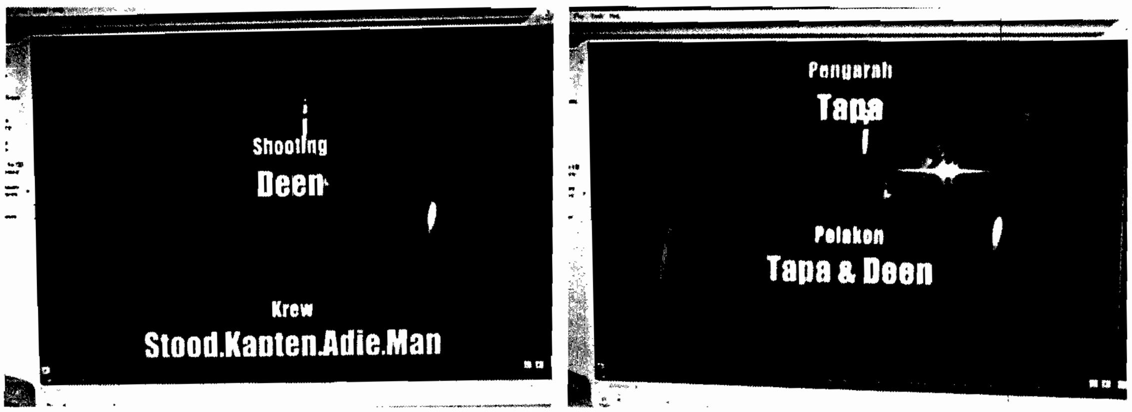


Figure 5.10: Course 2 lists the developing team after the content

B. The reality content section

There are two divisions in the reality content section: pedagogical aspects and human entity. Further, pedagogical aspects component includes media elements, styles of presentation, content delivery strategies, and styles of flow. RLM should combine various media elements such as audio, texts, graphics, images, real objects, animations, and simulations. There are four options for styles of presentation: lecturing, instruction-base, documentary, and demonstration. Content delivery strategies has a sequence of elements; course briefing, course objectives, course reality content, and course closing; in which the course reality content combines planned and unplanned contents which includes mistakes, interferences, and feedbacks. The content flow could be either separated or not. Human entity component is discussed in terms of social interaction and persons, where interactions should happen with self, in group, and with the environment. Meanwhile, persons related to RLM are the actor and audience; whom the actor could be an instructor or a learner. All components in reality content section in the prototypes of this study are described in the following subsections.

(i) Pedagogical aspects

The components of pedagogical aspects in the prototypes of this study are composed to make the learning process entertaining. It is important to ensure the RLM is sustainable; especially to make the entertaining factors invoking fun among learners. The entertaining RLMs that invoke fun are expected to address factors eliminating limitations found in existing courseware as stated as the underlying statements of this study (Chapter 1 – Problem Statement)

Media elements – Audio

RLM is a family of video and inherits the video metaphor. Audio is important and is embedded along the RLM from start to finish. To accommodate different preferences regarding audio volume, audience could self-control using DVD-like control mechanism as shown in Figure 5.11.

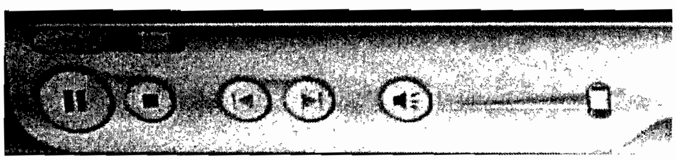


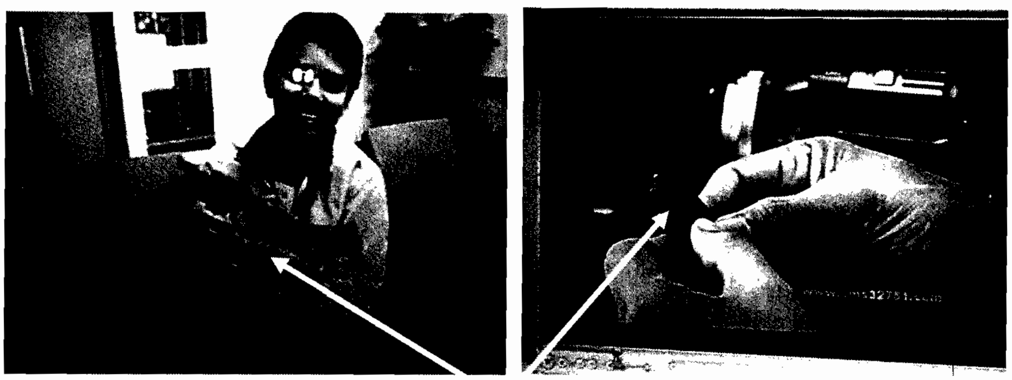
Figure 5.11: DVD-like audio/video control

Media elements – Visual

The prototypes in this study intentionally composed very minimal elements of text, images, and graphics. Figure 5.12 displays an example of a separator in which text is used, combined with a graphic. In contrast, the prototypes display most text, graphics, and images on the real objects[30] (see Figure 5.13). Concerning the contents of the RLM, which teach about video recorder, and computer hardware and software technology, use of these elements visually on the technologies themselves are found sufficient.

[30] The real objects refer to the object in the real world shot in the RLM. Example of real object in "VideoGraphy" is the video recorder

Figure 5.12: Combination of text and graphic



Real objects can reduce memory load because learners can map the contents to the real world quickly. Demonstration of real objects requires less text to explain the concept and description. This reflects a manifestation of recommendations in Cognitive Flexibility, Multiple Intelligence – visual intelligence, and Symbols System theories.

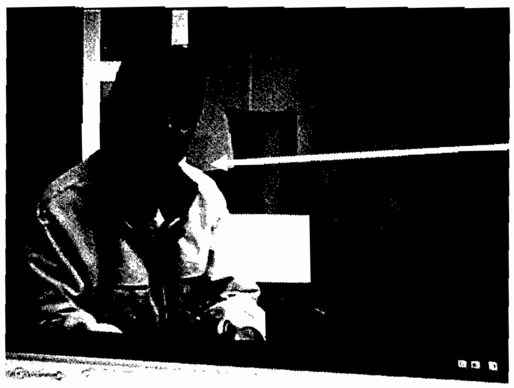
Figure 5.13: Real objects

The prototypes make use of real objects to deliver the planned content. There is no simulation and animation involved because the real objects are easy to get, and easy to handle and demonstrate. With the real objects, the actors visualize every action in real situations.

Use of real objects and various media elements can support learners' recognition when in performing in their actual working environment. This factor reflects a manifestation of recommendations in Cognitive Flexibility theory, Multiple Intelligence theory – visual intelligence, and Symbols System theory.

Styles of presentation – Lecturing

Course 1 applies the lecturing style to emphasize certain consequences of actions or any concepts when necessary. This is possible because the main actor in the course is an instructor of the course. In that situation, he speaks to the audience just like an instructor is speaking to the students in the conventional classroom teaching. Figure 5.14 shows the actor speaking to the audience. This can nurture the linguistic intelligence as suggested in Multiple Intelligence theory.

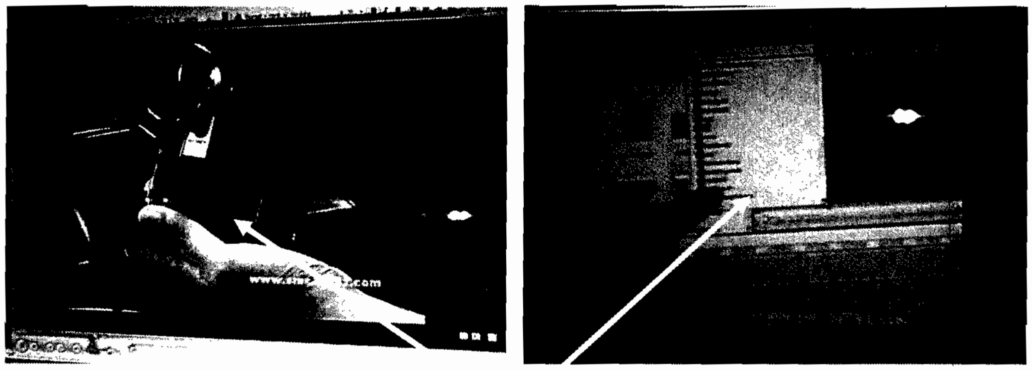


Linguistic intelligence is nurtured. Learners are also attended to with used of proper intonation, emphasis, and stress.

Figure 5.14: Actor lecturing to the audience

Styles of presentation – Instruction-based

Course 2 applies instruction-based style to deliver contents. The actor of the course is a learner, who performs steps from start to finish as commanded by a hidden actor who is the instructor of the course. With this, the audience of the RLM could follow the steps, and gain more knowledge than the planned contents because the actor makes mistakes that should be avoided. Figure 5.15 (a) and (b) depict samples of instruction-based style.



Both styles are familiar to learners, as in daily life. Display of real hardware and software strengthens the understanding and empowers knowledge acquisition on learners' part. Experiential theory is addressed in these styles.

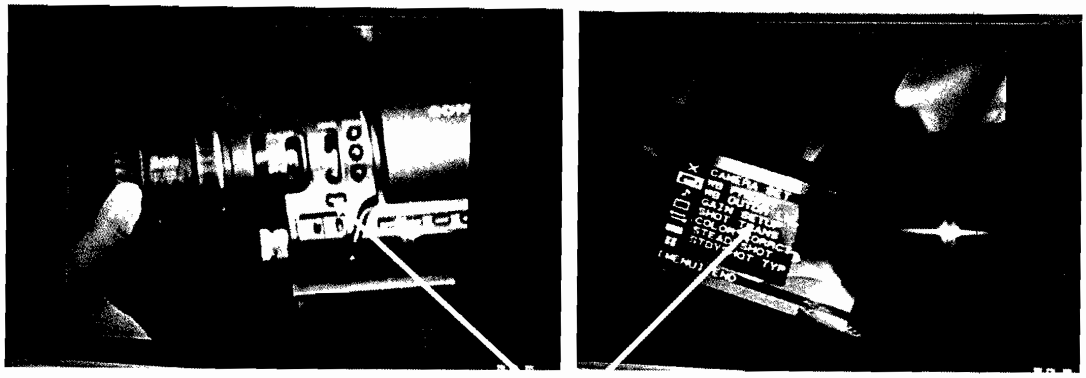
a. Actor asking instructions from the hidden actor.

b. Hidden actor giving commands to the actor

Figure 5.15: Instruction-based style

Styles of presentation – Demonstration

Lecturing is just applied at parts where necessary in Course 1. In addition, the main style in Course 1 in delivering the planned contents is demonstration. The actor has the object of discussions in hand, demonstrating all the taught contents to the audience. At the same time, he speaks explaining elaborated concepts to the audience. Some questions raised by the hidden actor; the learner; and the actor responses to the questions. Samples of related shots can be seen in Figure 5.16 (a) and (b).



Learners who have experienced operating any video camera will find that this element is within their knowledge, so learning with RLM is easy. This addresses the Experiential theory. Besides that, learners are also discussing with self, to connect the new knowledge with the existing in their schema, which addresses the intrapersonal intelligence in Multiple Intelligence theory. In demonstration, the actor and learners must be able to move freely, which maps the bodily-kinesthetic intelligence.

a. Actor demonstrating focusing function

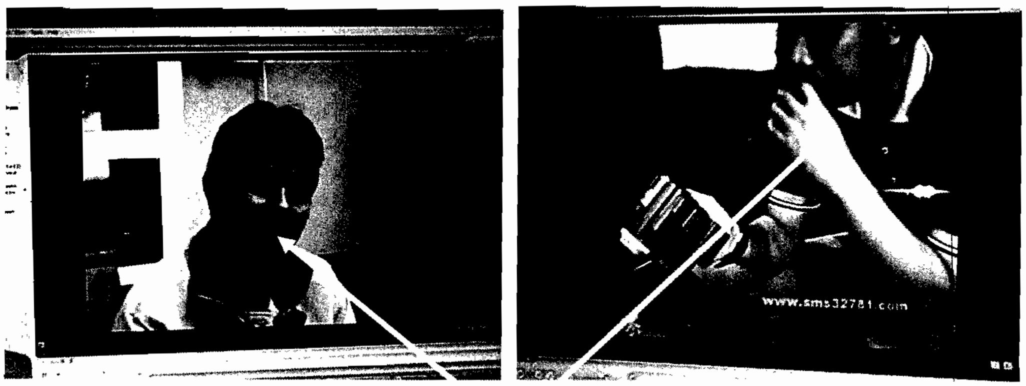
b. Actor demonstrating the manual menu

Figure 5.16: Demonstration style

Experiential theory is applied in this element, where learners are personally promoted to involve in the demonstration, assess their own progress, and prompt-and-chunk their knowledge continuously. Besides the Experiential theory, intrapersonal intelligence in Multiple Intelligences theory is also addressed. In participating actively in the demonstration, learners have to move themselves, rather than sitting consistently on the chair as recommended by bodily-kinesthetic intelligences in Multiple Intelligence theory.

Content delivery strategies – Briefing and Learning outcome

Both prototypes in this study brief the audience about the contents of the course in the form of narration; In Course 1, the actor clearly welcomes the audience to learn the content, and remind the audience to get ready. In contrast, in Course 2, the actor tells the hidden actor about his intention to learn the content, and addresses the reasons driving him to learning the content. The ways they address the briefing differ because their roles in acting are different: instructor vs. learner. This study refers to briefing in Course 1 as direct briefing, and indirect briefing in Course 2. Figure 5.17 (a) and (b) depict samples of the briefing shots.



The actor talks to the learners which maps to interpersonal and linguistic intelligences in Multiple Intelligence theory. Some learners prefer to have the instructor addressing the learning outcome verbally.

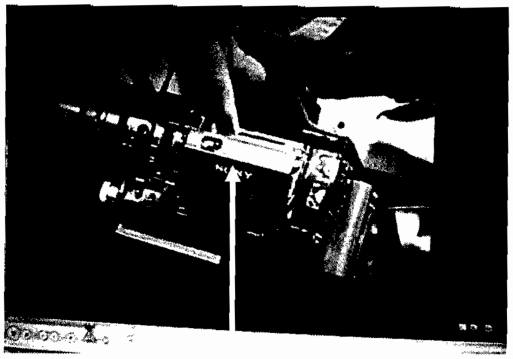
a. Course 1 – direct briefing b. Course 2 – indirect briefing

Figure 5.17: Briefing and learning outcome

The learning outcomes of the course are included together with the briefing in the form of narration. When addressing the welcoming wish, the actors also address outline of contents audience will learn from the courses.

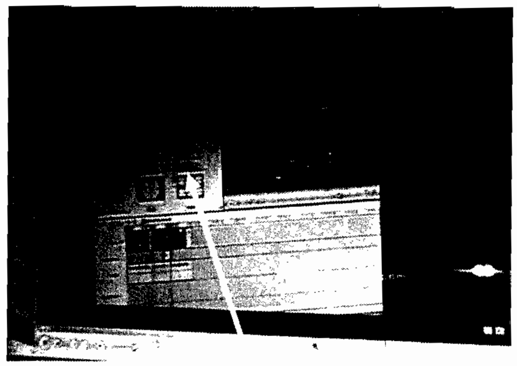
Content delivery strategies – Reality content: Planned content

The planned content is the major part in both prototypes. Planned contents refer to the content that the RLM makers intend to deliver to the audience. The intended contents are included in the description sheets (**Appendix I**). In both prototypes, planned contents are conveyed with the help of special and minimal props as stated in the pre-production phase. Both prototypes make use of real objects of discussions to facilitate audience's information gathering and knowledge generation. The content in the prototypes was verified to follow the outline. Figure 5.18 (a), (b), and (c) depict the samples of planned contents. Overall, the contents apply theories of Cognitive Flexibility, Experiential, Symbol System, and Multiple Intelligences.



All steps are shown in live-captured which address the Experiential theory.

a. About battery and the compartment



Options of steps are addressed so that learners could have flexible way to meet with their prior knowledge. This maps the Cognitive Flexibility theory

b. About inserting a transition

RLM utilizes additional props to explain concepts which maps with visual intelligence in Multiple Intelligence and Symbol System theories.

c. Describing about a concept wit help of prop

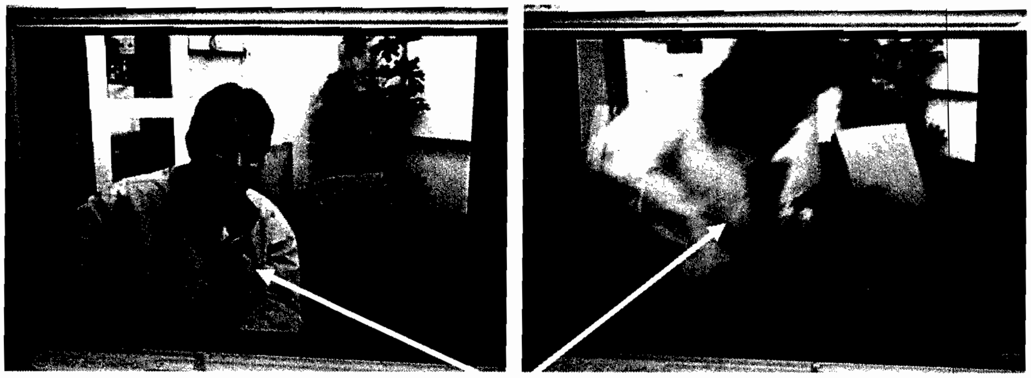
Figure 5.18: Planned content

Content delivery strategies – Reality content: Unplanned content

Both prototypes contain unplanned contents. The unplanned contents are captured including mistakes, interferences, and feedback.

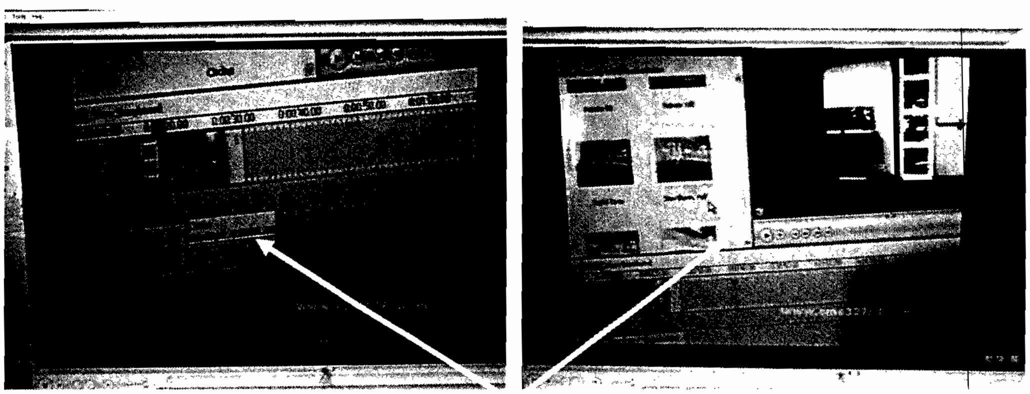
Unplanned content: Mistakes – action and speech

In both prototypes, both types of mistakes are found. As in the real life of a human, a person shows some signs when he makes mistakes. This situation is found in both prototypes, such as laughing, apologies expression, and pausing. Shots depicting actors making mistakes are provided in Figure 5.19 and Figure 5.20.



These pictures address the Cognitive Flexibility and Experiential theories. The actor makes a mistake, so the learners can associate the mistake with their knowledge, and accept the mistake as step that they should not do.

Figure 5.19: Mistakes in speech; causing laughter



These pictures address the Cognitive Flexibility and Experiential theories. The actor makes a mistake, so the learners can associate the mistake with their knowledge, and accept the mistake as step that they should not do.

Figure 5.20: Mistakes in action; causing repetition of step

Unplanned content: Interference and Feedback

Interference refers to external unexpected reactions, responses, or attractions that affect the RLM. It is not in the planning at all, and happens in absolute-spontaneous state. In RLM, it is considered as content because in the learning environment, interference could trigger new knowledge (Rosenberg, 2001). As an example, when the actor is leading beyond the boundary, then the hidden actor reminds him to focus to the planned content. In real learning situation, when someone wants to clarify a concept deeper, he asks for more explanation; and this situation are found in both prototypes. Some interferences could be considered as feedback, which are referred to as reactions towards the contents in RLM. The hidden actors in both prototypes always **feed back** to the actor; such as answering questions, agreeing to any statement, and prompting some ideas; making the conversation looking natural. This makes the sender-and-receiver component in communication exist.

In short, the unplanned content; mistakes, interferences, and feedback; are found as closely related and appear frequently in the prototypes from start to finish regardless of formal and informal lessons. Blending of the three components would build up a strong formative assessment.

Unplanned content: Formative assessment

Formative assessment refers to any assessment during the learning process. In the prototypes, audiences are assessed indirectly through questions posted by the actor and answered by the hidden actor and vice versa. Mistakes as well as interferences are also types of assessment for audience. Mistakes component is seen as a great form of assessment because through it, audience may know the right-and-wrong over certain concepts with real illustrations.

Styles of flow – Separated scenes

The flows of contents in both prototypes are separated. Both prototypes mostly apply speech-based separators. It is found in the prototypes that the actors express phrases such as "*...ok, our topic now is...*", "*...just now we learn about...so now we learn...*", and

"*...ok after this I want to show you how to...*". Those are the separators in RLM, which function to alert audiences about the change of content. In addition, there are also slide-based separators used especially when shifting from-and-to exclusive contents, such as from shooting to editing video clips as shown in Figure 5.21.

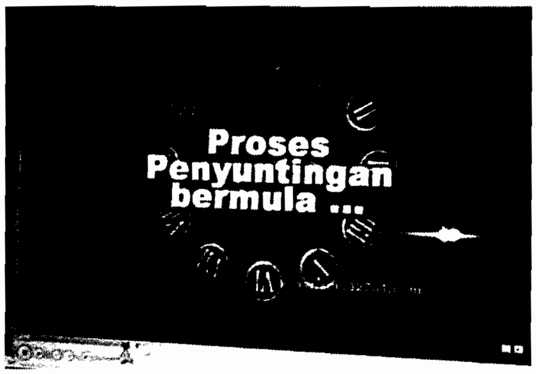


Figure 5.21: Slide-based separator

(ii) Human Entity

Learning involves entities that deliver and acquire knowledge. In RLM, the entities are human. Two aspects related to human are social interaction and the persons.

Social interaction

Human interact within social boundaries. The boundaries include the self, groups, and environment. In both prototypes, these boundaries exist. Actors are found communicating with himself, with other actor and audience, and with the environment in which the shooting takes place.

Audiences' interaction is more important in RLM and captures more focus than the interaction the actors initiated in the RLM. On audiences' part, they also create their own selves boundaries, and communicate within. Monologue is an example of communicating with one self. When audiences view the RLM in a group they talk with each other, and react towards the contents together as to realize the within-group interaction. When they perform any action involving external apparatus, it is the interaction with the environment they have created. An observation on audiences' interaction was carried out during testing and is discussed in next chapter.

Persons

All learning materials regardless of teaching method; whether electronic-based or conventional approaches; regard persons as highly important entities. In any communication system, there must be at least two ends; sender and receiver, or in teaching and learning it is referred to as instructor and learner. In both prototypes, the persons are the actors and also the audiences. The actor besides interacting with other actors, are also interacting with the audience, such as provoking idea, giving example, maintaining eye-contact, encouraging to do something, and addressing tips.

C. The closing section

At the end of the courses, the prototypes debrief the audience, by wrapping the learning content, and encourage the audiences to make a trial on things they have learnt in the RLMs. Figure 5.22 shows two shots of debriefing sessions, where the actor speaks to the audience.

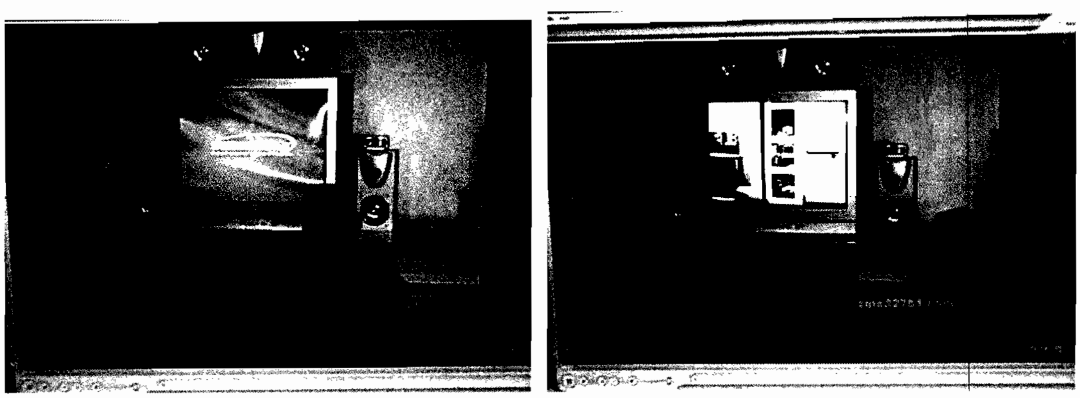


Figure 5.22: Debriefing slots

Also, appreciation to the audience and crews is addressed in both prototypes. Besides using narration, the gratitude was also addressed in the form of text as can be seen in Figure 5.23. The prototypes in this study use all original self-collected material. In that case, acknowledgement is not necessary.

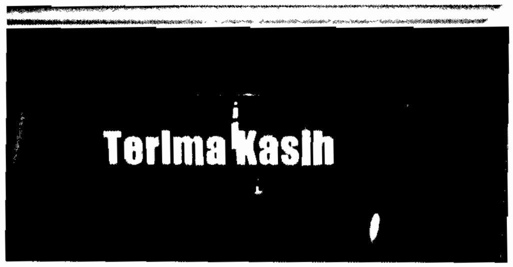


Figure 5.23: Thanking remark

While RLM development began with no tight designing period and efforts, the development of courseware followed a different method and is described in next section.

5.4 COURSEWARE DESIGN AND DEVELOPMENT

This study developed one courseware to compare with RLM in terms of how learners perceive them in terms of entertaining and fun. There are a number of methods for software development in SE such as waterfall model, spiral, and RAD (discussed in Chapter 3). When CE adapts and applies methods of software engineering, those development methods were also adapted, purposely to develop and ensure the courseware quality (Dwolatzky, Kennedy & Owens, 2002). However, the methods are intended for projects with huge budget and longer period (Boehm, 1988; Millington & Stapleton, 1995).

Meanwhile, this study intends to develop a small scaled courseware, sufficient to investigate different user experience between the technology and RLM. It was found that such methods are not suitable for adoption. So a methodology for small scaled courseware was instead adapted.

