

**DEVELOPMENT OF KEMAHIRAN HIDUP TINGKATAN SATU (1)
COURSEWARE PROTOTYPE USING USER CENTERED DESIGN (UCD)
METHODOLOGY BASED ON THE MODALITY PRINCIPLE**

A thesis submitted to the faculty of Information Technology
in partial fulfillment of the requirement for the degree
Master of Science (Information Technology)
Universiti Utara Malaysia

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ABSTRACT

Many educational coursewares have been developed either from the government sector or private sectors. However, the coursewares only for core subjects such as *Bahasa Malaysia*, English, Mathematics, and Sciences. The rest is still under development. This is maybe because of low resources and need more multimedia learning theory applied. The objective of this study is to identify the user requirement and applied it to CDKH prototype. The methodology of this study is User Centered Design Methodology (UCD). Thereby this paper discuss about the problem faced by the students in learning *Kemahiran Hidup*. The limitations for developing a good courseware have been verified. The development of this courseware is by involving the user as part of the development team and process. For a maximum effectiveness, the courseware will be developed by using Adobe Director with customize lingo script to make the interaction more effective. The respondents are most equally for the color to background and font color. The respondent are like to have the animation background, background music. The type of exercise that the respondents like most is the drag and drop type. The respondents are also like the simple theme. Result that get from the evaluation is most of the respondent are like about the interfaces in the CDKH prototype.

ACKNOWLEDGEMENTS

“All praise is due to Allah, the Most Gracious and the Most Merciful”

Firstly, I thank to Allah for blessing me with good health to be able to complete this research paper. My expression of appreciation goes to several individuals, without their cooperation, encouragement and suggestion; this study would not have been possible.

I heartily thanks to Mr. Abd. Hadi Bin Abd, Razak for agree to serving as my advisor. Without tired his support, insight, guidance encouragement throughout to fulfill my study. May Allah bless him for the whole of his life.

My special thanks to my parents, Ishtiyahq Ahmed Bin Sharfuddin and Siti Faridah Bte Shaikh Ahmad and my brothers Faisal, Muaz, and Mustakim who sacrificed much and supported my efforts with love, understanding and constant encouragement and prayers, without it, it is almost impossible for me to complete this master's degree.

My thanks to my roommate Saiful Azizi for his supportive and understanding in everything includes this study. Lastly I would like to dedicate my sincere gratitude and appreciation to my friends Malik, Hairy, Roszana, Hanif, Asyraf, and Laziman for their assistance and support throughout the duration of my graduate studies.

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LIST OF ABBREVIATIONS

Acronym	Meaning
CDKH	Courseware Kemahiran Hidup
QUIS	Questionnaire for User Interface Satisfaction
UCD	User centered design

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Learning is a basic process for human. Naturally from first day of born, a person will start to learn, and the learning process will continuous and become mature together with the knowledge and physical development. As the learning processes become mature, the kind of learning methods either formal or informal to equip the person with more and more new knowledge. Learning processes and techniques evolve to align with continues factors. In this 21st century, learning is closely associated with technology especially in Information Technology.

The multimedia tools become popular since middle of 1990s. The power of multimedia tools such as audio, video, graphic, animation, and text or combination of it into single application or presentation is making huge of change to the society (Singh, 2003). The main things that make this tools becoming more powerful is the interactive ability. From the educational researcher observed, they can conclude that the more element used in the process, the better ability for people to grab and absorbed the knowledge from the learning material (Ayub, Venugopal & Nor,

2005). Therefore, Multimedia is one of the best methods for teaching and learning that can be adopted into education especially in how to learn *Kemahiran Hidup*.

Inducting teaching is the better ways to motivate student. The instructor begins by giving them the specific challenges such as give them time to make tasks. The student will make a full focus in fulfill these challenges. In the other way, the students are quickly recognized and learn what they want for the skills, facts and conceptual understanding. At the other end the teacher or instructor provides the instruction or guidelines to help student study and understand at their own ways (Prince & Felder, 2007).

In Malaysia, according to Aini and Norizan (2008) multimedia has been used widely in the school since 2003 when the government started to introduce of Smart Schools and teaching Science and Mathematics in English. The teachers, government and the multimedia developer believed that by using the courseware in teaching the subject will be more efficiency, easy to understand and saving more time. On the other word, the courseware is making win –win situation to solve the problem between the teacher and the student. This is supported by Ali and Zaman (2006) where the effort in the usage of multimedia in teaching and learning mathematic has been impress and increase compare to old days. There are many coursewares has been developed adaptable and individual approach to learning.

The potential of using multimedia in the design of instruction to incorporate method is appeals to student who prefer guided experience rather than rely only on the text-based media. There are a lot of coursewares in the Malaysian market now produced by both private and government sector. But they are only focusing on the subject that they think as a core subject such as Malaysia language, English, Chinese

language, Mathematics and Science as supported by Mukti and Hwa (2004), where the needs for computer-aided learning materials in other subject for the student to help them in educational activities in the interactive ways. Besides that, most of the coursewares were developed just to suite with the syllabus planned without any proper plan and learning theory applied into them.

User- Centered Design (UCD) is a general term to draw the design process in which the end users affect the design of the system or courseware. There are many philosophy and method in UCD but the main important concept is to make the users involves or as a part of the development process (Abrams, Maloney-Krichmar & Preece, 2004). For example, many of the UCD consultants use the user as their object in the way to know user's need and involve the user during the design process especially during the requirement gathering and usability testing. In the other word, that the user have a deep impact in the development of the application or system by participate as the partners with the designer every part through the design process.

Vahlensieck (2005) said all teachers require the new active technology tools in the classroom. The great opportunities come to the teacher when the students are naturally enthusiastic to the new technology. The new challenges when the teacher is force to make the technology combine with the educational method of teaching. The result to the new edge of teaching method is when the student becomes more curios. Multimedia learning theory is needed to be employed in any courseware developed as a strategic knowledge tools with a perfect planned prototype development model to make this research achieve the maximum effectiveness. Therefore multimedia learning theory is believed could bring a new dimension to the experience of teaching environment in Malaysia.

The Modality Principle is apart of multimedia learning theory. When learning with multimedia tools the brain will simultaneously encode two different types of information, an auditory stimulus and a visual stimulus. One might expect that these competing sources of information would tend to overwhelm or overload the learner.

1.1 PROBLEM STATEMENT

There are many issues regarding students and teacher's difficulties faced for teaching *Kemahiran Hidup* in Malaysia secondary school today. Based on the observation, literature reviews and interview gathered, these findings lead to the identification of 3 main problems addressed in typical consultation in education context:

1.1.1 Lack of courseware only available for main or core subject

Due to Mukti and Hwa (2004) when deal about courseware for student, the society only focusing in the certain subject such as *Bahasa Malaysia*, English, Chinese, Mathematic, and Science. To produce the good student, all subject must be achieve well not only the core subject. The instructor said that they did not want to use the courseware in the workshop because the workshop not include with the projector and white screen. All parents are capable to spend much money only for the core subject. Their mentality only think about the core subject must get well in the examination without think about other subject. If the student get only good credit in core subject, chances them to further study will be decrease compare to the student who excellent in all subjects.

1.1.2 The courseware in the market now is not user centered

From interview with a few teachers there are many coursewares in the market which are not user friendly. Many students feel hard and difficult while using the courseware. Most of them will use the courseware once and never want to use it again. This will make the learning become bored and uninteresting. The instructor teaches the student using the conventional method rather than teaching using the courseware because the courseware is not easy to use. At the same time, the instructor said that they have difficulty to teach at the same time showing the courseware to the student because the theme in the courseware is worse. This can make the instructor feel uncomfortable.

1.1.3 Problem in learning *Kemahiran Hidup*:

1.1.3.1 Totally rely on skillful teacher

From interview with a few teachers who teaching *Kemahiran Hidup*, mentions that to teach *Kemahiran Hidup*, the teacher must have a technique techniques in how to deal with the component in electric such as how to make circuit, how to use the tools in the workshop and so on. The teacher must have a lot of training and experience in order to deliver the subject effectively. For the current situation, not all the teacher can teach *Kemahiran Hidup* efficiently and effectively. Only the experienced teacher knows how to grab the attention of the student and then can deliver the subject as the result.

According to Bahagian Teknologi Pendidikan Malaysia (2003), until 2003 there are approximately 44 coursewares have been developing by Ministry of Education. From all of it, only 2 coursewares have been designed for *Kemahiran Hidup* which is for standard 4 and form 2.

1.1.3.2 Hard to synchronize to teach using the courseware

The teacher and instructor said it is hard to them to teach and refer to the courseware simultaneously. Many factors were identified influencing the situation; nevertheless, content wrapping could be one of the reasons. They can give a full focus to teach the student efficiently. Some of the instructor said they rather not using the courseware because the courseware will limit their teachings skills and will make the class become boring and the student will lose their attention.

1.1.3.3 The workshop is not equipped with the supporting equipment

The supporting teaching tools is only equipped in the classroom and laboratory. Resulting if the instructor wants to use the tools, they must teach in the classroom. The tools for teaching *Kemahiran Hidup* cannot be move because of the thing is suitable to use in the workshop. It is hard to teach *Kemahiran Hidup* without the *Kemahiran Hidup* tools.

1.1.3.4 Student focusing to the instructor

From the interview with a few of respondents, they said that they have a difficulty to pay a full attention during lesson in the classroom. The student said that their instructor is boring and did not attract them to like the subject. Most of them will be “*day dreaming*” in the classroom. Some of the student said that the icon and character in the courseware will make them depart from pay a full attention to the instructor.

1.2 OBJECTIVE

Based on the problem statements that have been identified, the main objective for this project is to solve the problems. The objectives are clustered and identified as following:

- i. To identify the user requirement analysis for developing a suitable *Kemahiran Hidup* courseware for student Form 1.
- ii. To develop a prototype for *Kemahiran Hidup* subject Form 1: Electric based on modality principles.
- iii. To evaluate the prototype interfaces by using questionnaire for user interface satisfaction (QUIS).

1.3 RESEARCH QUESTIONS

This study aim to investigate and answer the following question:

- i. What are the modality principles that can be adapted in developing an effective courseware for learning?
- ii. What are the multimedia components that suitable to be implemented in the courseware?
- iii. What are the criteria of interface design which students and teachers want in this courseware that can attract them to use it?
- iv. What is the appropriate method to be use in the developing the courseware?
- v. What are the methods to grab student attention for them to attract to this courseware?

1.4 RESEARCH SCOPE

This study will be focused only on subject Kemahiran Hidup for secondary student in form 1 and the content is only for chapter 3, The Introduction to Electricity. This courseware will be developed using prototyping method which is vertical prototype. The study will focus on Chapter 2 in Kemahiran Hidup because of time constraint (refer appendix A). The respondent will be choosing at Sekolah Menengah Agama Sheikh Abdul Malek, Kuala Terengganu. In this school there is approximately 228 student form 1 from 7 classes. The courseware will be using the User Centered Design (UCD) methodology. The modality principle will be adapted to determine which principle is the most suitable for form 1 student. At the final stage, the

usability testing method questionnaire will be use to get feedback from the user. The CDKH is an off-line approach and will be inside the Compact Disk (CD). The CDKH prototype is developed using Adobe Director and Adobe Premiere for video editing. The respondents for this courseware development are taken from different in level background of knowledge.

1.5 SIGNIFICANT OF THE STUDY

The main contribution of this development courseware is to get the user requirements for developing and integrating multimedia components as result to produce a good multimedia courseware. The benefits of this courseware are different from people perspective. The Modality Principle will be adapted to determine what the theories suitable for *Kemahiran Hidup* are. Some teachers see it as a time saving and can improve the understanding among the students. Teachers see that if their student is not quite understood about the chapter, the student can do their revision on their own interactively. Some bad perspective said that teacher sees that the courseware is like to replacing their job in the learning hierarchy. With the new edge of multimedia authoring tools, it has become the easy relation to enhance the pedagogical aspects in the designing of the courseware component to be interactively.

With modern of multimedia tools, the courseware model offers pedagogical benefit for educational content especially for the secondary schools in Malaysia. In summary, the right selections of the multimedia tools and implement it in instructional consultation model bring extensive benefits as describe below:

- i. The courseware can be access using any kind of computer with the compact disc (CD ROM). Its mean that the knowledge is not only get from the internet but also from the offline methods. The user can access the courseware whenever they want to use it. It will make the user can learn at their own pace.
- ii. The courseware includes the animation during the notes section which is the most boring part for the student. The student will know how the simple circuit is connected and make it operate.
- iii. The interactive method will make the student not boring and fun because the interaction during make exercise.
- iv. The courseware is easy to jump to the related topic. If the user did not understand about certain topic, they can jump immediately to the topic without to browse it.

1.6 SUMMARY

This chapter discussed a generally of the introduction about using multimedia courseware in teaching method, the benefits using courseware as teaching tools, the potential of it and general brief about using UCD method in development the courseware. The problem encountered by the teachers and student when there is no courseware is using to teach in *Kemahiran Hidup*. Besides that, research objective, scope and significant study are stated.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

In order to obtain a broad perspective on this research as well as define a suitable functionality and features to be implemented in the courseware prototype, review on the literature start from identify the characteristics of courseware, existing courseware for different context, the UCD involved as well as method or approach suitable for prototyping the courseware.

2.2 *KEMAHIRAN HIDUP*

According to Pusat Perkembangan Kurikulum (2002) *Kemahiran Hidup* also known as *Kemahiran Hidup Bersepadu* is one of the practical subjects based on technology. It has been offered and must be taken by all students in form 1 until form 3. The structure of this subject is defined for make the expose for the student to increase the national productivity by involve the community to be creative, innovative and productive. The objective of this subject is to make Malaysian more

self-reliant and understanding about the technology and economy and also been creative, initiatively and convince in themselves. *Kemahiran Hidup* in divided into 4 subdivision which is *Kemahiran Teknikal* (KMT), *Perdagangan* (PERD), *Sains Pertanian* (SPN), and *Ekonomi Rumah Tangga* (ERT). In KMT, there are 3 main chapters which is electric, basic electromechanical and basic entrepreneurship as shown in Appendix A.

2.3 COURSEWARE

Oxford Advanced Learner's Dictionary (2005) defines course in ten different ways. For course in education mean series of learning, lesson or lecture on a particular subject. Courseware means the computer programs that are designed to be used to teach a subject. Ayub, Venugopal and Nor, (2005) and Vassileva (1992) define courseware as teaching material that be guide and manipulate individually and interactive mode to ease the student while Ali and Zaman (2006) defined the courseware is must be stand-alone, self- learning unit, content of various multimedia elements. In order to make effective learning, the presentation part is the most important one.

According to Saad, Idris, Cheong, Razak and Nor (2007) in Malaysia, the Mathematics and Science courseware is designed and developed by the Malaysian Educational Technology Department (METD) to support the implementation of teaching Mathematics and Science in English. This courseware used as a model for pronunciation of scientific terms and acts as teaching instrument especially for teachers who lack of competency in English. Abtar (2000) gave a critical review of educational software produced by private companies. He was criticizes that the

private sector produce the coursewares which are attractive in graphical presentation but lack pedagogical value.

The success of the courseware is fully depends how the presentation is presented. According to Khalifa, Bloor, Middleton and Jones (2000) the main criteria for mathematic courseware is the quality of it. There are 22 criteria for developing and test the courseware as list in table 2.1:

Table 2.1: Criteria for developing and test the courseware

Quality of software program	Suitable for group work
Pass first level	Clear menu
Ease of use	Encourages creativity
Interactive learning	Feedback, and printing work
Challenging games	Appropriateness to the curriculum
Levels of difficulty	Concentration games
Use of command language	Well Designed
Clear features	Problem solving
Age appropriate	Entertaining
Thinking games	Critical thinking skills
Exercise and tests	Use of mouse

2.4 MODALITY PRINCIPLE

According to Mayer (2001) the modality principle roots come from the limited capacity assumption of the cognitive theory of multimedia learning. It indicates that words should be presented as auditory narration rather than on-screen text when presenting an explanation using multimedia. Cognitive load theorists pointed to this principle as an alternative way of dealing with split attention. Split-attention effects unfortunately affect learning because the process of mentally integrating disparate sources of information overloads working memory. If the textual information is presented in auditory rather than visual as written form, the integration of the sources of information may not overload working memory (McNeill, Doolittle, Hicks, 2009).

McNeill, Doolittle and Hicks (2009) adapted from Mayer and Moreno (1998) mention that Mayer and Moreno produced the first demonstration of a modality effect within the context of multimedia learning using animations.

Mayer (2005) frequently found that by given the multimedia tools and narration constantly is better than using only one media of instruction .There are 2 approaches in Multimedia which are Technology- centered and Learner- centered. Technology-centered is an approach which the main target is the ability and capability of the design to be. The main target of this approach is to produce the good design without consideration of the users. The learner-centered approach is beginning with the understanding about the user problem and difficulty. The focus is by using multimedia as an aid or tools to human cognition.

McNeill, Doolittle and Hicks (2009) mention that research on the modality effect produce a consistent evidence to suggest that in many situations mixed modality

presentations are superior to most integrated text and visual presentations and the evidence of the benefit using modality principle has been documented in the previous research on verbal learning, cognitive load and multimedia learning (Kalyuga, Chandler, & Sweller, 1999; Mayer & Moreno, 1998; Moreno & Mayer, 1999; Mousavi et al., 1995; Tindall-Ford et al., 1997).

Mayer and Moreno (2001) from Mayer (1997) describe that multimedia learning theory is a theory that will be achieved to the optimal and effectiveness of learning by combine the visual and verbal material and present it simultaneously. In multimedia learning theory there are 3 important cognitive theories which is selecting, process and integrating. There are 5 principles in the Modality Principle:

2.4.1 Multiple Representation Principle

This is the best way to present in the word and video rather than present it in the word only. For example, the student who listened to the narration explaining how to make a simple circuit by using wire, battery, switch and bulb while also viewing a corresponding video generated twice as many useful solution compare to the student who only listened to the narration without viewing any video.

2.4.2 Contiguity Principle

While giving the explanation using multimedia, presentation by using the word and picture is greater than present it separately. For example, the student who listened to a narration explaining in how to make simple circuit while also viewing a corresponding video will generate more useful solutions to subsequent problem-

solving transfer questions greater than the student which viewed the animation before and after listening to the narration.

2.4.3 Split-Attention Principle

During the multimedia presentation, presentation audible narration is better simultaneously with visual text on screen or either. For example, the student who viewed video how to make a simple circuit while other student also listening to a corresponding narration generated fairly 50% more useful solution on a subsequent problem- solving transfer test rather than the student who view the same video with the narration same text with the on screen.

2.4.4 Individual Differences Principle

This principle is useful and better for low-knowledge or slow learners. This principle is use the multimedia effect and split-attention effect. For example, the slow student needs more multimedia effect compare to student who have high level of learn.

2.4.5 Coherence Principle

The principle show that the student will be more understands when using the multimedia explanation which highlight the relevance word rather than long presentation of text. For example, the student who read the text explain about steps in make simple circuit along with corresponding illustration generated 50% more

useful solution compare to the student who read the same text with additional details embed in the presentation.

2.5 PROTOTYPE

Oxford Advanced Learner's Dictionary (2005) defines prototype as the first design of object which other forms are copied or developed. The word prototype is derives from Greek which mean first and impression. In the other word mean primitive form.

According to McCracken and Wolfe (2003) prototype is a technique that can be defines as original model or pattern. Prototype also can be defined as evolutionary or thrown away. Evolutionary mean the prototype become a part of the project while thrown away define as the prototype only as a pattern for the implementation in the development. There are 2 additional type of prototyping which are low fidelity and high fidelity. The low fidelity prototype is usually by sketch on the paper. High fidelity is design in the computer and most similar to the final product that are develop. According to Bostock (2003) the prototype is to use as a visualization model. It will help the user visualize about the product and refine the user requirement. The prototype will be as a guide and references until the product is finished.

The benefit of prototyping is to improve the chance of creating the usable product. Study from over the past decade shows the prototyping approach result in fewer time pressures on the development team and higher user satisfaction and acceptance. Part of the reason shows that the user can be very good at criticizing at the existing

system compare to ask and describe what they need for the unseen system (McCracken & Wolfe, 2003).

2.6 USER CENTERED DESIGN (UCD)

User-centered design (UCD) as define by Abras, Maloney-Krichmar, Preece, (2004) is a general term which to describe the design processes that end user influence the design of the system. While Lindstrom & Malmsten(2008) said that there are many way to describe UCD but it all pointed to user perspectives. The main concept of UCD is the users are involved in either one way or many ways. While Prothero (2007) said that UCD is a “top down” which the first phase is analysis the user need, followed by implementation of the user interface based on first phase, followed by construct the functionality to support the user interface.

Due to Norman adapted from Lindstrom and Malmsten (2008) as process that has been formalized in the ISO- standard 13407 Human-centered design processes for interactive systems (ISO 1999) which has describe the UCD is iterative process that include five (5) steps which is Plan the human centered process, understand and specify the context of use, specify the user and organizations requirements, produce design solution and evaluate design against requirements. Compare to McCracken and Wolfe (2004) and Lindstrom and Malmsten (2008) there are 5 phase or steps in UCD. The steps can be illustrated as figure 2.1.