In the early of 21st century, The Fraunhofer Institute of Experimental Software Engineering (Fh IESE) has developed a methodology suitable for developing small scaled courseware to alleviate disadvantages found in development of large courseware from scratch which typically has three phenomena:

- the courseware imparts large chunks of knowledge;
- it is developed by teams consisting of subject matter experts, instructional designers, graphical designers and artists, programmers, and many more; and
- the development often starts from scratch

and normally incurs a large amount of money (Grũtzner, Angkasaputra, & Pfahl, 2002). It was developed to allow and encourage the content experts develop courseware individually.

The methodology which is named IntView courseware development methodology has been tested and the first results found that IntView reduces effort spent to develop large courseware significantly (Grũtzner, Pfahl & Ruhe, 2002). Based on the argument in the report by Grũtzner, Angkasaputra, & Pfahl (2002), and the argument by Grũtzner, Weibelzhal, and Waterson (2004) that the method assures courseware quality, this study has decided to adapt the IntView methodology to design and develop the courseware. Next paragraphs outline the general ideas of the adapted IntView, while detailed descriptions of the original IntView can be obtained from Grũtzner, Angkasaputra, and Pfahl (2002). This study has to adapt the IntView because the original IntView frameworks suggest steps for developing online courseware, while this study attempts to develop courseware stored in a CD.

This study names the adapted IntView as IntView version 1 (IntView v1). There are two major phases in IntView v1, which separate the tasks into pre-development phase and development phase. Figure 5.24 illustrates both phases.

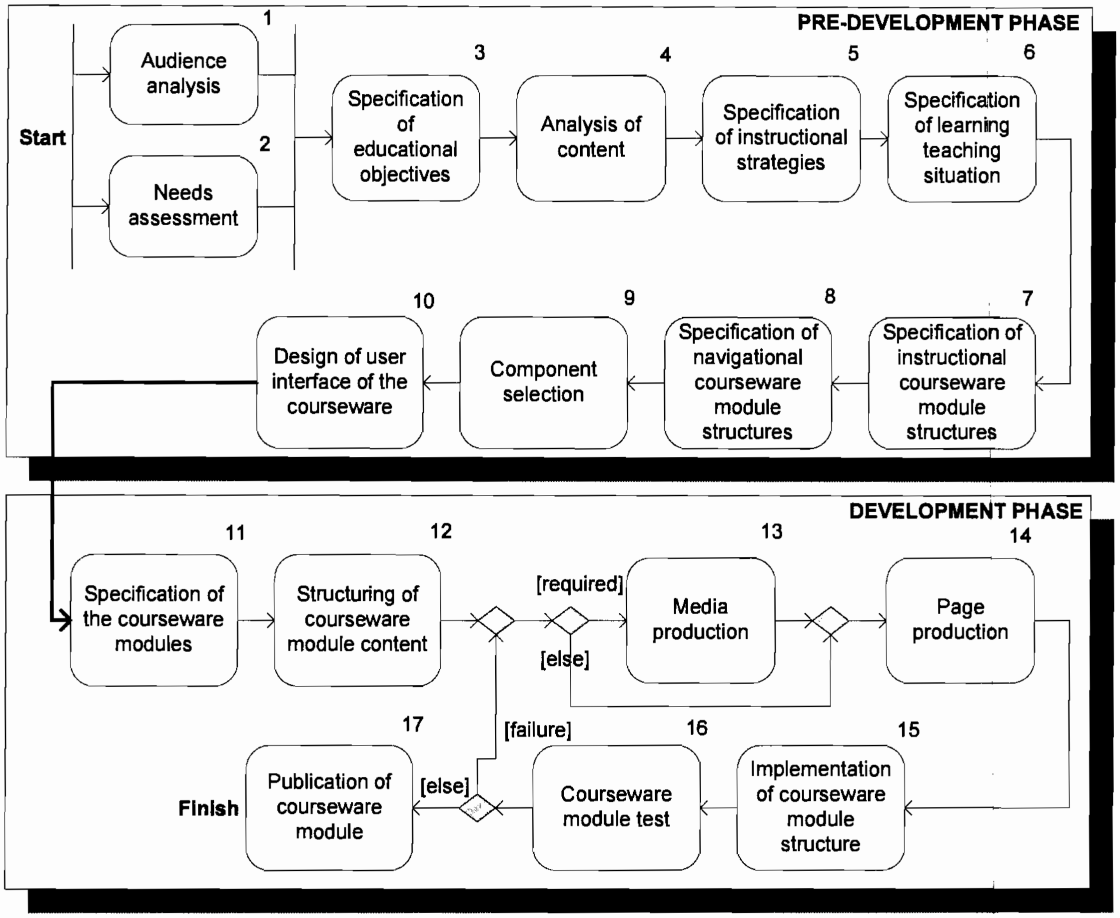


Figure 5.24: IntView v1 framework

There are 10 stages involved in phase 1 and 7 stages in phase 2. The activity(ies) and output(s) of each stage are listed in Table 5.3.

Table 5.3: Summary of the activities involved and output obtained of each stage through the IntView v1 framework

Stage	Activity / Output
Audience analysis	Students of HLI at diploma and degree levels with basic knowledge and experience on computer application.
Needs assessment	• All contents for "VideoGraphy" as listed in Table 5.2. • The interface must suit the target audience as specified in the audience analysis. • Skills in composing courseware (intermediate fidelity prototype).
Specification of learning outcomes	After learning the course, learners will be able: • to name the features of video recorder. • to use and operate the features.

	• to use microphone when shooting.
Analysis of content	As listed in Table 5.2. Further, each will be exclusive modules in both coursewares.
Specification of instructional strategies	• Variation of media – text and pictorial information. • Variation of styles in information display. • To show operations – animated step-by-step tasks are used. • Demonstration is important. • Narration is used throughout the courseware.
Specification of learning teaching situation	Users use the coursewares at their own paced. It is expected that they learn the contents during leisure time, more meaningfully if prepared with appropriate apparatus to demonstrate the exercises. • Interactivity between user and courseware is required. • Tool-tip texts are used when necessary.
Specification of instructional courseware module structures	• Module 1 includes real picture of the video camera to display features • All modules except module 1 come together with video for demonstration. • Voice over used to address the advantages and disadvantages if required.
Specification of navigational courseware module structures	Hybrid navigation style among modules. Within modules are linear navigational to support next-and-next task sequences. The storyboard is outlined at this stage, and can be seen in **Appendix I**.
Component selection	There is no special component. The details of the instructional and navigational structures are used to determine the components required. The development activities could begin at this stage.
Design of user interface of the courseware	Some templates are drafted, and the most desired is obtained here.
	The development phase begins here.
Specification of the courseware modules	The contents of the courseware are determined as the modules.
Structuring of courseware module content	All detailed information for activities in pre-development phase is used as the pre-requisites in this stage. Each module is presented in an exclusive page. If the information to deliver is not enough, then sub-pages will be used.
Media production	• Text – for textual information. Used to provide sufficient information at minimal amount. • Picture and graphic – to visualize the textual information • Audio – used for narration and voice over to compliment

	the textual, pictorial, and graphical information • Animation – some complex explanation are worth supported with animation. • Video – used to demonstrate the real object and subject of discussion.
Page production	The pages are developed. All details in the activities previously were considered.
Implementation of courseware module structure	The pages are arranged as intended, as designed in the storyboard. All navigational elements are made working.
Courseware module test	This study adapts testing procedure to ensure the courseware quality from the work of Grützner et al. (2004). From the perspective based inspections◊ by instructional courseware designer, subject matter expert, courseware author, human factor expert, and potential learner, the coursewares were found able to perform learning activities by the learner.
Publication of courseware module	The courseware is not publicized, used only for this study.

At the 'Implementation of courseware module structure' stage, the pages are combined, and some shots of the pages are depicted in Figures 5.25 through 5.29.

Figure 5.25: Title page

◊ The inspection is not discussed in this thesis; it was utilized for researcher's initiative in maintaining the quality.

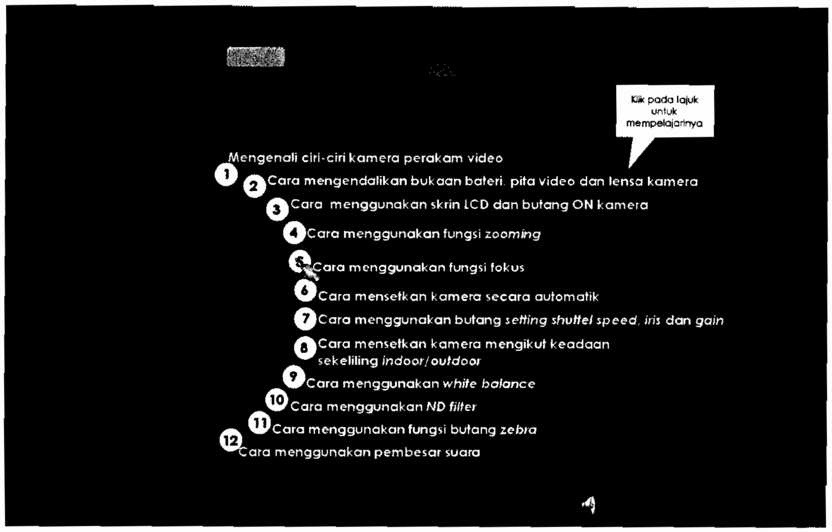


Figure 5.26: Table of content

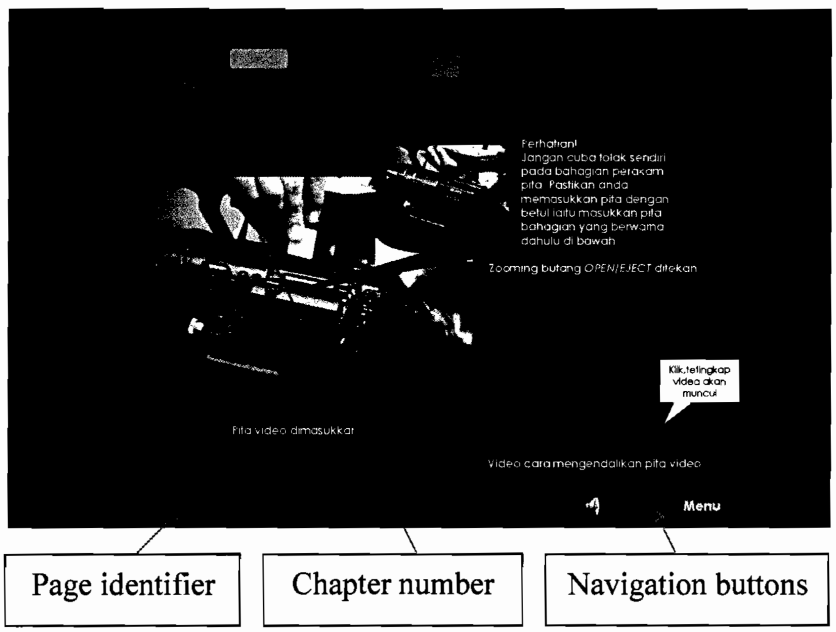


Figure 5.27: Typical layout

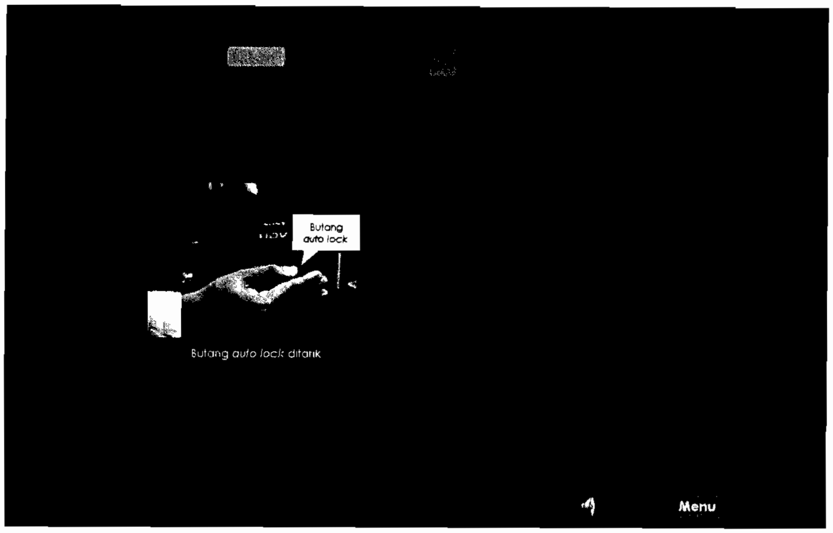


Figure 5.28: Page with picture and text

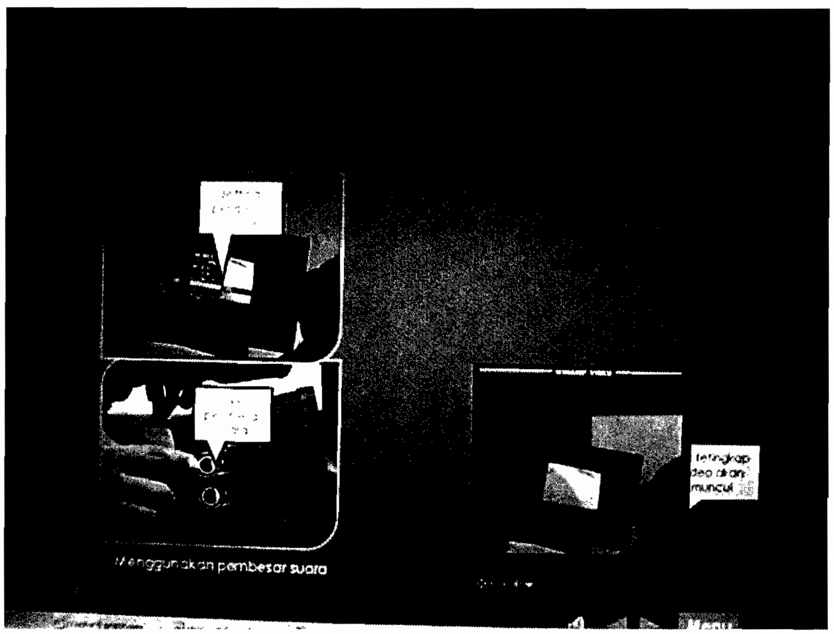


Figure 5.29: Video demonstrating the explanation

5.5 CONCLUSION

This chapter addresses the processes involved in developing the RLM and coursewares. Briefly, both learning media were designed and developed following different methods.

In RLM development, QVRT method was followed to translate the Conceptual Design Model which has been discussed in Chapter 4 into the prototypes. While, IntView v1 was found easing the design and development processes. In guaranteeing appropriate learning aim, at the instructional structures determination, one instructional design expert (Assoc. Prof. Dr. Ahmad Jelani Shaari); who has a PhD in the area and has been teaching and researching since the last ten years; was engaged and collaborated with, to ensure the design is tailored towards the target users.

The aims of this chapter are twofold: (1) to validate the proposed Conceptual Design Model as discussed in Chapter 4, and (2) to provide means (develop RLM prototypes) for testing the proposed Conceptual Design Model. Having elaborated the sections above, this study concludes that both aims are achieved.

The eLMs are ready for use to gather data in the planned experiment. As stated at the end of Chapter 4, the experiment using these developed prototypes is necessary to determine whether the conceptual design model proposed in Chapter 4 has the ability to invoke fun and to trigger the feeling of being entertained. The experiment is discussed in Chapter 6.

CHAPTER 6

USER EXPERIENCE AND EFFECTIVENESS

6.1 INTRODUCTION

Chapter 4 contains the proposed conceptual design model. Then, the model has been validated through prototyping, as described in Chapter 5. This chapter describes the efforts to investigate users' experience with the focus to test whether RLM is entertaining learners and learners feel fun when using (i.e. satisfactory). At the same time, it is expected that learners grab the content (effectiveness). It is the aim of this chapter to achieve objective 4. To seek findings on user experience and effectiveness, two tests need to be carried out involving different groups of subjects. Figure 6.1 outlines the division of subjects.

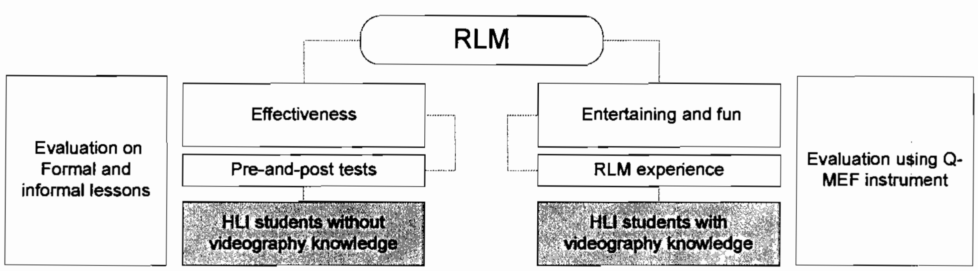


Figure 6.1: Two divisions of subjects

In Figure 6.1, it is noticed that different procedures with different subjects were appropriate for collecting data. Accordingly, this thesis divides the descriptions respectively. Test for effectiveness of RLM is described first in the next section and then it is followed by test for user experience in Section 6.3.

6.2 TESTING THE EFFECTIVENESS

RLM can be considered effective if it helps learners to gain knowledge. The knowledge acquisition could result in behavior change. Also, the new knowledge changes perceptions towards the topics absorbed. In relation, change in behavior and perception could be observed easily.

However, new knowledge also adds up the existing knowledge, and this could not be observed because the difference between old and new knowledge on the topics does not influence physical cues. One possible technique to investigate whether new knowledge has been acquired is to carry out pre-and-post tests as utilized in Tronstad, Phillips, Garcia, and Harlow (2009) and Knight (2002).

In carrying pre-and-post tests out, learners first answered a set of questions, and scores are recorded. Then the learners use the RLM to learn about the topics. After learning with RLM, the learners answer the identical[31] questions as before learning with RLM. The test before using RLM is called pre-test and the test after using RLM is called post-test (**Appendix J** depicts pictures of the pre and post tests). To control the learning process (i.e. to ensure that participants only learn with the RLM), they were not allowed to leave the test location. Approximately the duration for pre-post-test was between two and three hours for each participant.

In this study 41 learners were involved in the pre-and-post tests. They were students of multimedia-related programmes at HLI who have not yet learnt about videography. A set of questions was constructed making-up a quiz-like question sheet (**Appendix K**). It consists of five true/false questions and five structured (short answer) questions. Total marks for both quizzes were ten, and this study set the passing line at five-over-ten.

[31] Identical questions means the questions for pre test and post test are exactly same.

Referring to Blooms taxonomy (Blooms, 1956), the questions ask learners at knowledge level, which tests whether they know about certain things.

Learners were tested on two topics, Videography and How to make VCD. The first topic covers formal lessons, included in most syllabuses of multimedia-related programmes, while the later topic contains content for informal lessons. The scores for the two topics could justify whether RLM is effective for both formal and informal lessons.

This study observes the means to deduce the results. The mean is arithmetic average. In this test, means for pre-tests are the average scores for the tests before learning the subject matter only using RLM, while means for post-tests are the average scores after learning the subject matter. If the post-test means are higher than means for pre-tests, this conveys meaning that the participants have acquired knowledge to answer questions in the post-tests from the content in the RLM, and vice versa. Results of effectiveness testing over the RLM are discussed in the subsection.

6.2.1 Results of Effectiveness Testing

To ensure that the knowledge acquired to provide answers in the post-tests were entirely from the RLM, participants were asked to answer the quizzes immediately after learning with the RLM. The scores are provided in Table 6.1. Having got the answers from the participants, the means were calculated (results are presented in Table 6.2).

Table 6.1: Scores in pre-test and post-test

	Scores for the quizzes					
Subject	Videography			Making VCD		
	Pre-test	Post-test	Difference	Pre-test	Post-test	Difference
1	2	6	4	3	3	0
2	3	6	3	3	9	6
3	4	7	3	0	6	6
4	4	6	2	0	4	4
5	5	5	0	3	4	1
6	6	8	2	2	5	3
7	0	5	5	2	4	2
8	3	4	1	2	4	2

9	3	5	2	3	7	4
10	0	8	8	5	6	1
11	3	4	1	3	5	2
12	3	7	4	1	3	2
13	3	7	4	0	3	3
14	3	7	4	1	4	3
15	4	5	1	4	5	1
16	1	8	7	0	8	8
17	3	6	3	0	7	7
18	0	6	6	2	2	0
19	6	8	2	0	3	3
20	6	7	1	4	6	2
21	2	8	6	3	7	4
22	5	6	1	3	5	2
23	4	8	4	1	4	3
24	3	7	4	2	3	1
25	5	7	2	3	8	5
26	2	7	5	3	3	0
27	4	6	2	2	3	1
28	3	8	5	2	7	5
29	2	8	6	5	8	3
30	6	8	2	0	7	7
31	5	10	5	4	7	3
32	3	9	6	1	7	6
33	2	8	6	1	6	5
34	3	7	4	2	4	2
35	3	5	2	4	8	4
36	3	8	5	3	7	4
37	7	9	2	4	6	2
38	4	9	5	4	9	5
39	4	7	3	3	6	3
40	5	9	4	2	7	5
41	2	7	5	5	9	4

Table 6.2: Means for pre-tests and post-tests

Videography		How To Make VCD	
Mean pre-test	**Mean post-test**	**Mean pre-test**	**Mean post-test**
3.39	6.98	2.32	5.59

From Table 6.2, it could be observed that means for post-tests (for both Videography (formal lesson) and How To Make VCD (informal lesson)) are higher than means for pre-tests. This study interprets that the RLM are effective and could be used to teach/learn both formal and informal lessons (Ariffin & Norshuhada, 2009a).

This paragraph presents the score difference between post-tests and pre-tests. This analysis could help in observing whether the knowledge acquired from RLM is high. The related data are presented in Table 6.3.

Table 6.3: Score difference (post-test minus pre-test)

Score difference	Frequency	
(post-test minus pre-test)	**Videography**	**VCD**
0	1	3
1	5	5
2	9	8
3	4	8
4	8	6
5	7	5
6	5	3
7	1	2
8	1	1
9	0	0
10	0	0
Total participants	**41**	**41**

Table 6.12 shows significant information. Learners score better in post-tests for both topics, with majority differences ranging between 1 to 5 marks over ten. This study concludes the results as fairly good because RLM was tested on learners without prior knowledge on the subject matter. Moreover, there are also learners whose score differences are between 5 and 8 (over ten), which means they gain significant amount of knowledge from RLM. This study further interprets from the results in Table 6.3 that RLM can be used to deliver content for both formal and informal lessons.

6.3 PRE-USER EXPERIENCE TESTING

This section discusses some introduction of previous works investigating the entertainment and fun aspects of computer applications. Also, before carrying out the user testing, necessary apparatus were prepared, especially the sampling and construction process, reliability, and factor analysis of the evaluation instrument, which is called **Q**uestionnaire for **M**easuring **E**ntertaining and **F**un (Q-MEF).

There are a number of previous studies on testing the user experience. For example, in works by Malone (1980; 1984), Amory et al. (1999), Pinhanez et al. (2001), Karat et al. (2001), Asgari and Kaufman (2004), MacFarlane et al. (2005), Neal et al. (2004), Kempter (2007), and Spillers (n.d.). They agree that applications for education and games should not only be easy to use, but should also be entertaining. Also, in other literatures, attempts are found to research in this similar topic (Evans, 1993; Harrison & Rainer, 1996; Mahmood et al., 2000; Chin & Lee, 2000; Lindgaard & Dudek, 2003). Another, Wiberg (2001; 2005) further explored the topic of satisfaction. Later, the work in investigating user satisfaction was extended by Kaye (2007).

The studies stated in the above paragraph mainly investigated entertainment by users' perception. This study adapts their works. Some of the instruments used to collect perceptions in those studies were also adapted. Mandryk et al. (2006) evaluated user feelings including entertaining quantitatively by quantifying psychophysiology attributes using body-worn sensors. Their methods are very objective, but researchers have to be very well-verse about the techniques thus require long learning time. In addition, the methods require skills in programming, which is discouraging non-programming skilled researchers to adapt them. Meanwhile in Wiberg's methods, researchers may come up with different interpretations on similar clues.

There are different types of learners. Previous chapters have stated that RLM is a type of video production, developed with a method, proposed by this study; QVRT. In a group of learners there are different levels of academic achievement, and especially skills in making video. In terms of video making skills and abilities, some learners have better performance over the other, and therefore they might consider themselves as video developers in this study.

6.3.1 Evaluation Instrument

This study intends to investigate whether RLM are entertaining and learners feel fun when using RLM. Dictionaries have defined the terms entertaining and fun differently (elaborated in Chapter 1). Inline with that, researchers have also discussed about the dissimilarities, and these are described earlier in Chapter 3. Mandryk et al. (2006) measured fun among game players using psychophysiology. In their study, body-worn sensors were used to read signals. Other researchers (part of the list in Table 6.1) took perceptions as the measures. This study has decided not to follow the method by Mandryk and friends due to some technical limitations as discussed in the previous page. As a result, quantitative data need to be gathered through an instrument. In supplementing the quantitative data, subjective input through interview and observation might help enriching the collected data. To develop the instrument for measuring entertaining and fun, a systematic approach as summarized in Figure 6.2 was performed (Ariffin & Norshuhada, 2009b).

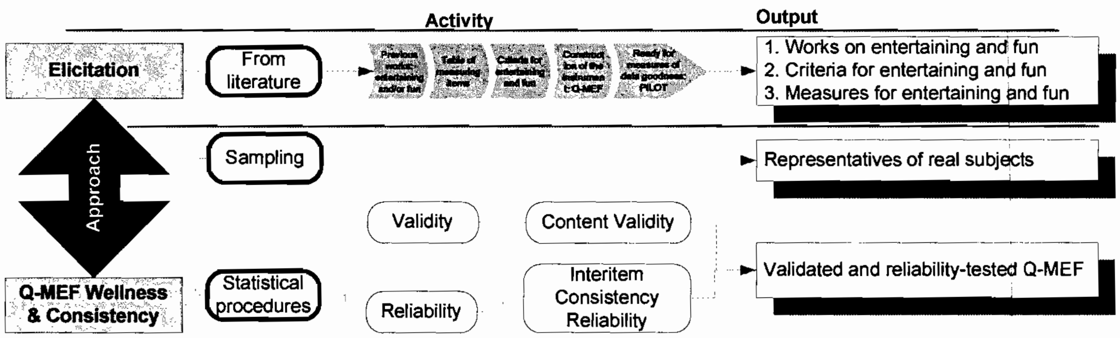


Figure 6.2: Summary of instrument development

Figure 6.2 visualizes the processes involved in the instrument development; beginning with elicitation works to determine measuring items until the instrument was piloted. The subsections below describe the processes.

A. Elicitation works

Currently, literatures do not contain an instrument that measures both aspects; entertainment and fun. However, there are a number of studies that measure either entertaining or fun aspect. Measuring entertaining and fun sounds easy, but it actually needs critical and tedious selection of measuring items. Accordingly, this study did not construct items for measuring but reuse measuring items from the previous studies. It involved 20 previous research works which measure either fun or entertaining of various applications. The elicitation activities were carried out as outlined in Figure 6.3.

Figure 6.3: Summary of elicitation works

All the previous works were numbered with indicators as in **Appendix L**. This study looks into works in various states on timeline spectrum from 1980 until 2007. This is important to collect as rich items as possible.

The measuring items are presented in Table 6.4. In the table, column heading contains numbers representing indicators in **Appendix L**. The indicators are previous studies on entertaining and fun.

Table 6.4: Detail of measurement items with authors and frequencies

Entertaining / Fun	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Captures my interest						Y		Y			Y					Y	Y			Y
Sparks discussion.		Y	Y			Y	Y						Y			Y				
Engages me through unique elements.								Y		Y					Y	Y				Y
Attracts me.								Y		Y	Y		Y			Y		Y		Y
Appealing to my eye and ear.								Y							Y	Y				Y
I have ample opportunity to apply my own input (fantasy).		Y	Y			Y	Y		Y				Y			Y			Y	Y
Arousing.						Y		Y		Y	Y									Y
Provides for innovative approach to teaching and learning.	Y	Y											Y			Y				Y
Contains surprising factors.										Y	Y							Y		Y
The way it guides me in doing entertains me.			Y			Y					Y		Y		Y	Y				
I feel pleased.					Y			Y				Y					Y			Y
I feel interested.		Y		Y	Y	Y	Y	Y		Y							Y			Y
I feel happy to use.				Y										Y			Y			

I was excited when learning.					Y	Y				Y		Y					Y			Y
I am satisfied and delighted.					Y			Y						Y			Y			Y
I have plenty of curiosity when learning.			Y					Y	Y	Y				Y			Y	Y	Y	Y
I feel confident when learning.	Y		Y			Y				Y				Y			Y			Y
I feel comfortable to learn.						Y						Y					Y			
I feel challenged.			Y	Y		Y				Y	Y							Y	Y	Y
I enjoy learning.	Y	Y		Y		Y						Y			Y					Y

Note: Y → Items are asked in the original work

The items in Table 6.4 were used for drafting the first-version instrument (**Appendix M**). This version was then validated through expert review for content validity. Content validity is a basic test for determining the instrument whether or not it measures entertaining and fun. An example of work utilizing content validity is one carried out by Kidder and Judd (1986), where they employed experts (speech therapists) to judge speech impairment. This study adopted their work, initiating expert review for content validity test. Schneiderman (1998) suggests that having between three to five experts participating in an expert review is sufficient. Accordingly, this study managed to invite four experts in the areas of human-computer interaction to review the Q-MEF (**Appendix N**). During review, the experts were provided with a guiding form besides the artifact (i.e. the first-version instrument). The form contains information about the table and the aspects the experts were expected to feed back (See **Appendix O**). In addition, their expertise was assured:

- they have masters in HCI or related areas or/and
- they at least three years teaching background in HCI and related areas, and
- they have been studying/researching in HCI for at least three years.

However, the experts found that the instrument was not good enough in measuring entertaining and fun because of three reasons; (1) obviously the items were not placed in respective logical groups, (2) the scaling should not contain a zero, and (3) the scale descriptions are nor conveying clear meanings. As a consequence, the strategy was changed. First, the criteria for entertaining and fun were determined through brainstorming and eliciting the works in **Appendix L**. The criteria are listed in Table 6.5.

Each criterion was earlier associated with some characteristics. The pairs among criteria and characteristics can be found in Table 6.6 and Table 6.7.

Table 6.5: Criteria for entertaining and fun

Entertaining		Fun	
1	Attracting and capturing attention	1	Laugh
2	Provoking perceptions	2	Humor
3	Arousing emotions	3	Relax
4	Interesting	4	Happy
5	Challenge	5	Fun
6	Appealing	6	Enjoyable
7	Encouraging	7	Excited
8	Entertaining		
9	Guiding		
10	Engaging		
11	Flexible		

Table 6.6: Groups for characteristics for entertaining

Group	Entertaining Criteria	Characteristics
1	Attracting and capturing attention	Attracting attention, Capturing attention, Holding attention, Iteration
2	Provoking perceptions	Stimulating, Visualization, Provoking perceptions, Curious
3	Arousing emotions	Fantasy, Freedom, Arousing emotions,
4	Interesting	Interesting, Not boring,
5	Challenge	Challenging, Uncertainty, Challenging interpretations
6	Appealing	Pleasant, Appealing to the eye and ear, Pleasing
7	Encouraging	Curiosity, Privilege, Fortune,
8	Entertaining	Entertainment,
9	Guiding	Not confusing, Sufficient feedback, Control, Reflection, Confident, Providing guidance, Adequate feedback
10	Engaging	Engaging, Opportunity to engage
11	Flexible	Different look and feel, flexible

Table 6.7: Groups for characteristics for fun

Group	Fun Criteria	Characteristics
a	Laugh	Laugh
b	Humor	Humor
c	Relax	Easy, Comfortable,
d	Happy	Happy
e	Fun	Fun
f	Enjoyable	Not frustrating, Enjoyable, Delighted
g	Excited	Exciting, Excited, Surprising

There are eleven groups for entertaining and seven for fun. The characteristics of criteria in Tables 6.6 and 6.7 were those obtained from the previous works by mapping with items in the works listed in **Appendix L.** The summary of characteristics and group number is provided in Table 6.5. In Table 6.8, there are two columns, the first is characteristics, and second column is the group label. The groups were labeled with numbers and letters to represent different aspects of dimension, in which entertaining items are labeled with numbers and fun items are labeled with letters.

Table 6.8: Summary of characteristics of entertaining and fun in studies listed in Table 6.5

Characteristic	Group #	Characteristic	Group #
Stimulating	2	Curiosity	7
Interesting	4	Control	9
Not confusing	9	Fantasy	3
Sufficient feedback	9	Iteration	1
Visualization	2	Reflection	9
Not boring	4	Enjoyable	f
Challenging	5	Exciting	g
Easy	c	Pleasant	6
Engaging	10	Interesting	4
Exciting	g	Attracting attention	1
Not frustrating	f	Capturing attention	1
Fun	e	Holding attention	1
Freedom	3	Provoking perceptions	2
Engagement	10	Arousing emotions	3
Entertainment	8	Surprising	g
Appealing	6	Different look and feel	11
Appealing to the eye and ear	6	Challenging interpretations	5
Opportunity to engage	10	Providing guidance	9
Pleasing	6	Adequate feedback	9
Interesting	4	Complex	5
Happy	d	Laugh	a
Excited	g	Uncertainty	5
Delighted	f	Humor	b
Curious	2	Fortune	7
Confident	9	Flexible	11
Comfortable	c	Privilege	7
Challenged	5		

The instrument was constructed by basing to the criteria in Tables 6.6 and 6.7. It led to some modifications to the first-version instrument. Major modifications included repositioning some items into another dimension of the instrument and inclusion of characteristics of criteria as listed in Tables 6.6 an 6.7. The instrument was then named as Q-MEF, which contains items as can be seen in Figure 6.4.

1 – Strongly disagree || 2 – Disagree || 3 – Somewhat agree || 4 – Agree || 5 – Strongly agree

RLM is entertaining						
1.	RLM attracts and captures my attention.	1	2	3	4	5
2.	RLM provokes perception through unplanned content.	1	2	3	4	5
3.	RLM engages me through unique surprise elements.	1	2	3	4	5
4.	RLM arouses my emotions through its reality approach.	1	2	3	4	5
5.	RLM is pleasing and appealing to my eye and ear.	1	2	3	4	5
6.	The way RLM presents contents is interesting.	1	2	3	4	5
7.	RLM encourages just-in-time learning, question-answer, and problem-solution problem solving.	1	2	3	4	5
8.	RLM challenges me through uncertain persuading content.	1	2	3	4	5
9.	RLM provides sufficient guides for problem solution.	1	2	3	4	5
10.	They way RLM guides me in doing entertains me.	1	2	3	4	5
11.	RLM allows me to move to any part of content flexibly.	1	2	3	4	5
I feel fun with RLM						
1.	RLM makes me laugh.	1	2	3	4	5
2.	RLM contains humor in its unplanned content.	1	2	3	4	5
3.	I feel happy to use RLM.	1	2	3	4	5
4.	I was excited when learning with RLM.	1	2	3	4	5
5.	Learn with RLM is fun.	1	2	3	4	5
6.	I feel comfortable to learn with RLM.	1	2	3	4	5
7.	I enjoy learning with RLM.	1	2	3	4	5

Figure 6.4: Items in the Q-MEF Instrument

B. Q-MEF

There are two dimensions in Q-MEF; RLM is entertaining and I feel fun with RLM. These dimensions contain items that measure entertaining and fun aspects as discussed at length previously. Entertaining dimension contains eleven items, and fun dimension contains seven items.

There are generally four types of scale; Nominal, Ordinal, Interval, and Ratio. Nominal is a basic scale, to gather simple information such as about names and yes/no options. Information about order of something is gathered through ordinal scale. Interval and ratio scales measures continuous values such as currency and time. Some statistical packages group both interval and ratio as one type and is named as scale.

This study measures continuous values on feelings. So, the scale type is used for the items with range from 1 to 5 where 1 means *highly disagree* with the item, 2 means *disagree*, 3 means *somewhat agree*, 4 means *agree*, and 5 represents *highly agree*. This type of scale was utilized for the benefit of both the researcher and the subjects. For the researcher, it helps to make sure the works in analyzing the data is not confusing. While for the subjects, it helps simplifying option selection compared to utilizing scales with seven or nine scores. The dimensions are followed with five general questions asking whether subjects:

- will use RLM again next time.
- prefer to use RLM more than the traditional courseware and video.
- feel RLM can cater appropriate content satisfactorily.
- feel creating RLM is interesting (for those who are familiar with video making).
- feel creating RLM is possible (for those who are not familiar with video making).

These general questions use nominal scale, because it is enough to know whether subjects answer either 'yes' or 'no'. **Appendix P** presents the Q-MEF used in this study.

In addition, this study also investigates academic achievement groups. The academic achievement groups were used to measure possibilities of their effects on RLM. The gender-related information is using nominal type. The Q-MEF as depicted in Figure 6.6 was further experimented to investigate its wellness and consistency.

C. Pilot study to investigate Q-MEF wellness and consistency

Subsection 6.2.1 describes the methods and activities involved in eliciting previous works for adaptation at length. This subsection adds some discussions on pilot subjects and statistical procedures for determining how well Q-MEF measures entertaining and fun, and how consistently Q-MEF measures entertaining and fun. It is important for this study to determine the consistency of Q-MEF because it is an adaptation of other works. Subjects and consistency analysis are discussed separately followed by the results of validity and consistency tests.

i) Subjects

In this investigative work, representative subjects are important. Sekaran (1992) suggests employing at least 30 datasets for obtaining reliable results in statistical tests. However, a bigger sample size will result in more accurate readings. Hence, to satisfy the suggestion, this study managed to engage 41 students of HLI as respondents. They were selected randomly among students who have knowledge on videography because the contents in RLM example were on that topic.

ii) Statistical Procedures

To ensure the Q-MEF is reasonably good, two criteria were carried out: validity and reliability. Validity tests how well Q-MEF measures entertaining and fun; and Reliability tests how consistently Q-MEF measures entertaining and fun. This study decided to make use of two tests; Content Validity and Interitem Consistency Reliability. At this stage, Factor Analysis was not possible to run because total data was less than 100 (Hair et al., 2006).

Four experts (**Appendix N**) who engaged in content validity for the first-version instrument (Figure 6.5) were engaged in validating Q-MEF. In a way, this maintains the experts' view on the Q-MEF and made the reviewing process less tedious. Since Content Validity has been elaborated in validating the first-version instrument, this part describes about Interitem Consistency Reliability. Interitem Consistency Reliability is a test to measure consistency of subjects' responses to all items in Q-MEF. Literatures suggest that the most common test for consistency is Cronbach's alpha (α) and Kuder-Richardson formulas (Sekaran, 1992). This study ran the Cronbach's alpha test, and set $\alpha > 0.7$ to be significant as suggested by Pallant (2001) and Sekaran (1992), as well as many other authors. Results of validity and reliability tests are discussed in the next section.

iii) Results of validity test

Experts found that the criteria of entertaining and fun are logical; making the insertion of items in both aspects of study as also logical. This study interprets from that statement, that Q-MEF tests entertaining and fun aspects well. This allows the reliability test to run.

iv) Results of Interitem consistency analysis

This study ran reliability analysis to ensure that Q-MEF is highly consistent in measuring entertaining and fun aspects. This test is important because not only items in Q-MEF are adapted from other works, but also the items have been reworded and recoded. Although the minimum accepted α is 0.7 (Sekaran, 1992), it was expected to have higher value.

From the tests of both aspects, they were found as significant with α value were high, as depicted in Table 6.9 and 6.10. This means Q-MEF are consistently measuring entertaining and fun. It explains that the items in both aspects are empirically found measuring entertaining and fun respectively.

Table 6.9: Reliability Statistics for entertaining

Cronbach's Alpha	N of Items
0.813	11

Table 6.10: Reliability Statistics for fun

Cronbach's Alpha	N of Items
0.889	7

Up to this end, after piloting the Q-MEF, this study found that the instrument is able to collect intended data from RLM users. Next, sampling matters are discussed.

6.3.2 Evaluation Subjects

60 randomly selected students of HLI at degree level were engaged as respondents. Including the data in the pilot test (41 respondents participated), overall 101 dataset were collected in separated evaluations (refer Chapter 3 for discussion on sampling).

Hair et al. (2006) strongly recommends that studies with 100 datasets and over investigate whether the internal items of a test dimension should be remained asked. Factor analysis test is used for that reason, in which it is a test for investigating items that should or not be in the dimensions of study. Results of factor analysis test could recommend for item deletion.

6.3.3 Factor Analysis

The aim in running factor analysis test was to investigate the degree of significance of each item to what it measures i.e. entertaining and fun. Test for both aspects were run separately based on the argument that entertaining and fun are two different aspects as discussed in Chapter 2. Indicators for accepting each item asked include Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity, Measure of Sampling Adequacy (MSA), and Component Matrix.

KMO test measures sampling adequacy in which it suggests whether the partial correlations among variables are small. Bartlett's test of sphericity measures whether the correlation matrix is an identity matrix, which would indicate that the factor model is inappropriate. Results of MSA contain more detailed explanations of KMO results where each item is calculated mutually. The component matrix suggests number of variables the whole items should be grouped into. Hair et al. (2006) suggests that in factor analysis, the following conditions must be met to accept the measures:

i) p (Sig.)-value for KMO test ≥ 0.5 and in Bartlett's test, $p \leq 0.05$
ii) MSA for the items ≥ 0.5
iii) Reading in the first component of Component Matrix ≥ 0.5

Following paragraphs discuss the results of factor analysis for entertaining and fun dimensions separately.

A. Entertaining dimension

Rule 1: KMO and Bartlett's test

Figure 6.5 presents the results for KMO and Bartlett's tests. It can be noticed that KMO measures of sampling adequacy value is 0.874 ($p > 0.5$), and Bartlett's test of sphericity is 0.000 ($p < 0.05$). These values indicate that the first rule was met.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,874
Bartlett's Test of Sphericity	Approx. Chi-Square	547,434
	df	55
	Sig.	,000

Figure 6.5: Results of KMO and Bartlett's tests – entertaining

Rule 2: Measures of Sampling Adequacy (MSA)

Results of MSA are presented in Table 6.11, and all p-values are greater than 0.5. The values in the table met with the rule number 2.

Table 6.11: Results of MSA – entertaining

Item	p
RLM attracts and captures attention	0.901
RLM provokes perceptions	0.908
RLM is engaging	0.863
RLM arouses emotions	0.851
RLM is pleasing and appealing	0.908
RLM is interesting	0.891
RLM is encouraging	0.777
RLM challenges through uncertain contents	0.897
RLM provides guides	0.811
RLM is entertaining	0.884
RLM is flexible	0.923

Rule 3: Component Matrix

Results of rotated component matrix test suggest that two items are excluded from the first component i.e. (1) RLM provokes perceptions and (2) RLM challenges through uncertain contents. The item 'RLM is encouraging' was suggested not to be within any component (see Figure 6.6). However, this study decided to include the item in the first component because it was much closed to 0.5 in component 1. Moreover, after removing the (1) and (2), results showed to have only one component as indicated in Figure 6.7.

Rotated Component Matrix[a]

	Component	
	1	2
RLM attracts and captures attention	.677	.368
RLM provokes perceptions	**.013**	**.784**
RLM is engaging	.644	.406
RLM arouses emotions	.754	.346
RLM is pleasing and appealing	.720	.360
RLM is interesting	.570	.481
RLM is encouraging	.456	.376
RLM challenges through uncertain contents	**.311**	**.727**
RLM provides guides	.813	-.038
RLM is entertaining	.796	.271
RLM is flexible	.755	.086

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

Figure 6.6: Results of rotated component matrix – entertaining

Component Matrix[a]

	Component
	1
RLM attracts and captures attention	.775
RLM is engaging	.761
RLM arouses emotions	.834
RLM is pleasing and appealing	.808
RLM is interesting	.723
RLM is encouraging	.570
RLM provides guides	.718
RLM is entertaining	.832
RLM is flexible	.718

Extraction Method: Principal Component Analysis.
a. 1 components extracted.

Figure 6.7: Component suggested after two items removed

B. Fun dimension

Rule 1: KMO and Bartlett's test

It can be observed in Figure 6.8 that KMO measures of sampling adequacy value is greater than 0.5, and Bartlett's test of sphericity is lesser than 0.05. These values satisfy the first rule.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,903
Bartlett's Test of Sphericity	Approx. Chi-Square	603,262
	df	21
	Sig.	,000

Figure 6.8: Results of KMO and Bartlett's tests – fun

Rule 2: Measures of Sampling Adequacy (MSA)

Table 6.12 presents results of the MSA, and all p values are greater than 0.5. The values in the table supports rule number 2.

Table 6.12: Results of MSA – fun

Item	p
RLM makes me laugh	0.866
RLM triggers my sense of humor	0.879
I feel happy to learn with RLM	0.895
I was excited to learn with RLM	0.878
Learning with RLM is fun	0.933
I feel comfortable to learn with RLM	0.932
I enjoy learning with RLM	0.925

Rule 3: Component Matrix

Component matrix test found that all items are included in only one component, as seen in Figure 6.9.

Component Matrix[a]

	Component
	1
RLM makes me laugh	,734
RLM triggers my sense of humor	,791
I feel happy to learn with RLM	,852
I was excited to learn with RLM	,891
Learning with RLM is fun	,911
I feel comfortable to learn with RLM	,860
I enjoy learning with RLM	,908

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Figure 6.9: Results of component matrix test – fun

Based on the results of factor analysis above, two items of the entertaining dimension were removed. From the original Q-MEF, the removed items were '*RLM provokes perceptions*' and '*RLM challenges through uncertain contents'*. Thus, all results in the tests of User Experience do not contain both items.

6.4 USER EXPERIENCE TESTING

Testing results are presented in different sections for demographic background and hypotheses testing. The background information including demographic with additional findings are discussed first.

6.4.1 Demographic Background

There were 60 subjects involved in this study. 28 of them were female, representing 47% of the total. Another 32 (53%) were male. Most of them (26 – 43%) were moderate academic performance achievers. Sixteen (27%) were less achievers and 18 (30%) were high achievers. Figures 6.10 and 6.11 illustrate the data. Chapter 3 discusses the academic-achievement levels. This study classifies the academic-achievement levels to statistically measure whether they have any difference on specified tests in the hypotheses.

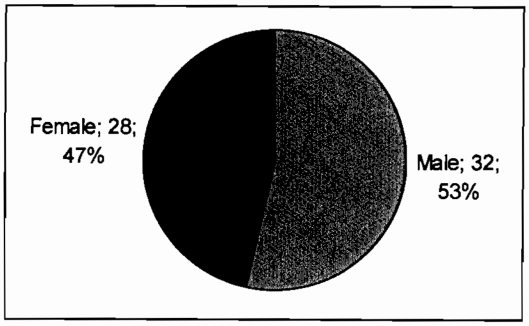


Figure 6.10: Gender

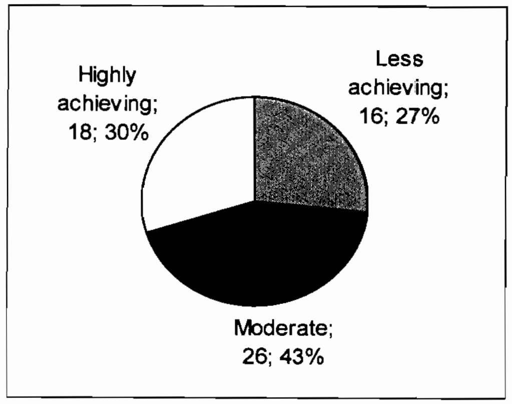


Figure 6.11: Academic achievement

Further, how each gender achieves in academic performance is explored. Figure 6.12 explains the distributions. Out of 32 male subjects, seven (21.8%) were found less achieving, 15 (46.8%) were moderate, and 10 (31.2%) were highly achieving. Comparatively, 9 out of 28 females (32.1%) were found less achieving, 11 (39.3%) were moderately achieving, and 8 (28.6%) were highly achieving.

		Category in class			
		Less achieving	Moderate	Most achieveing	Total
Gender	Male	7	15	10	32
	Female	9	11	8	28
Total		16	26	18	60

Figure 6.12: Fair distribution of academic achievement over gender

In addition, all respondents have (as mentioned in the criteria for selecting the respondents) good computer skills and learned about videography and have experience in making video projects.

The explanations above describe that subjects involved in this study were representing different gender and academic achievement levels fairly. This section also describes some general findings which partly answer the questions at the beginning of this chapter.

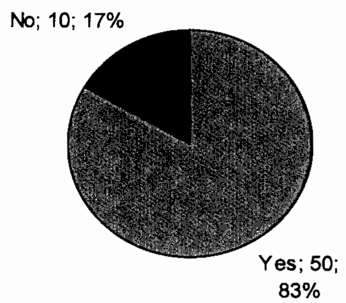
6.4.2 General Findings

There are specific statistical procedures used in analyzing data. Some data are analyzed using various descriptive procedures to obtain frequency tables, pie charts, and bar charts. To measure the tendencies and variability of groups, the mean and standard deviation were calculated from scale data. The mean is the arithmetic average. It is the sum of observed values divided by the number of observations. Depending on the scale used, in this study, a low mean value indicates that subjects disagree with the question asked. In contrast, high mean value means the subjects agree. Standard deviation is a measure of variability of response to an item. It is a measure of score dispersion about the mean, in which the larger the standard deviation, the wider the spread of data is.

In making inferences and because scale type data was used in this study, the following parametric procedures were utilized:

- One sample t-Test: was used to investigate whether there is any significant difference between means for two technologies in one sample.
- Independent sample t-Test: was used to compare means for two groups of cases (i.e. RLM response of subjects testing RLM versus courseware and RLM response of subjects testing RLM versus video).
- ANOVA (One way Analysis of Variance): was applied to compare means of a single variable between two groups or more (e.g. between different gender and academic levels).

First, it was found that 83% of subjects will use RLM again next time. There was no significant effect ($p > 0.05$) found between different academic achievements on decision to use the RLM in the future (see Figure 6.13).



		I will use RLM again		Total
		Yes	No	
Category in class	Less achieving	15	1	16
	Moderate	22	4	26
	Most achieveing	13	5	18
Total		50	10	60

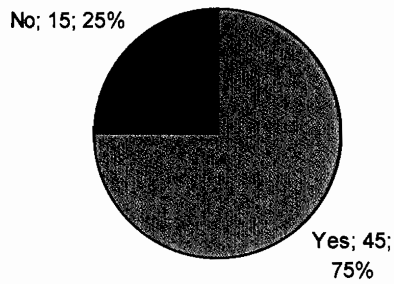
ANOVA

I will use RLM again

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.400	2	.200	1.437	.246
Within Groups	7.933	57	.139		
Total	8.333	59			

Figure 6.13: Graph and statistics showing subjects will use RLM again next time

Secondly, the percentage of subjects preferring to use RLM more than traditional courseware and video was obtained. It was found that 75% of subjects prefer to use RLM. This answers that at least more than 60% of subjects prefer to. The distribution among academic achievement groups for those prefer to use RLM was found fair. In conjunction, there was no significant difference found ($p > 0.05$) among academic levels influencing the decision to choose RLM more than courseware and video, as can be seen in Figure 6.14.



Count

		I prefer to use RLM		Total
		Yes	No	
Category in class	Less achieving	13	3	16
	Moderate	19	7	26
	Most achieveing	13	5	18
Total		45	15	60

ANOVA

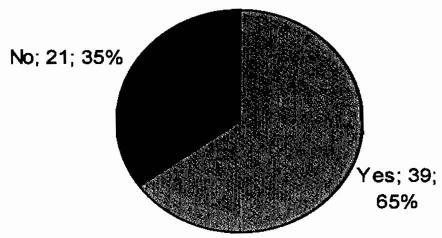
I prefer to use RLM

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.086	2	.043	.220	.804
Within Groups	11.164	57	.196		
Total	11.250	59			

Figure 6.14: Graph and statistics showing learners prefer to use RLM more than courseware and video

Overall, 65% of the subjects found that RLM caters appropriate content, especially by those of less and highly achieving learners. However, the patterns are similar in all academic classes, where most subjects agree with the statement. So, the evidence that shows significant difference among academic levels influencing the decision to accept the statement does not exist because $p > 0.05$ (see Figure 6.15).

The findings above explain that academic achievement level is not a factor for learners to make decisions regarding those statements.



		RLM caters appropriate content		
		Yes	No	Total
Category in class	Less achieving	12	4	16
	Moderate	15	11	26
	Most achieveing	12	6	18
Total		39	21	60

ANOVA

RLM caters appropriate content

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.304	2	.152	.649	.526
Within Groups	13.346	57	.234		
Total	13.650	59			

Figure 6.15: Graph and statistics showing RLM caters appropriate content satisfactorily

6.4.3 Hypotheses Testing

This section discusses the hypotheses individually. It is noted that testing subjects were divided into two groups: first group consisted of 30 subjects learning using RLM and video, and second group consisted of 30 subjects learning with RLM and courseware.

A. Testing H_1

H_1: RLM is perceived as more entertaining and fun compared to video and courseware.

(i) Testing whether RLM is entertaining and invoking fun

First, this study analyzed the entertaining aspect. Subjects are considered as agreeing with a statement if the means are 2.5 and greater. Figure 6.16 presents the data, where there was one subject scored a mean between 2.01 and 3. Other subjects (59) scored the means between either 3.01 and 4, and 4.01 and 5. This means that there were 98.33% subjects found RLM was entertaining.