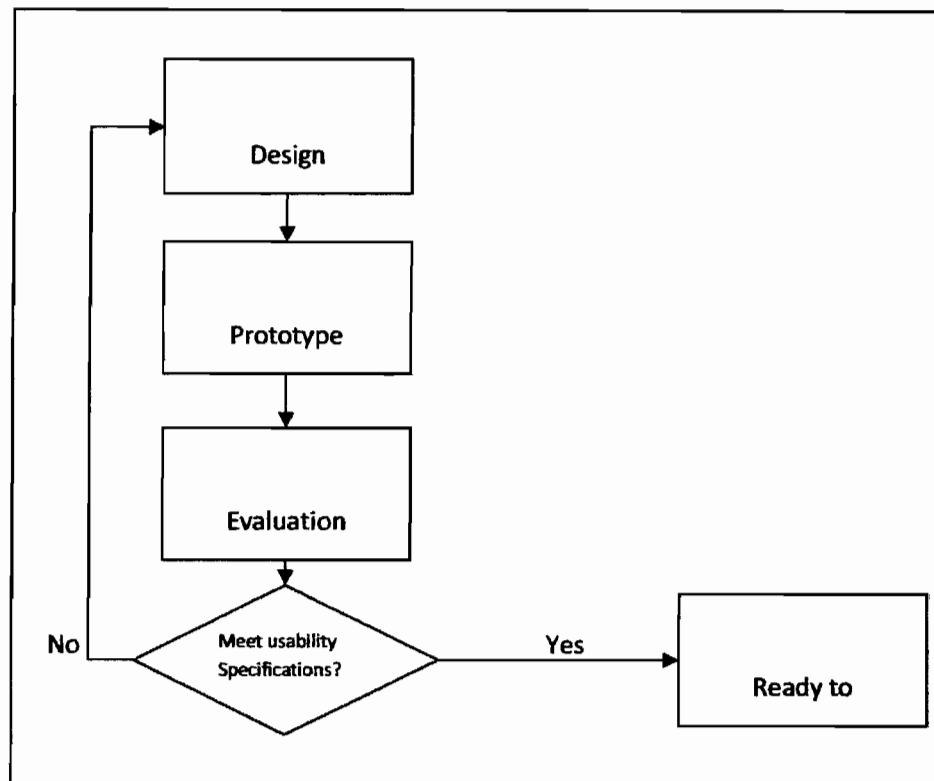


Figure 2.1: UCD Development cycle

According to Patton (2007) the main objective to bring the user into the development process is to make the courseware is not difficult and easy to them to use it. If the user likes to use that system, it means the potential and productivity is increase. Even the development along with the user, it does not mean the courseware that been develop is not quality enough.

2.7 SUMMARY

At the first part of literature review, brief about the courseware and the characteristic of courseware has been discussed. Then *Kemahiran Hidup* has been brief and describe generally. The comparisons of Multimedia Theory, Prototype and UCD have been discussing detail. As the result of this literature reviewed, UCD

Methodology has been identified to facilitate this courseware. Detailed will be discussed in Chapter 3.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

As discussed briefly in Chapter 2, UCD has been verifying and selected to be as the methodology for this courseware development methodology. In this chapter, all the phases in the UCD methodology are brief in detail. The component of research method also will be discussed in remain section.

3.2 USER CENTERED DESIGN (UCD) METHODOLOGY

From McCracken and Wolfe (2003) adapt from Moran (1981) the successful of user interface depend on the user centered development methodology. The methodology start with gathering the need analysis, user and task analysis, functional analysis, requirement analysis, setting usability analysis, design prototyping and finally the evaluation. This methodology is iterative and full with the testing for user satisfied and expectations.

During the survey, the respondents are the secondary school students from Sekolah Menengah Kebangsaan Sheikh Abdul Malek, Kuala Terengganu. There are 7 classes of students form one in this school. About 34 respondents were selected randomly by class were gathered to answer the questionnaire. The questionnaire was constructed in fully Bahasa Melayu so that the respondents will get more clearly about the questions.

In the early stage, the questionnaires are constructing to get the user requirements. The questionnaire will be covered in 3 sections: Demographic, Experience Using Computer and User Requirement. In the User Requirement sections, there are divided into two parts. For the first part, the respondents were required to answer all the questions in objective type. Second part the of user requirements questionnaires were measured using the Likert Scale format ranging from one (1) up to five (5) as in Table 3.1. The questionnaires that answered by the respondents will be collected, computed and analyzed using SPSS 12. The results are shown in Chapter 5, finding and result section.

Table 3.1: Likert Scale Classification

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Score	1	2	3	4	5
Category	Disagree		Neutral	Agree	

3.2.1 Needs Analysis

The purpose for developed this courseware was to increase the user satisfaction when using the educational courseware. The courseware will be used by form one students ad anyone who want to learn about basic electric. The courseware will be in the compact disc (CD) by using hybrid method. The courseware will be developed in off-line method while the interactive games will needs the user to connect to the internet which is online method. The courseware will be included with the interactive notes and various types of exercises. The courseware will be one of the choices for student to study and make revisions rather than the conventional ways. The courseware will be as teaching tools and help the instructor to spread the knowledge effectively.

3.2.2 User and Task Analysis

Due to time constraints, the courseware will be developed only for chapter 3 according to the syllabus of *Kemahiran Hidup* form one. The courseware will be developed across the gender, religion and will be suitable for all levels of experience with computer. This courseware also will be developed not only for the expert user but include the beginner. The courseware will be developed for form one students and as a teaching instrument for the instructors. The questionnaire is constructed and distributed to 34 students to get the information about what they needed for the courseware.

3.2.3 Functional Analysis

During this analysis, the functionality of the courseware will be determined. The courseware was designed to be suitable to all kind of computer included the out-dated computer. The courseware was developing based on text book of *Kemahiran Hidup Tingkatan Satu*. The courseware will be used the natural language and general terms adapted from the text book so that the user will understand and capable to maneuver it. Type of specification is shown as flow chart in Appendix B.

3.2.4 Requirement Analysis

Instead to get the user requirement for the courseware *Kemahiran Hidup* form 1, set of questionnaires were constructed. The questionnaires were used to get the user requirements and what they needed in their perspective which should be applied in the courseware.

3.2.5 Setting Usability Analysis

The courseware will be developed under zero condition of errors which mean the courseware is zero error. The questionnaires were constructed to get what kind of computer they used. This is including their experience using the computer. The courseware will be developed to grab and catch the user first eyes to use it. Set of questionnaires were been constructed to get the user requirements. The questionnaires are to measure what are the respondents interested most in the interfaces, color, and interaction. The questionnaire is shown in Appendix C.

3.2.6 Design

During this phase, the user needed has been identified for the content of the courseware and it is according to user requirements. Every element must be calculated and verified include the layouts, interfaces, navigation and so on.

The modality principle has been studied and has been identified to each section for the CDKH prototype. In the notes section, it has been identified that the multiple representation principle, split attention principle, coherence principle and the contiguity principle will be used as a design principle in CDKH. For the exercise section, only the individual differences principle will be used as a principle of design.

The functionality of CDKH prototype will be determined. For example in the developing the courseware, the target computer requirement must be included the minimum specification of computer. Some of the schools still use the old computer as teaching tools in the schools. CDKH prototype will help the students to understand more about *Kemahiran Hidup* subject. The courseware will also be new assistant to help teacher and instructor to give more knowledge to the students. The courseware will be define whether needed to be more interactive like to more focusing in exercises, notes or else. There are several interaction styles such as menu selection, form filling, graphical interaction and natural language. In the developing the courseware, all thing must be considered. The courseware supposedly must lead to user satisfaction.

In this phase also describe the formal specification that required and needed to implement in the courseware. For example the courseware should not only have the notes but it must be including with exercise. The courseware will be develop using

Adobe Director and supported by other software like Adobe Photoshop, Adobe Premiere, Sony Sound Forge, Cool Edit Pro and a few others software. By using the Adobe Director, it also includes customized lingo script to do a special trick in the courseware instead to make the courseware and learning process become more attractive.

3.2.7 Prototyping

According to McCracken and Wolfe (2003) prototyping is based on user feedback. This method were luring to successive refinements. The prototype is effective when we need to measure the courseware whether the user satisfy or not. Other benefit using prototyping are we can reveals errors; reduce errors, improving usability and so on. There are two kind of prototype is evolutionary and revolutionary. The evolutionary is when the prototype becomes the actual product. The revolutionary or throwaway is the prototype that uses only to get the right specification and after finish it will be discarded. In this development of CDKH prototype will be used two kind of prototype to gather the information needed to develop the courseware. The revolutionary prototyping is by using the paper prototype.

By using the paper prototype, the researcher goes to the school and asked the teachers who teached *Kemahiran Hidup* about the interface whether they satisfied or not. If the teachers are not satisfies, the interface will be changed again. The teachers were also brief about the Modality Principle. It is easy to make the interfaces that are followed by Modality principle if the teachers know and understand about it.

In this prototyping phase, the target user will be considered in many way such as sex, experience using computer and so on. The task and activities will be decided and targeted. The respondents for this courseware are students and teacher form one in secondary schools. The respondents will be selected randomly by not focusing their standard of knowledge. By using the questionnaires as data collection techniques, it will get a good responds from the students and teachers about what they exactly want in the courseware.

3.2.8 Evaluation

The prototype was used during the questionnaires distribution. The questionnaires based on Questionnaire for User Interface Satisfaction (QUIS) will be distributed to the students who participate in the survey. The students are choosing from the class which does the User Requirement Evaluation Questionnaires. The questionnaires were using the simple word so that the respondents will cleared about it. The researchers and his friends which respondents home class teacher were guided the respondents to answered all the questions and also to prevent biasness if the researcher do by himself. The respondents will be needed to fill the questionnaires after they finish using the courseware while their instructor guided them. Some of the respondents do on their owned. The questionnaires are measured using the Likert Scale format ranging from one (1) to five (5) as in Table 3.1. The questionnaires were answered by the respondents and collected, computed and analyzed using SPSS 12. The results are shown in Chapter 5, finding and result section.

In this phase, the courseware performance will be determined. These also include performance measure such as the minimum specification of computer that can run

the courseware and number of error with observable user behaviors. The first impression and overall satisfaction from the user also need to be measure. The courseware was in the zero condition of error which mean gap of error was null.

3.3 SUMMARY

This chapter presented the research methodology of the study. It was guided to develop and evaluate the courseware. All of the stages in this methodology are based on the UCD Methodology. Next chapter presents the system development for CDKH prototype.

CHAPTER 4

PROJECT ANALYSIS

4.1 INTRODUCTION

This chapter discussed about the user requirement for the courseware CDKH prototype. The analysis has been done using a set of questionnaires which consists of descriptive statistic and reliability analysis. To analyze the data, SPSS version 12 was used. The questionnaires are divided into two part; Demographic Analysis and User Requirement Analysis. The result from this study has been discussed in the following section.

4.2 REQUIREMENT ANALYSIS

The requirement analysis is a very important stage of CDKH prototype development. This is to get the requirement for the development the CDKH

according to user requirements. According to Johnson et al. (2004) and Akili (2005) the requirement can be as guidance in the design or redesign of the system for assessing potential areas of system improvement. This project used the summative evaluations which all the processes were evaluated during development. The CDKH user requirements were conducted on thirty four respondents. Each of them was given brief explanation regarding the requirements and what they want to be implemented in the prototype. After they understand, the respondents were given a set of questionnaires for requirement that show in Appendix C.

4.3 INSTRUMENT FOR USER & REQUIREMENT ANALYSIS

The questionnaires for user requirement analysis are tools were developed to determine the user requirements for courseware CDKH. The questionnaires are divided into three parts: Demographic, Background in Computer and User Requirement. The User Requirement parts were divided into two parts which is multiple choices and Likert scale.

Descriptive statistic and reliability analysis were used in this study. SPSS version 12 for Windows was used to analyze the data (Liu, 2010). According to Santos (1999) the most commonly reliability coefficient is Cronbach Alpha.

4.4 RELIABILITY OF USER & REQUIREMENT ANALYSIS

Reliability was pointed for the usability evaluation questionnaires. The reliability was the characteristic of the instrument itself, but validity comes from the way the

instruments were employed. One of the most commonly reliability coefficient used is Cronbach Alpha (Santos, 1999). The reliability of questionnaires is the ability of the questionnaires to give the same result when filled out by liked- minded people similar circumstances. Cronbach Alpha is an index of reliability associated with the variation accounted for by the true score of the “underlying construct”. Construct is the hypothetical variable that was being measured. It is usually expressed on a numerical scale from zero (very unreliable) to one (extremely reliable). The Alpha coefficient ranges in values of range from zero to one. It maybe used to describe the reliability of factor extracted from dichotomous (question with two possible answers) and or multipoint formatted questionnaire or scale such as rating scale one is for poor and five for excellent. The higher score, the more reliable the generated scales are.

The Cronbach Alpha values were calculated using SPSS version 12 to determine the data inter- item reliability which assesses the degree of internal consistency between multiple measurements of a dimension. The Cronbach Alpha values for each measure are shown in Table 4.1. The range of Cronbach Alpha for this questionnaire is between 0.712 and 0.877. The most measured that has high value is section Video (0.877) followed by Navigation (0.825). According to Cavana, Delahaye and Sekaran (2001) the Cronbach Alpha values greater than 0.7 is counted as acceptable to be used as a questionnaire. The Cronbach Alpha for all dimensions is 0.7942.

Table 4.1: Cronbach Alpha for all dimensions

6	0.712
2	0.877
3	0.741
3	0.825
4	0.816

4.5 DESCRIPTIVE STATISTIC OF DEMOGRAPHIC RESPONDENTS

The descriptive statistics are using to describe the basic features of the data in the study. It provides simple summarized about the sample and measures. Descriptive statistics are typically distinguished from inferential statistics. Descriptive statistics are use to shows the quantitative descriptions in a manageable form. Descriptive statistics help to simplify a large amount of data in a practical way. Each descriptive reduce a lot of data and make it into simpler summary. The usability evaluation from user opinion will toward to the usability of courseware CDKH. The summaries of demographic of the respondents are shown in Table 4.2.

Table 4.2: Demographic data summary

Demographic Data	Frequency	Percentage (%)
1- Male	16	47.1
2- Female	18	52.9
1- Town	14	41.2
2- Near Town	9	26.5
3- Rural Area	11	32.4

Respondents are mostly balance between both of genders. Respondents male are 16 (47.1%) respondents and female 18 (52.9%) respondents. Respondent home town is divided by three; respondent who live in the town area 14 (41.2%) respondents, respondent who live near to the town 9 (26.5%) respondents and lastly the respondent who live at rural area 11 (32.4%) respondents.

4.6 RESULT OF THE USER EXPERIENCE USING COMPUTER

The second parts of user requirement evaluation are about the user experience using the computer. Five items has been asked in this section. The finding will be used as guidelines to the development of CDKH prototype.

The first item asked about the user experience using the computer before entered to form 1 as shown in figure 4.1. About 22 (65%) of the respondents are experienced using the computer while 12 (35%) of the respondents are not experienced using the computer before entered to form 1.

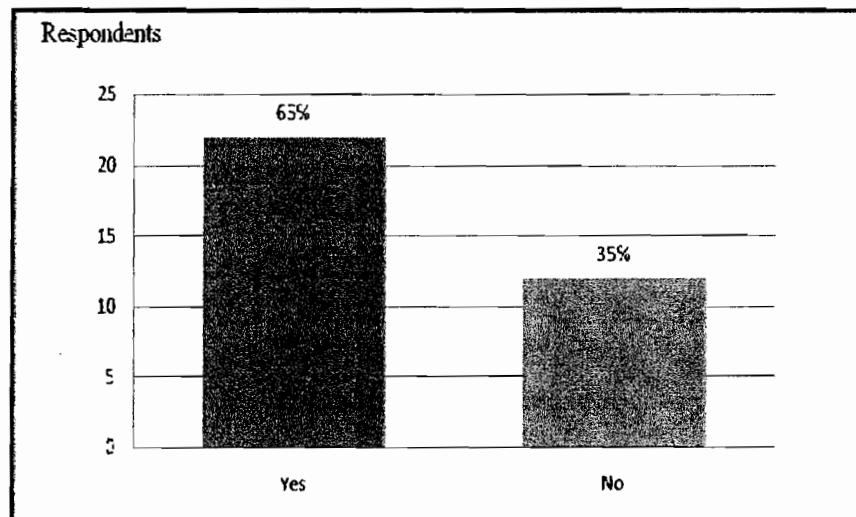


Figure 4.1 : User experience using the computer before entered to form 1

The second item asked about how frequencies the respondents used the computer I their life is shown in figure 4.2. About 7 (21%) of the respondents are used the computer daily. While 11 (32%) of the respondents are used the computer weekly and 14 (41%) of the respondents use the computer sometimes. There are only one respondents for monthly and not been used about 3% each.

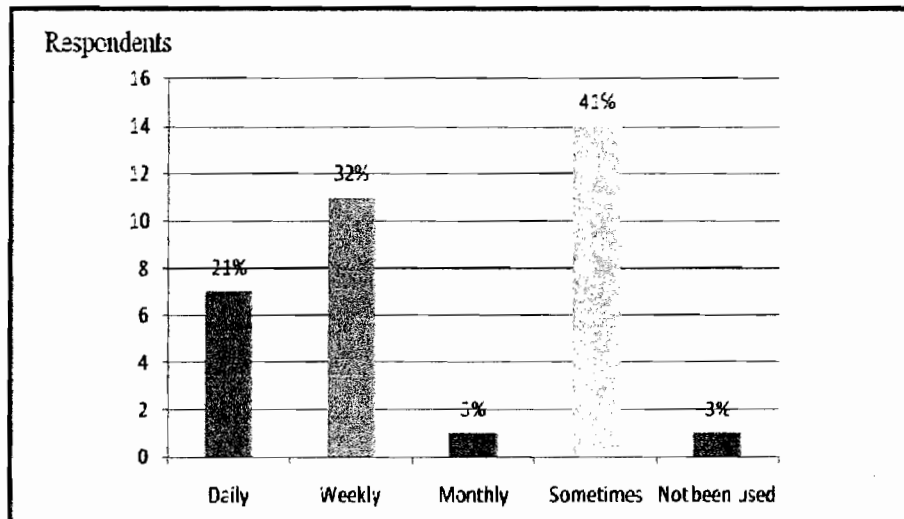


Figure 4.2 : Frequencies of the user using the computer

The third item asked about period that the respondents have been using the computer is shown in figure 4.3. About 6 (18%) of the respondents used the computer less than a year while 7 (21%) of the respondents used the computer between one to two years. About 8 (24%) of the respondents used the computer between three to four years. The highest percentage is more than 4 years period using the computer about 13 of the respondents.

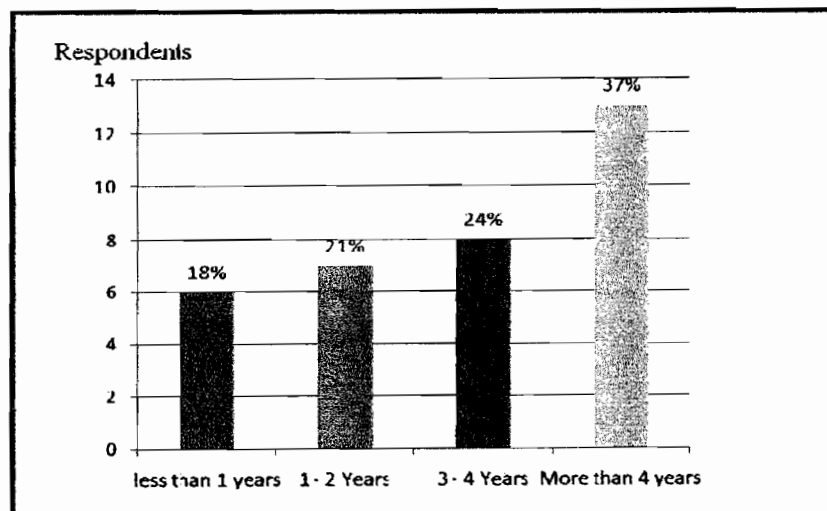


Figure 4.3 : period of the user using the computer

The fourth item asked about where the respondent place most used the computer is shown in figure 4.4. About 17 (50%) of the respondents used the computer is at home and school while about 6 (18%) of the respondent used the computer at school and cybercafé. About 4 of the respondents used the computer at cybercafé and home and lastly about 7 of the respondents used the computer at three place which is home, school and cybercafé.