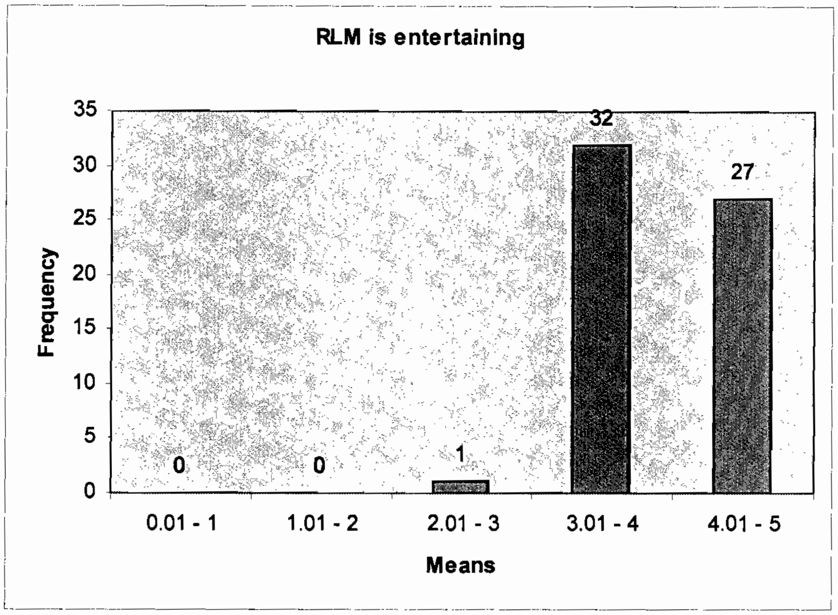


Figure 6.16: Graph showing RLM was entertaining

The data in Figure 6.17 are provided to observe the mean and standard deviation for a single item asked. It can be noticed that the means for all items are greater than three (somewhat agree) which means overall, all items were agreed by subjects. In addition, data in Figure 6.18 are provided to observe the cumulated means. The greater the mean value conveys meaning that RLM is more entertaining.

Having obtained the results for entertaining aspect, it was preceded with analyzing the fun aspect. There were 32 subjects scored with means greater than 4 which means strongly agree. It was more than half, with overall only seven means recorded between 2.01 and 3. This is shown in Figure 6.19 and can be interpreted that more that 60% of subjects found RLM was fun.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
RLM attracts and captures attention	60	3.00	5.00	4.1667	.64221
RLM is engaging	60	2.00	5.00	3.8500	.68458
RLM arouses emotions	60	2.00	5.00	3.9667	.80183
RLM is pleasing and appealing	60	3.00	5.00	4.0833	.71997
RLM is interesting	60	2.00	5.00	4.1667	.80605
RLM is encouraging	60	3.00	5.00	4.0333	.60971
RLM provides guides	60	3.00	5.00	3.9333	.70990
RLM is entertaining	60	3.00	5.00	4.1000	.70591
RLM is flexible	60	2.00	5.00	4.0833	.69603
Valid N (listwise)	60				

Figure 6.17: Mean and standard deviation for each item

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std.	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
MeanE	11	3,47	4,17	3,9621	,21175	-1,433	,661
Valid N (listwise)	11						

Figure 6.18: Cumulative mean – mean obtained from all observed means

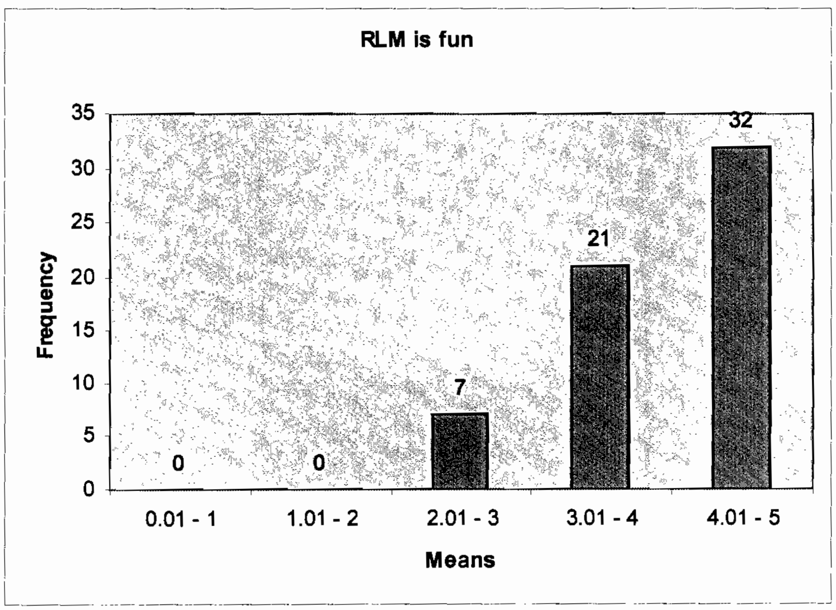


Figure 6.19: Graph showing RLM was fun

Observe in Figure 6.20 where means are greater than three and the standard deviations are very low (closed to zero). This explains that subjects agree with the statements confidently, that RLM makes them feel fun when learning.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std.	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
RLM makes me laugh	60	1,00	5,00	4,0167	,96536	-,853	,309
RLM triggers my sense of humor	60	2,00	5,00	3,9667	,86292	-,262	,309
I feel happy to learn with RLM	60	3,00	5,00	4,1167	,76117	-,201	,309
I was excited to learn with RLM	60	2,00	5,00	4,0667	,88042	-,595	,309
Learning with RLM is fun	60	2,00	5,00	4,0500	,89110	-,546	,309
I feel comfortable to learn with RLM	60	3,00	5,00	3,9333	,73338	,105	,309
I enjoy learning with RLM	60	2,00	5,00	4,1333	,74712	-,476	,309
Valid N (listwise)	60						

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std.	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
MeanF	7	3,93	4,13	4,0405	,07382	-,224	,794
Valid N (listwise)	7						

Figure 6.20: Means and standard deviation on fun

(ii) Testing whether RLM is more entertaining and fun than the video.

The test started off with a comparison between RLM and video on entertaining aspect. Overall means for RLM and video were calculated to observe which is greater. It was found that RLM has overall mean 3.921 and video has overall mean 2.957. From the means, this study interprets that both technologies were entertaining but RLM was found more entertaining than video because its mean was greater. When t-test was run, the results show that the means are significantly different with p = 0.00 as depicted in Figure 6.21.

Figure 6.22 illustrates the difference of mean scores between RLM and video to support the means stated above. It is seen that not all subjects found that video is entertaining. It may be because the video was presented in a formal way, as compared to RLM which is more leisure.

One-Sample Test

	Test Value = 0					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
meanRLMe	48.832	29	.000	4.05167	3.8820	4.2214
meanVe	32.271	29	.000	3.05200	2.8586	3.2454

Figure 6.21: Means for entertaining aspect is significantly different between RLM and video

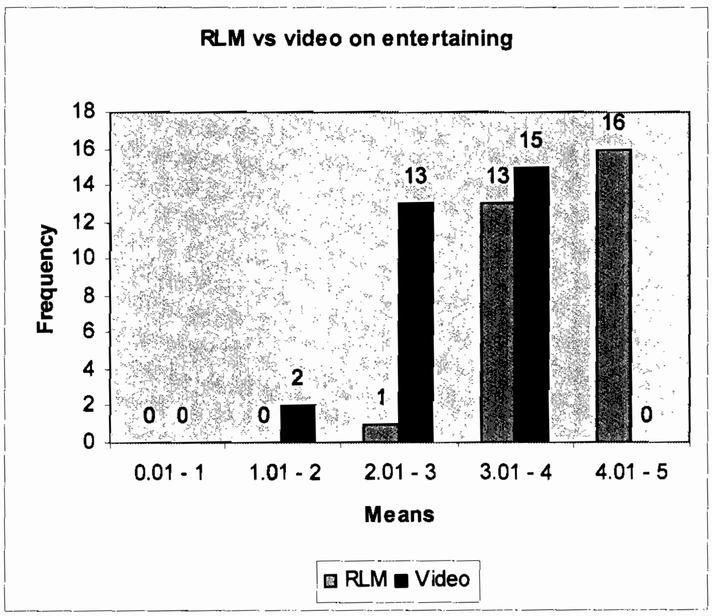


Figure 6.22: Graph showing RLM is more entertaining than video

Then, the fun aspect followed. The overall mean for RLM was 4.119, which is very high as opposed to overall mean for video (2.619). This finding interprets that the RLM used in this study invoked more fun than the video. Moreover, the means are significantly different as found in t-test procedure, where $p < 0.05$ (see Figure 6.23). This is strongly supported by the graph in Figure 6.24.

The findings above are not doubted because the RLM itself was initiated to ensure learning is fun. So, the way of conveying content to learners has been planned so that it looks natural with considerable fun with learning objectives in mind. It was pictured during testing[32], where subjects were observed having fun (e.g. laughing, nodding head, and discussing with peer) when using RLM; and did not when using video.

One-Sample Test

	Test Value = 0					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
meanRLMf	32.476	29	.000	4.28533	4.0155	4.5552
meanVf	21.452	29	.000	2.71400	2.4553	2.9727

Figure 6.23: Means for fun aspect is significantly different between RLM and video

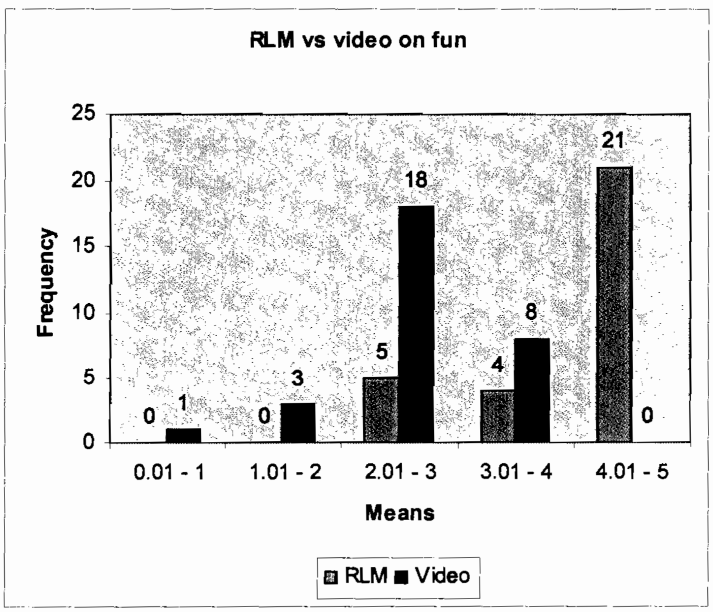


Figure 6.24: Graph showing RLM makes more fun than video

[32] Some subjects preferred to do the testing in the computer lab

(iii) Testing whether RLM is more entertaining and fun than the courseware.

Analysis on the RLM and the courseware in terms of entertaining aspect was initiated first. From the graph in Figure 6.25, it is seen than both RLM and courseware were entertaining. However, RLM is actually stronger because its mean was 3.873 as compared to courseware (mean = 3.288), in which the means are also found significantly different with $p < 0.05$ (Figure 6.26).

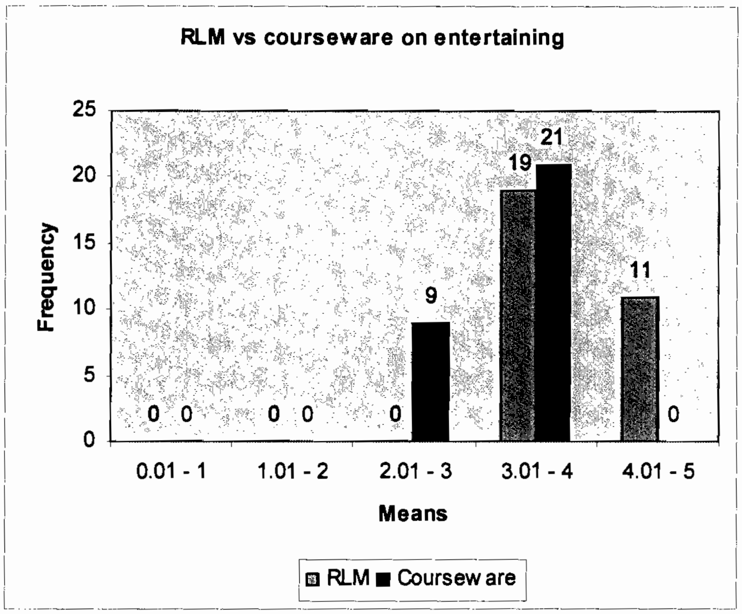


Figure 6.25: Graph showing RLM is more entertaining than courseware

One-Sample Test

	Test Value = 0					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
MeanRLMent	55.210	29	.000	3.87267	3.7292	4.0161
MeanCent	44.052	29	.000	3.28800	3.1353	3.4407

Figure 6.26: Means for entertaining aspect is significantly different between RLM and courseware

Then, this study initiated the comparison between the RLM and the courseware on fun aspect. Learning with RLM was found invoking more fun than learning with courseware because the group mean for RLM was 3.795 while the mean for courseware was 2.904 which are significantly different with $p < 0.05$ as seen in Figure 6.27. This is supported with the graph in Figure 6.28.

One-Sample Test

	Test Value = 0					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
MeanRLMfun	35.779	29	.000	3.79467	3.5778	4.0116
MeanCfun	28.249	29	.000	2.90400	2.6937	3.1143

Figure 6.27: Means for fun aspect is significantly different between RLM and courseware

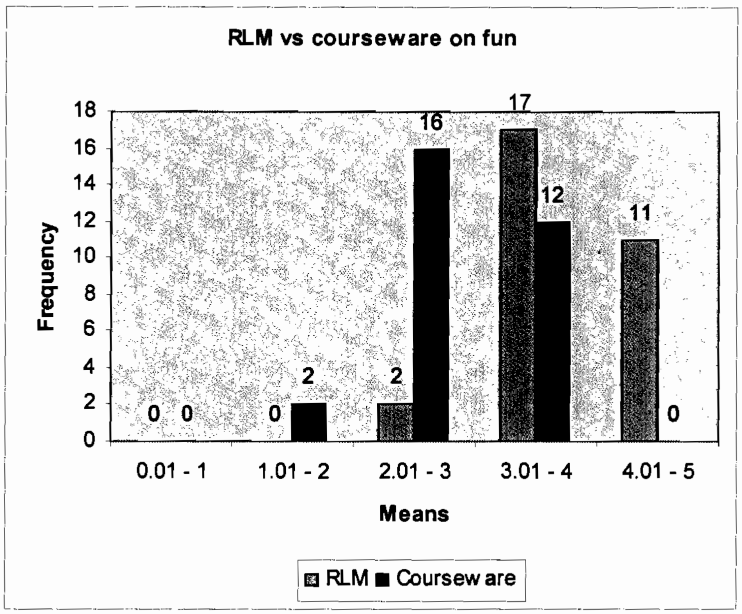


Figure 6.28: Graph showing RLM makes more fun than courseware

Referring to the results of the tests described in (a), (b), and (c), it was found that the RLM is more entertaining and more fun than the video and the courseware.

B. Testing H_2

H_2: There is no significant difference between responses by respondents who learn with the video and with the courseware towards the RLM on entertaining aspect.

The means for RLM of subjects learning with RLM (see Figure 6.29) and video, and those learning with RLM and courseware were analyzed.

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
meanRLMe	Video	30	4.0515	.45466	.08301
	courseware	30	3.8727	.38466	.07023

Figure 6.29: Descriptive statistics for RLM (entertaining) in different groups (i.e. subjects learning using video and courseware)

The p-value was rather larger ($p = 0.106$) indicating that there was not enough evidence to reject H_0 ($p > 0.05$) (see Figure 6.30). Thus, there was no significant difference between responses by subjects learning with video and subjects learning with courseware towards RLM on entertaining aspects. They found RLM as entertaining.

Note: Decision to accept or to reject the null hypothesis (H_0) depends on the p-value. If the p-value is small, the finding is statistically significant. That is the data provide enough evidence to allow a study to reject H_0. Usually, when $p < 0.05$, a study rejects H_0, while if $p > 0.05$, a study fails to reject H_0.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff	Std. Error Diff	Lower	Upper
mean RLMe	Equal variances assumed	1.126	.293	1.644	58	.106	.1788	.10873	-.03886	.3964
	Equal variances not assumed			1.644	56.5	.106	.1788	.10873	-.03899	.3966

Figure 6.30: t-Test results for entertaining aspects of RLM between different groups

Note that since the p-value for Levene's test is great ($p = 0.293$), the equal variances assumptions is not violated.

C. Testing H_3

H_3: There is no significant difference between responses by respondents who learn with the video and with the courseware towards the RLM on fun aspect.

Means for RLM scored by those learning with video was 4.286 and by those learning with courseware was 3.795 as displayed in Figure 6.31. The difference between means was rather large. Inline with that, p-value was found low ($p = 0.005$) indicating that there was enough evidence to reject the H_0 ($p < 0.05$). This finding, in Figure 6.32, explains that there existed a significant difference between responses by subjects learning with video and subjects learning with courseware towards RLM on fun aspects.

Through observations during some testing samples, subjects were found having fun when using RLM. It was clearly noticeable from the way they interact with peers. Also, it was found that subjects were not happy to click the mouse to continue the lessons as opposed to those using the video where they were not required to perform too many mouse-clicks. That was identified as the difference between using video and courseware. So, this study interprets that familiarities of using either video or courseware may influence their perceptions towards RLM.

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
meanRLMf	Video	30	4.2857	.72261	.13193
	courseware	30	3.7952	.58081	.10604

Figure 6.31: Descriptive statistics for RLM (fun) in different groups (i.e. subjects learning using video and courseware)

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff	Std. Error Diff	95% Confidence Interval of the Difference	
									Lower	Upper
mean RLMf	Equal variances assumed	2.3	.137	2.898	58	.005	.4905	.1693	.15166	.82930
	Equal variances not assumed			2.898	55.4	.005	.4905	.1693	.15132	.82963

Figure 6.32: t-Test results for fun aspects of RLM between different groups

D. Testing H_4

H_4: There is no significant difference between genders with on their perceptions of entertaining and fun of RLM.

First, the entertaining aspect was analyzed. The p-value in Figure 6.34 (see also Figure 6.33) was rather large ($p = 0.677$) indicating that there was not enough evidence to reject H_0 ($p > 0.05$). Thus male and female subjects could be in agreement on feeling entertained when using RLM.

Descriptives

meanRLMe

	N	Mean	Std. Deviat	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
Male	32	3.940	.34219	.06049	3.8170	4.0637	3.45	4.64
Female	28	3.987	.51290	.09693	3.7881	4.1859	3.00	4.82
Total	60	3.962	.42715	.05515	3.8518	4.0725	3.00	4.82

Figure 6.33: Descriptive statistics for mean-RLM-entertaining and subjects' gender

ANOVA

meanRLMe

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.033	1	.033	.176	.677
Within Groups	10.733	58	.185		
Total	10.765	59			

Figure 6.34: ANOVA results for mean-RLM-entertaining and subjects' gender

Then, the fun aspect was analyzed. The p-value was found greater than 0.05 ($p = 0.428$), as seen in Figure 6.36 (see also 6.35). This indicates that there was not enough evidence to reject H_0 ($p > 0.05$). Hence, it could be said that male and female subjects were both having fun when learning with RLM.

Descriptives

meanRLMf

	N	Mean	Std. Deviat	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
Male	32	3.9732	.67343	.11905	3.7304	4.2160	2.43	5.00
Female	28	4.1173	.72432	.13688	3.8365	4.3982	2.43	5.00
Total	60	4.0405	.69544	.08978	3.8608	4.2201	2.43	5.00

Figure 6.35: Descriptive statistics for mean-RLM-fun and subjects' gender

ANOVA

meanRLMf

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.310	1	.310	.638	.428
Within Groups	28.224	58	.487		
Total	28.534	59			

Figure 6.36: ANOVA results for mean-RLM-fun and subjects' gender

E. Testing H_5

H_5: There is no significant difference among academic-achievement groups on their perceptions of entertaining and fun of RLM.

To answer the hypothesis, this study first analyzed the entertaining aspect. Figure 6.37 shows descriptive statistics for difference academic achievement groups. The p-value in Figure 6.38 was large with p = 0.713 which indicates that there was not enough evidence to reject H_0 ($p > 0.05$). Thus, the different academic achievement groups were found not influencing and have no significant effect on feeling entertained when learning with RLM.

Descriptives

meanRLMe

	N	Mean	Std. Deviat	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
Less achieving	16	3.9659	.47048	.11762	3.7152	4.2166	3.09	4.64
Moderate	26	3.9161	.39158	.07680	3.7579	4.0742	3.09	4.73
Highy achieving	18	4.0253	.45273	.10671	3.8001	4.2504	3.00	4.82
Total	60	3.9621	.42715	.05515	3.8518	4.0725	3.00	4.82

Figure 6.37: Descriptive statistics for mean-RLM-entertaining and subjects' academic achievement

ANOVA

meanRLMe

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.127	2	.064	.340	.713
Within Groups	10.638	57	.187		
Total	10.765	59			

Figure 6.38: ANOVA results for mean-RLM-entertaining and subjects' academic achievement

It was followed by the analysis of fun aspect. The p-value in Figure 6.40 was 0.565, which is larger than 0.05. This indicates that there was not enough evidence to reject H0 (see also Figure 6.39). This explains that the feel of fun had no significant influence by the academic achievement groups.

Descriptives

meanRLMf

	N	Mean	Std. Deviat	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
Less achieving	16	3.8929	.71619	.1790	3.5112	4.2745	2.43	5.00
Moderate	26	4.1319	.63365	.1243	3.8759	4.3878	3.14	5.00
Highy achieving	18	4.0397	.77600	.1829	3.6538	4.4256	2.43	5.00
Total	60	4.0405	.69544	.0898	3.8608	4.2201	2.43	5.00

Figure 6.39: Descriptive statistics for mean-RLM-fun and subjects' academic achievement

ANOVA

meanRLMf

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.566	2	.283	.577	.565
Within Groups	27.969	57	.491		
Total	28.534	59			

Figure 6.40: ANOVA results for mean-RLM-fun and subjects' academic achievement

6.3 CONCLUSION

The prototype of RLM developed in Chapter 5 with inclusion of the conceptual design model in Chapter 4 was evaluated in this chapter. The evaluation was made by comparing the RLM with video and courseware. Data on user experience were gathered using an instrument. This chapter also elaborates the methods in constructing the instrument, i.e. the Q-MEF. In addition, validity test, reliability test, and factor analysis were explained to clarify that the Q-MEF was reliable for use to collect intended data in this study. In identifying whether RLM is entertaining and invoking fun in teaching and learning, a group of 60 HLI students was involved. The RLM was empirically tested with these participants.

In general, participants involved in this study will use the RLM again next time and they prefer to use the RLM over video and courseware. At least 75% of the participants regardless of their academic achievement levels share these views. Moreover, majority of the participants (65%) also found that RLM caters appropriate contents.

When all hypotheses were tested, participants agreed that the RLM was found entertaining and invoking fun, in fact the RLM was agreed to be more entertaining and fun than the video and courseware. On top of that, there were significant differences between RLM and courseware and video in terms of their ability to entertain and to invoke fun in learning. Also, it was proven that experience in using either courseware or video does not make any significant difference in participants' views on the RLM on entertaining but found significant on fun aspects.

The empirical data also revealed that gender and academic-achievement levels have no significant difference on perceptions over the RLM. This suggests that RLM can be used by anyone regardless of academic-achievement levels and gender.

In addition, post-test results are better than pre-test. This indicates that learning with RLM is not only entertaining and fun, but is also effective. This study claims the RLM is effective because the knowledge in scoring for the post-test was acquired during learning with the RLM.

CHAPTER 7

SUMMARY OF THESIS

7.1 INTRODUCTION

The research background is introduced in Chapter 1. In particular, this study focuses on electronic learning materials (eLMs) which would be utilized in higher learning institutions (HLI). This study formed a main aim to meet its expectation, i.e. to propose a conceptual design model of Reality Learning Media (RLM) that is able to ensure the learning experience is entertaining, fun, and effective. To accomplish the aim, four objectives were also formed; (1) to determine the components of conceptual design of RLM model, (2) to develop the conceptual design of the RLM model, (3) to validate the conceptual design model of RLM through prototyping, and (4) to investigate user experience in terms of entertaining, fun, and effectiveness.

In addition, any assumptions and hypotheses were also related. The research objectives and review of literatures (Chapter 2) led to a structured framework of this research (Chapter 3) which involved investigation, elicitation, analysis, deduction, construction, collaboration, and evaluation processes. A diagrammatic proposed conceptual design model of RLM (Chapter 4) was defined, and translated into working prototypes. Two prototypes of RLM were elaborated (Chapter 5), with an addition of a prototype of courseware used for user experience evaluation purposes. There were two types of testing carried out, to investigate RLM's effectiveness and user experience in terms of entertaining and fun. Students of HLI participated in the tests. The results of these investigations which involved pre and post-tests and user experience including the testing of hypotheses have contributed to the conclusions and suggestions for future studies outlined in this final chapter. The contents of this chapter can be classified into:

- Overall discussion from testing of hypotheses
- Contributions
- Limitations and suggestions

The next section presents the overall conclusions obtained mostly from the testing of hypotheses. Hypotheses 1 through 5 are listed below:

- RLM is perceived more fun and entertaining compared to video or courseware
- There is no significant difference between responses by subjects learning with video and subjects learning[33] with courseware towards RLM on entertaining aspects
- There is no significant difference between responses by subjects learning with video and subjects learning with courseware towards RLM on fun aspects
- There is no significant difference between genders on their perceptions of fun and entertaining of RLM
- There is no significant difference among academic-achievement groups on their perceptions of fun and entertaining of RLM

7.2 OVERALL DISCUSSION ON HYPOTHESES TESTINGS

This section elaborates research findings in achieving the stated research objectives and answering the research questions as well as the hypotheses. There are four objectives, three research questions, and five hypotheses formulated to support the research findings. The findings are based on the pre-test, post-test, and feedbacks through questionnaire from real users. In the pre-test and post-test, 41 students of HLI were involved, while the

[33] Subjects involved in this study learn in merely two hours; a duration similar to most classroom learning duration. This study considers the subjects learn something with the RLM.

questionnaires were answered by 60 students of HLI. The students who were involved in the pre-test and post-test are different from those who answered the questionnaire, and both types were carried out at different times.

In the pre-test and post-test, before students learned with the prototype (the RLM), they were asked to answer a ten-question quiz (called pre-test). Scores were recorded. It was aimed at evaluating students' knowledge on the topic before learning with the prototype. After that, the same group of students learned with the RLM prototype, and finally they performed the identical quiz (called post-test). The post-test was initiated to evaluate students' achievement after learning with the prototype, which also serves to evaluate the prototype's effectiveness.

In the second phase of the study; i.e. the user experience investigation; the questionnaire which is named Questionnaire for Measuring Entertaining and Fun (Q-MEF) was used to gather feedback from the real users on entertaining and fun dimensions. Entertaining dimension explores whether the prototypes[34] entertain the real users when learning with them. In contrast, the fun dimension explores whether the real users feel fun when learning with the prototypes.

7.2.1 Summary of Findings

Overall, the findings reveal that all research questions were successfully answered through the tests and the conceptual design model which have been iteratively evaluated by peers and experts. The first research objective was achieved through elicitation process with the help of some constructive works as discussed at length in Chapter 4. The constructive works which compared the existing models of eLMs were also part of achieving the second objective. The conceptual design model and its components were constructed by considering theories in teaching and learning. There are theories suggesting self-paced and self-directed learning, where technology plays as the anchor such as Anchored Instruction and Symbol System. In response to this, RLM is an

[34] There were three types of eLM involved at this stage: RLM, video, and courseware

independent eLM and can always be used at students' own pace and convenience, and it is the anchor in learning, just like other technologies such as courseware and video.

Besides, there are theories emphasizing that learners are not similar in terms of intelligences, tendencies of learning preferences, and levels of cognitive; examples of these theories are Aptitude Treatment Instruction, Cognitive Flexibility, and Multiple Intelligence. Looking at the conceptual design models, RLM are promoted to present contents in many ways or styles, containing various media elements, and the designers are flexible to tailor their learning contents to suit the real users. On the other hand, theories such as Cognitive Load and Minimalism emphasize that the learning content should support human memory abilities. Understanding the cognitive structure, it is a fact that human memory gets tired and exhausted when the information is overloading. In RLM, learners do not have to read extensive explanations. The video approach recommends learners to watch more than to read and to click, in order to reduce memory load. Also, learners will learn better by performing related activities; as suggested by Constructivist, Experiential, and Situated Learning. RLM reacts to these theories by making demonstration as a compulsory presentation style. By demonstrating the learning content, it is easier for learners to follow the steps. Moreover with video approach, learners can 'pause' the content whenever they need to.

The conceptual design model of RLM was then field-validated through prototyping, where a video practitioner was asked to develop a prototype of RLM with the conceptual design model as the basis. The description about the intended learning content was enclosed. At the end, the prototype produced by the video practitioner was found fulfilling the RLM concept requirements and through this achieved objective number three. The final objective was achieved through the study elaborated previously. The main aim of this research was accomplished after all specific objectives were achieved successfully. RLM utilizes video approach in learning. The niche of this research was to measure whether RLM entertains learners and whether the learners feel fun learning with RLM. To know the answer, hypotheses were formulated. It was found that the first hypothesis was proven. RLM was found more entertaining and making more fun than video and courseware. This finding also answers the first research question.

Independent samples t-Test was utilized to seek evidence for proving the second and third hypotheses. It was found in the test that there was no significant difference between two groups over the experience using RLM. This strengthens that RLM was perceived entertaining and made learners felt fun without influence of their previous experience on other technologies. In contrasts, learners will feel more fun if they are exposed to video before using RLM. In addition, from ANOVA tests to prove hypotheses four and five, it was found that gender and academic achievement levels have no significant difference on RLM in terms of entertaining and fun. This reflects that RLM could be a good application to convey learning content to students without regard to their gender and academic achievement.

With the evidences in the hypotheses, this study strongly argues that RLM is entertaining and making learners felt fun. This is a base to answer the second research question. With the results of the post-test which show that students scored higher than in the pre-test, it could be deduced that entertaining and fun eLM can be effective in delivering learning content to the intended users. This means, learners can have fun to learn effectively, and having fun while learning is not necessarily ineffective. This finding is supported by theories that suggest learning in constructive environment, where learners are encouraged to learn with at the same time performing some tasks.

On the other hand, majority of participants (55%) who were not familiar with video making found that they were able to create RLM (Figure 7.1). This reflects that RLM could be designed and developed by instructors who are not technically-skilled. In relation to discussion in the previous paragraph, RLM is entertaining and fun, yet it is possibly created by people without technical skills. This is interpretable that instructors regardless of technical skills are able to create eLM that is entertaining and fun (i.e. the RLM), which answers the research question number three.

NoTechnicalSkill

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not possible	27	45.0	45.0	45.0
	Possible	33	55.0	55.0	100.0
	Total	60	100.0	100.0	

Figure 7.1: Non-technical-skill participants are able to create RLM

This study investigated learning experience with RLM among students of HLI. It was inline with the current trends in HLI, where attention towards eLearning is given special treatment as discussed in Chapter 1. Next sub section discusses on how RLM could be utilized in HLI.

7.2.2 How To Make Use of RLM in HLI

RLM could be used similarly as materials that EchoSystem (discussed in Chapter 1) utilizes. There are two ways course instructors or lecturers could produce RLM. First, the course instructors or lecturers could hire assistant to create the RLM for them. In this method, they would just need to provide a description sheet as guidelines. Of course, they will be monitoring the content. When the RLM is ready, the instructors could upload the material into the existing infrastructure (i.e. the LCMS) for student access. In that case, learners could access the RLM even though if the class is postponed.

Second, the instructors could develop and produce the RLM on their own, which will require minimal technologies. As outlined in the QVRT method (Chapter 4), to prepare the RLM in-house, the developer will need one or a few video recorder, digital tape, video making software such as Windows Movie Maker, and multimedia related input and output devices. These equipments could be provided by the University for the Staffs, as are provided for student use. After all, those equipments are affordable; in fact many individuals have their own video recorder.

Instructors could always update with new RLM in the LCMS, as they always update their slides and notes. However, if they feel that the RLM could be used for a number of semesters, then they could remain the RLM in the LCMS.

RLM holds a number of benefits to students and instructors. As an eLM, which can be stored online or burnt on VCD, the RLM can be easily accessed, for students to learn on their own paced. If lecture is not possible to run as scheduled, the instructor could still ask students to study from the RLM. The technical skills required to develop RLM is very minimal, so instructors can develop RLM on their own.

7.3 CONTRIBUTIONS

The significance of this study can be seen in two aspects; the tangible artifacts and to the body of knowledge and theory. Chapter 1 elaborates the contributions more extensively.

RLM can be a beneficial form of content selling by people who have ideas and knowledge but lack of exposure, and technical skills on how to market their knowledge. With RLM, they could sell their contents (knowledge) on their own initiatives. On the other hand, this could enrich the sources in market that the community can have.

In relation, this study introduced the concept of RLM, a type of video where the contents are not cut. It includes natural reactions such as mistakes, feedbacks, and interferences to make the content presentation look and feel natural plus entertaining learners and invoking fun. Not only that, but RLM was also found effective in delivering contents.

The RLM concept was complimented with a conceptual design model, to guide developers on how to develop an RLM. The conceptual design model comprises requirements and steps to make an RLM and the components an RLM should include.

There were also two prototypes of RLM developed in this study. One of the RLMs contains contents on how to make VCD and another contains contents on introductory to videography. The first is intended for informal education, while the second was tailored for formal lessons at degree and diploma level.

This study also formed an adapted method in making RLM, which was inherited from a video production technique, and is named QVRT. The QVRT was utilized in making the prototypes, and it worked satisfyingly (discussed in Chapter 5).

Finally, this study also constructed an instrument that measures two dimensions of a system; (1) whether the system entertains learners and (2) whether the learners feel fun when learning. The instrument was named as Questionnaire for Measuring Entertaining and Fun (Q-MEF) and has been found reliable to measure what it is supposed to.

To the theories and body of knowledge, the findings of user testing reveal that RLM is entertaining and invoking fun among learners. Although the existing eLMs were found as adequately providing content, are interactive, containing video and animation, using multiple elements, and are easy to use as well as meeting other usability guidelines, however they were found not entertaining and not invoking fun. In conjunction, this study interprets that the elements of natural reactions are important in making learning activities entertaining and invoking fun. That, if designed carefully with the learning objectives in mind, would not neglect the effectiveness, as is already proven in this study (Chapter 6). This amends the existing knowledge, to compliment the user experience goals, that users feel entertained and fun through natural reactions. This finding is supported by the preference among viewers towards TV programmes; where in a survey, this study found that viewers prefer to watch reality programmes more than the non-reality.

7.4 LIMITATIONS AND RECOMMENDATIONS

The limitations can be divided into at least four categories:

- RLM
- Perceptions

- Research subjects
- Relation to computer games and commercial systems

7.4.1 RLM

RLM is proposed for delivering learning contents, in the form of a video. Specifically, the contents in RLM is not cut and not edited. Guidelines for usable video have not been found in any literature. This is completely different than the case of web site or any other types of applications, where guidelines and principles are easily found and followed. RLM when inherits the video metaphor; with limitations in terms of time and resources; did not focus on establishing such guidelines. It is a challenge for researchers to standardize guidelines and principles for RLM. Moreover in this age, video has become one of popular seamless technologies, applied not only for entertainment, but also for education purposes, like the RLM. With established guidelines and principles, especially for video in education (RLM), developers may be more interested in producing RLM.

This study anticipated that with variety of media elements blended in the prototypes of RLM, various learning intelligences were supported, as it is supposed to do. During the user testing, participants were observed to view the contents with different styles. Examples of the differences can be seen in the way they used the navigation slider, where some participants like to watch the contents without sliding the navigation slider, and some use the slider many times to skip unintended parts. However, this study did not study that aspect systematically, to empirically report the results, and analyze the importance. Scientific data regarding the different learning intelligences can provide sufficient information on how different learning intelligences as suggested in Multiple Intelligences in RLM could be applied. In the future, researchers could look into this aspect, utilizing field test method to engage real users of RLM for gathering empirical and qualitative data. This could better enhance the way information is delivered in RLM to a wider scope of users.

It was proven that learners learn effectively with the RLM, besides feeling fun when learning. In fact, when learners were experiencing different types of eLM, RLM were perceived more entertaining and the learners felt more fun than the courseware and video. However, whether the RLM is more effective than the courseware was not tested in this study. RLM is a newly proposed type of eLM, while courseware and video are two popular types of eLM. Generally, courseware is claimed as a good learning material, and has been used in various fields for many years. Organizations spend huge amount of money to develop courseware for different purposes as discussed in Chapter 1. Video also has been used in education and other purposes for many years ago. Accordingly, studies to compare their effectiveness in learning domain is necessary, perhaps the results could be good suggestions to utilize the three technologies in appropriate fields.

Besides that, inline with the advancement of mobile technologies, with supports of software and hardware, RLM should be available for play while learners are on the move. This requires that RLM is playable on mobile technologies, which is always associated with small screens. To achieve that, researchers have to be concern about interface guidelines, such as the use of scrolling bar vertically and horizontally should be minimized to user tasks and reduce memory load. In accordance, studies to make the RLM suitable for play on mobile devices should take place, so that RLM could be better utilized in learning domain.

Another issue that needs serious attention among researchers is about the copyright or digital rights management. RLM could be easily duplicated because it is a type of learning material, a type of content. In education, generally learning contents are open for sharing; however there may be some parties expecting that their intellectual properties will not be imitated. Studies on digital right management should look into how RLM could be protected. In addition, RLM should also be universal and playable on different platforms as other learning objects. This may need further studies to investigate whether RLM is compliant to SCORM standard.

7.4.2 Perceptions

Two generalizations made in this study are (1) that learners perceived the RLM as entertaining, and (2) they felt fun. They also perceived that RLM was more entertaining than courseware and video. However, this study only attempted to determine learners' perceptions on the RLM over the other eLM technologies; but not gathering the actual data representing the attribute of entertaining in the RLM and the feel of fun among human being. Other studies using different method such as carried out by Mandryk et al (2006) which collected psychophysiological data may help gathering more concrete information in terms of the feel of fun. In studies to gather psychophysiological data, special equipments are required. In contrast, to seek for the attributes of entertaining, in any electronic application require other methods of study.

7.4.3 Research Participants and Culture

This study gathered learning experience data among students of HLI. It was decided on two reasons; that RLM is meant for assisting learning and that it supports the current needs in eLearning initiatives in HLI, which serves as another type of eLM. Data in this study represent experience of adults in learning environments. However, besides the young adults (ages between 16 and 20), RLM could also be applied to learners of different ages, such as children and matured adults (ages 30 and over). To obtain data from different age groups, the process should start with developing RLM suitable for contents at intended groups. This contains contents for formal and informal lessons. Contents for school children could be easily obtained. However, to develop courseware and video might take significant time duration. Besides, future researchers should also interview lecturers of HLI to gather their feedback on RLM. Through the interview, the researchers could investigate information such as their readiness and willingness to implement RLM in their teaching activities, and acceptance pattern among different characteristics of lecturers.

7.4.4 Relation to Computer Games and Commercial Systems

Besides RLM, there are also a number of research studying computer games (such as Poels, Kort, & Ijsselsteijn, 2007) that assist learning. RLM and computer games are used in similar intention; to assist learning in informal environment[35]. Accordingly, RLM should have also been tested to compare the learning experiences between RLM and computer games. This study did not have any intention to study about the computer games. Findings about learning experiences using RLM and using computer games could be compared to observe which is more preferred by the learners. Analysis of technical requirement aspects could also be tabulated as part of suggestions for implementation.

In addition, the use of RLM could also be compared with the use of commercial system like EchoSystem. Besides, Chandra (2007) also attempted to study similar application, which could also be compared. The findings would be significant to make decision whether to plunge a huge amount of money for buying such a system or use the existing infrastructure with self-created RLM.

7.5 CONCLUSION

By inheriting the video metaphor, RLM was designed to be absolutely seamless (Ariffin & Norshuhada, 2009). It also inherits the concepts of reality TV that contains unplanned contents such as mistakes, interferences, feedbacks, and humor. It is proposed as another type of learning object in eLearning environment. From the findings obtained in this study, there were indications that RLM have three advantages which could be listed as:

- RLM is an entertaining learning object.
- RLM is more entertaining than video and courseware.
- RLM conveys learning content effectively to learners.

[35] Informal environment and informal lessons are different.

RLM will become an important part of our future. It is a learning object, that could be viewed in leisure time, and at the same time gain the learning contents. Learning with RLM should be entertaining, because positive experience is important to foster learning motivation (Marcus, 2007). Learners will learn without having to concentrate on tasks to control the learning object, but on the learning content while having fun at the same time. However, the RLM is not replacing the existing eLMs, it is just to complement the eLearning environment for enriching the diversification.

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APPENDIX A

Hello,
I am sure you enjoy watching TV in your free time. I want you to share with me your most favorite TV programmes.

Please list five most favourite TV programmes and state reasons for each.

Just reply this email.

Thank you.

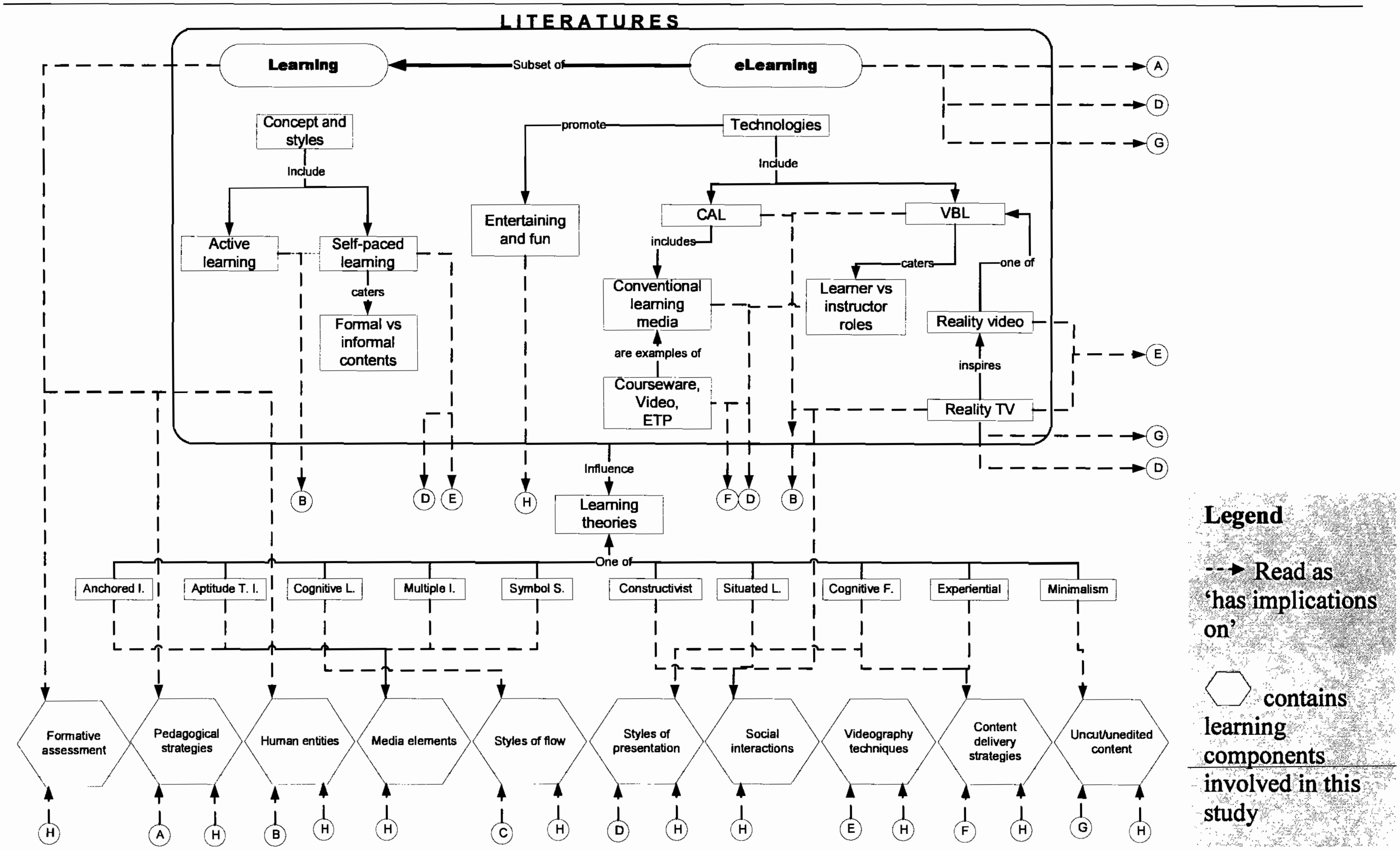
Hello,
Pastinya anda suka menonton TV pada masa lapang. Marilah berkongsi rancangan kegemaran dengan saya.

Senaraikan lima rancangan TV paling anda gemari dan sertakan sebab untuk setiap satu.

Hanya perlu balas emel ini.

Terima kasih.

APPENDIX B



LITERATURES
Learning
Subset of
eLearning
Concept and styles
Include
Active learning
Self-paced learning
caters
Formal vs informal contents
promote
Entertaining and fun
Technologies
Include
CAL
VBL
includes
Conventional learning media
are examples of
Courseware, Video, ETP
caters
Learner vs instructor roles
one of
Reality video
inspires
Reality TV
Influence
Learning theories
One of
Anchored I.
Aptitude T. I.
Cognitive L.
Multiple I.
Symbol S.
Constructivist
Situated L.
Cognitive F.
Experiential
Minimalism
Formative assessment
Pedagogical strategies
Human entities
Media elements
Styles of flow
Styles of presentation
Social interactions
Videography techniques
Content delivery strategies
Uncut/unedited content
Legend
Read as 'has implications on'
contains learning components involved in this study

APPENDIX C

Experts consulting the concept of RLM

Name	Expertise	Position	Institution
Assoc. Prof. Dr. Ahmad Jelani Shaari	Instructional Design	Head Coordinator Research and Innovation, Division of Educational Studies.	Universiti Utara Malaysia
Prof. Dr. Steven Meisel	Organizational Psychology and Video-based Learning	Associate Dean, School of Business	La Salle University

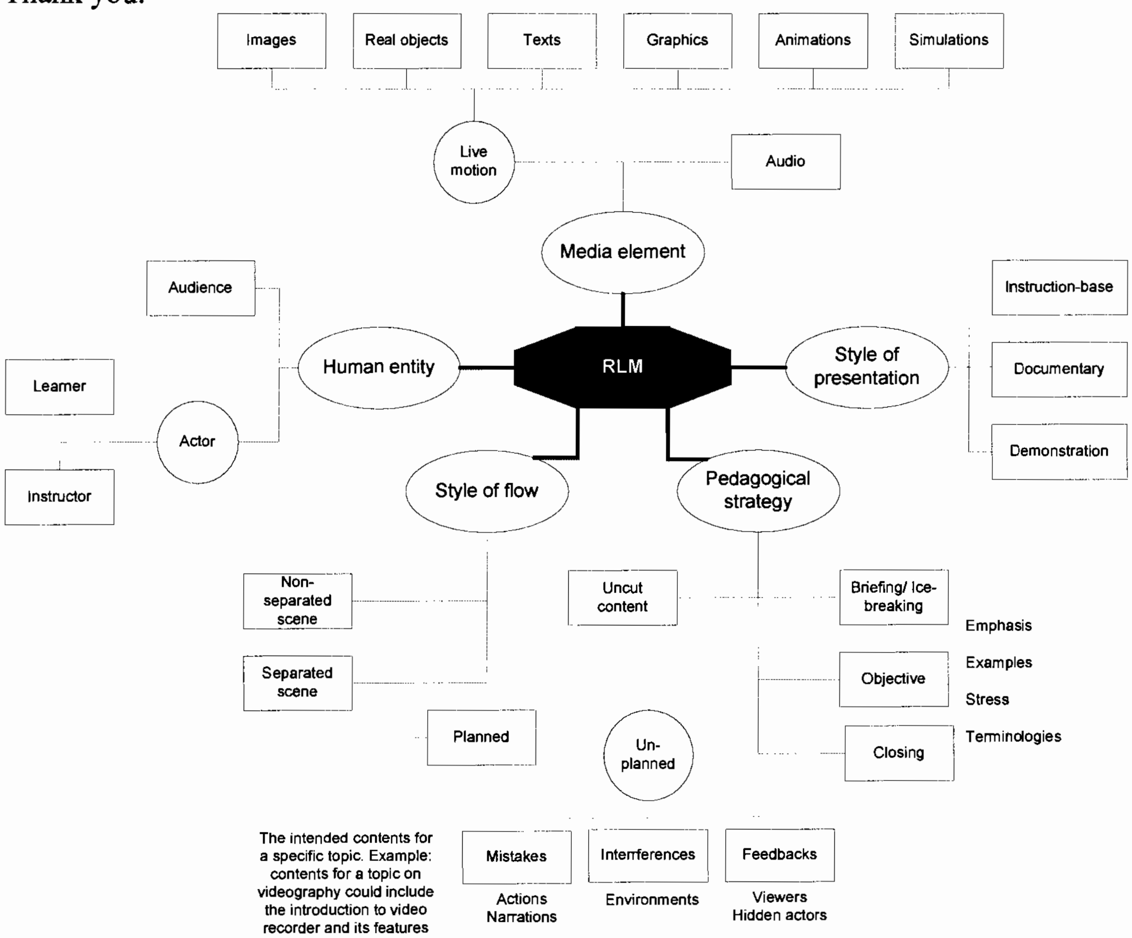
APPENDIX D

Form for experts reviewing the concept of RLM

Dr. Jelani,

This is the concept of learning material in the form of reality video. The concept is proposed to make learning entertaining and invoking fun. Nevertheless, the content should be delivered effectively. Please provide your recommendations from your view as an Instructional Design Expert for further improvements.

Thank you.

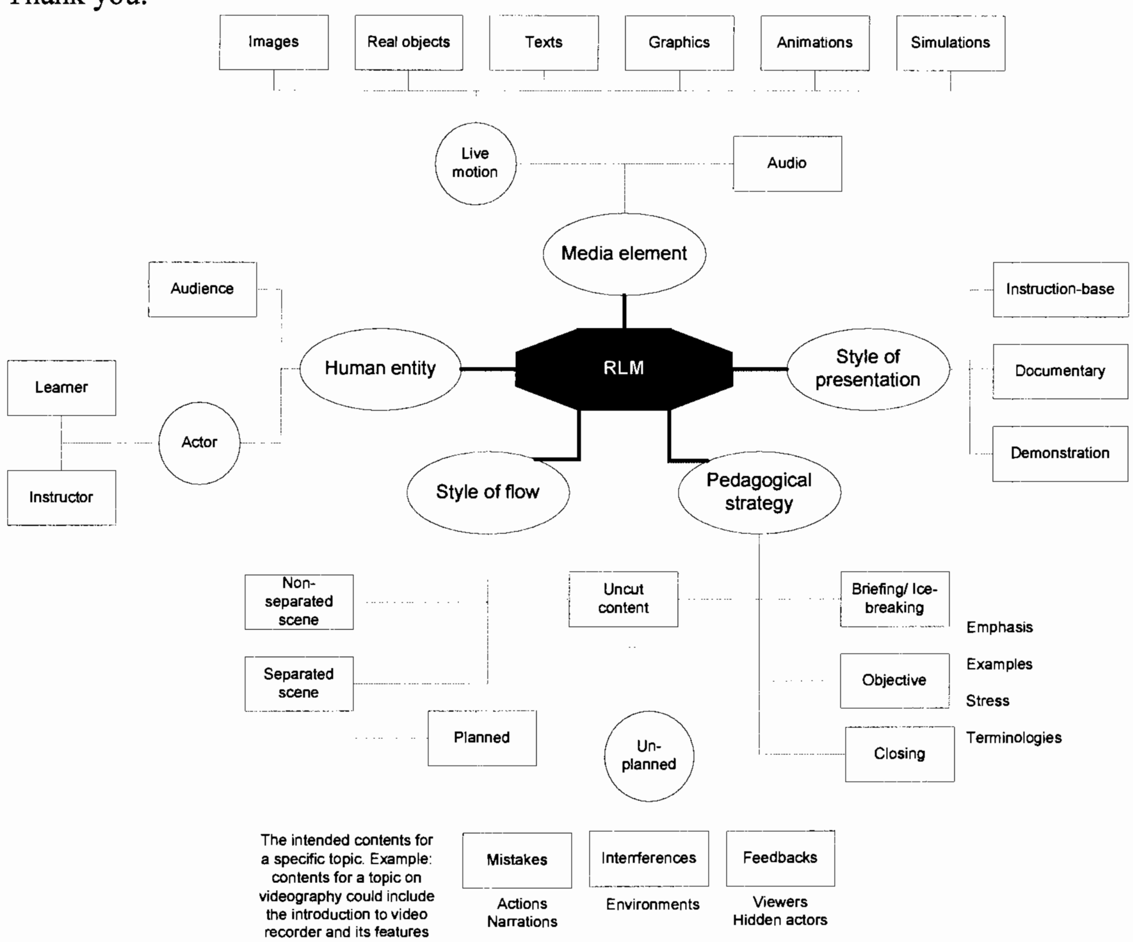


Form for experts reviewing the concept of RLM

Dr. Meisel,

This is the concept of learning material in the form of reality video. The concept is proposed to make learning entertaining and invoking fun. Nevertheless, the content should be delivered effectively. Please provide your recommendations from your view as a Video-Based Learning (VBL) Expert for further improvements.