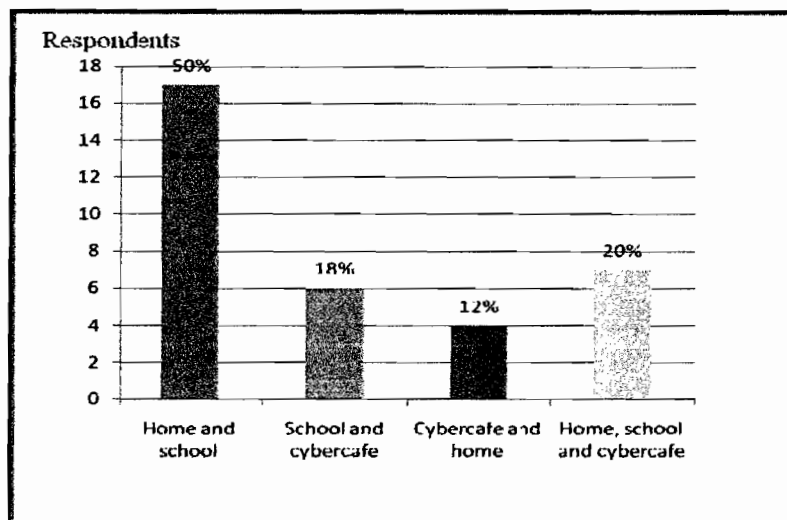


Figure 4.4: Place most used the computer

The fifth item asked about where the respondent place learned to use the computer is shown in figure 4.5. About 5 of the respondents are going to the computer class and self learned while 15 of the respondents are self learned and learned from others. About 10 of the respondents going to computer class and learned from others. Lastly, about 4 of the respondents are going to computer class, self learned and also learned from others. Learn from other include informal which is teaching by their parent, sibling or others.

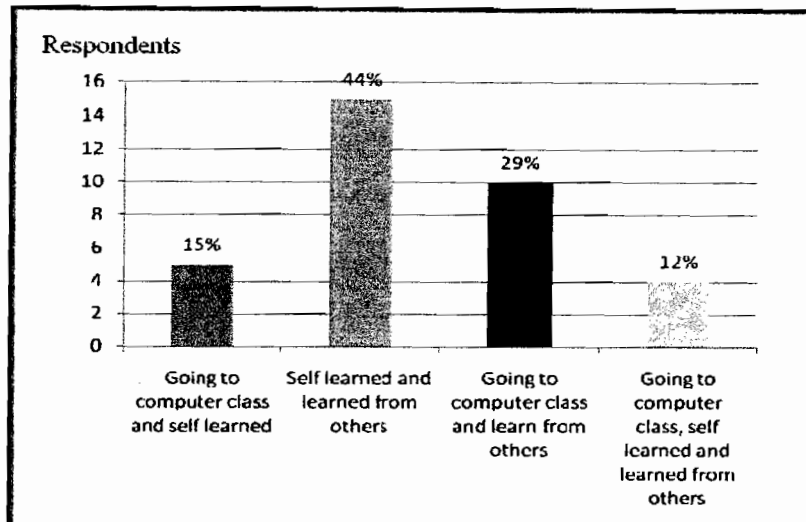


Figure 4.5: Place learned most the computer

The sixth item asked about courseware that respondents have been used shown in figure 4.6. About 23 (68%) of the respondents have experience using the courseware in *Bahasa Malaysia*, English, Mathematic and Sciences while 6 (18%) of the respondent have experienced using the English, Mathematic and sciences coursewares. Lastly, about 5 (14%) of the respondents only have the experienced using the Mathematic and Sciences courseware only.

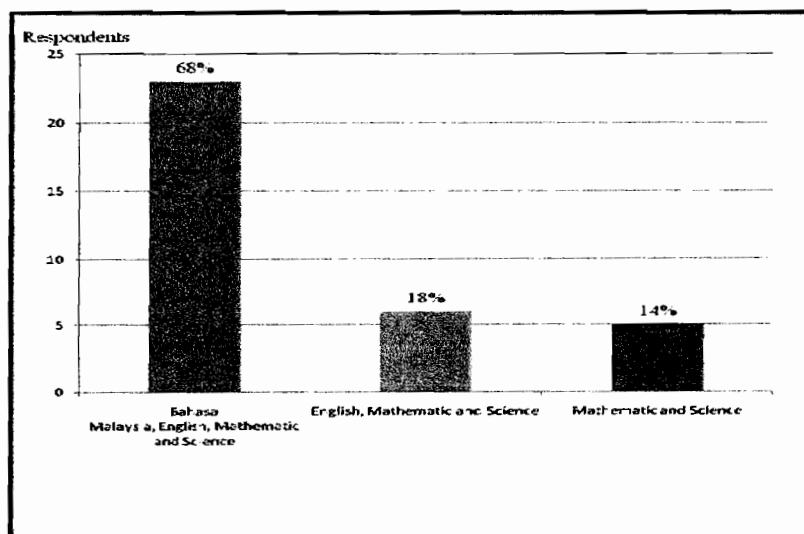


Figure 4.6: Courseware that respondents have been used

4.7 RESULT OF USER & REQUIREMENT ANALYSIS

The third parts of user requirements evaluation is to evaluate about user requirements in frequency. There are five scope of question have been asked to the respondent about what they needed for the prototype. The finding will be used as a guidelines the development of CDKH prototype.

4.7.1 Color

These sections are described about the color of the interfaces in CDKH prototype. Two items has been asked in this section. The question is asked about the type of color for background and secondly asked about type of color for font in the CDKH prototype.

The first item is asked about the type of color that most suitable to be used as the background of CDKH prototype. About 18 (52.9%) of the respondents choose the dark type color to become the background of the prototype and 16 (47.1%) of the respondents choose the light color to be the background of the prototype. It can be illustrated in the Figure 4.7.

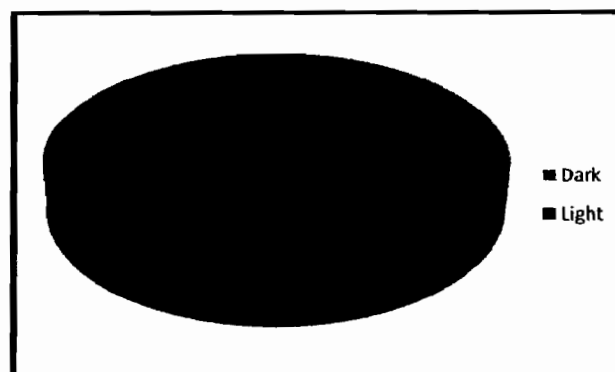


Figure 4.7: Type of color chooses by respondents

The second item is asked about type of the color to be used for the font in CDKH prototype. About 16 (47.1%) of the respondent choose the dark color to become the font color of the prototype and 18 (52.9%) of the respondents choose the light color of the font to be the color of the prototype. It can be see that the respondent who choose the dark color as a background, willing to choose the light color as a font color. It can be illustrated in the Figure 4.8.

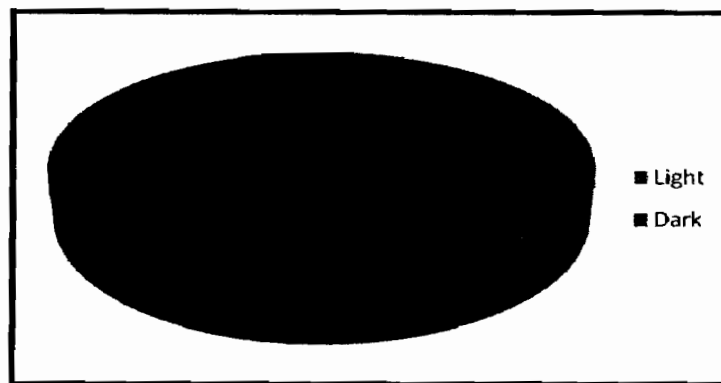


Figure 4.8: Type of font color chooses by respondents

4.7.2 Type of background

This section discussed about the background type for CDKH prototype. Only one question has been asked in this section. The item was asking about the background animation for CDKH prototype. About 13 (38.2%) of the respondents choose the static background and about 21 (61.8%) of the respondents choose the animation background of the prototype. It can be illustrated in the Figure 4.9.

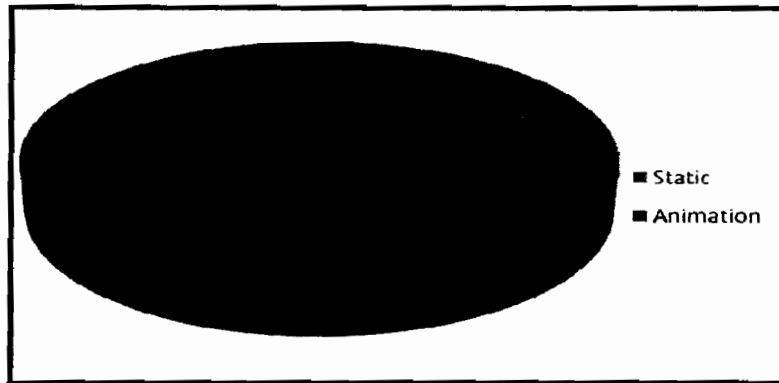


Figure 4.9: Kind of background chooses by respondents

4.7.3 Type of exercise

This section will be discussed about type of exercise in courseware CDKH prototype. Only one question has been asked in this section. From 34 respondents, about 13 (38.2 %) of the respondents choose the drag and drop type of exercise, 11 (32.4%) of the respondents choose interactive game, 4 (11.8%) of the respondents choose identify and match game and find hidden object and lastly 2 (5.9%) of the respondents choose objective type of question. It is show that most of the respondents choose the drag and drop and interactive game because it is not bored and fun. It can be illustrated in the Figure 4.10.

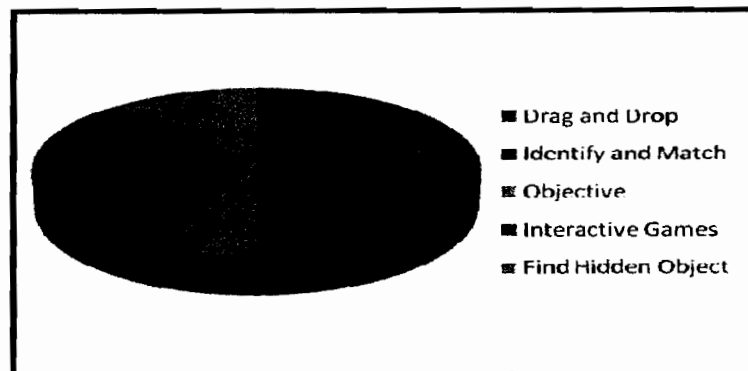


Figure 4.10: Type or exercise choose by respondents

4.7.4 Background of music

This section discussed about the music background for CDKH prototype. Only one question has been asked in this section. The item was asking about the music background for CDKH prototype whether it suitable or not to use it. There are 30 (88.2%) of the respondents like the music background in the prototype. Meanwhile, 4 (11.8%) of the respondents not like for the background music in the courseware. It can be illustrated in the Figure 4.11.

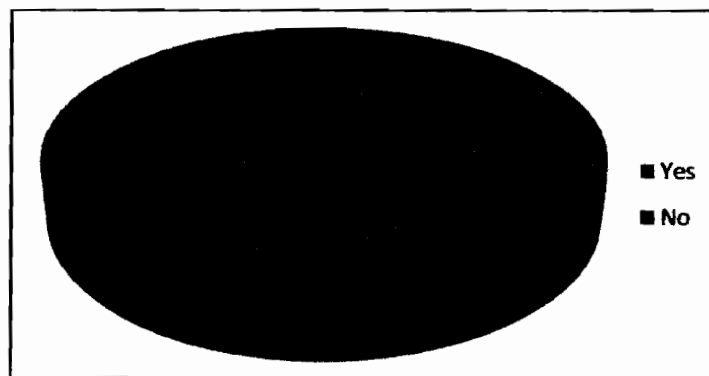


Figure 4.11: Background music for the courseware

4.7.5 Theme of courseware

The last section was asking about the theme for CDKH prototype. This section the respondent chooses whether they want simple, corporate, artistic or childish theme. There are 14 (41.2%) of the respondents choose the simple theme while 9 (26.5%) choose the corporate theme. The balance choose artistic theme 8 (23.5%) of the respondents and childish theme 3(8.8%) respondents. It can be illustrated in the Figure 4.12.

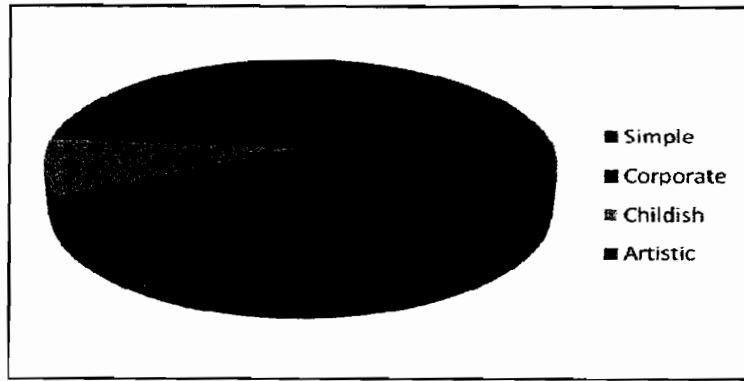


Figure 4.12: Theme selected by the respondents

4.7.6 Likert scale

In this part, it is shown the descriptive statistics for all measures which using the Likert scale. The results for the categories are shown in Table 4.3 and Figure 4.13. The measure that has the highest mean is Navigation (4.44). The lowest mean is come from Audio (3.83). The mean response for all measure by users was 4.084 (S.D = 0.8968). Table 4.4 shows the descriptive statistics for all items.

Table 4.3: Descriptive statistics for categories measures

	34	4.16	0.9595
	34	4.28	0.7955
	34	3.83	0.9656
	34	4.44	0.8240
	34	3.71	0.9396

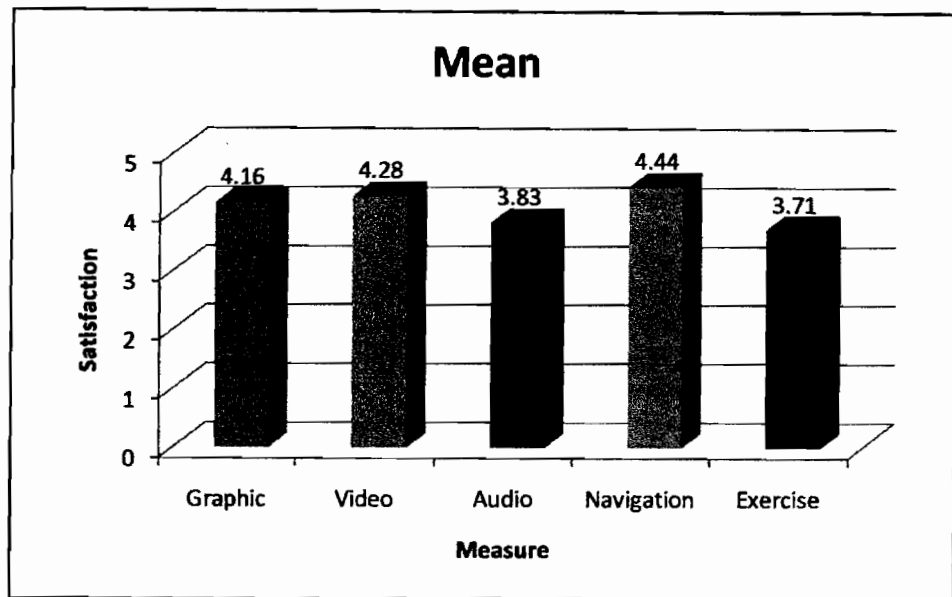


Figure 4.13: Descriptive statistics for categories measures

The graphic section consists of two items about the graphical instruments for CDKH prototype. The items were asking about the background and the font color must be different and about the icon must be suitable. Mean for background color must be different with font color is 4.03 (1.243) and icon must be suitable is 4.29 (0.676). It can be concluded that the respondent want the background different color to the font and the icon must suitable with the concept.

The video section consists of two items about the video content in CDKH prototype. The items asking about the courseware should include video and the video must be understandable. Mean for the courseware should include video is 3.91 (0.900) and the video must be understandable 4.65 (0.691). It can be concluded that the respondent want the courseware to include the understandable video.

The audio section consists of three items about the audio content in CDKH prototype. The items asking about the courseware should include the sound effect, each question must be asked by narrator and lastly each note must be clarified by the

narrator. Mean for the items asking about the courseware should include the sound effect is 4.29 (0.871), each question must be asked by narrator is 3.68 (1.065) and lastly each note must be clarified by the narrator is 3.53 (0.961). It can be conclude that most of the respondents is like to read in the musical environment. About the narrator, most of the respondent neutral and did not care whether it is include or not.

The navigation section only contains one item in the evaluation for CDKH prototype. The item asking about the courseware should be easy to navigate. Mean for this item is 4.44 (0.824). It can be concluded that most of the user agree that the courseware should be easy to navigate.

The exercise section consists of two items in the evaluation for CDKH prototype. The items asking about the question should be easy to answer and the question must be challenge. Mean for the question should be easy to answer is 3.26 (1.163) and the question must be challenge is 4.71 (0.579). It can be concluded that most of user want the question easy but challenge their mind.

Table 4.4: Descriptive Statistics for All Measures

	N	Mean	Std. Deviation
Graphic			
What kind of color is the most suitable for background courseware?	34	1.47	0.507
What kind of color is the most suitable for font in the courseware?	34	1.53	0.507
Background of the courseware should be animation or static?	34	1.62	0.493
What is the most suitable theme that you like most?	34	2.15	1.209
Music			
The background music is need in the courseware?	34	1.12	0.327
Exercise			

Type of exercise that you prefer the most?	34	2.68	1.552
Graphic			
Background and font color must be contrast?	34	4.03	1.243
Courseware should have understandable icons?	34	4.29	0.676
Video			
Courseware should include the video?	34	3.91	0.900
Video must be understandable?	34	4.65	0.691
Audio			
Courseware must have sound effects?	34	4.29	0.871
All the question need to be asked by narrator?	34	3.68	1.065
All the notes need to clarify by narrator?	34	3.53	0.961
Navigation			
Courseware must be easy to navigate?	34	4.44	0.824
Question			
All questions must be easy to answer?	34	3.26	1.163
All questions must be challenge?	34	4.71	0.579

4.8 SUMMARY

This chapter is discussed about the analysis data obtained by using the user and requirements evaluation. It was described and summarized the respective of participants toward CDKH prototype. The respondents chose more dark background compare to light color background. The respondents also chose light color for font. The respondents choose animation background more than static background in the type of background section. For the type of exercise, most of the respondents chose the drag and drop type. In the background section, most of the respondents like to have the background music. Most of the respondents chose the simple theme.

CHAPTER 5

DESIGN AND PROTOTYPE DEVELOPMENT

This chapter described the activities involved in the system development by using the UCD methodology. This methodology consists of analysis, design, implementation, testing and lastly evaluation.

5.1 INTRODUCTION

The development is an important stage because it will determine whether the prototype will function based on the user requirements from the user requirement questionnaires. The CDKH development are according to UCD Methodology which can be divided into four phases that is analysis phase, design phase, implementation phase, testing and evaluation phase. It was adapted from McCracken and Wolfe (2003).

5.2 PHASE 1: ANALYSIS OF USER REQUIREMENT

The first phase is analysis requirement. In this phase, it will be defined the function and data subject are the *Kemahiran Hidup* subject and focusing only for Electric topic. The requirements were gathered from the user requirement questionnaires and analyzed their needed and lastly restate the data rigorously. All the data from the questionnaires were analyzed for accuracy, consistency and completeness. Observation and interview were also been used to get the overall requirements from form one student beside the questionnaires. Reading the concern journal and analysis the interfaces of the existing courseware such as *Sistem Pakar dalam Pengajaran Matematik Ungkapan Algebra Tingkatan 1* (Surip et al. 2008) and *Courseware G-Reflect* (Mahmud, Ismail & Kiaw, 2009) also have been done to determined appropriate technology during developed CDKH prototype. CDKH prototype was developed using Macromedia Director. It was easier to develop the prototype because of time constraint and it can be integrated with the video easily. The software that has been used during producing CDKH prototype were Macromedia Director MX 9.0, Adobe Premiere Pro 9.0, Adobe Photoshop CS2 and Cool Edit Pro 2.1.

5.3 PHASE 2: APPLICATION DESIGN BASED ON FUNCTIONAL ANALYSIS

After the information and requirement was gathered and has been identified, the component that will be used in producing CDKH prototype will be sketched to make a storyboard. The making of storyboard based on the information obtained before this. The storyboard will determine the layout and the elements in the screen of the

system. Its include layout for text, background, video, animation, and icon that used in CDKH prototype.

Figure 5.1 shows the featured of CDKH prototype interface for main menu. The main menu consists of four parts which are notes, symbol, exercise and the syllabus. At the bottom left of the page is the button to exit. The interface will be included with the background sound to attract the user's interest of using it. The interface was designed according to individual differences principle which is one of the principles in the Modality Principle. Individual differences principle has been chosen because the target user for CDKH prototype is for all levels of learners which include the fast learners and slow learners. The advantages of this principle are the principle is not only targeting to one group of user only but it targeted to the user no matter what are their levels of learners. These principles also make the user satisfied and enjoyed while used the CDKH courseware.