Thank you.



APPENDIX E

Available online at http://tvp.moe.edu.my/Jadual2007/april_ogos.pdf

JADUAL WAKTU RANCANGAN TV PENDIDIKAN
BAHAGIAN TEKNOLOGI PENDIDIKAN
KEMENTERIAN PELAJARAN MALAYSIA

ULANGAN JULY & AUGUST 2007				
HARI MASA	**ISNIN 30.7.2007**	**SELASA 31.7.2007**	**RABU 1.8.2007**	**KHAMIS 2.8.2007**
9.00 Pagi	**MATHEMATICS (R) YEAR 1** Fractions	**BAHASA MELAYU (R)** Kemahiran Berfikir Dalam Pemahaman Karangan	**SCIENCE (M)** Electrolysis	**BAHASA MELAYU (M)** Makyung
9.30 Pagi	**ENGLISH (R)** AZ With Pento-NOP For You	**SCIENCE (R) YEAR 1** Living Things	**SEJARAH (MA)** Jeram Ampai Bhg.2	**SEJARAH (MR)** Mat Salleh Pahlawan Bhg.3
10.00 Pagi	**PENDIDIKAN MORAL (R)** Keadilan Episod 6	**PEMDIDIKAN ISLAM (R)** Dosa Pahala	**ENGLISH (M)** Write Right	**MATHEMATICS (M)** Straight Line
10.30 Pagi	**PEDAGOGI YEAR 1** English. Animals	**SIVIK (R)** Berbangga Dengan Rukun Negara	**PENDIDIKAN ISLAM (M)** Hadirnya Insan	**SIVIK (M)** Sistem Demokrasi
11.00 Pagi	**RANCANGAN KHAS** Kitar Semula Plastik	**RANCANGAN KHAS** Kitaran Asas. Penyejukan dan Penyaman Udara	**PENDIDIKAN MORAL (M)** Nilai Patriotisme	**SCIENCE (M)** Transport System In Human
MR=Menengah Rendah		**MA =Menengan Atas**		

JADUAL WAKTU RANCANGAN TV PENDIDIKAN
BAHAGIAN TEKNOLOGI PENDIDIKAN
KEMENTERIAN PELAJARAN MALAYSIA

AUGUST 2007				
HARI MASA	**ISNIN 6.8.2007**	**SELASA 7.8.2007**	**RABU 8.8.2007**	**KHAMIS 9.8.2007**
9.00 Pagi	**MATHEMATICS (R) YEAR 3** 3 Dimensional Shapes	**BAHASA MELAYU (R)** Indahnya Gurindam	**SCIENCE (M)** Matter	**BAHASA MELAYU (M)** Anak Laut
9.30 Pagi	**ENGLISH (R)** AZ With Pento-R To Z For You	**SCIENCE (R) YEAR 3** Soil	**SEJARAH (MA)** Jeram Ampai Bhg.3	**SEJARAH (MR)** Tragedi 14 Hari Bhg.1
10.00 Pagi	**PENDIDIKAN MORAL (R)** Sikap Terbuka Episod 7	**PEMDIDIKAN ISLAM (R)** Peristiwa Gua Hirak	**ENGLISH (M)** Teenstation. Of Lefties And Monkeys	**MATHEMATICS (M)** Whole Eltood &Warmboy
10.30 Pagi	**PEDAGOGI YEAR 2** Best Practices. Long&Shot	**SIVIK (R)** Jalur Gemilang Jata Negara	**PENDIDIKAN ISLAM (M)** Sembahyang Orang Sakit	**SIVIK (M)** Mengapai Cita- Cita
11.00 Pagi	**RANCANGAN KHAS** Tanah dan Sumbernya	**RANCANGAN KHAS** Baju Kurung Tradisional	**PENDIDIKAN MORAL (M)** Mematuhi Peraturan Dan Undang-Undang	**SCIENCE (M) FORM 3** Space Exploration Part 1
MR=Menengah Rendah		**MA =Menengan Atas**		

JADUAL WAKTU RANCANGAN TV PENDIDIKAN
BAHAGIAN TEKNOLOGI PENDIDIKAN
KEMENTERIAN PELAJARAN MALAYSIA

ULANGAN AUGUST 2007				
HARI MASA	**ISNIN 13.8.2007**	**SELASA 14.8.2007**	**RABU 15.8.2007**	**KHAMIS 16.8.2007**
9.00 Pagi	**MATHEMATICS (R) YEAR 3** 3 Dimensional Shapes	**BAHASA MELAYU (R)** Indahnya Gurindam	**SCIENCE (M)** Matter	**BAHASA MELAYU (M)** Anak Laut
9.30 Pagi	**ENGLISH (R)** AZ With Pento-R To Z For You	**SCIENCE (R) YEAR 3** Soil	**SEJARAH (MA)** Jeram Ampai Bhg.3	**SEJARAH (MR)** Tragedi 14 Hari Bhg.1
10.00 Pagi	**PENDIDIKAN MORAL (R)** Sikap Terbuka Episod 7	**PEMDIDIKAN ISLAM (R)** Peristiwa Gua Hirak	**ENGLISH (M)** Teenstation. Of Lefties And Monkeys	**MATHEMATICS (M)** Whole Eltood &Warmboy
10.30 Pagi	**PEDAGOGI YEAR 2** Best Practices. Long & Shot	**SIVIK (R)** Jalur Gemilang Jata Negara	**PENDIDIKAN ISLAM (M)** Sembahyang Orang Sakit	**SIVIK (M)** Mengapai Cita- Cita
11.00 Pagi	**RANCANGAN KHAS** Tanah dan Sumbernya	**RANCANGAN KHAS** Baju Kurung Tradisional	**PENDIDIKAN MORAL (M)** Mematuhi Peraturan Dan Undang-Undang	**SCIENCE (M) FORM 3** Space Exploration Part 1
MR=Menengah Rendah			**MA =Menengan Atas**	

JADUAL WAKTU RANCANGAN TV PENDIDIKAN
BAHAGIAN TEKNOLOGI PENDIDIKAN
KEMENTERIAN PELAJARAN MALAYSIA

AUGUST 2007				
HARI MASA	**ISNIN 20.8.2007**	**SELASA 21.8.2007**	**RABU 22.8.2007**	**KHAMIS 23.8.2007**
9.00 Pagi	**MATHEMATICS (R) YEAR 4** 2 Dimensional Shapes	**BAHASA MELAYU (R)** Bicara Sajak	**SCIENCE (M)** 3 States Of Matter	**BAHASA MELAYU (M)** Adik Berjasa Bhg. 1
9.30 Pagi	**ENGLISH (R)** Nac's World Episode 10	**SCIENCE (R) YEAR 4** Understanding Length	**SEJARAH (MA)** Wang-Wang	**SEJARAH (MR)** Tragedi 14 Hari Bhg.2
10.00 Pagi	**PENDIDIKAN MORAL (R)** Alam Sekitar Episod 8	**PEMDIDIKAN ISLAM (R)** Mukjizat Al-Quran	**ENGLISH (M)** Teenstation. Do You Believe In Ghosts	**MATHEMATICS (M)** Angle
10.30 Pagi	**PEDAGOGI FORM 4** Best Teaching Practices Mathematics. Histogram	**SIVIK (R)** Bahasa Jiwa Bangsa	**PENDIDIKAN ISLAM (M)** Ilmu Pengetahuan	**SIVIK (M)** Bersatu Teguh
11.00 Pagi	**RANCANGAN KHAS** Fotosintesis	**RANCANGAN KHAS** Arnhan Ikan Keli	**PENDIDIKAN MORAL (M)** Menghargai Dan Menyayangi Alam Sekitar	**SCIENCE (M) FORM 3** Space Exploration Part 2
MR=Menengah Rendah			**MA =Menengan Atas**	

**JADUAL WAKTU RANCANGAN TV PENDIDIKAN
BAHAGIAN TEKNOLOGI PENDIDIKAN
KEMENTERIAN PELAJARAN MALAYSIA**

ULANGAN AUGUST 2007				
HARI MASA	**ISNIN 27.8.2007**	**SELASA 28.8.2007**	**RABU 29.8.2007**	**KHAMIS 30.8.2007**
9.00 Pagi	**MATHEMATICS (R) YEAR 4** 2 Dimensional Shapes	**BAHASA MELAYU (R)** Bicara Sajak	**SCIENCE (M)** 3 States Of Matter	**BAHASA MELAYU (M)** Adik Berjasa Bhg. 1
9.30 Pagi	**ENGLISH (R)** Nac's World Episode 10	**SCIENCE (R) YEAR 4** Understanding Length	**SEJARAH (MA)** Wang-Wang	**SEJARAH (MR)** Tragedi 14 Hari Bhg.2
10.00 Pagi	**PENDIDIKAN MORAL (R)** Alam Sekitar Episod 8	**PEMDIDIKAN ISLAM (R)** Mukjizat Al-Quran	**ENGLISH (M)** Teenstation. Do You Believe In Ghosts	**MATHEMATICS (M)** Angle
10.30 Pagi	**PEDAGOGI FORM 4** Best Teaching Practices Mathematics. Histogram	**SIVIK (R)** Bahasa Jiwa Bangsa	**PENDIDIKAN ISLAM (M)** Ilmu Pengetahuan	**SIVIK (M)** Bersatu Teguh
11.00 Pagi	**RANCANGAN KHAS** Fotosintesis	**RANCANGAN KHAS** Aruhan Ikan Keli	**PENDIDIKAN MORAL (M)** Menghargai Dan Menyayangi Alam Sekitar	**SCIENCE (M) FORM 3** Space Exploration Part 2
MR=Menengah Rendah		**MA =Menengan Atas**		

APPENDIX F

Aspects in typical video production

Pre-production	Program objectives:	
	Angle	1*
	Evaluation	2
	Medium Requirement:	
	Script	3
	Producer – budget	4
	Director	5
	Talent (actor)	6
	Art director	7
	Floor plan	8
	Storyboard	9
	Technical personnel	10
	Facilities and equipment	11
	Studio production or Field production	12
	Single-camera production	13
	Multi-camera production	14
Production	Personnel:	
	Nontechnical production personnel	15
	Technical production personnel	16
	Communication	17
	Schedule and timeline	18
	Basic camera functions and elements	
	Function:	
	Lens:	19
	Focal length (zoom lens):	20
	Wide-angle lens (short focal length)	21
	Narrow-angle lens (long focal length)	22
	Zoom range (zoom ratio)	23
	Digital zoom	24
	Lens speed	25
	Lens iris and aperture	26
	f-stop	27
	Auto-iris	28
	Imaging device:	
	Beam splitter	29
	Charge-coupled device	30
	Video signal processing	
	Luminance channel (also known as the *luma*, or *Y*, *channel*)	31
	Chrominance channel (also known as *color*, or *C*, *channel*)	32

	Viewfinder	33
	Types of cameras:	
	Camcoders	34
	Studio cameras	35
	Field cameras	36
	Electronic News Gathering/Electronic Field Production (ENG/EFP) cameras	37
	HDTV cameras	38
	Basic camera movements:	
	Pan – turn the camera 'lift-right' horizontally.	39
	Tilt – make the camera point up or down.	40
	Cant – tilt the camera sideways.	41
	Pedestal – to elevate or lower the camera on the center column of a tripod or pedestal.	42
	Dolly – move the camera towards or away from an object.	43
	Truck – or 'track', move the camera laterally by means of a mobile camera mount.	44
	Arc – move camera in a slightly curved dolly or truck	45
	movement.	46
	Crane – or 'boom', move camera up and down on a camera	
	crane or jib arm.	47
	Tongue – move the whole camera from left to right (vice	
	versa) with the boom of a camera crane or jib arm.	48
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	Sound recording	85
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* indicates the item number

APPENDIX G

Videography Professional

- Objectives of course – after learning the course, learners will be able:
  - to name the features of video recorder.
  - to use and operate the features.
  - to use microphone when shooting.
- Target audience – diploma and degree students of private and public colleges and universities. The prototype is specifically targeted for people aged 16 to 20 years old.
- Type of content / lesson – formal
- Concept – leisure
- Content / modules:
  a. Introduction of video recorder features.
  b. Operating battery, tape, and lens.
  c. Operating LCD screen and ON button.
  d. Operating zooming function.
  e. Operating focusing function.
  f. Setting automatic mode.
  g. Operating Shuttle Speed, Iris, and Gain functions.
  h. Operating Indoor/Outdoor functions.
  i. Operating White Balance function.
  j. Operating ND Filter function.
  k. Operating Zebra function.
  l. Using microphones in shooting.
- Storage media – CD or DVD

How To Make VCD/DVD

- Objectives of course – after learning the course, learners will be able:
  - to do the 'shooting'.
  - to do the 'editing'.
  - to transfer video project into VCD, and packaging.
- Target audience – anyone aged ranging 15 to 25.
- Type of content – informal
- Concept – leisure
- Content / modules
  a. Using the video camera and video shooting.
  b. Connecting cables.
  c. Importing clips from recorder into computer.
  d. Editing video clips.
  e. Inserting transition into video clips.
  f. Inserting video effects into video clips.
  g. Inserting audio/music into video clips.
  h. Inserting picture into video clips.
  i. Inserting text into video clips.
  j. Saving video project in computer.
  k. Transferring video project into VCD/DVD.
- Storage media – CD or DVD

APPENDIX H

Note (This notes apply to all RLM):

- Emphasis on important parts in various ways such as repeating words/phrases, changing tones, use various words, and providing examples.
- Use less technical terminologies to support different level of background knowledge.
- Stress important parts to engage learners' attention, as if they are situated in real learning environment.

Videography Professional

General	
Concept	Leisure – conversation is natural, use of terminologies should not be too technical.
Type of actor	Instructor
Number of actor	1
Metaphor / props	Office setting
Instructional	
Type of content	Formal
Duration	Not more than 50 minutes
Style of flow	A combination of separated and non-separated scenes. Minimal transition used for separated scenes.
Style of presentation	Demonstration
Content	
Objective	▪ To introduce the features of video recorder. ▪ To teach learners to use and operate the features. ▪ To teach learners to use microphone when shooting.
Tackling objective 1	Use real video camera to highlight important features. Use different models of camera to show different locations for similar features on different camera.
Tackling objective 2	Use real video camera, operate the features. Features are: a. Battery, tape, and lens. b. LCD screen and ON button. c. Zooming function. d. Focusing function. e. Automatic mode. f. Shuttle Speed, Iris, and Gain functions. g. Indoor/Outdoor functions. h. White Balance function. i. ND Filter function and Zebra function.
Tackling objective 3	Use real apparatus.
Shooting technique	Single camera, tripod is used in most situation. - focusing and zooming functions

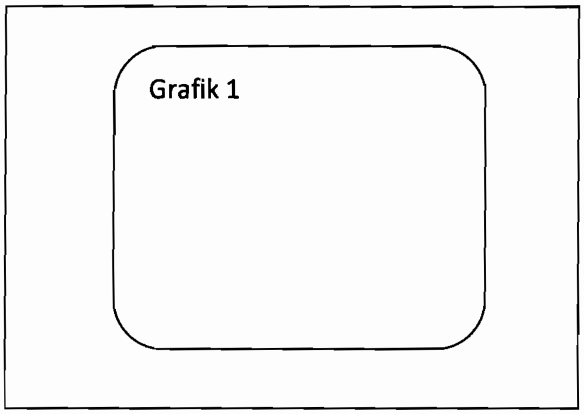
Note (This notes apply to all RLM):

- Emphasis on important parts in various ways such as repeating words/phrases, changing tones, use various words, and providing examples.
- Use less technical terminologies to support different level of background knowledge.
- Stress important parts to engage learners' attention, as if they are situated in real learning environment.

How To Make VCD/DVD

General	
Concept	Leisure
Type of actor	Learner
Number of actor	1 actor and 1 hidden actor as an instructor.
Metaphor / props	Office setting
Instructional	
Type of content	Informal
Duration	Not more than 50 minutes
Style of flow	A combination of separated and non-separated scenes. Minimal transition used for separated scenes.
Style of presentation	Instruction-based, where actor performs tasks as commanded by hidden actor who responsible as the instructor.
Content	
Objective	▪ To teach learners to do the 'shooting'. ▪ To teach learners to do the 'editing'. ▪ To teach learners to transfer video project into VCD, and packaging.
Tackling objective 1	The actor demonstrates how to hold camera, and shooting. Actor asks questions to make sure the methods are correct.
Tackling objective 2	Actor receives commands from instructor (hidden actor) to perform following tasks / functions: a. Connecting cables. b. Importing clips from recorder into computer. c. Editing video clips. d. Inserting transition into video clips. e. Inserting video effects into video clips. f. Inserting audio/music into video clips. g. Inserting picture into video clips. h. Inserting text into video clips. i. Saving video project in computer.
Tackling objective 3	Actor performs tasks as instructed to transfer video project into VCD, and packaging.
Shooting technique	Single camera, tripod is used in most situation. - focusing function and zooming function

APPENDIX I

<table>
<tr><th colspan="2">Screen: Montage</th></tr>
<tr><th>Visual</th><th>Content</th></tr>
<tr><td>


Animation

Grafik1:
Animasi grafik merangkumi animasi tulisan dan latarbelakang yang bergerak.

Presentation:
Teks akan keluar dan zooming pada teks yang seterusnya seolah-olah skrin yang bergerak ala rollercoster yang pergi ke teks-teks

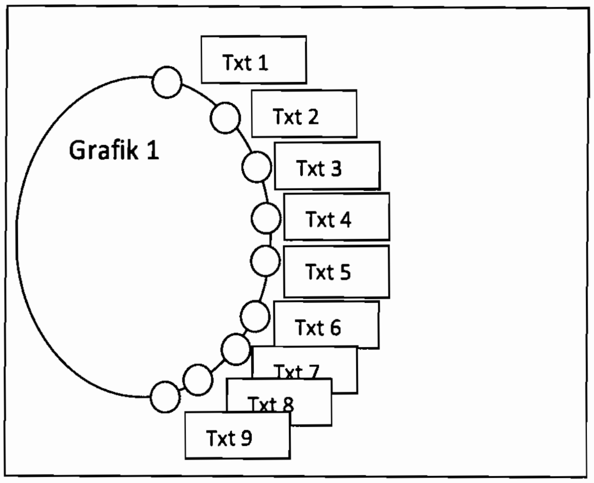
Text1:
Mempelajari Asas Fotografi PRO

Text2:
Teknik pembelajaran yang mudah diikuti.

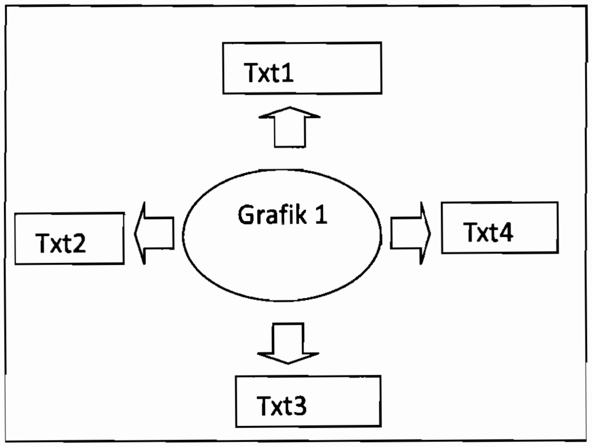
Text3:
Video yang menarik dan interaktif.

Text4:
Langkah pembelajaran yang mudah.

Text5:
Grafik dan audio yang menarik.
</td><td></td></tr>
</table>

Text6: Kini, anda boleh mempelajarinya hanya dalam 1 CD.	
Screen: Main Menu	
Visual	**Content**
 **Animation** **Grafik1:** Grafik movie clip kamera..buat dalam bentuk bulat.gambar grafik ada sikit animasi bergerak.contoh: terdapat bebola kecil yang bercahaya dan bergerak. **Cara persembahan Butang menu:** Apabila scene mula load..keluar grafik 1 dalam beberapa saat. kemudian,keluar butang-butang menu secara menggelongsor mengikut bentuk bulatan di bahagian tepi..dan keluar teks menu secara fade out. **Link:** *Hover:* Tulisan dan butang akan besar serta butang akan berkelip. *Klik:* Ada sound dan tukar warna. **Txt1:** Mengenali ciri-ciri kamera perakam video. **Txt1:** Cara mengedalikan bukaan bateri, pita (tape) video dan lensa kamera.	Selamat Datang dan selamat menggunakan VCD Asas Videografi PRO. Anda akan mempelajari cara mengendalikan perakam video digital jenis Sony HDV. Perkataan kamera dalam modul pembelajaran ini merujuk kepada kamera perakam video digital. Kebanyakan Kamera yang berevolusi tinggi memiliki ciri-ciri dan fungsi yang lebih kurang sama dengan kamera Sony HDV ini. Oleh itu, dalam sesi pembelajaran ini, model yang akan digunakan ialah Sony HDV 1080i.

Txt2: Cara menggunakan Skrin LCD dan Butang ON pada kamera. **Txt3:** Cara menggunakan fungsi zooming **Txt4:** Cara menggunakan fungsi fokus **Txt5:** Cara setkan kamera secara automatik **Txt6:** Cara menggunakan butang setting Shuttel speed, Iris dan Gain. Txt7: Cara setkan kamera mengikut keadaan sekeliling indoor/outdoor. **Txt8:** Cara menggunakan White Balance. **Txt9:** Cara menggunakan ND Filter. **Txt10:** Cara menggunakan fungsi butang zebra. **Txt11:** Cara menggunakan Pembesar suara.	

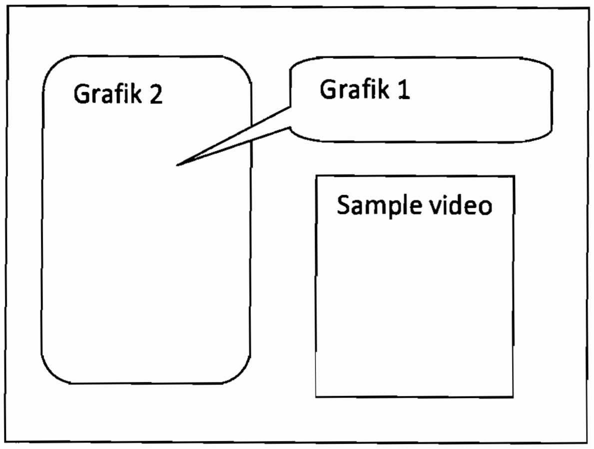
Screen: Knowing the features of video camera.	
Visual	**Content**
 **Animation** **Grafik1:** Gambar Kamera sony HDV secara 3D yang akan bergerak secara berpusing. **Anak Panah:** Grafik arrow akan berkelip-kelip. **Link:** Setiap txt akan link kepda scene yang berlainan. **Txt1:** Sudut Atas **Txt2:** Sudut Kiri **Txt3:** Sudut Bawah **Txt4:** Sudut Kanan	Visual menunjukkan ciri-ciri Kamera Perakam Sony HDV. Pada sesi pembelajaran pertama ini, anda akan mengenali dahulu ciri-ciri serta butang-butang yang terdapat pada kamera Sony HDV sebelum anda mempelajari setiap fungsi-fungsi kamera ini. Klik pada anak panah tersebut dan anda dapat lihat ciri-ciri yang terdapat pada kamera tersebut mengikut sudut penglihatan yang anda telah pilih.

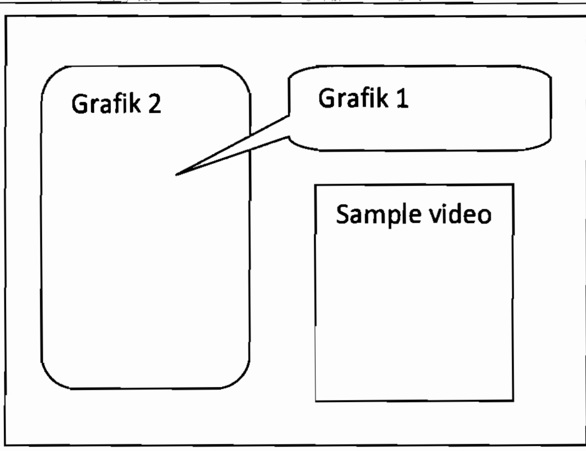
Screen: Top view	
Visual	**Content**
Grafik 1 **Animation** **Grafik 1:** Gambar kamera pada sudut atas dan setiap butang kamera dilabelkan.	

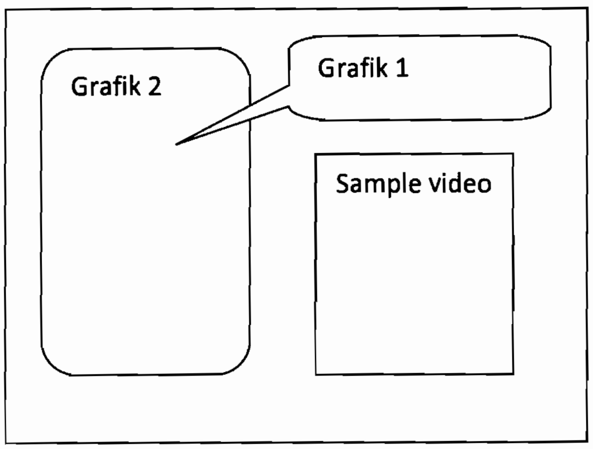
Screen: Left View	
Visual	**Content**
Grafik 1 **Animation** **Grafik 1:** Gambar kamera pada sudut kiri dan setiap butang kamera dilabelkan.	

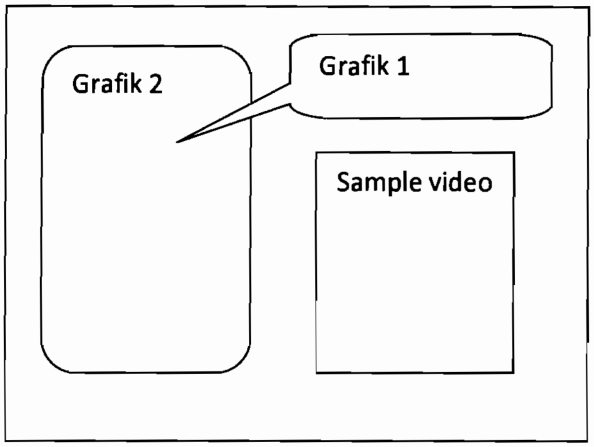
Screen: Bottom View	
Visual	**Content**
Grafik 1 **Animation** **Grafik 1:** Gambar kamera pada sudut bawah dan setiap butang kamera dilabelkan.	

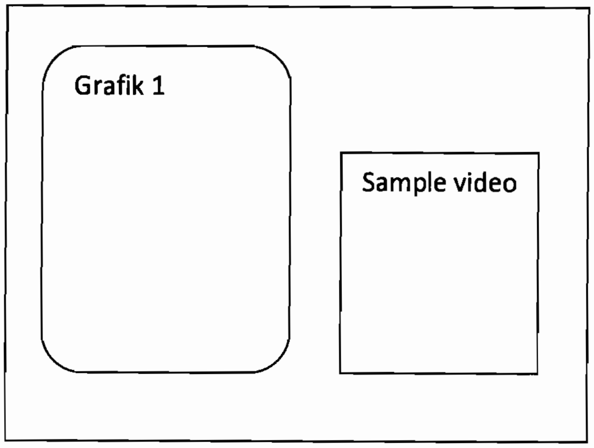
Screen: Right View	
Visual	**Content**
Grafik 1 Animation **Grafik 1:** Gambar kamera pada sudut kanan dan setiap butang kamera dilabelkan.	

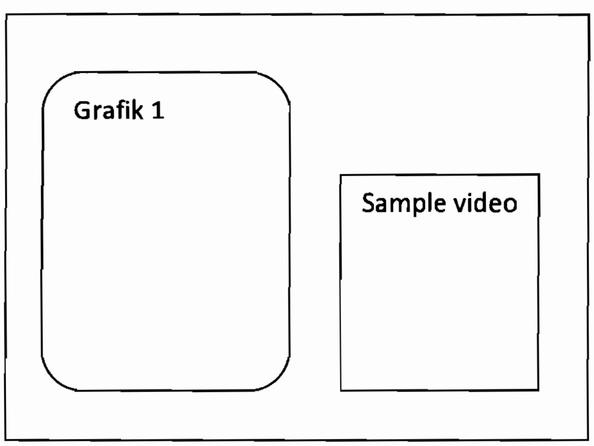
Screen: Learning the video recorder functions (Fixing batteries)	
Visual	**Content**
 **Animation** **Grafik 1:** Zooming Grafik animasi butang 'Batt release' ditekan. **Grafik 2:** Grafik menunjukkan bateri video ditarik keluar.	Terdapat banyak fungsi perakam video yang anda boleh dapati pada kamera ini. Sebagai contoh: focus, iris, white balance, zoom, lighting dan sebagainya. Dalam bab pertama ini, anda akan mempelajari cara untuk membuka bateri kamera. Tekan butang Batt Release dan jangan lepaskan butang tersebut. Sekali gus, angkat bateri itu ke atas dan tarik keluar. Tips: Untuk melakukan rakaman video yang agak lama. seelok-eloknya anda haruslah menggunakan bateri jenis litium kerana mempunyai simpanan kuasa yang banyak iaitu selama 570 minit.

Screen: Learning the video recorder functions (Taking-out tape)	
Visual	**Content**
 **Animation** **Grafik 1:** Grafik animasi butang Batt release ditekan. Masukkan teks perhatian juga..sebagai tanda amaran.	Bagi memulakan rakaman video, anda hendaklah memiliki pita (video tape) bagi membolehkan anda menyimpan segala rakaman yang anda akan lakukan. Caranya ialah: tarik butang OPEN/EJECT. Secara automatik video tape akan keluar dengan sendirinya. Tugas memasukkan video tape pula adalah dengan cara memasukkan video tape tersebut ke dalam kelongsong perakam tape dan kemudian tutup penutup perakam video tape dengan perlahan. Secara automatik video tape tersebut akan tersimpan di dalam kemera. Perhatian: Jangan cuba tolak sendiri pada bahagian perakam tape. Pastikan anda memasukkan tape dengan betul iaitu masukkan bahagian yang berwarna

Grafik 2: Grafik mengandungi bateri video ditarik keluar. **Sample video:** Bahagian video membenarkan pengguna menekan butang play untuk memainkan video untuk memasang dan membuka tape. Butang Navigasi Play dan Stop sahaja.	dahulu di bawah.
Screen: Learning the video recorder functions (Opening lens cover)	
Visual	**Content**
 **Animation** **Grafik 1:** Grafik animasi butang lensa ditarik ke atas dalam beberapa saat dan ditarik ke bawah pula. **Grafik 2:** Grafik menunjukkan penutup lensa dibuka dalam beberapa sat dan kemudian ditutup pula. **Sample video:** Bahagian video membenarkan pengguna menekan butang play untuk memainkan video untuk menarik butang lensa. Butang Navigasi Play dan Stop sahaja.	Untuk menggunakan lensa kamera, pastikan penutup lensa kamera dibuka terlebih dahulu untuk membolehkan kamera anda merakam video. Butang yang dapat mengawal bukaan penutup lensa kamera terletak pada bahagian hujung lensa. Ia merupakan butang kawalan yang boleh ditarik ke atas dan ke bawah. Tarik butang lensa ke atas untuk membuka penutup lensa. Dan jika anda tidak mahu merakam video, pastikan penutup lensa kamera ditutup dengan menarik butang lensa ke bawah.

Screen: Learning the video recorder functions (Previewing on screen)	
Visual	**Content**
 **Animation** **Grafik 1:** Gambar view finder **Grafik 2:** Gambar beranimasi, skrin LCD ditarik dan dibuka. **Sample video:** Bahagian video membenarkan pengguna menekan butang play untuk memainkan video untuk menarik skrin LCD. Butang Navigasi Play dan Stop sahaja.	Kebanyakan kamera terkini dilengkapi skrin LCD kecil bagi memudahkan perakam melihat rakaman (view) yang sedang dirakamkan. Untuk melihat view rakaman semasa dengan menggunakan skrin LCD kamera anda, anda perlu: Buka dan tarik skrin LCD rakaman keluar, supaya anda boleh melihat rakaman yang sedang dirakam. Bagi kamera berjenis Sony HDV ini terdapat 2 bahagian preview yang anda boleh gunakan samada dengan menggunakan skrin LCD preview atau view finder.

Screen: Learning the video recorder functions (Starting to operate)	
Visual	**Content**
 **Animation** **Grafik 1:** Gambar animasi menunjukkan cara butang on CAMERA dan VCD ditekan..selang beberapa minit butang rekod (berwarna merah) pula ditekan **Sample video:** Bahagian video yang membenarkan pengguna menekan butang play untuk memainkan video on camera dan start record. Butang Navigasi Play dan Stop sahaja.	Jika anda sudah bersedia untuk menggunakan kamera rakaman video, anda perlu menghidupkan fungsi kamera tersebut dengan cara: menekan butang hijau pada bahagian power kamera dan jangan lepaskannya. Kemudian tolak butang tersebut ke ke atas yang menunjuk arah tulisan CAMERA. Kini, kamera perakam video anda telahpun dihidupkan Jika anda mahu melihat kembali video rakaman yang anda telah rakamkan, tekan butang hijau dan tolak ke bawah yang menunjukkan ke arah tulisan VCR. Kini, anda boleh melihat kembali rakaman pada skrin LCD kamera yang anda telah lakukan. Untuk memulakan rakaman video pula. Tekan, butang rakaman. Kebiasaannya, butang rakaman tersebut berhampiran dengan butang ON/OFF. Apabila butang rakaman anda telah ditekan, kini anda bolehlah merakam video yang anda mahu.

Screen: Learning the video recorder functions (Zooming - handle)	
Visual	**Content**
 **Animation**	Fungsi Zooming yang terdapat pada kamera adalah untuk memperdekatkan lagi view rakaman video anda. Sebagai contoh, jika ada objek yang jauh dari rakaman anda dan anda mahu mengambil gambar video objek tersebut, anda bolehlah menggunakan fungsi zooming untuk melihat objek tersebut dengan lebih dekat lagi. Fungsi zooming ini boleh disama ertikan dengan kanta mata, di mana ia boleh memperdekatkan lagi penglihatan objek yang jauh. Cara menggunakan fungsi zoom ini adalah dengan menekan satu butang zoom yang terdapat pada pemegang kamera. Label W (wide) adalah untuk

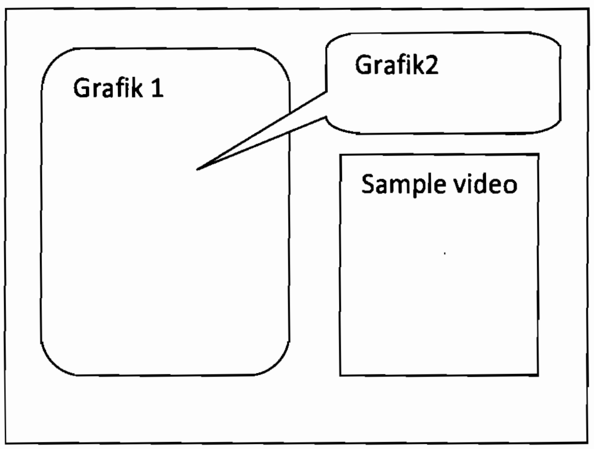
<table>
<tr>
<td>Grafik 1:
Gambar animasi menunjukkan cara butang pada pemegang ditekan untuk mengawal video.

Sample video:
Bahagian video membenarkan pengguna menekan butang play untuk memainkan video cara untuk guna zoom di pemegang kamera. Butang Navigasi Play dan Stop sahaja.</td>
<td>(Zoom out) menjauhkan lagi rakaman view objek. Label T (Tele) adalah untuk (Zoom in) mendekatkan lagi rakaman view objek.

Tips:
Untuk merakam video di dalam sebuah bilik yang kecil, pilih zoom W (wide) supaya seluruh kawasan bilik tersebut dapat dirakam.

Untuk melakukan rakaman di kawasan yang luas, anda akan berhadapan dengan gambar yang terlalu jauh dan tidak jelas. Maka anda bolehlah menggunakan fungsi Zoom T (Tele) untuk mendapatkan gambar yang lebih jelas dan dekat.</td>
</tr>
</table>

<table>
<tr><th colspan="2">Screen: Learning the video recorder functions (Zooming - lens)</th></tr>
<tr><th>Visual</th><th>Content</th></tr>
<tr>
<td>



Animation

Grafik 1:
Gambar animasi menunjukkan cara menggunakan gegelang lensa dikawal.

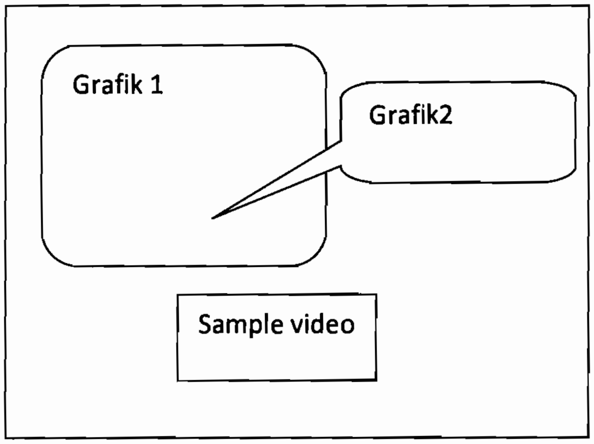
Grafik2:
Gambar animasi menunjukkan cara setkan fokus

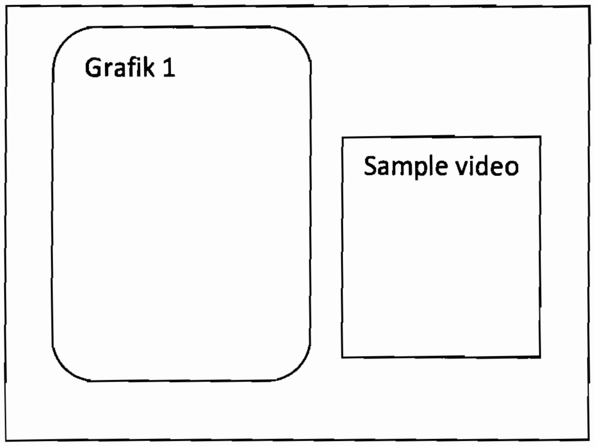
Sample video:
Bahagian video membenarkan pengguna menekan butang play untuk memainkan video cara untuk kawal zoom di lensa kamera. Butang Navigasi Play dan Stop sahaja.</td>
<td>Selain zoom pada pemegang, anda boleh menggunakan fungsi zoom yang terdapat pada lensa kamera. Sebelum anda mahu menggunakan fungsi zoom di bahagian lensa kemera, anda hendaklah mengubah setting pada kamera tersebut.

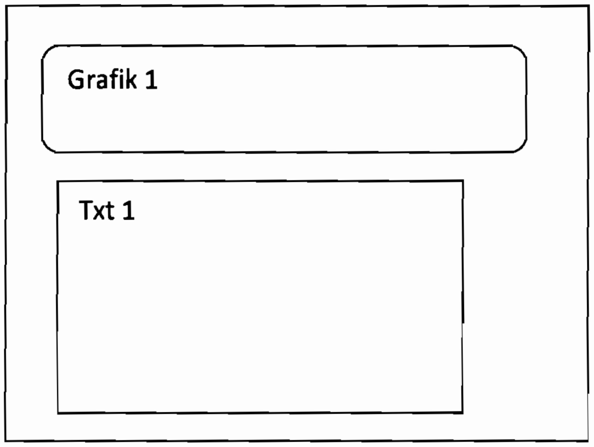
Perhatikan pada bahagian tepi bawah lensa tersebut terdapat bahagian yang bertulis zoom.

Tarik butang ke tulisan Ring untuk menggunakan fungsi zoom pada bahagian lensa. Atau tarik butang ke tulisan lever/remote untuk menggunakan fungsi zoom pada bahagian pemegang kamera.

Selalunya, anda akan gunakan gegelang fokus ini untuk menfokuskan sesuatu objek dengan lebih cepat dan boleh melaraskannya mengikut keinginan cara focus anda tersendiri.</td>
</tr>
</table>

Screen: Learning the video recorder functions (Focusing – manual)	
Visual	**Content**
 **Animation** **Grafik 1:** Gambar animasi menunjukkan cara gegelang fokus kamera digunakan. **Grafik2:** Gambar animasi menunjukkan cara setkan fokus **Sample video:** Bahagian video membenarkan pengguna menekan butang play untuk memainkan video cara untuk menggunakan gegelang fokus. Butang Navigasi Play dan Stop sahaja.	Kamera ini mempunyai fungsi fokus. Fungsi fokus ini bertujuan untuk menjadikan gambar yang anda rakamkan lebih jelas atau lebih kabur. Terdapat dua cara yang boleh digunakan untuk menggunakan fungsi fokus ini iaitu secara Manual atau Automatik. Dalam bab ini, anda akan mempelajari cara-cara untuk menggunakan fungsi fokus secara manual dahulu. Cara menggunakan fungsi fokus secara manual adalah dengan mengawal gegelang yang terdapat pada bahagian lensa kamera. Jika anda menfokuskan kepada sesuatu objek, objek yang anda rakamkan tersebut akan lebih jelas berbanding objek-objek lain di sekelilingnya. Tips: Selalunya apabila anda menggunakan fungsi zoom, anda akan turut menggunakan fungsi fokus untuk menghasilkan satu gambar video yang lebih menarik

Screen: Learning the video recorder functions (Focusing – auto)	
Visual	**Content**
 **Animation** **Grafik 1:** Gambar animasi yang menujukkan butang setting fokus ditarik mengikut fungsinya.. **Sample video:** Bahagian video membenarkan pengguna melihat cara dan kesan apabila kita guna fungsi fokus auto manual dan push auto.	Anda telah mempelajari bagaimana mahu mengawal gegelang fokus secara manual. Sebagai tambahan, anda juga boleh mengubah setting pada kawasan fokus yang boleh mengawal semua program kamera samada automatik atau manual. Terdapat 3 opsyen, untuk mengubah setting fokus pada kamera iaitu: Automatik, Manual dan Infinity. Fungsi automatik ini adalah untuk menjadikan kamera tersebut fokus secara automatik. Apabila anda telah menukar setting fokus kepada auto, maka gegelang kawalan fokus pada lensa tidak akan berfungsi. Opsyen manual berfungsi untuk melaraskan sendiri gegelang fokus yang terdapat pada lensa kemera. Infiniti pula digunakan apabila anda telah hilang punca untuk menfokuskan sesuatu objek. Apabila butang ini ditarik, secara langsung, kamera anda akan menfokuskan secara infiniti dan anda bolehlah mengawal gegelang fokus dengan mengurangkan kuantiti fokus tersebut sehingga objek yang anda mahu itu kelihatan. Jika anda menggunakan pilihan fokus secara manual anda juga boleh menekan butang Push Auto yang membolehkan kamera anda akan terus fokus kepada sesuatu objek secara automatik.

<table>
<tr><th colspan="2">Screen: Learning the video recorder functions (Using automatic camera)</th></tr>
<tr><th>Visual</th><th>Content</th></tr>
<tr>
<td>


Animation

Grafik 1:
Gambar animasi cara bagaimana butang auto lock ditarik. Paparkan juga butang Auto/man dan Hold ditarik.

Txt 1:
Kelemahan mengunakan fungsi Auto lock

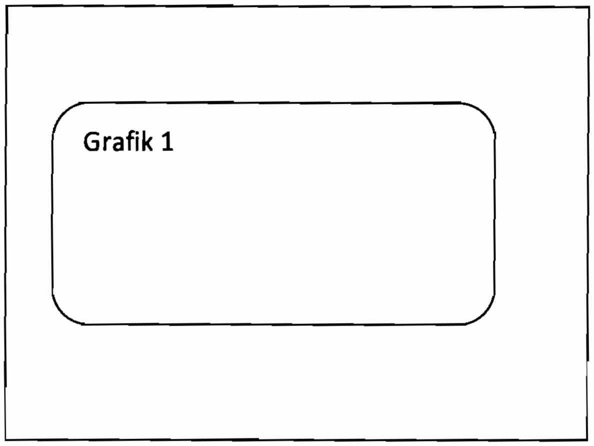
• Anda tidak boleh mengawal setting yang anda mahukan.
• Fungsi fokus tidak dapat dilakukan.
• Meghasilkan gambar yang tidak cantik.
• Menjadikan warna gambar rakaman berubah-ubah dengan sendiri.
• Pencahayaan dalam rakaman video juga tidak memuaskan.
</td>
<td>
Jika anda mahu menggunakan kamera secara automatik anda hanya perlu tarik butang di bahagian kiri bawah kamera ke Auto Lock. Kamera anda akan beroperasi dalam mode automatik, dan segala fungsi dikawal sendiri oleh kamera.

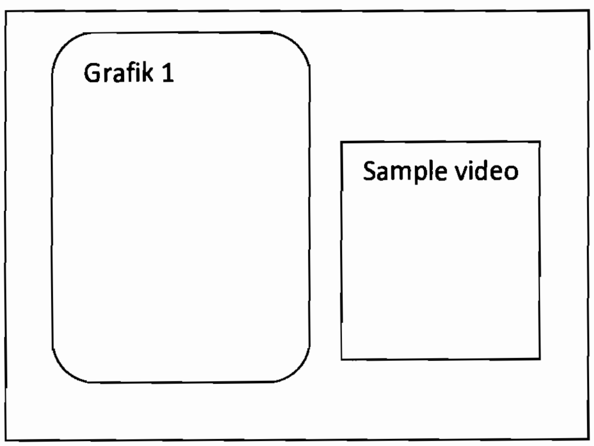
Pada bahagian ini terdapat 3 pilihan butang iaitu auto lock , auto/manual dan hold. Butang-butang ini mempunyai peranan yang berbeza.

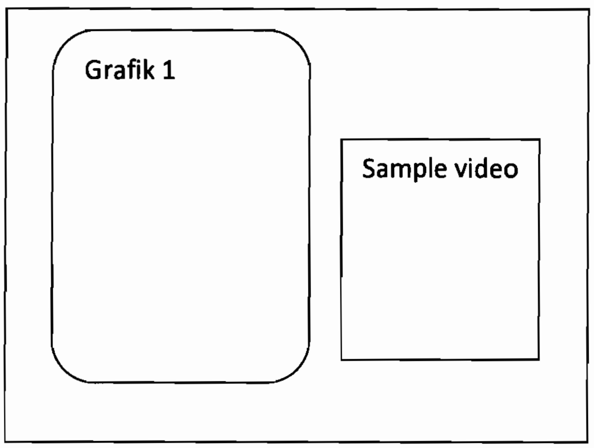
Auto lock: Membolehkan kamera dikawal secara automatik.
Auto/Manual: Membolehkan kemera dikawal secara automatik dan manual.
Hold: Membolehkan kamera memegang segala fungsi yang telah anda tetapkan.

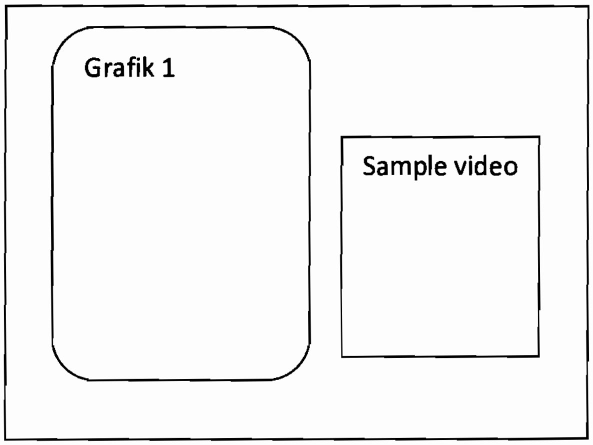
Walaubagaimanapun, fungsi kamera Auto lock mempunyai kelemahan pada teknik kawalan dan rakaman video anda, antaranya termasuklah:

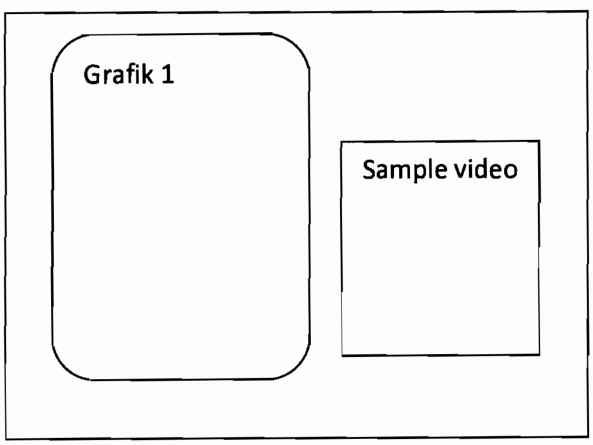
• Anda tidak boleh mengawal setting yang anda mahukan.
• Fungsi fokus tidak dapat dilakukan.
• Meghasilkan gambar yang tidak cantik.
• Menjadikan warna gambar rakaman berubah-ubah dengan sendiri.
• Pencahayaan dalam rakaman video juga tidak memuaskan.
</td>
</tr>
</table>

Screen: Learning the video recorder functions (Setting to video)	
Visual	**Content**
 **Animation** **Grafik 1:** Gambar animasi yang menujukkan butang-butang setting. Setiap butang dilabelkan.	Kamera ini mempunyai butang laras (setting) yang membenarkan anda mengubah ciri-ciri video yang anda akan rakamkan. Pada bahagian kiri di bawah kamera terdapat butang laras (setting) yang membolehkan anda menghasilkan sendiri video gambar yang terbaik. Butang-butang laras tersebut adalah: White Balance, Shutter Speed, Gain dan Iris. Setiap butang di atas mempunyai fungsi masing-masing yang berbeza dan saling berkait.

Screen: Learning the video recorder functions (Setting the shuttle speed)	
Visual	**Content**
 **Animation** **Grafik 1:** Gambar animasi yang menujukkan butang laras shuttle speed dikawal.	Dalam bab ini anda akan mempelajari bagaimana untuk menggunakan butang laras (setting) Shuttel Speed. Tekan butang Shuttel speed yang terdapat pada bahagian belakang kamera, berdekatan dengan bateri. Fungsi shuttle speed ini adalah untuk mengawal bukaan cahaya yang diterima oleh kamera. Apabila anda menaikkan jumlah shuttle speed ini, anda akan dapati gambar dalam video anda menjadi lebih gelap. Jika anda turunkan jumlah shutter speed pula gambar tersebut menjadi lebih terang. Kegunaan lain bagi shuttle speed adalah untuk mengambil gambar pada skrin TV dan skrin komputer jenis tiub. Secara lalai, apabila anda

Sample video: Bahagian video membenarkan pengguna melihat kesan apabila jumlah shuttle speed ditambah atau dikurangkan. Butang Navigasi Play dan Stop sahaja.	merakamkan sesuatu video pada skrin TV atau komputer anda akan dapati garisan melintang akan wujud dan bergerak pada skrin tersebut. Untuk mengatasi masalah ini, anda perlulah setkan jumlah shuttle speed supaya bersamaan dengan Synchronize Hertz pada skrin tersebut. Ini dapat mengelakkan garis–garis melintang tersebut terhasil.
Screen: Learning the video recorder functions (Setting the iris)	
Visual	**Content**
 **Animation** **Grafik 1:** Gambar animasi yang menujukkan butang laras iris dikawal. **Sample video:** Bahagian video membenarkan pengguna dapat melihat kesan apabila jumlah iris ditambah atau dikurangkan. Butang Navigasi Play dan Stop sahaja.	Dalam bab ini anda akan mempelajari cara-cara untuk menggunakan butang laras (setting) Iris. Tekan butang Iris. Butang tersebut terdapa pada bahagian kiri di bawah kamera, berdekatan dengan lensa kamera. Untuk mengawal butang Iris ini, anda hanya perlu Scroll ke kanan atau ke kiri. Fungsi Iris ini adalah untuk mengawal bukaan cahaya yang diterima oleh kamera. Apabila anda menurunkan jumlah Iris ini, anda akan dapati gambar dalam video anda akan menjadi lebih cerah. Pada kebiasaannya, penggunaan iris ini akan disekalikan dengan fungsi shuttle speed untuk mengawal pencahayaan pada video. Anda boleh menggunakan kedua-dua fungsi tersebut untuk mengawal bukaan cahaya supaya anda dapat menghasilkan video yang sempurna.