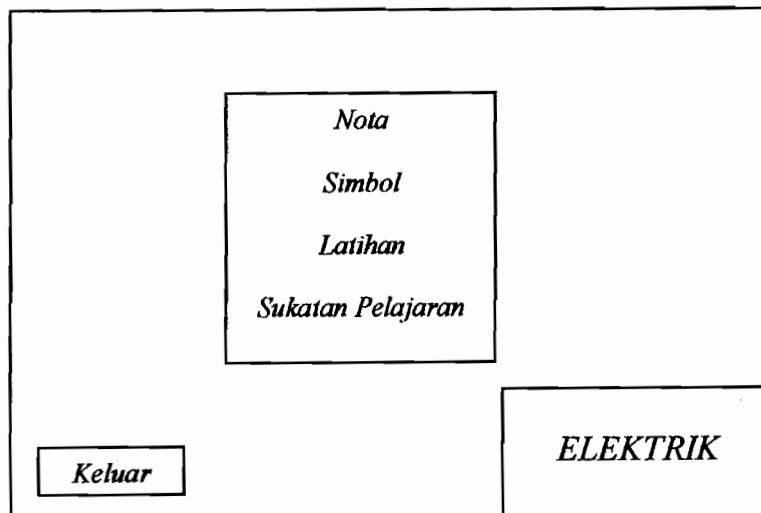


Figure 5.1: Main menu

Figure 5.2 shows the featured of CDKH prototype interface of submenu for notes. The interfaces consisted of four parts which are electrical circuit, power of electric, usefulness of various meters and the main supply for domestic used. At the bottom left of the page is the button to go to main menu. The interface included with the background sound to attract the user's interest of using it. The individual differences principles have been chosen to become the principle for this type of interfaces. This principle has been chosen because it is suitable for various levels of learners include the slow learners. The advantages of individual difference principle are it not only focused to a specific kind of user but to various kind of it. This principle also can make all user of CDKH courseware are satisfied and enjoyed while using it.

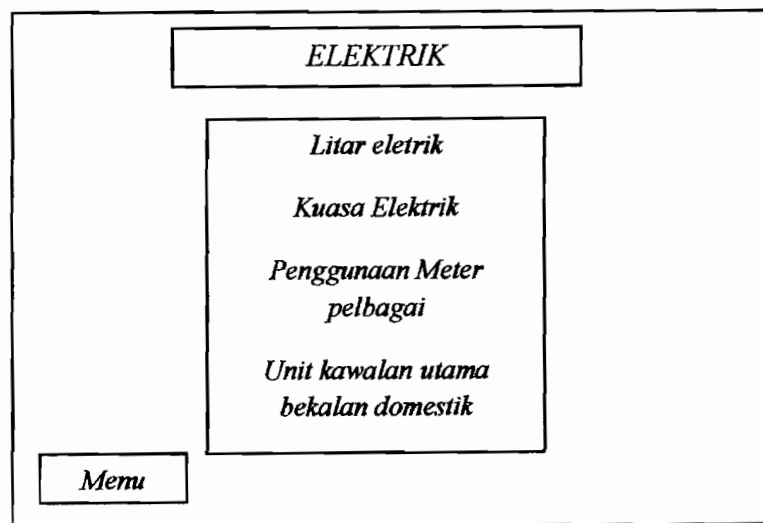


Figure 5.2: Submenu for notes

Figure 5.3 shows the featured of CDKH prototype interface for notes. The interface consisted of four parts which are electrical circuit, power of electric, usefulness of various meters and the main supply for domestic used. At the bottom left of the page

was the button to replay the narrator voice. At the middle bottom consist of four buttons. The buttons are exit to main menu, back to previous note, menu to menu of notes and next to next notes. The interface was designed according to multiple representation principle which is one of the principles in the Modality Principle. This is the best to represent in the words and either videos or animations rather than present it in words only. The advantages of this principle are it can represent the note in more interactive, attractive, and enjoyable to the user of CDKH courseware. This principle can make the user more attracted and interacted with the courseware. This principle also can make the user still focused and gained knowledge from the CDKH courseware.

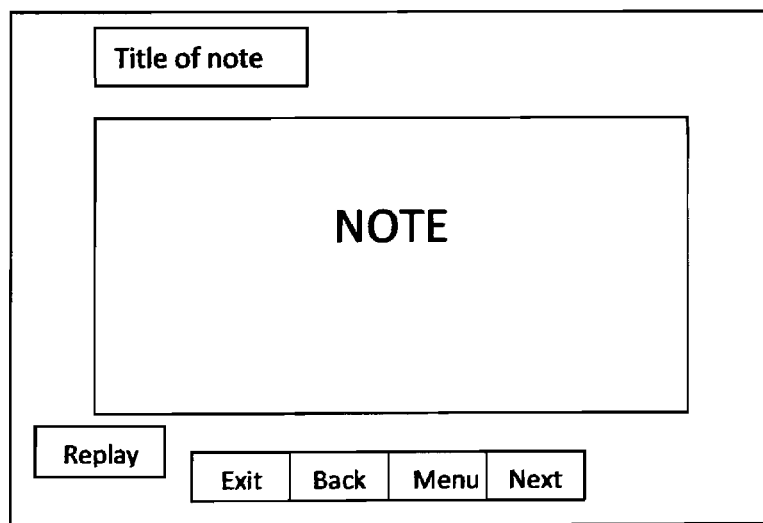


Figure 5.3: Notes

Figure 5.4 shows the featured of CDKH prototype interface for symbol in electric circuit. The interface consisted of only one part which is the electric circuit. At the mid bottom consist of four buttons. The buttons were exit to main menu, back to

previous note, menu to menu of notes and next to next notes. The interface was designed according to Modality Principle. The Modality principle that has been chosen is individual differences principle. Individual differences principle has been chose because the target users for CDKH prototype are for all levels of learners. The user of CDKH courseware was included the fast learners and slow learners. The main advantages of using this principle is the principle that not only targeting to one group of user. The users of CDKH courseware are to be all type of users included the slow learners. Other advantages using this principle are also can make all users satisfied, enjoyed and focused while used the CDKH courseware because it is fulfill their requirements.

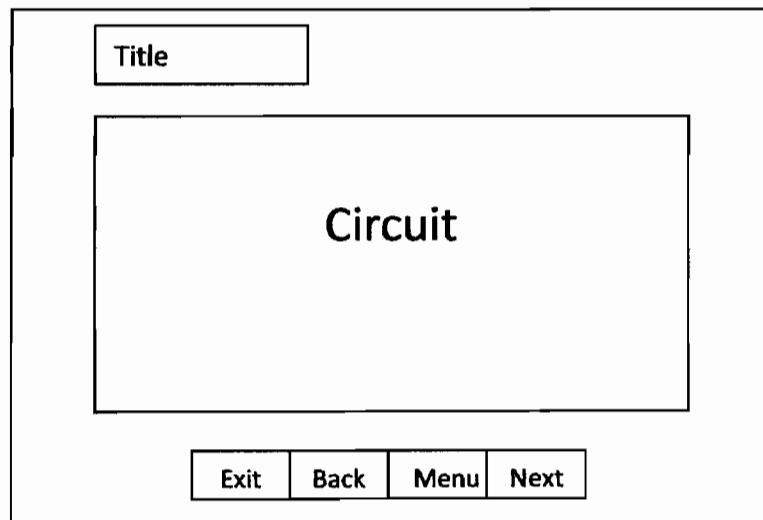


Figure 5.4: Symbol in electric circuit

Figure 5.5 shows the featured of CDKH prototype interface of submenu for the exercises. The interface consisted of five parts which are electrical circuit, power of electric, usefulness of various meters, the main supply for domestic used and lastly

the interactive game. Every of the subtopic have its own exercise except for the interactive game. At the bottom left of the page is the button to go to main menu. The principle that has been chose from the Modality Principle is individual differences principle. This principle was chose because of the CDKH courseware is not only focusing to fast learner users but include the slow learners. The main advantaged of this principle is it can make the user satisfied and enjoyed using the courseware. The interface was designed careful so that it can meet the user requirements. The interface was using the natural language. The language was adapted from the text book.

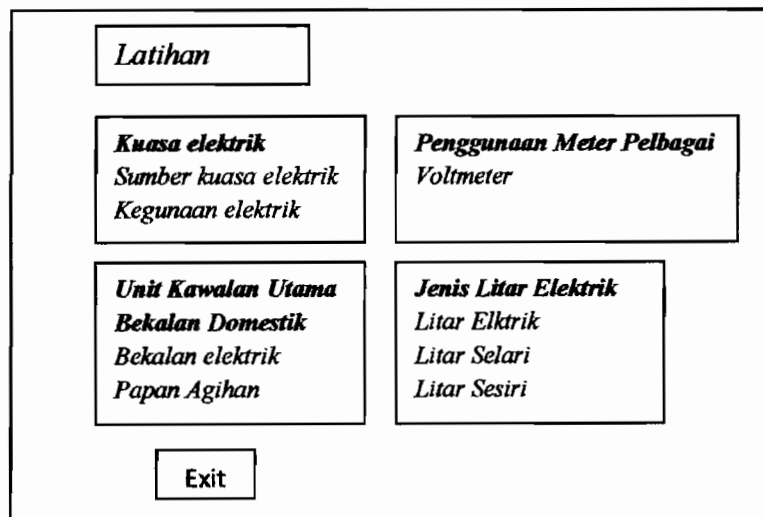


Figure 5.5: Submenu for exercise

Figure 5.6 shows the featured of CDKH prototype interface of the exercise. The interface consisted of the exercise for the specific topic. At the mid bottom consisted of four buttons. The buttons are exit to main menu, back to previous note, menu to menu of notes and next to next notes. The interface was designed according to split-

attention principles which are one of the principles in the Modality Principle. The split attention principle will be used to all exercise in CDKH courseware. The split-attention principle is used the audible narration simultaneously with visual text on screen which means that the narration are used to brief the question. The advantages of this principle are it can make the student more focused about what they should do to the exercise. The instruction is given by verbal and not situated in the exercises which mean the user must give a full attention about the exercise instruction. This can grabbed more user attention and make them focus to the CDKH courseware's instructions.

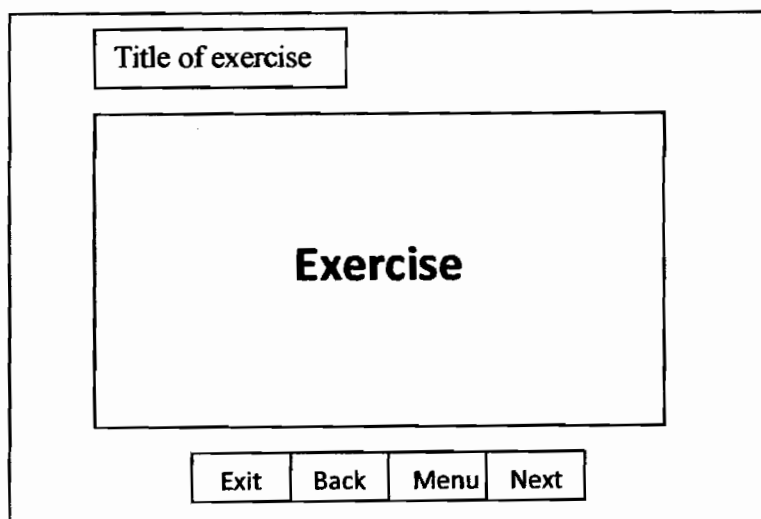


Figure 5.6: Exercise

Figure 5.7 shows the featured of CDKH prototype interface for the interactive game. The interactive game is an optional to the courseware. The interactive game are not apart of the system. The interface needs the user to make connection to the internet because the game is online. The game is uploaded to the Game Maker Website. The

game can be accessed at <http://www.yoyogames.com/games/126113-pacman-kemahiran-hidup#>. The game consisted of 3 stages which need the user to complete the level before can make up to other level. In the games section, the Modality Principle that will be used is individual differences principle. This principle has been chosen because of the target user of this courseware are all rounded to form one student. It is meaning the CDKH was including the fast learners and slow learners. The other benefit of using this principle is it also can make the user focused, satisfied and enjoyed while used the courseware CDKH.

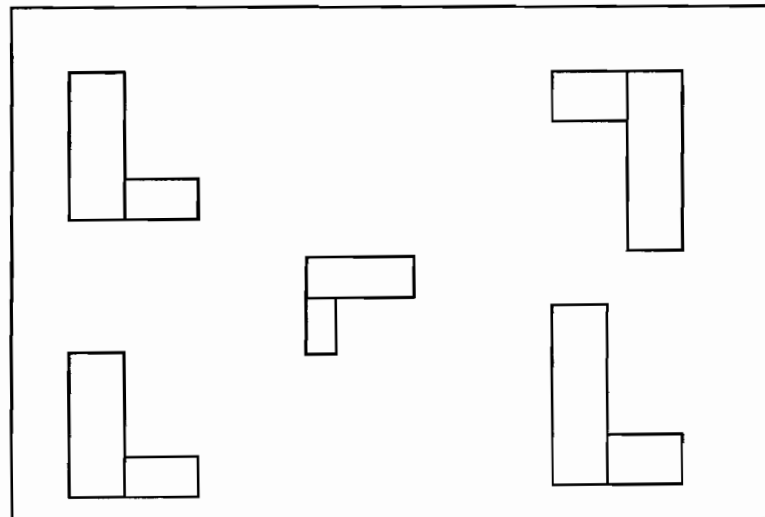


Figure 5.7: Interactive game

Figure 5.8 shows the featured of CDKH prototype interface of the syllabus. The interface consisted of four parts which are electrical circuit, power of electric, usefulness of various meters and the main supply for domestic used. Every of the topic was linked to the specific note. This section was created to make easy for the user to jump to the specific notes when they are in needed. The interface was design

according to user requirement for CDKH courseware. The interface for the syllabus menu was designed according to individual differences principle in the Modality Principle. The individual differences principle was chosen because the target user for CDKH prototype was for multi levels of learners which include the fast learners, moderate learners and slow learners. The main advantages of this principle are the principle is not only targeting to certain group of users but it was created to target all users no matter what are their levels of learners. So it was suitable to become the principle for the syllabus CDKH courseware. Other advantages are these principles also can make all users focused to the courseware more, satisfied and enjoyed while used the courseware CDKH.

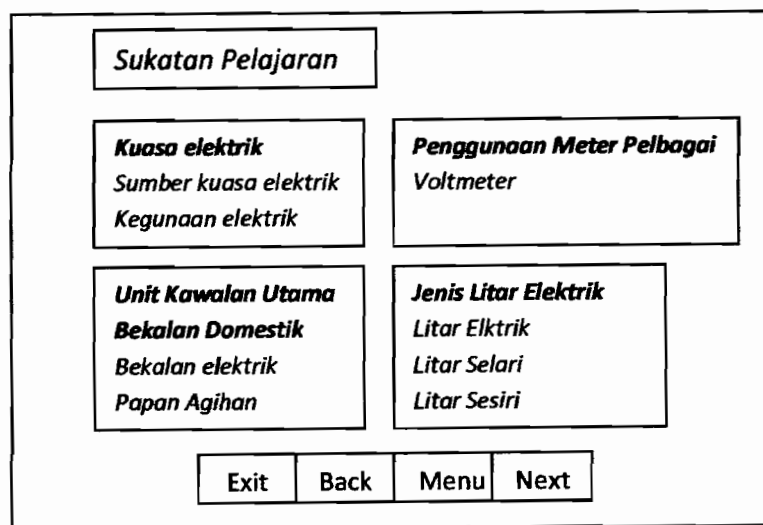


Figure 5.8: Syllabus

5.4 PHASE 3: PROTOTYPING

When the processes of producing the storyboard are completed, the CDKH prototype was produced according the guide from the storyboard. During the

implementation phase, a prototype has been built using the software that has been described earlier. CDKH prototype used Macromedia Director as core software for developing the prototype and includes for the scripting and interface.

5.4.1 Develop the courseware

The engine of the courseware was built using the Lingo Script as a script language using Macromedia Director MX 9.0. The interface CDKH prototype is shown in Figure 5.9. CDKH prototype development was using Microsoft Windows XP because of Macromedia Director are compatible with this version of Windows. If using the Macromedia Director in the Microsoft Windows Vista, the feature full screen is not available.

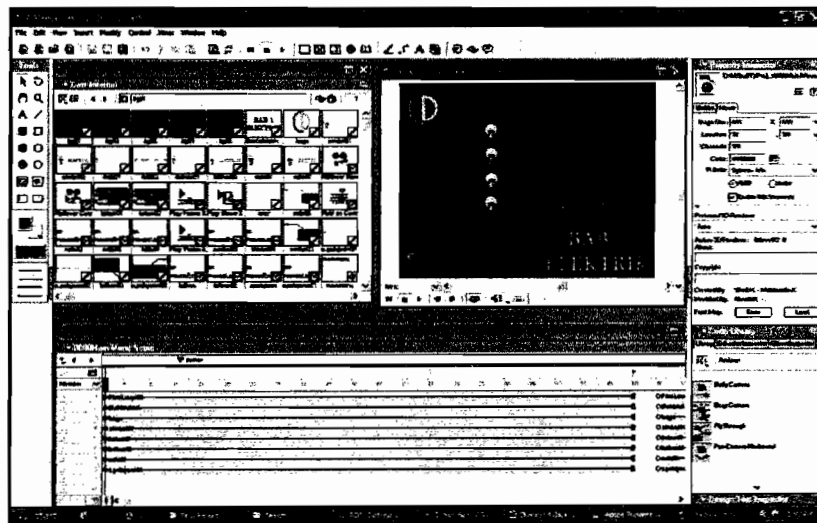


Figure 5.9: Interface of Main Menu in Macromedia Director MX

5.4.2 Development animation

The animation also developed by using Macromedia Director MX 9.0. The animation in this system in using as a backgrounds and in the notes to attract student use the system and make the interaction and interface is more fun.

5.4.3 Development of interface and graphic element

All the graphics such as the backgrounds, icons and images for the interface of CDKH prototype has been developed using Adobe Photoshop CS2. The interface was saved as .jpeg format. Meanwhile for the icon and other image was saved as .png because if using the .jpeg the interface will be included the image background. It is hard to make the white background disappeared in the .jpeg format. If the image also have a white color in it, Macromedia will also remove it. Figure 5.10 show the interfaces development in Adobe Photoshop CS2.

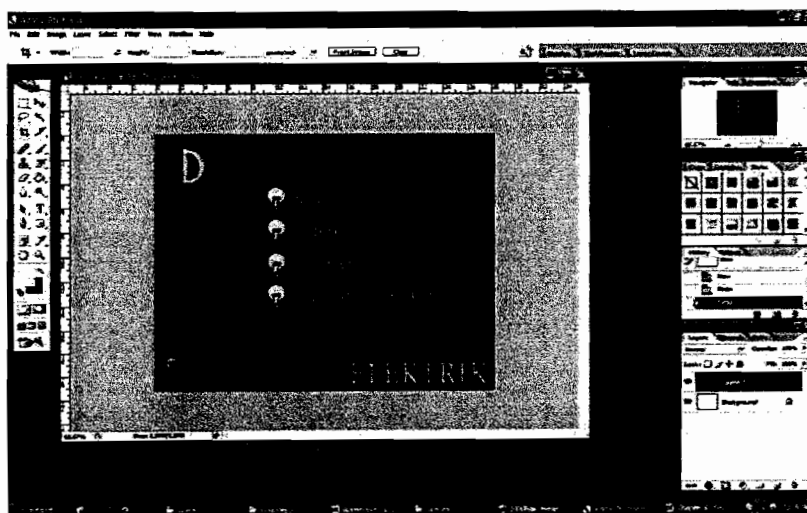


Figure 5.10: Interface of Main Menu in Adobe Photoshop CS2

5.4.4 Audio recording

Background music and voice over were recorded and manipulated using the Cool Edit Pro 2.1. Then all the music and voice over are inserting in the scene of the interface using macromedia Director MX 9.0. The interface of Cool Edit Pro 2.1 is shown at figure 5.11.

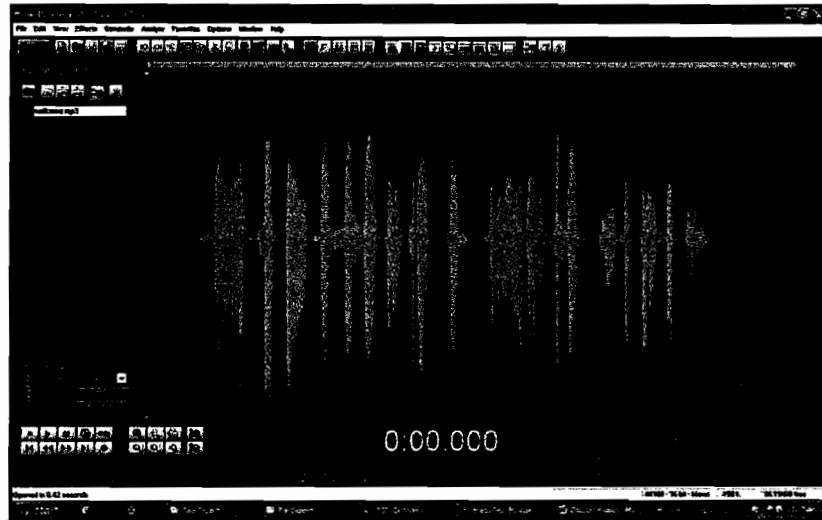


Figure 5.11 Interface of Cool Edit Pro 2.1

5.4.5 Games element

The interactions at the exercise section are using the Game Maker 6.1. After complete the game, the game will be upload to Game Maker website. The interface of Game Maker is shown at Figure 5.12.