Screen: Learning the video recorder functions (Setting the gain)	
Visual	**Content**
 **Animation** **Grafik 1:** Gambar animasi yang menujukkan butang laras Gain dikawal. **Sample video:** Bahagian video membenarkan pengguna dapat melihat kesan apabila fungsi Gain diubah-ubah. Butang Navigasi Play dan Stop sahaja.	Dalam keadaan yang gelap, anda perlu menggunakan fungsi Gain. Butang kawalan untuk Gain terdapat pada bahagian kiri bawah kamera, berhampiran dengan butang kawalan Iris. Butang kawalan gain ini terbahagi kepada 3 bahagian iaitu L (Low), M (Medium) 9 DB dan High (H) 18 DB. Anda hanya perlu tarik butang tersebut ke penanda yang telah tersedia pada bahagian gain. Fungsi Gain ini adalah untuk meghasilkan suatu gambar pada keadaan yang gelap menjadi cerah. Ini membolehkan kamera sebegini boleh digunakan dalam bilik yang gelap.

Screen: Learning the video recorder functions (Setting indoor outdoor)	
Visual	**Content**
 	Apabila anda mahu mengambil sesuatu gambar video, pastikan anda peka terhadap keadaan sekeliling lokasi rakaman yang akan anda jalankan. Terdapat dua jenis keadaan sekeliling yang anda perlu tahu iaitu indoor dan outdoor. Indoor adalah suatu keadaan sekeling yang tertutup seperti di dalam bilik. Manakala, jenis Outdoor pula adalah suatu keadaan yang terbuka luas contohnya di kawasan taman rekreasi dan sebagainya. Untuk mengubah setting indoor dan outdoor, anda

<table>
<tr>
<td>Animation

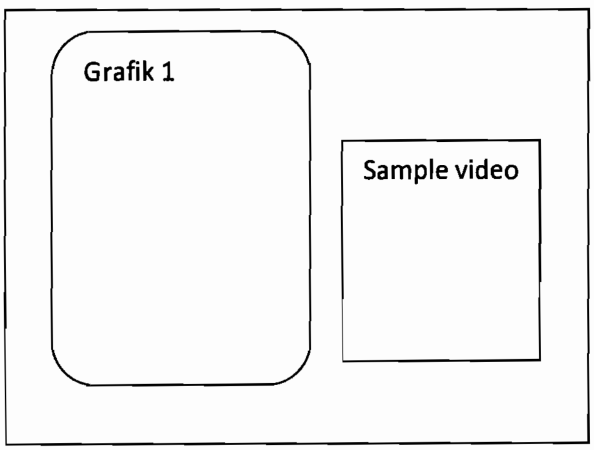
Grafik 1:
Gambar animasi yang menujukkan opsyen-opsyen indoor dan outdoor boleh diperolehi.

Sample video:
Bahagian video membenarkan pengguna menyaksikan kesan apabila fungsi indoor dan outdoor dilaksanakan secara berselang. Butang Navigasi Play dan Stop sahaja.</td>
<td>perlu:

Tekan butang menu dan perhatikan pada skrin LCD anda terdapat beberapa menu kecil yang anda perlu pilih. Pilih CAMERA SET dan kemudian, pilih WB PRESET. Pilih sama ada OUTDOOR ataupun INDOOR mengikut keadaan persekitaran yang anda akan rakamkan.

Apabila anda memilih setting Indoor, anda akan dapati simbol lampu akan terpapar pada skrin LCD anda. Jika anda memilih Outdoor, simbol matahari pula akan terpapar pada skrin LCD anda.

Apabila anda memilih setting Indoor anda perlulah menggunakan fungsi White Balance.</td>
</tr>
<tr>
<td colspan="2">Screen: Learning the video recorder functions (Setting white balance)</td>
</tr>
<tr>
<td>Visual</td>
<td>Content</td>
</tr>
<tr>
<td>



Animation

Grafik 1:
Gambar animasi yang menujukkan butang White Balance ditekan.

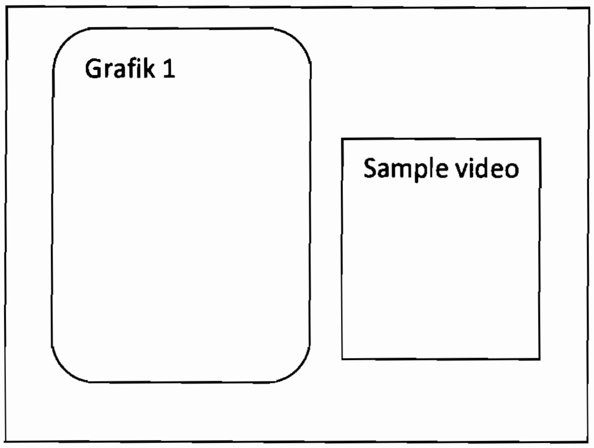
Sample video:
Bahagian video membenarkan pengguna melihat cara melakukan teknik White Balance. Butang Navigasi Play dan Stop sahaja.</td>
<td>Dalam bahagian ini, anda akan mempelajari cara menggunakan fungsi White Balance. Fungsi ini digunakan untuk menyelesaikan masalah gambar yang kusam.

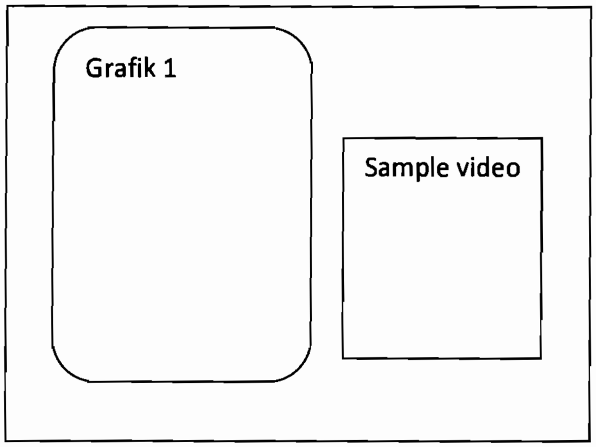
Apabila anda mahu mengambil gambar pemandangan di kawasan yang terbuka dan terang (Outdoor) anda tidak perlu menggunakan fungsi White Balance ini. Sebaliknya, rakaman yang dilakukan dalam bilik yang tertutup dan kurang cahaya (indoor) memerlukan fungsi white balance.

Lampu tungsten digunakan untuk memberi pencahayaan di dalam bilik yang tertutup. Malangnya lampu tungsent ini mengeluarkan cahaya kuning yang menyebabkan gambar video anda akan turut kuning.

Untuk menyelesaikan masalah ini, Langkah yang perlu anda lakukan adalah:-

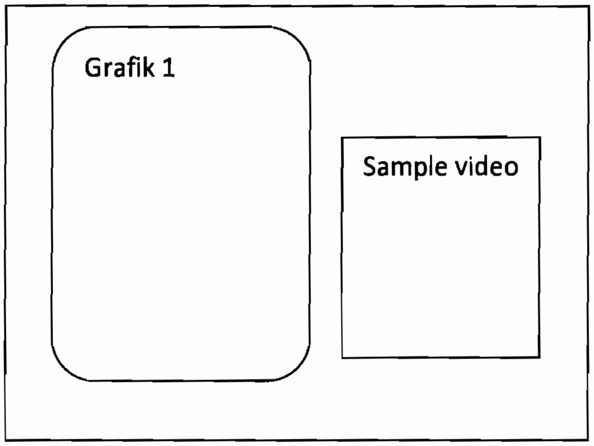
Dapatkan sekeping kertas putih dan tekan butang setting White Balance. Kemudian, programkan rakaman yang akan anda lakukan itu samada A atau B. Seterusnya, fokuskan pada kertas yang anda perolehi tadi dan tekan butang bersimbol</td>
</tr>
</table>

	yang terdapat berhampiran dengan butang setting White Balance. Hasilnya, skrin anda akan bertukar dari kuning menjadi putih.
Screen: Learning the video recorder functions (ND Filter)	
Visual	**Content**
 **Animation** **Grafik 1:** Gambar animasi yang menujukkan butang ND Filter dikawal. **Sample video:** Bahagian video memaparkan kesan apabila ND Filter dimasukkan.	ND Filter yang bermaksud Natural Density Filter berfungsi untuk memberi pengaruh kesan gelap yang sedikit sahaja pada gambar yang terlalu cerah. Terdapat 3 pilihan ND filter ini, iaitu 2, 1, dan OFF. 1 ND ini berfungsi akan menggelapkan sedikit kecerahan gambar pada 1 stop. 2 ND pula akan menurunkan warna pada 2 stop. Manakala, OFF pula digunakan untuk anda tidak mahu menggunakan fungsi ND Filter ini. Selalunya, anda akan menggunakan fungsi ND filter ini untuk merakan gambar Outdoor pada waktu siang. Oleh itu, ND filter ini membantu anda menyelesaikan masalah shuttle speed yang kurang gelap. Hasilnya ialah ND filter ini akan menggelapkan sedikit gambar anda yang terlalu cerah tersebut.

Screen: Learning the video recorder functions (Setting zebra)	
Visual	**Content**
 **Animation** **Grafik 1:** Gambar animasi yang menujukkan butang laras Zebra dikawal. **Sample video:** Bahagian video memaparkan kesan apabila butang Zebra dikawal. Butang Navigasi Play dan Stop sahaja.	Setting zebra sangat berguna kerana ia dapat memberi panduan kepada anda apabila ingin mengambil gambar di kawasan yang terang. Apabila anda menggunakan setting zebra, maka terhasillah satu siri garisan-garisan kecil pada skrin LCD anda. Garisan-garisan ini akan timbul pada kawasan yang terang sahaja di mana kawasan tersebut akan over-burnt atau over-exposed. Fungsi zebra ini adalah sebagai panduan kepada anda untuk memastikan gambar yang anda ambil tersebut tidak menjadi over-burnt. Langkah untuk mengatasinya adalah dengan menambah jumlah shuttle speed supaya, gambar tersebut menjadi gelap sedikit sehingga garisan-garisan kecil pada skrin LCD tidak lagi kelihatan. Tip: Apabila anda mengawal butang laras shuttle speed, pastikan jumlah tersebut tidak kurang dari 60. Jika tidak gambar anda akan timbul bayang-bayang.

Screen: Learning the video recorder functions (Working on microphone)

Visual



Animation

Grafik 1:
Gambar animasi yang menujukkan opsyen mikrofon digunakan.

Sample video:
Bahagian video memaparkan cara-cara menggunakan opsyen mikrofon. Butang Navigasi Play dan Stop sahaja.

Content

Dalam Bab ini, anda akan mempelajari cara untuk menggunakan pembesar suara.

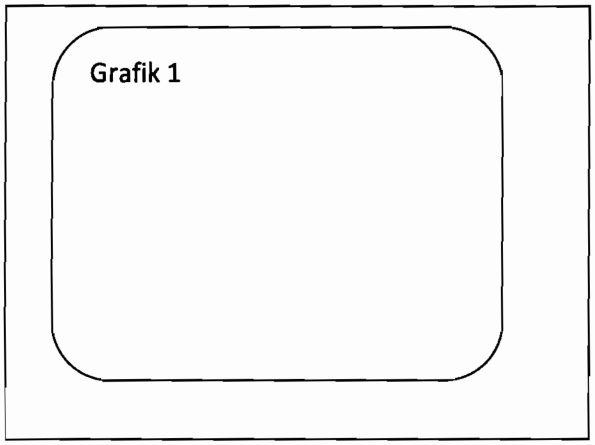
Terdapat 2 butang laras mikrofon yang boleh anda kawal iaitu pada channel 1 dan channel 2.

Sebelum anda mahu menggunakan microfon tersebut pastikan anda telah setkan dalam menu kamera.

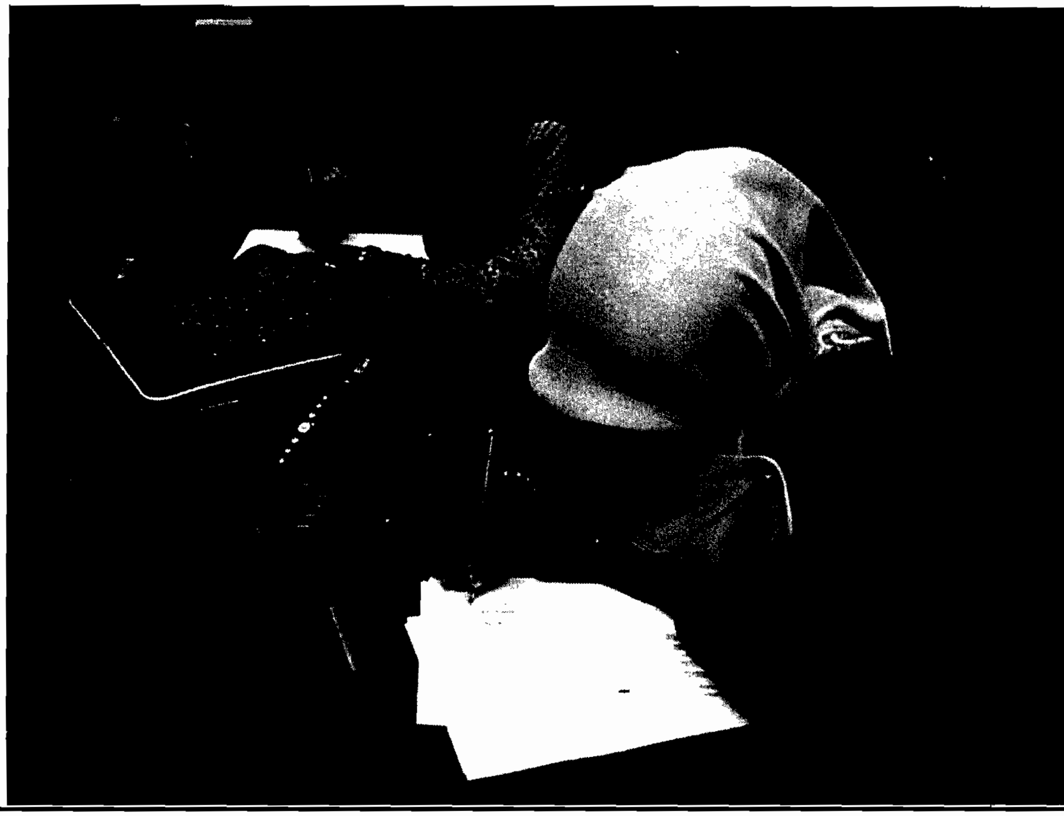
Tekan butang menu, pilih AUDIO MODE dan pilih MIC SELECT dan pilih samada XLR MIC atau INTERNAL MIC. INTERNAL MIC ini adalah pembesar suara yang sedia terdapat dalam kamera tersebut manakala XLR MIC adalah pembesar suara yang perlu dipasang pada input 1 atau input 2.

Jika anda mahu melihat tahap bunyi yang anda rakam anda boleh menekan butang Status Check, dn anda boleh menyemak sensitiviti bunyi yang anda rakamkan.

Tips:
Untuk mendapatkan sensitiviti bunyi yang baik pada kamera anda, anda hendaklah pastikan tahap sensitiviti bunyi adalah pada tahap bawah 40 semasa tiada sebarang bunyi dihasilkan. Jika tidak anda akan dapati kehadiran bunyi yang tidak diperlukan pada rakaman bunyi anda. Untuk mengurangkan sensitiviti pembesar suara ini, anda mestilah kawal pada butang laras Internal Microfon, sehingga sensitiviti kamera tersebut turun.

Screen: Learning the video recorder functions (Closing)	
Visual	**Content**
 **Animation** **Grafik 1:** Buat montaj clip rakaman yang simple dan ada keluar suara. Montaj clip gambar pembikinan VCD.	Diharap, anda mendapat manfaat dari mempelajari Asas Fotografi melalui VCD ini.

APPENDIX J



APPENDIX K

Buat Sendiri VCD

KUIZ || Sila jawab semua soalan.

SEKSYEN A: Tandakan BETUL (B) atau SALAH (S)

1. Pita (*Tape*) tidak perlu di'*rewind*' sebelum membuat suntingan (*editing*). B S
2. Windows Movie Maker boleh digunakan untuk membuat penyuntingan video. B S
3. Terdapat 3 ruang baris di dalam *timeline* iaitu video, audio, dan kesan khas (*effect*). B S
4. Langkah memasukkan audio ke dalam *timeline* perlu dilakukan secara manual dan diselaraskan dengan klip video. B S
5. Tulisan yang dimasukkan ke dalam klip video dinamakan '*transition*'. B S

SEKSYEN B: Tuliskan jawapan yang betul dalam ruang disediakan

1. Berikan satu langkah yang boleh menjimatkan penggunaan bateri.
2. Berikan satu perbezaan '*firewire*' untuk *notebook* dan *desktop*.
3. Apakah maksud perlaksanaan '*capture video*'?
4. Terangkan perbezaan klip video yang disertakan '*transition*' dengan yang tidak disertakan '*transition*'.

KUIZ || Sila jawab semua soalan.

SEKSYEN A: Tandakan BETUL (B) atau SALAH (S)

1. Umumnya saiz bateri tidak menentukan jangkamasa perakam video boleh berfungsi. B S
2. Skrin LCD dan *'viewfinder'* mempunyai fungsi sama iaitu melihat 'objek' yang dirakam. B S
3. *Zoom* dan *focus* adalah fungsi yang sama. B S
4. *Iris* dan *white balance* bukan merupakan ciri penting alam mod manual. B S
5. Warna kekuningan pada klip video terjadi akibat limpahan cahaya yang melampau dan tidak boleh diatasi. B S

SEKSYEN B: Tuliskan jawapan yang betul dalam ruang disediakan

1. Berikan satu sebab mempelajari ciri-ciri perakam video besar lebih baik dari mempelajari perakam video kecil.
2. Berikan satu perbezaan *'wide'* dan *'tele'* dalam fungsi *zooming*.
3. Tuliskan fungsi *focus*.
4. Berikan 2 kekurangan mod auto berbanding manual.

APPENDIX L

Indicators for sources of instrument adaptation

Indicator	Author
1	Kearney & Schuck (2007)
2	Hakkarainen, Saarelainen & Ruokamo (2007)
3	Schaller (2006)
4	Mandryk, Inkpen & Calvert (2006)
5	Chesney (2006)
6	Karppinen (2005)
7	Schuck & Kearney (2005)
8	Wiberg (2005)
9	Asgari & Kaufman (2004)
10	Amory, Naicker, Vincent & Adams (2004)
11	Carroll (2004)
12	Pikkarainen, Pikkarainen, Karjaluoto & Pahnila (2004)
13	Herrington, Oliver & Reeves (2003)
14	Kort & Reilly (2002)
15	Pinhanez, Karat, Vergo, Karat, Arora, Riecken & Cofino (2001)
16	Perry (2001)
17	Sanders & Ayayee (1997)
18	Carroll & Thomas (1988)
19	Malone (1984)
20	Malone (1980)

APPENDIX M

First-version instrument

0 – do not agree
1 – awful || 2 – a little agree || 3 – agree || 4 – agree, good || 5 – agree, excellent!

RLM is entertaining							
1.	RLM captures my interest.	0	1	2	3	4	5
2.	RLM sparks discussion.	0	1	2	3	4	5
3.	RLM engages me through unique surprise elements.	0	1	2	3	4	5
4.	RLM attracts me.	0	1	2	3	4	5
5.	RLM is appealing to my eye and ear.	0	1	2	3	4	5
6.	I have ample opportunity to engage RLM elements through my own input.	0	1	2	3	4	5
7.	RLM encourages just-in-time learning, question-answer, and problem-solution problem solving.	0	1	2	3	4	5
8.	RLM provides for innovative approach to teaching and learning.	0	1	2	3	4	5
9.	RLM attends to my feeling.	0	1	2	3	4	5
10.	They way RLM guides me in doing entertains me.	0	1	2	3	4	5
I feel fun with RLM							
1.	RLM is pleasing.	0	1	2	3	4	5
2.	RLM is interesting.	0	1	2	3	4	5
3.	I feel happy to use RLM.	0	1	2	3	4	5
4.	I was excited when learning with RLM.	0	1	2	3	4	5
5.	RLM makes me feel delighted.	0	1	2	3	4	5
6.	RLM is full of curiosity.	0	1	2	3	4	5
7.	Learning with RLM makes me feel confident.	0	1	2	3	4	5
8.	I feel comfortable to learn with RLM.	0	1	2	3	4	5
9.	RLM provides challenges to me.	0	1	2	3	4	5
10.	I enjoy learning with RLM.	0	1	2	3	4	5

APPENDIX N

Experts engaged in Q-MEF validity test

Name	Expertise	Position	Institution
Assoc. Prof. Dr. Shahizan Hassan	Usability Evaluation	Director, University-Industry Link, UUM	Universiti Utara Malaysia
Assoc. Prof. Dr. Zulikha Jamaludin	HCI, Usability Evaluation	Associate Professor, College of Arts and Sciences (CAS)	Universiti Utara Malaysia
Yusrita Mohd Yusoff	HCI, Multimedia	Coordinator, Multimedia Programme, CAS	Universiti Utara Malaysia
Aeni Zuhana Saidin	HCI, Multimedia	Lecturer	Universiti Utara Malaysia

APPENDIX O

Guide for expert/reviewer

You are selected to review this questionnaire on reasons as follows:

- You have masters in HCI or related areas, or/and
- You have at least three years teaching background in HCI and related areas.

On top of that, you have been studying/researching/teaching in HCI for at least three years.

Apparatus:

1. This sheet (Guide for expert/reviewer)
2. The Questionnaire for Measuring Entertaining and Fun (Q-MEF)
3. Pen

Instructions:

- You are provided wit the above-listed apparatus.
- Read and understand the Q-MEF carefully.
- Finally, with the expertise you have, it is expected that you could provide feedback for all questions in the provided spaces.

QUESTIONS FOR REVIEW

1. Do all items in entertaining dimension ask appropriate questions?

2. Do all items in fun dimension ask appropriate questions?

3. Do questions in both dimensions sound mutually exclusive?

4. Additional comments.

APPENDIX P

Questionnaire for Measuring Entertaining and Fun

INSTRUCTION: Tick the number that fits you best for each statement. Use the following scale:

1 – Strongly disagree || 2 – Disagree || 3 – Somewhat agree || 4 – Agree || 5 – Highly agree

RLM is entertaining

1.	RLM attracts and captures my attention.	1	2	3	4	5
2.	RLM provokes perception through unplanned content.	1	2	3	4	5
3.	RLM engages me through unique surprise elements.	1	2	3	4	5
4.	RLM arouses my emotions through its reality approach.	1	2	3	4	5
5.	RLM is pleasing and appealing to my eye and ear.	1	2	3	4	5
6.	The way RLM presents contents is interesting.	1	2	3	4	5
7.	RLM encourages just-in-time learning, question-answer, and problem-solution problem solving.	1	2	3	4	5
8.	RLM challenges me through uncertain persuading content.	1	2	3	4	5
9.	RLM provides sufficient guides for problem solution.	1	2	3	4	5
10.	They way RLM guides me in doing entertains me.	1	2	3	4	5
11.	RLM allows me to move to any part of content flexibly.	1	2	3	4	5

I feel fun with RLM

1.	RLM makes me laugh.	1	2	3	4	5
2.	RLM contains humor in its unplanned content.	1	2	3	4	5
3.	I feel happy to use RLM.	1	2	3	4	5
4.	I was excited when learning with RLM.	1	2	3	4	5
5.	Learn with RLM is fun.	1	2	3	4	5
6.	I feel comfortable to learn with RLM.	1	2	3	4	5
7.	I enjoy learning with RLM.	1	2	3	4	5

Generally: Tick if appropriate

I will use RLM again next time. ☐

I prefer to use RLM more than the traditional courseware and video. ☐

RLM can cater appropriate content satisfactorily. ☐

If you are a video developer: Creating RLM is interesting. ☐

If you are not familiar with video production: Creating RLM is possible. ☐

Researcher to fill || Academic achievement: ____________________ Male / Female

Questionnaire for Measuring Entertaining and Fun

INSTRUCTION: Tick the number that fits you best for each statement. Use the following scale:

1 – Strongly disagree || 2 – Disagree || 3 – Somewhat agree || 4 – Agree || 5 – Highly agree

Courseware is entertaining

1.	Courseware attracts and captures my attention.	1	2	3	4	5
2.	Courseware provokes perception through unplanned content.	1	2	3	4	5
3.	Courseware engages me through unique surprise elements.	1	2	3	4	5
4.	Courseware arouses my emotions through its reality approach.	1	2	3	4	5
5.	Courseware is pleasing and appealing to my eye and ear.	1	2	3	4	5
6.	The way Courseware presents contents is interesting.	1	2	3	4	5
7.	Courseware encourages just-in-time learning, question-answer, and problem-solution problem solving.	1	2	3	4	5
8.	Courseware challenges me through uncertain persuading content.	1	2	3	4	5
9.	Courseware provides sufficient guides for problem solution.	1	2	3	4	5
10.	They way Courseware guides me in doing entertains me.	1	2	3	4	5
11.	Courseware allows me to move to any part of content flexibly.	1	2	3	4	5

I feel fun with Courseware

1.	Courseware makes me laugh.	1	2	3	4	5
2.	Courseware contains humor in its unplanned content.	1	2	3	4	5
3.	I feel happy to use Courseware.	1	2	3	4	5
4.	I was excited when learning with Courseware.	1	2	3	4	5
5.	Learn with Courseware is fun.	1	2	3	4	5
6.	I feel comfortable to learn with Courseware.	1	2	3	4	5
7.	I enjoy learning with Courseware.	1	2	3	4	5

Researcher to fill || Academic achievement: ____________________ Male / Female

Questionnaire for Measuring Entertaining and Fun

INSTRUCTION: Tick the number that fits you best for each statement. Use the following scale:

1 – Strongly disagree || 2 – Disagree || 3 – Somewhat agree || 4 – Agree || 5 – Highly agree

Video is entertaining

1.	Video attracts and captures my attention.	1	2	3	4	5
2.	Video provokes perception through unplanned content.	1	2	3	4	5
3.	Video engages me through unique surprise elements.	1	2	3	4	5
4.	Video arouses my emotions through its reality approach.	1	2	3	4	5
5.	Video is pleasing and appealing to my eye and ear.	1	2	3	4	5
6.	The way Video presents contents is interesting.	1	2	3	4	5
7.	Video encourages just-in-time learning, question-answer, and problem-solution problem solving.	1	2	3	4	5
8.	Video challenges me through uncertain persuading content.	1	2	3	4	5
9.	Video provides sufficient guides for problem solution.	1	2	3	4	5
10.	They way Video guides me in doing entertains me.	1	2	3	4	5
11.	Video allows me to move to any part of content flexibly.	1	2	3	4	5

I feel fun with Video

1.	Video makes me laugh.	1	2	3	4	5
2.	Video contains humor in its unplanned content.	1	2	3	4	5
3.	I feel happy to use Video.	1	2	3	4	5
4.	I was excited when learning with Video.	1	2	3	4	5
5.	Learn with Video is fun.	1	2	3	4	5
6.	I feel comfortable to learn with Video.	1	2	3	4	5
7.	I enjoy learning with Video.	1	2	3	4	5

Researcher to fill || Academic achievement: ______________________ Male / Female