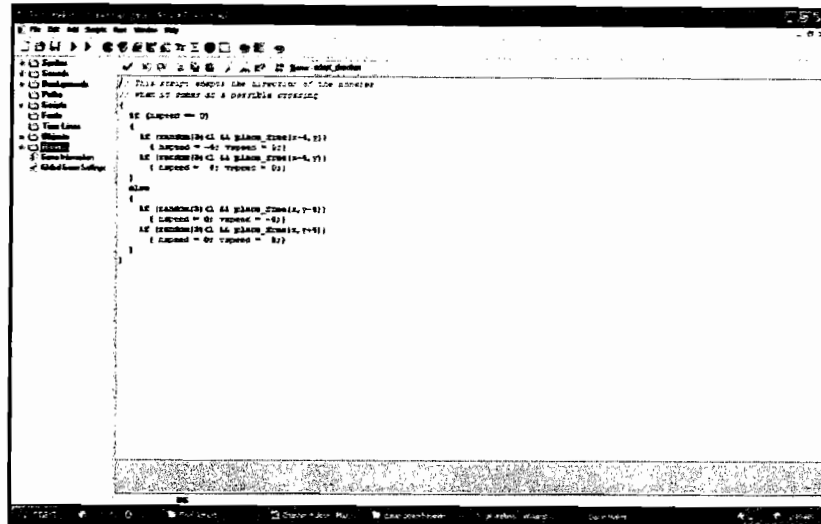


Figure 5.12 Interface of Game Maker 6.1

5.4.6 Video element

All of the video in the CDKH prototype are using Adobe Premiere Pro. After completed and rendering process, the video will be integrated with Macromedia Director MX. The interface of Adobe Premiere Pro is shown at Figure 5.13.

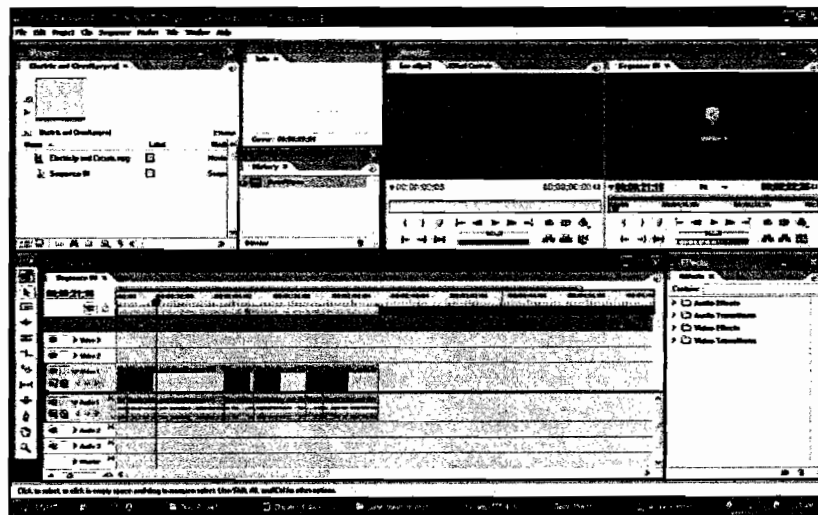


Figure 5.13 Interface of Adobe Premiere Pro

Figure 5.14 shows the featured of CDKH prototype interface for main menu. The interface was designed according to individual differences principle which is one of the principles in the Modality Principle.



Figure 5.14: Main menu

Figure 5.15 shows the featured of CDKH prototype interface of submenu for notes. The interface has been designed according to individual differences principles which are one of the principles in the Modality Principle.

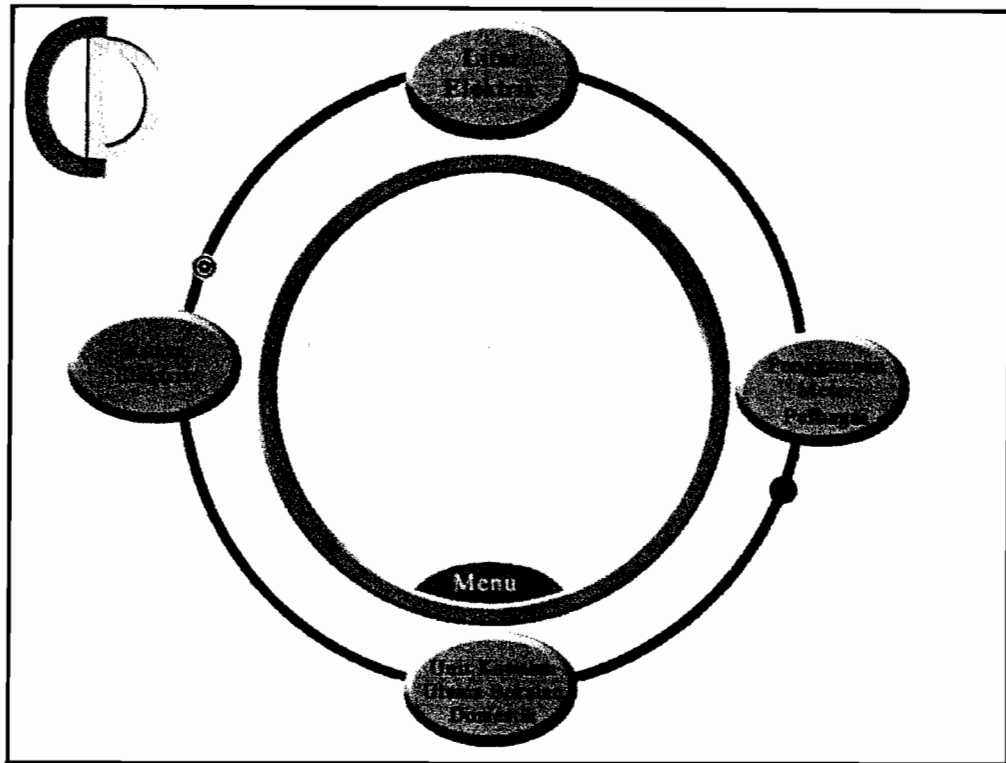


Figure 5.15: Submenu for notes

Figure 5.16 and 5.17 shows the feature of CDKH prototype interface for notes. The interface of this are developed according to the user requirement from the user requirement analysis. The interfaces were designed according to multiple representation principle which is one of the principles in the Modality Principle.

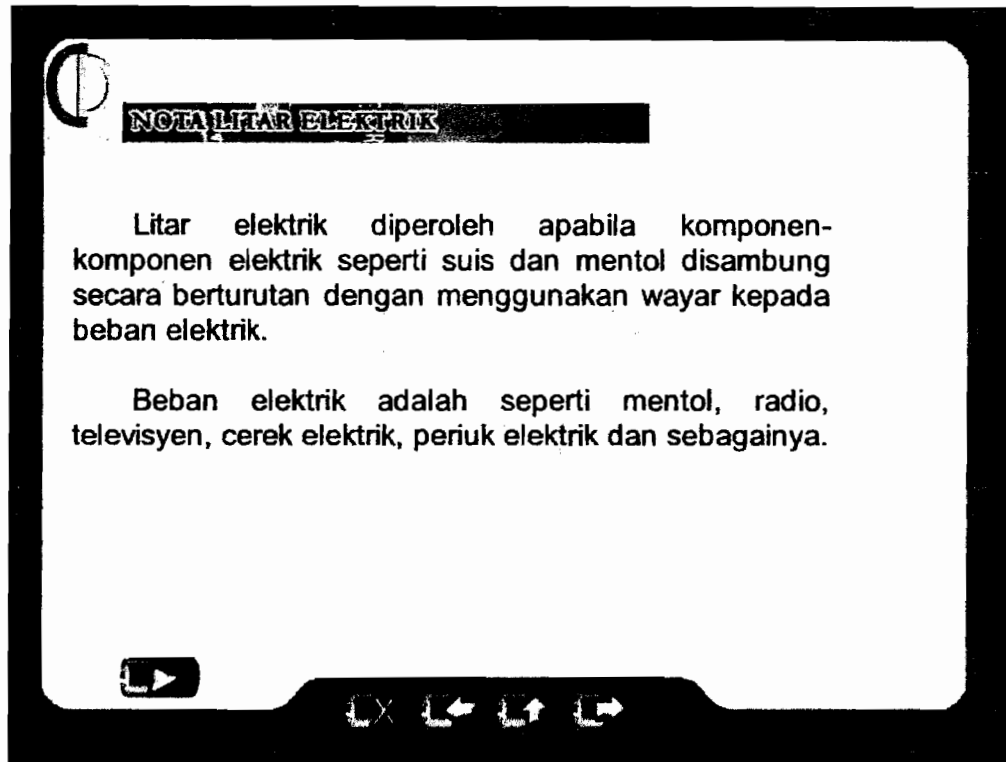


Figure 5.16: Notes



Figure 5.17: Video notes

Figure 5.18 shows the feature of CDKH prototype interface for symbol in electric circuit. The interface of this has been developed according to the user requirement from the user requirement analysis. The interface is designed according to individual differences principle which is one of the principles in the Modality Principle.

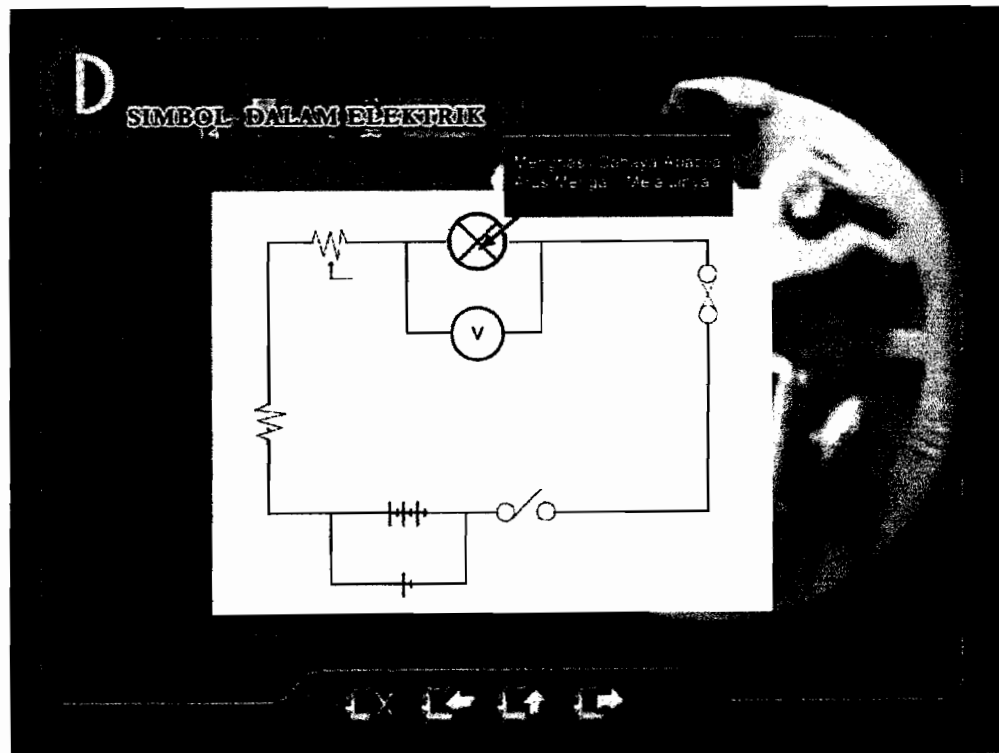


Figure 5.18: Symbol in electric circuit

Figure 5.19 shows the feature of CDKH prototype interface of submenu for the exercises. The interface of this are developed according to the user requirement from the user requirement analysis. The interface is designed according to individual differences principle which is one of the principles in the Modality Principle.

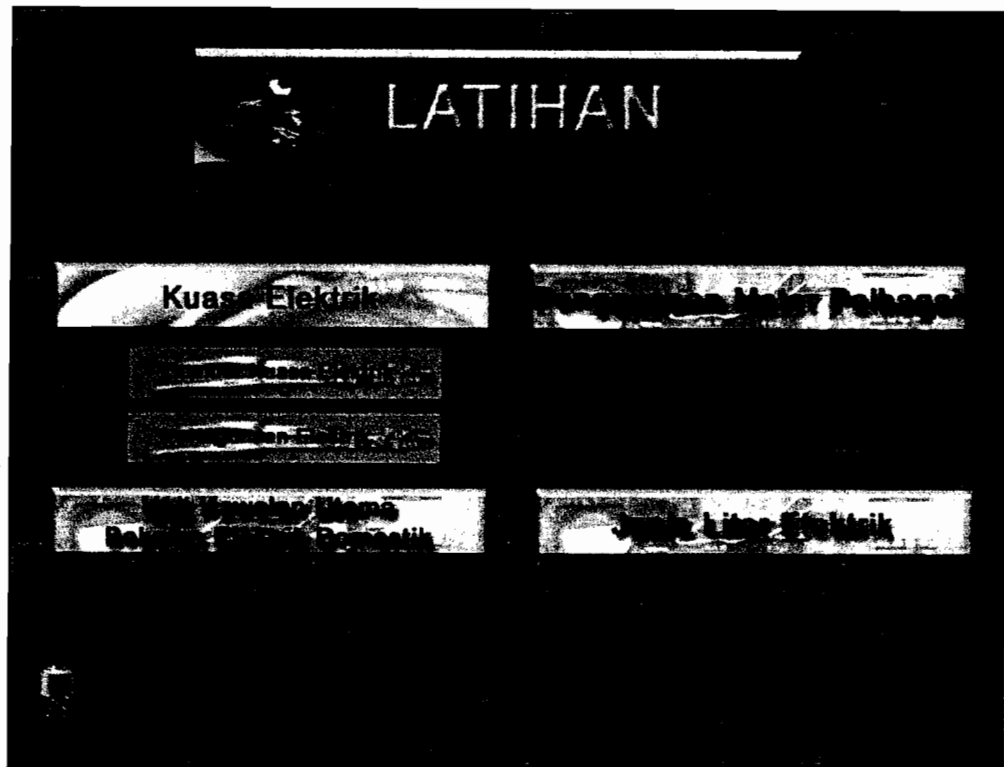


Figure 5.19: Submenu for exercise

Figure 5.20 shows the feature of CDKH prototype interface of the exercise. The interface of this has been developed according to the user requirement from the user requirement analysis. The interface has been designed according to split-attention principle which is one of the principles in the Modality Principle.

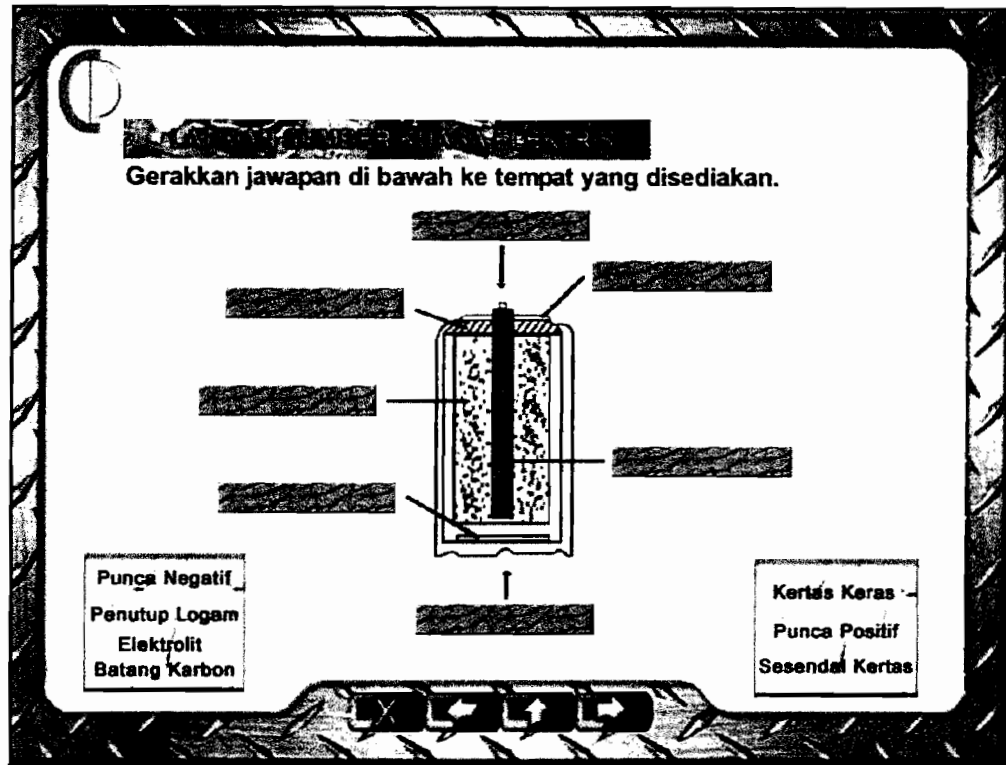


Figure 5.20: Exercise

Figure 5.21 shows the feature of CDKH prototype interface for interactive game. The interface of this has been developed according to the user requirement from the user requirement analysis. The interface has been designed according to individual differences principle which is one of the principles in the Modality Principle.

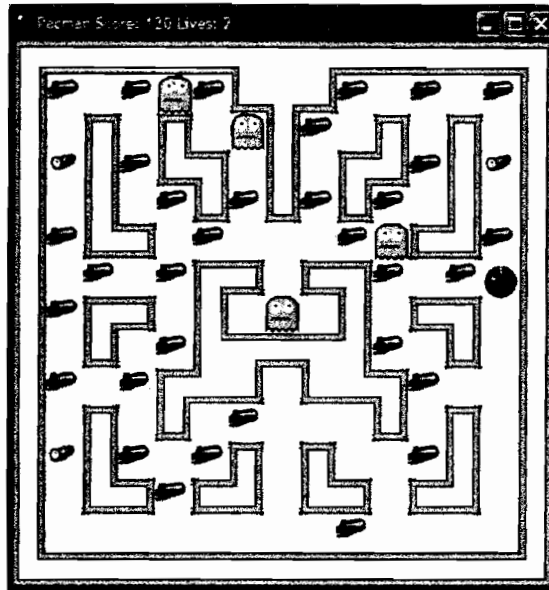


Figure 5.21: Interactive game

Figure 5.22 shows the feature of CDKH prototype interface of the syllabus. The interface of this has been developed according to the user requirement from the user requirement analysis. The interface has been designed according to individual differences principle which is one of the principles in the Modality Principle.

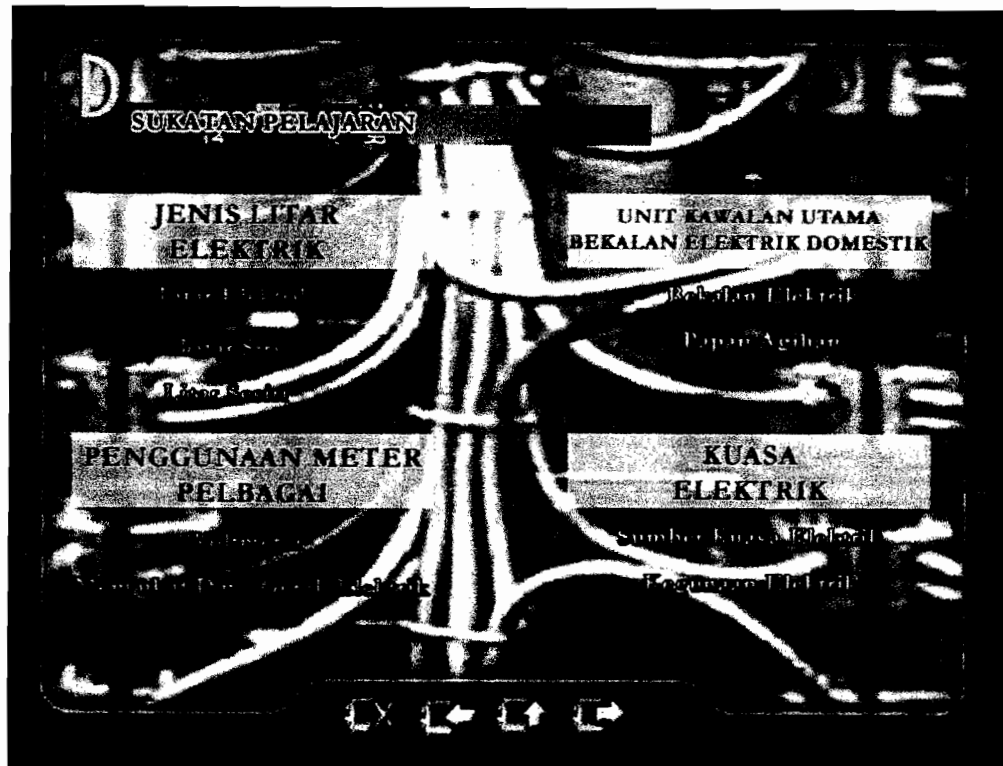


Figure 5.22: Syllabus

5.5 PHASE 4: TESTING

In this phase, also known as deployment stage includes final user testing and training and the implementation of the application system. The prototype system was evaluated to fulfill the user request and user requirement. The prototype was tested using a set of questionnaire base on User Interface Satisfaction (QUIS). In this study, questionnaire was the most important instrument to obtain the research information. Thirty four of the respondents are needed to answer the questionnaire. The analysis of the data will discuss in Chapter 6.

5.6 SUMMARY

This chapter explained about the process of system development to build CDKH prototype. This study is carried out 4 main phases; analysis phase, design phase, implementation phase, testing and evaluation phase. Chapter 6 will discuss about the result and finding of the study.

CHAPTER 6

DATA ANALYSIS

6.1 INTRODUCTION

This chapter discusses about the evaluation of interfaces for the courseware CDKH prototype. Descriptive statistics and reliability analysis were used in this study. To analyze the data SPSS version 12 was used. The questionnaires are User Interface Satisfaction Evaluation (QUIS). Result from the descriptive and reliability analysis will be discussed in the following section.

6.2 USER INTERFACE SATISFACTION EVALUATION

User satisfaction evaluation was important for the study to judge on the output of the development of CDKH prototype. The CDKH user interface satisfaction was conducted on thirty four respondents in Sekolah Menengah Sheikh Abdul Malek, Kuala Terengganu. The evaluation is done in the school computer laboratory. Each

of the computers has been installed with the prototype so that the respondents can maneuver by their own. Each of them was given brief explanation regarding the user satisfaction evaluation to the prototype. After they understood, the respondents were given a set of questionnaire that show in Appendix D.

6.3 INSTRUMENT FOR INTERFACE SATISFACTION EVALUATION

The questionnaire for User Interaction Satisfaction (QUIS) is tools developed by a multi-disciplinary team of research in the Human- Computer Interaction Lab (HCIL) at the University of Maryland at College Park. The QUIS is a standardized, general user evaluation instrument and tool for interactive computer system (Chin, Diehl & Norman, 1988). The QUIS successfully addressed the reliability and validity problem found in the other satisfaction measures, creating a measure that highly reliable across many type of interfaces. The short form of QUIS is divided into five sections of four to five questions each. The section are designed to assess overall user reactions, screen design and layout, terminology and system messages, learning and system capabilities.

The questionnaire for User Interface Satisfaction (QUIS) was conducted to determine user satisfaction on the interface design of the CDKH prototype. For user interface evaluation, a set of questionnaire which comprises of General Information and Question Interface Satisfaction section was used. The General Information section functions as a mechanism to collect respondent's experience after using the courseware CDKH prototype. The questionnaires user interface satisfaction evaluation section intended to collect data on user's opinion regarding the CDKH

prototype. The questionnaire for User Interface Satisfaction (QUIS) was using five Likert Scale.

Descriptive statistics and reliability analysis were used in this study. SPSS version 12 for Windows has been used to analyze the data (Liu, 2010). According to Santos (1999) Cronbach Alpha is one of the most commonly reliability coefficient.

6.4 RELIABILITY OF INTERFACE SATISFACTION EVALUATION

Reliability was pointed for the usability evaluation questionnaire. The reliability is characteristic of the instrument itself, but validity comes from the way the instrument was employed. The reliability of a questionnaire was the ability of the questionnaire ability to give the same result when filled out by liked- minded people similar circumstances.

Cronbach Alpha is an index of reliability associated with the variation accounted for by the true score of the “underlying construct”. Construct is the hypothetical variable that is being measured. It is usually expressed on a numerical scale from zero (very unreliable) to one (extremely reliable). The Alpha coefficient ranges in values of range from zero to one and maybe used to describe the reliability of factor extracted from dichotomous (question with two possible answer) and/ or multipoint formatted questionnaire or scale such as rating scale one is for poor and five for excellent. The higher score, the more reliable the generated scales are.

Cronbach Alpha values were calculated using SPSS version 12 to determine the data inter- item reliability which assesses the degree of internal consistency between multiple measurements of a dimension. Cronbach Alpha value for each measure is

shown in Table 6.1. The Overall reaction to the courseware, Terminology and system information and System capabilities has Cronbach Alpha greater than 0.7. According to Cavana, Delahaye and Sekaran (2001) the Cronbach Alpha values greater than 0.7 was counted as acceptable to use as a questionnaire. The most measure that has high values were section Learning (0.842) and Screen (0.816). The Cronbach Alpha value for all dimensions is 0.7926.

Table 6.1: Cronbach Alpha Values for All Dimensions

Overall Reaction to the Courseware	6	0.712
Screen	4	0.816
Terminology and system information	5	0.796
Learning	6	0.842
System capabilities	5	0.797

6.5 RESULT OF INTERFACE SATISFACTION EVALUATION

Table 6.2 represented the descriptive statistics for all the measures. The mean response for all measure by users was 4.1485 (S.D = 0.8257). Overall all the respondents are agreed or satisfied the user interface of CDKH prototype. The measure that has the most mean was System Capabilities and Learning. These finding maybe because of CDKH prototype was standalone and build using Macromedia Director MX and running high specification of the computer in the computer laboratory. The interface was simple and easy to use for the student. It has a metaphor icon, constant place and easy to remember.

Table 6.2: Descriptive Statistics for All Measures

Overall reaction to the courseware	34	4.042	0.8840
Screen	34	4.123	0.8585
Terminology and System Information	34	4.160	0.7562
Learning	34	4.210	0.8435
System Capabilities	34	4.208	0.7864

Table 6.3 shows the descriptive statistic for all the items. The table indicated that most of the participant highly agreed to all the items that are related to the CDKH prototype.

The first sections are about the overall reaction to the courseware. It asked whether the software is wonderful, easy to use; satisfy to use it, adequate as needed and flexible to use it. The mean score are between 3.51 and 4.31; the standard deviations are between 0.970 and 0.766. The item that has high mean is This courseware is adequate as needed (4.31) and flexible (4.18). The mean average is 4.042. This implied that the users felt that over all in interactions to the CDKH prototype were highly satisfied. This is because the CDKH prototype has good interfaces.

The second sections are about the user perceived of the screen and layout of CDKH prototype. It was asked whether reading characters on screen are easy, highlighting simplifies task, organization and sequence of information is clear. The mean score are between 3.97 and 4.33. The item that has high mean is The sequence of the screen is clear (4.33) and Organization of information is clear (4.28). This implied that that user perceived that screen design is very satisfied. The screen designs are simple and based on the user requirements.

The third sections are about terminology and system information. It asked whether the used of terms through system is consistent, terminology always related to the

task, position of the messages on screen is consistent, prompt for tasks is clear and the error messages is helpful. The mean score are between 3.95 and 4.59. The item that has highest mean is Prompt of task is clear (4.59) followed by use of terms through system is consistent (4.26). This implied that the terminology usage and system information was understandable by the users.

The fourth sections are about the learning. It asked whether CDKH prototype easy to operate the courseware, exploring new features by try and error, performing task is straightforward and supplemental reference materials is clear. The mean score are between 3.83 and 4.44. The highest mean score are shared by easy to operate the courseware and performing task was straightforward. This implied that the users can used CDKH prototype without needed of experience using the computer because of the language are used which is very straightforward.

The last sections are about the system capabilities. It asked whether CDKH prototype was fast, reliable, tends to be quite, easy to handle the mistakes and designed for all levels of users. The mean score are between 4.03 and 4.49. The highest mean in The courseware tends to be quite (4.49) followed by The courseware is reliable (4.26). This implies that the users can use the CDKH prototype satisfies with the performance of the prototype.

Table 6.3: Descriptive Statistics for All Items

Overall reaction to the courseware		
This courseware is wonderful	4.13	1.005
This courseware is easy to use	4.15	0.670
This courseware is satisfying to use	3.51	0.970
This courseware is adequate as needed	4.31	0.766
This courseware is flexible to use	4.18	0.914
Screen		

Reading characters on screen is easy	4.00	1.318
Highlighting simplifies task	3.97	0.743
Organization of information is clear	4.28	0.647
Sequence of screen is clear.	4.33	0.772
Terminology and System Information		
Use of terms through system is consistent	4.26	0.677
Terminology always related to the task	3.95	0.857
Position of the messages on screen is consistent	4.18	0.721
Prompt for tasks is clear	4.59	0.637
Error messages is helpful	4.08	0.870
Learning		
Easy to operate the courseware	4.44	0.718
Exploring new features by try and error	3.82	1.144
Performing task is straightforward	4.44	0.680
Supplemental reference materials is clear	4.33	0.772
System capabilities		
The courseware speed is fast	4.10	0.852
The courseware is reliable	4.26	0.715
The courseware tends to be quite	4.49	0.683
Easy to correcting your mistakes	4.03	1.013
Designed for all levels of users	4.18	0.721

6.6 SUMMARY

This chapter discussed the analysis data obtained by using the questionnaire. It was described and summarized the respective of participants toward CDKH prototype. It can be summarized that the respondents satisfy with the CDKH prototype.

CHAPTER 7

CONCLUSION

7.1 INTRODUCTION

This chapter concludes the report by summarizing the overall results and achievements.

7.2 PROJECT SUMMARY

The CDKH prototype has been implemented based on user requirements followed by UCD Methodology and Modality Principle. Overall the objective of this study has been achieved which is to produce a prototype based on user requirements and needs. The user requirements that have been identified from this study are the background and the font color for the courseware must be contrast whether the background is dark and font color is light or vice versa. For the background type, most of the respondents like the animation background. Type of exercise for the courseware was preferred drag and drop type more than other type of exercise. For the background music, most of the respondents liked to study in the musical

environments. Lastly, for the theme of courseware, majority of the respondent liked to keep the courseware in the simple rather than artistic and childish themes. The modality principle has been identified to be used in this courseware are individual difference perspective, multiple representation principle and lastly split-attention principle. The individual difference principle has been identified and most suitable to be used to main menu, menu for notes, and menu for exercise, symbol in electric and interactive games. The multiple representation principle has been identified and most suitable for notes environments. Lastly for split attention principle has been identified and most suitable to be used in the exercises environment. Based on Modality Principle, CDKH prototype was developed to build up the interest and at the same time to gain knowledge for the student instead of learning *Kemahiran Hidup* and at the same time to give to the market what exactly the user need in the courseware. The prototype was evaluated and results confirm that the user satisfy about the interface of CDKH courseware.

7.3 CONCLUSION

The conclusion can be made according to the Table 7.1. The first objectives which are to identify the requirement and the modality principles for developing a suitable *Kemahiran Hidup* courseware for student Form 1 are using the need analysis method. It has been achieved in the chapter 1, chapter 2 and chapter 3. To complete the first objectives, other method that has been used which are user and task analysis, functional analysis, requirement analysis and setting usability analysis that has been achieved in chapter 4. The second objectives which are is to develop a prototype for *Kemahiran Hidup* Form 1 based on the requirement gathered in using the UCD

method based on modality principle. This objective has been achieved in chapter 5. The last objectives which are to test and evaluated the prototype by using usability testing through user interaction satisfaction are using the evaluation phase in UCD methodology. It has been achieved in chapter 6.

Table 7.1: Conclusion

Objective	Method	Achieve	Result
To identify the requirement and the modality principles for developing a suitable <i>Kemahiran Hidup</i> courseware for student Form 1.	Needs Analysis	Chapter 1 Chapter 2 Chapter 3	Proposal
	User and Task Analysis Functional Analysis Requirement Analysis Setting Usability Analysis	Chapter 4	User Requirement Questionnaire
To develop a prototype for <i>Kemahiran Hidup</i> subject Form 1: Electric based on the requirement gathered in using the UCD method based on modality principles.	Design Prototyping	Chapter 5	UML Storyboard
To test and evaluate the prototype by using usability testing through user interaction satisfaction and perceive of usefulness instruments	Evaluation	Chapter 6	QUIS

7.4 PROBLEMS AND LIMITATIONS

Since the study has been conducted, there are several limitation has been faced. The problem and limitations in conducting this study are:

- i. The courseware prototype was not fully functional due of time constraints in developing the prototype. However the project manages to finish by using the horizontal prototype.
- ii. There are many features did not implement in this prototype such as video to all note section and volume controller.
- iii. Macromedia platform cannot integrate with Game Maker.

7.5 RECOMMENDATIONS FOR THE FUTURE RESEARCH

Most of the study and framework was only guided to evaluation process. Otherwise there are a few researchers were concerned on the user's opinion. Different respondent with different races, schools, and educational level will affect the results of user requirement and evaluation.

For future development and expansion of this research, the followings are suggested:

- i. Enhance the courseware to online courseware.
- ii. Tested on more respondent across all state in Malaysia.
- iii. Tested include the rural area school.
- iv. Get the requirement from instructors or teachers.
- v. Develop using other than Macromedia Director platform

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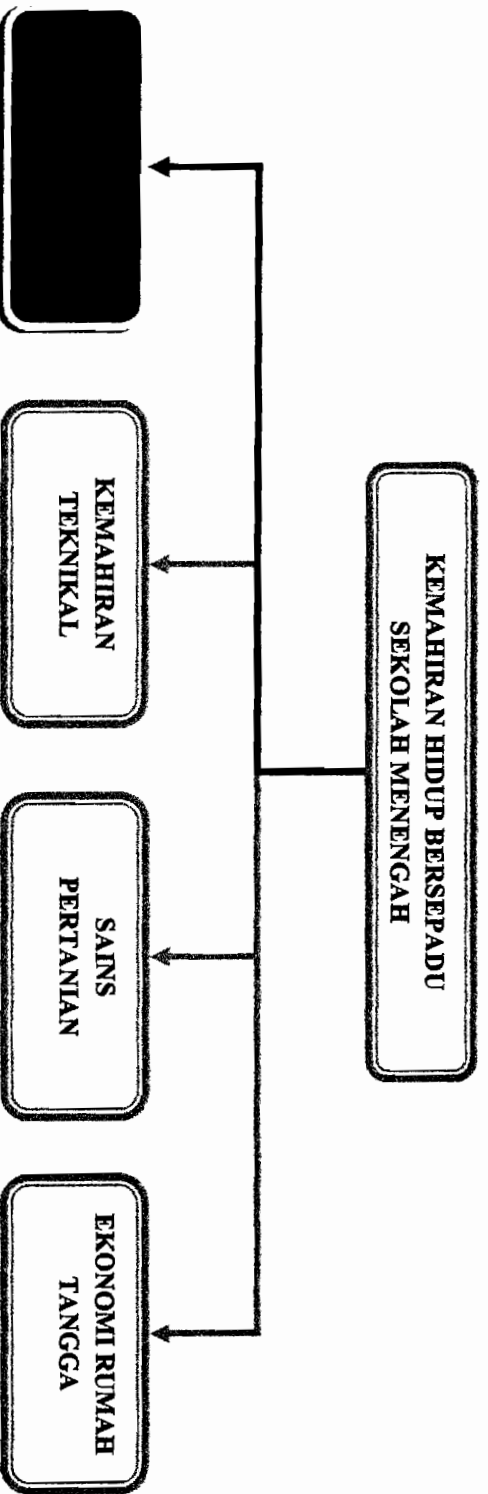
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Appendix A
Vertical Prototype

Figure A.1 : Scope for the Kemahiran Hidup Courseware (CDKH)



Tgktn 1	<ul style="list-style-type: none"> • Organisasi Bengkel & Keselamatan • Pekerjaan & Penghasilan Projek Elektrik • Penghasilan Perhiasan • Kerja Paip 	<ul style="list-style-type: none"> • Elektrik • Asas Elektromekanikal • Perniagaan & Keusahawanan 	<ul style="list-style-type: none"> • Kompos • Tanaman Sayuran • Pelandskap • Perniagaan dan keusahawanan 	<ul style="list-style-type: none"> • Pemakanan & Pengurusan Sejian • Bater • Kuli Tempatan • Pakaian • Jahitan • Perniagaan & Keusahawanan
Tgktn 2	<ul style="list-style-type: none"> • Reka Bentuk & Penghasilan Projek Elektrik • Lukisan Teknik • Masakan • Tanaman Hiasan 	<ul style="list-style-type: none"> • Lukisan Teknik • Elektrik • Perniagaan & Keusahawanan 	<ul style="list-style-type: none"> • Haiwan Kesayangan • Penternakan Ikan Air Tawar • Pelandskap • Perniagaan dan keusahawanan 	<ul style="list-style-type: none"> • Pemakanan & Pengurusan Sejian • Jahitan • Perniagaan & Keusahawanan
Tgktn 3	<ul style="list-style-type: none"> • Rekaocta Elektrik • Elektrik • Tempat Kediaman 	<ul style="list-style-type: none"> • Elektrik • Enjin • Perniagaan dan Keusahawanan 	<ul style="list-style-type: none"> • Pelandskap • Perniagaan dan keusahawanan 	<ul style="list-style-type: none"> • Biskut & Kek • Jahitan • Perniagaan dan keusahawanan

Appendix B

Flow Chart of Kemahiran Hidup Courseware (CDKH)

Figure B.1 : Flow overall for The Kemahiran Hidup Courseware (CDKH)

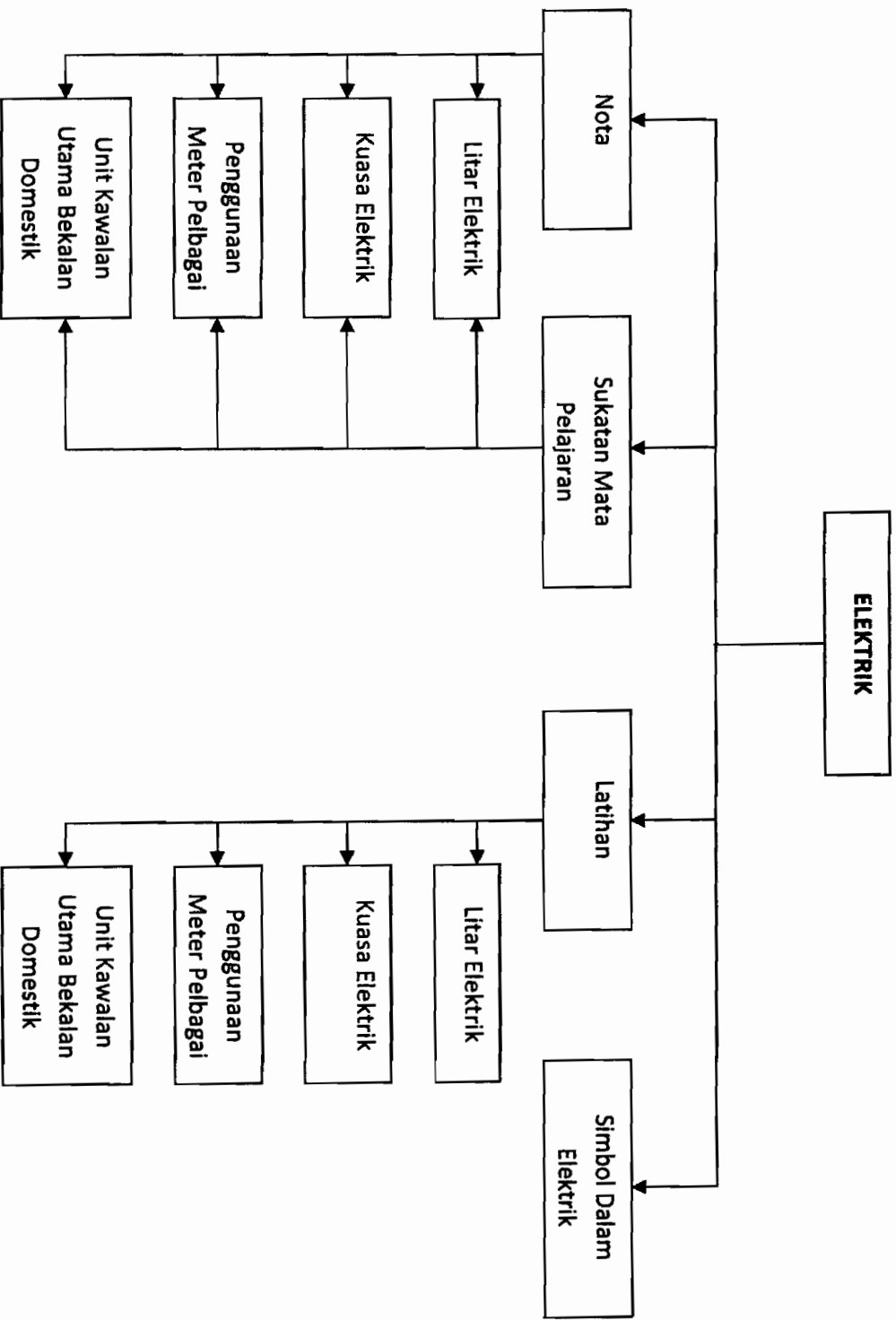


Figure B.2: Flow notes and syllabus for The Kemahiran Hidup Courseware (CDKH)

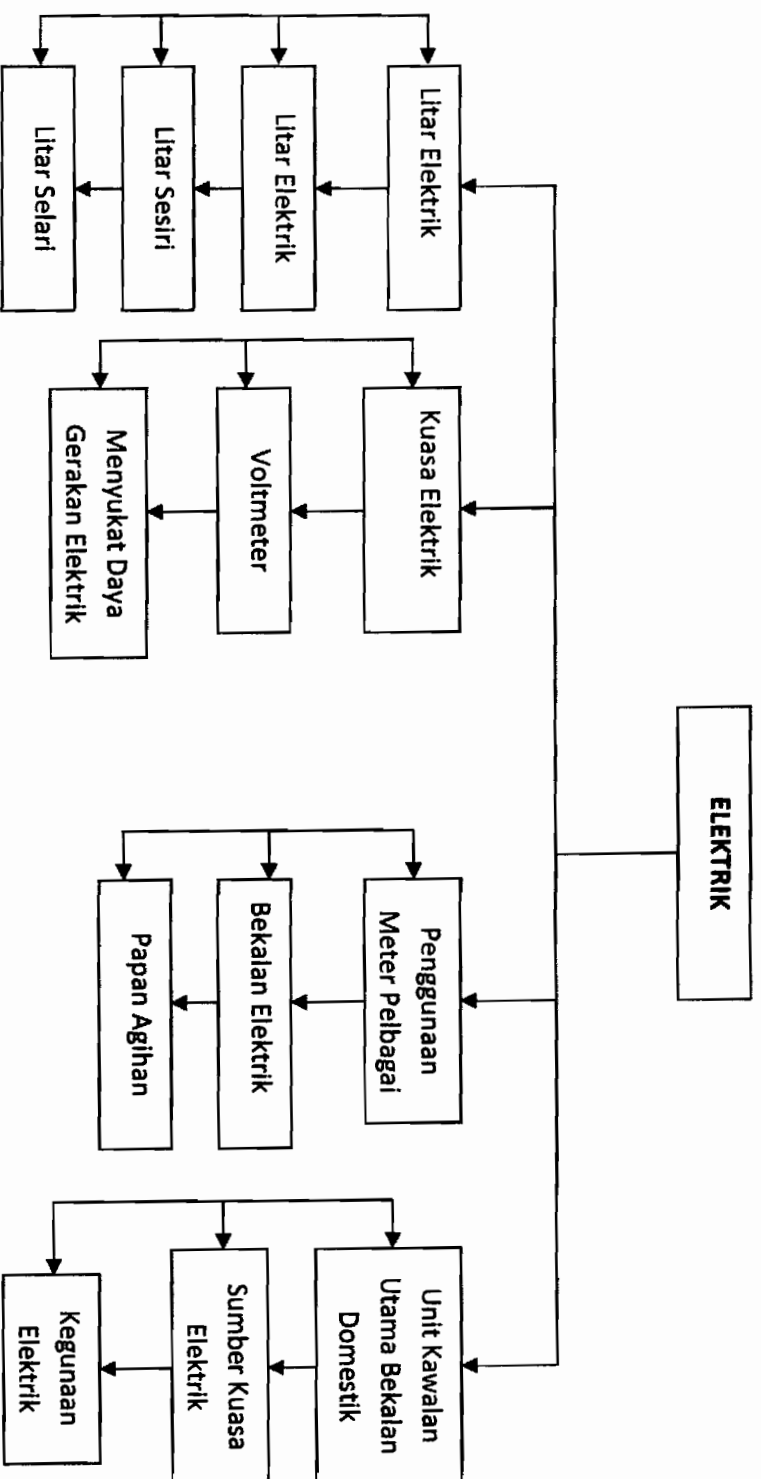
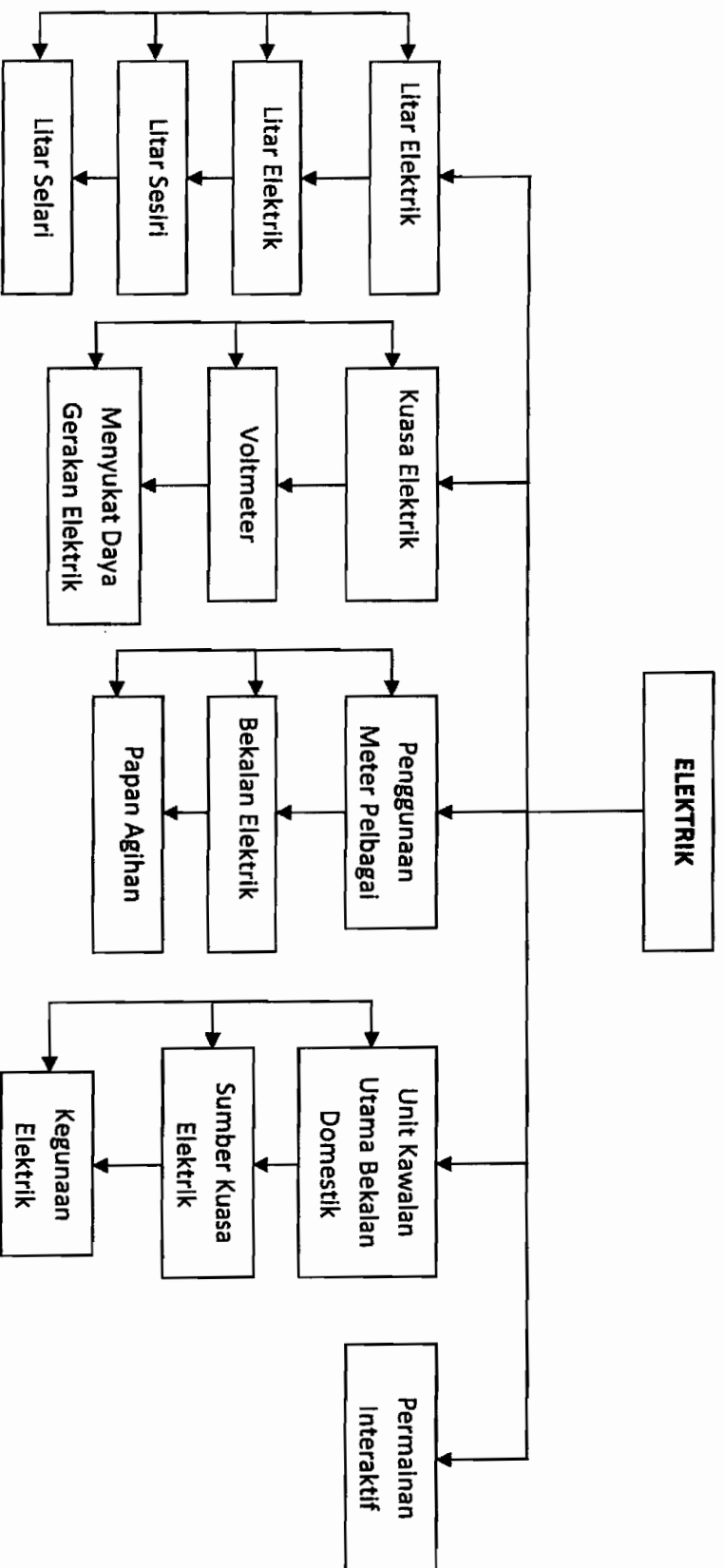


Figure B.3: Flow exercises for The Kemahiran Hidup Courseware (CDKH)



Appendix C
Questionnaire of User Requirement

BORANG SOAL SELIDIK



**KOLEJ SASTERA DAN SAINS
UNIVERSITI UTARA MALAYSIA**

Kepada Tuan/Puan/Encik/Cik,

Kajian ini adalah dibangunkan adalah sebahagian syarat untuk mendapat Sarjana dalam Sains (Teknologi Maklumat). Dapatan kajian ini adalah untuk mendapatkan kehendak pengguna dalam pembangunan perisian.

Peninjauan ini adalah penting untuk mendapatkan kemahuan atau kehendak pengguna kerana ianya akan membantu dalam menentukan keberkesanan sesebuah perisian itu. Ini juga merupakan peluang anda untuk terlibat sama secara langsung dalam pembangunan perisian pembelajaran.

Oleh itu, segala jawapan soal selidik ini dan identiti anda akan kami rahsiakan. Kami berharap pihak anda dapat memberi kerjasama dalam menjayakan peninjauan ini.

Sekian terima kasih,

Yang benar,

(AHMAD FADHIL BIN ISHTIYAQ AHMED)

Bahagian A

Sila tandakan (√) pada **satu (1)** jawapan sahaja yang difikirkan sangat sesuai

1. Jantina
 Lelaki Perempuan

2. Tempat Kediaman
 Bandar Pinggir Bandar Pekan
Pendalaman

Latar Belakang berkaitan Komputer

Sila tandakan (√) pada **satu (1)** jawapan sahaja yang difikirkan sangat sesuai

1. Adakah anda pernah menggunakan komputer sebelum tingkatan 1?
 Ya Tidak

2. Berapa kerapkah anda menggunakan komputer?
 Harian Mingguan
 Bulanan Sekali- sekala

3. Pengalaman anda telah menggunakan komputer?
 Kurang 1 tahun 1 – 2 tahun
 3 – 4 tahun Lebih dari 4 tahun

4. Dimanakah anda paling kerap menggunakan komputer?
 Di rumah dan di sekolah Di sekolah dan kafe siber
 Di Kafe Siber dan di rumah Di rumah, di sekolah dan di kafe siber

5. Dimanakah anda paling kerap menerima latihan komputer?
 Mengikut kelas formal dan belajar sendiri
 Belajar sendiri dan dari pengguna lain
 Mengikuti kelas formal dan belajar dari pengguna lain
 Mengikuti kelas formal, belajar sendiri dan belajar dari pengguna lain

6. Nyatakan perisian CD yang telah pun anda guna?
 Bahasa Malaysia, Bahasa Inggeris, Matematik dan Sains
 Bahasa Inggeris, Matematik dan Sains
 Matematik dan Sains

Bahagian B

Sila tandakan (√) pada **satu (1)** jawapan sahaja yang difikirkan sangat sesuai

1. Pada pendapat anda, apakah ciri warna yang difikirkan sesuai untuk dijadikan latar belakang perisian CD interaktif?
 Gelap Terang
2. Pada pendapat anda, apakah ciri warna yang sesuai bagi tulisan untuk perisian CD interaktif?
 Gelap Terang
3. Pada pendapat anda, latar belakang perisian CD interaktif sepatutnya:
 Animasi (bergerak) Statik (tidak bergerak)
4. Apakah tema perisian pembelajaran yang anda sukai?
 Ringkas Korporat
 Kebudayaan Artistik
5. Pada pendapat anda, perlukah muzik latar dalam perisian ini?
 Ya Tidak
6. Jenis latihan yang paling menjadi pilihan anda ?
 Drag 'n Drop (Tarik dan Letak) Suai dan Padankan.
 Objektif Permainan Interaktif
(Game)
 Cari objek tersembunyi

Bahagian C

Sila tandakan (√) pada **satu (1)** jawapan sahaja yang difikirkan sangat sesuai

No	Soalan	Sangat Tidak Suka	Tidak Suka	Neutral	Suka	Sangat Suka
		1	2	3	4	5
1	Latar belakang dan tulisan mestilah berbeza warna?					
2	Perisian mestilah menggunakan ikon yang sesuai?					
3	Perisian pembelajaran mestilah mempunyai video					
4	Video mestilah mudah untuk difahami					
5	Perisian pembelajaran mestilah mempunyai bunyi khas (sound effect)??					
6	Perlukan setiap soalan diajukan oleh suara latar (narrator)?					
7	Perlukan setiap nota diterangkan oleh suara latar (narrator)?					
8	Perisian mestilah mudah untuk dinavigasi					
9	Setaip latihan mestilah senang untuk dijawab?					
10	Setiap latihan mestilah menguji minda?					

Tamat

Terima kerana meluangkan masa untuk menjawab soal selidik ini.

Appendix D

Questionnaire for User Interface Satisfaction (QUIS)



UNIVERSITI UTARA MALAYSIA

College of Arts and Sciences

Questionnaire for User Interface Satisfaction (QUIS)

The questionnaire is to review the Kemahiran Hidup, Tingkatan Satu (1) Courseware Prototype (CDKH) software for Form One (1) student and identify overlooked areas or problem in need of improvement.

Instruction:

1. This questionnaire has 2 section:
 - a. Section A : Respondent demography
 - b. Section B : Kemahiran Hidup, Tingkatan Satu (1) Courseware Prototype Evaluation
2. Please answer all the question.
3. Please tick (✓) the number which most appropriately reflects your impression about using this courseware in Section B.

Section A.

Gender: () Male () Female

Age: _____

Race: _____

School: _____

Experience in Computer: () Yes () No

Section B

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Overall Reaction to the Courseware		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	This courseware is wonderful	1	2	3	4	5
2	This courseware is easy to use	1	2	3	4	5
3	This courseware is satisfying to use	1	2	3	4	5
4	This courseware is adequate as needed	1	2	3	4	5
5	This courseware is flexible to use	1	2	3	4	5

Screen		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6	Reading characters on screen is easy	1	2	3	4	5
7	Highlighting simplifies task	1	2	3	4	5
8	Organization of information is clear	1	2	3	4	5
9	Sequence of screen is clear.	1	2	3	4	5

Terminology and system information		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
10	Use of terms through system is consistent	1	2	3	4	5
11	Terminology always related to the task	1	2	3	4	5
12	Position of the messages on screen is consistent	1	2	3	4	5
13	Prompt for tasks is clear	1	2	3	4	5
14	Error messages is helpful	1	2	3	4	5

Learning		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
15	Easy to operate the courseware	1	2	3	4	5
16	Exploring new features by try and error	1	2	3	4	5
17	Performing task is straightforward	1	2	3	4	5
18	Supplemental reference materials is clear	1	2	3	4	5

System capabilities		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
19	The courseware speed is fast	1	2	3	4	5
20	The courseware is reliable	1	2	3	4	5
21	The courseware tends to be quite	1	2	3	4	5
22	Easy to correcting your mistakes	1	2	3	4	5
23	Designed for all levels of users	1	2	3	4	5

27. List the most **negative** aspect(s):

1. _____
2. _____
3. _____

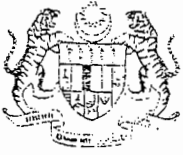
28. List the most **positive** aspect(s):

1. _____
2. _____
3. _____

“Thank you for agreeing to participate in this evaluation/ experiment”

Appendix E

Permission to Distribute the Questionnaire



تشیبات قلابرن دایره کوالا ترنگانو

PEJABAT PELAJARAN DAERAH KUALA TERENGGANU
JALAN PEJABAT
20200 KUALA TERENGGANU

Peg. Pel. Daerah 09-621 3401
Pejabat Am 09-621 3400
Fax 09-622 6931

"1 MALAYSIA. RAKYAT DIDAHULUKAN, PENCAPAIAN DIUTAMAKAN"

Ruj. Kami PPD (KT) 004/07/Jld. 2 (28)
Tarikh 06 April 2010
Bersamaan 21 Rabi'ul Akhir 1431H



En. Ahmad Fadhil bin Istiyahq Ahmed
UUM College of Arts and Sciences
Universiti Utara Malaysia (UUM)
06010 UUM Sintok
KEDAH DARUL AMAN

Tuan,

**KEBENARAN UNTUK MENJALANKAN KAJIAN DAN PENGUMPULAN DATA DI
SMKA SHEIKH ABDUL MALEK, KUALA TERENGGANU**

Dengan segala hormatnya surat tuan bertarikh 21 Mac 2010 mengenai perkara di atas adalah dirujuk

2. Sukacita dimaklumkan bahawa permohonan tuan untuk menjalankan kajian bertajuk "Development of Kemahiran Hidup Tingkatan Satu (1) Courseware Prototype Using User Centered Design Methodology Based on Modality Principle" adalah diluluskan

3. Walau bagaimanapun tuan diminta mengadakan perbincangan dengan pihak pengurusan sekolah berkenaan terlebih dahulu agar proses Pengajaran dan Pembelajaran (P&P) tidak terganggu.

4. Tuan diminta mengemukakan senaskhah akhir laporan kajian apabila selesai kajian kelak. Sebarang pertanyaan mengenai perkara di atas, sila hubungi Penolong PPD Pengurusan Kurikulum (Teknologi dan Vokasional) Tn. Hj. W. Mohd bin W. Ismail di talian: 019 - 951 7920 / 09 - 621 3426

Sekian, terima kasih.

"BERKHIDMAT UNTUK NEGARA"
"BERSAMA MELONJAKKAN PRESTASI PENDIDIKAN"

Saya yang menurut perintah,

(AZAHAR BIN ABU BAKAR)
Timbalan Pegawai Pelajaran Daerah
b.p Pegawai Pelajaran Daerah
Pejabat Pelajaran Daerah Kuala Terengganu.

s.k

Pegawai Pelajaran Daerah Kuala Terengganu
Pengetua, SMKA Sheikh Abdul Malek

Appendix F
USER MANUAL

1.0 MAIN MENU



Figure F-1: Main menu

Figure F-1 show the interface for main menu. The interface consist of 4 submenu; Notes, Symbol in electric, Exercise and Syllabus. If the mouse reaches the submenu icon, it will show the description about the submenu. At the left bottom side is an exit icon.

2.0 MENU FOR NOTES

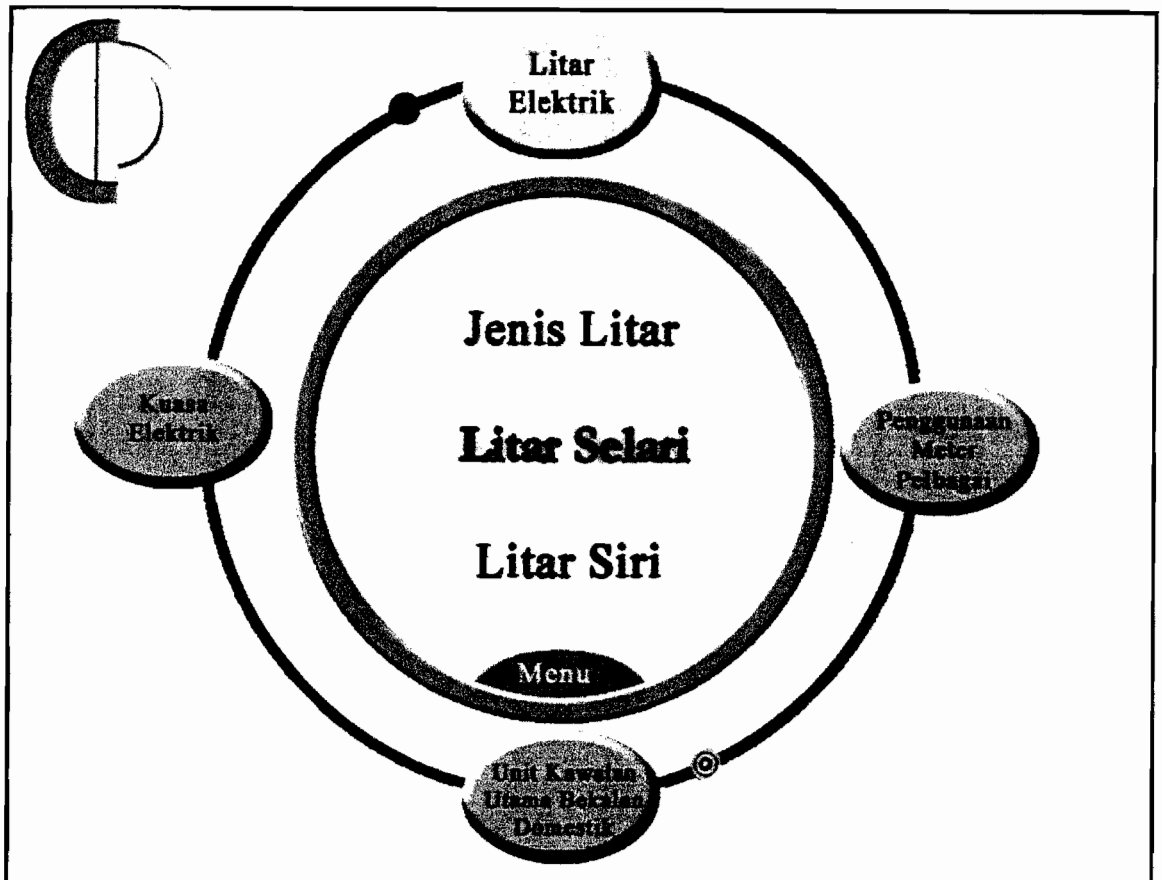


Figure F-2: Submenu for notes

Figure F-2 show the interface of submenu for notes. The interface consist of 4 submenus; Electric circuit, multi use of meter measurement, Main controller domestic unit and electric power. If the mouse clicks the submenu, it will show the topic for all the notes. At the lower middle is the button to back to the main menu.

2.1 SOURCE OF ELECTRIC

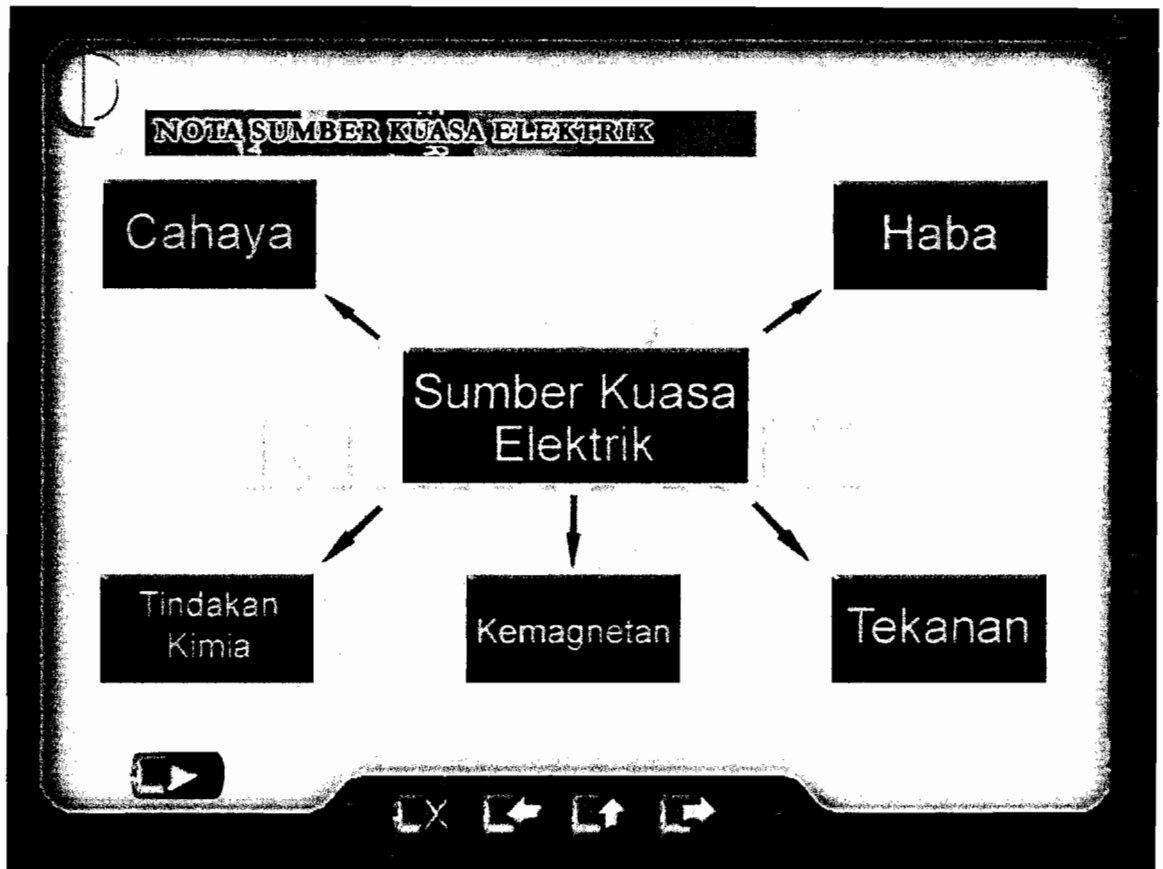


Figure F-3: Interface of power source of electric

Figure F-3 shows the notes about the power source of electric. The narrator describes it in generally. It is divided into 5 sources which is light, heat, pressure, magnet and chemistry reactions. At the bottom left is the playback narrator explanation. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

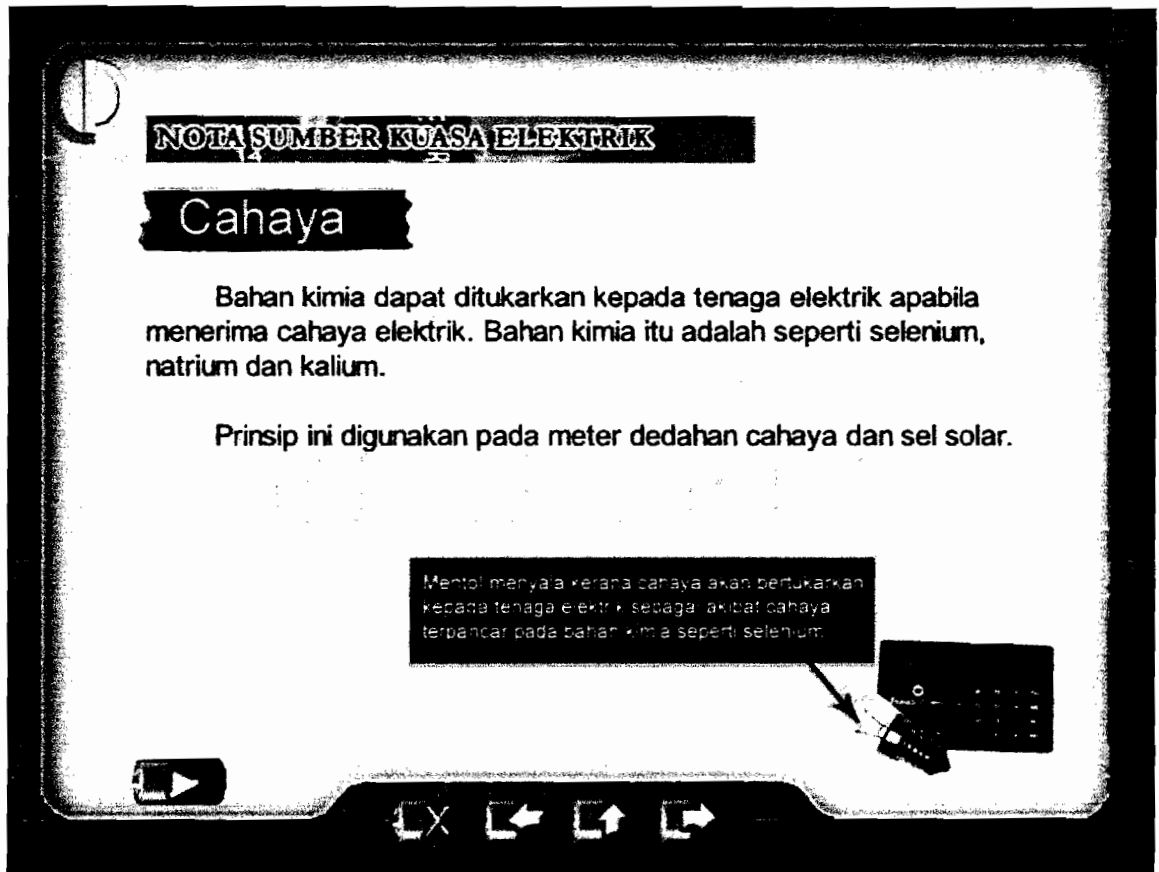


Figure F-4: Interface detailed power source of electric

Figure F-4 shows the notes about the detailed power source of electric. At the bottom right of the page show the electric object. By roll over the mouse over the object, the user can see how the object reacts by the electric. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

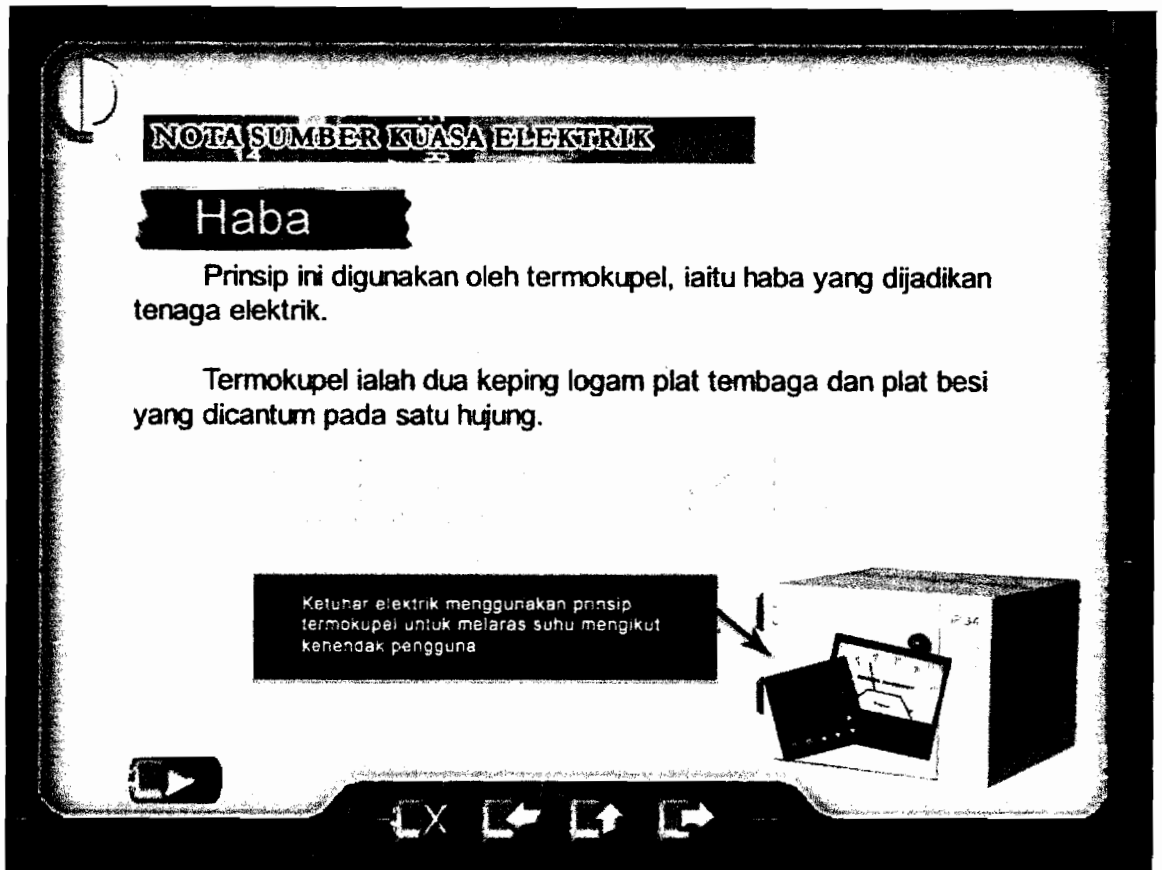


Figure F-5: Interface detailed power source of electric

Figure F-5 shows the notes about the detailed power source of electric. At the bottom right of the page show the electric object. By roll over the mouse over the object, the user can see how the object reacts by the electric. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

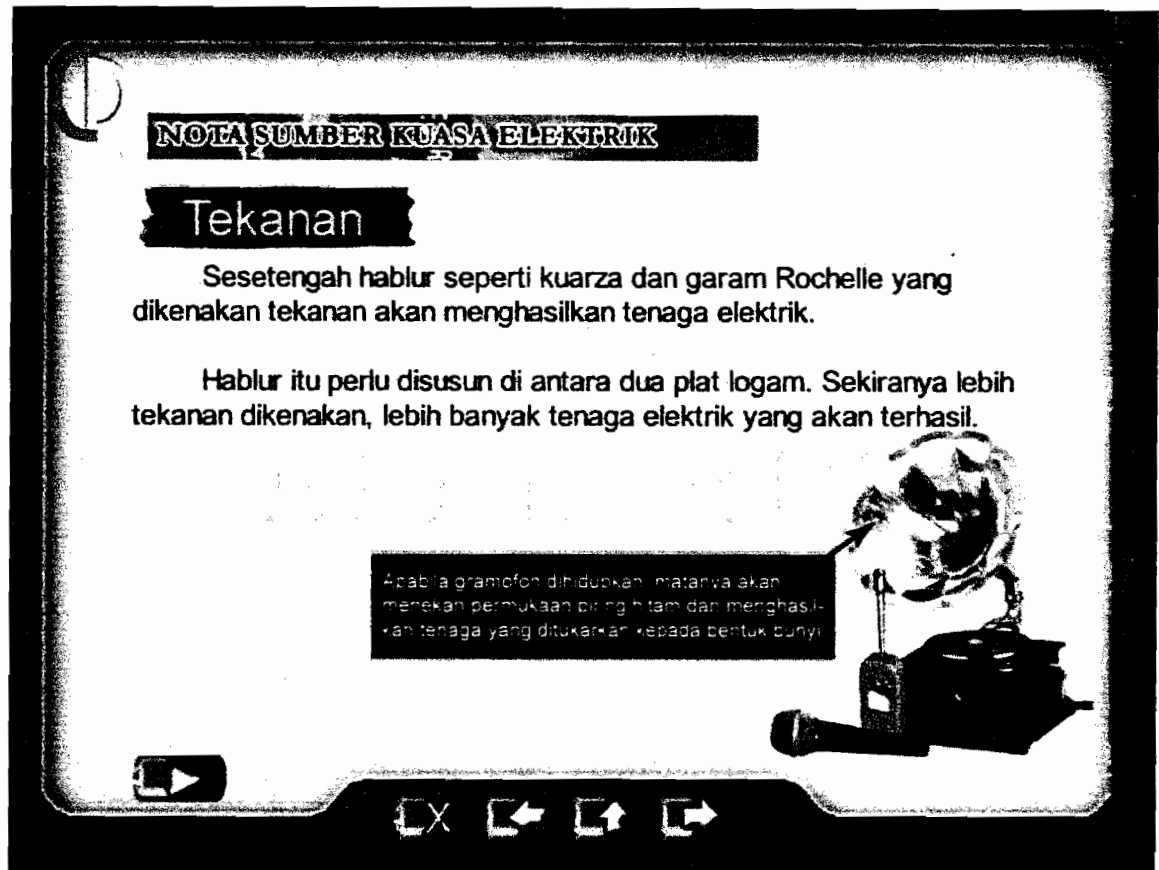


Figure F-6: Interface detailed power source of electric

Figure F-6 shows the notes about the detailed power source of electric. At the bottom right of the page show the electric object. By roll over the mouse over the object, the user can see how the object reacts by the electric. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

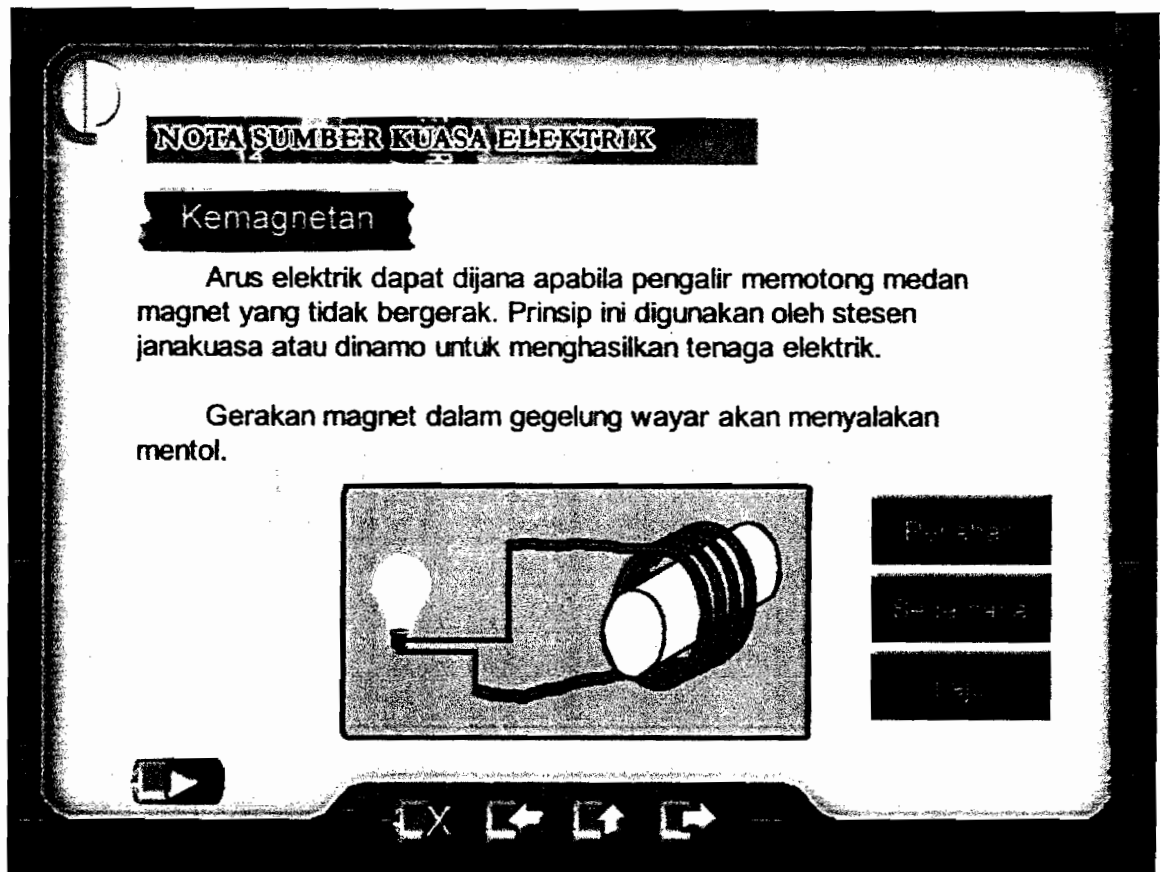


Figure F-7: Interface detailed power source of electric

Figure F-7 shows the notes about the detailed power source of electric. At the bottom right of the page show the electric object. By roll over the mouse over the object, the user can see how the object reacts by the electric. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

NOTA SUMBER KUASA ELEKTRIK

Tindakan Kimia

Tindakan kimia dapat digunakan untuk menghasilkan tenaga elektrik. Tenaga elektrik yang terhasil melalui tindakan kimia adalah sedikit kuantitinya.

Sumber tenaga elektrik secara tindakan diperolehi daripada sel kering dan sel basah.



The diagram shows a lead-acid battery on the left and a dry cell on the right. Labels for the lead-acid battery include: 'Punca Negatif' (Negative Pole), 'Punca Positif' (Positive Pole), 'Asid Sulfurik' (Sulfuric Acid), 'Plat Plumbum' (Lead Plate), 'Penyejang' (Separator), and 'Plat Plumbum Peroksida' (Lead Peroxide Plate). The dry cell is labeled 'BATERAI KERING'.

Navigation icons: play, back, forward, and search.

Figure F-8: Interface detailed power source of electric

Figure F-8 shows the notes about the detailed power source of electric. At the bottom right of the page show the electric object. By roll over the mouse over the object, the user can see how the object reacts by the electric. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

2.2 NOTES OF MULTI USE OF METER MEASUREMENT

1) Voltmeter

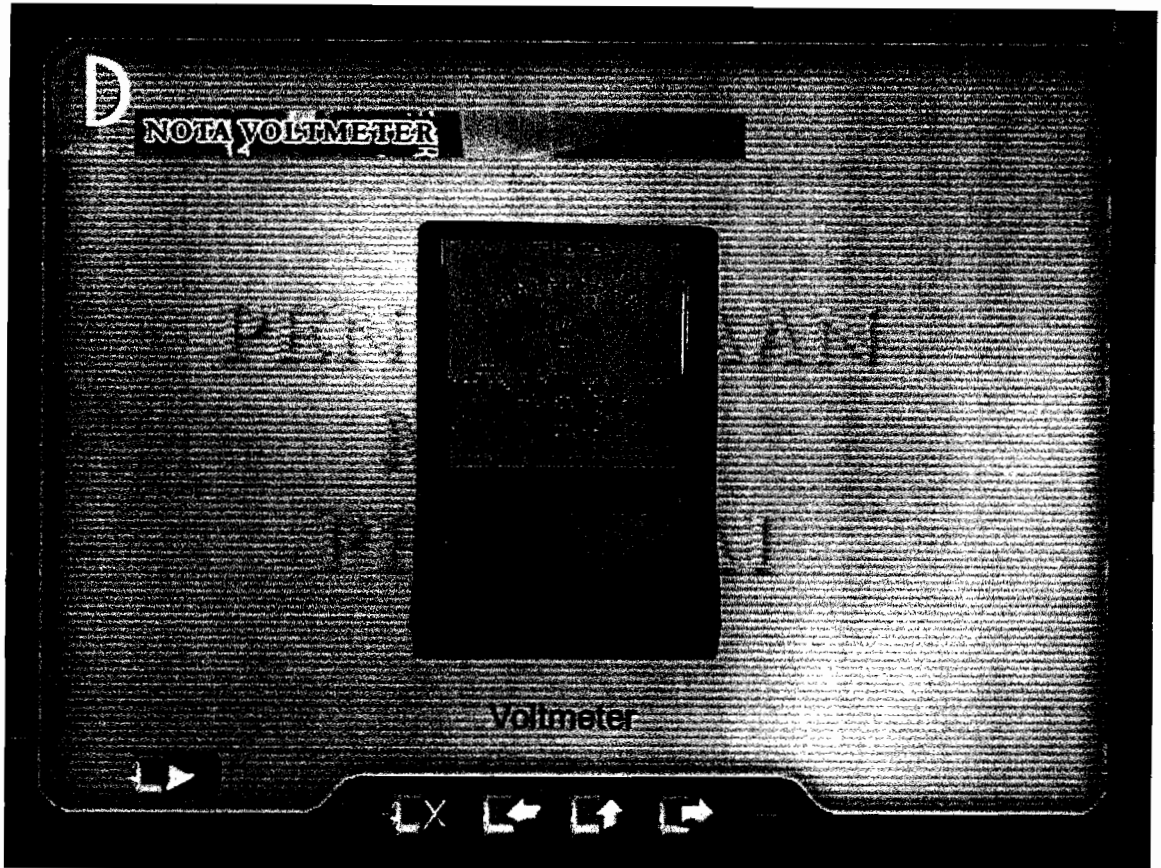


Figure F-9: Interface of notes for voltmeter 1

Figure F-9 show the interface of notes for voltmeter. The interface shows the voltmeter but the narrator gives a brief explanation about the voltmeter. The user can move the mouse to the voltmeter to know explanation about it. User can get the detailed explanation by roll the mouse to the header. At the bottom left is the playback narrator explanation. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

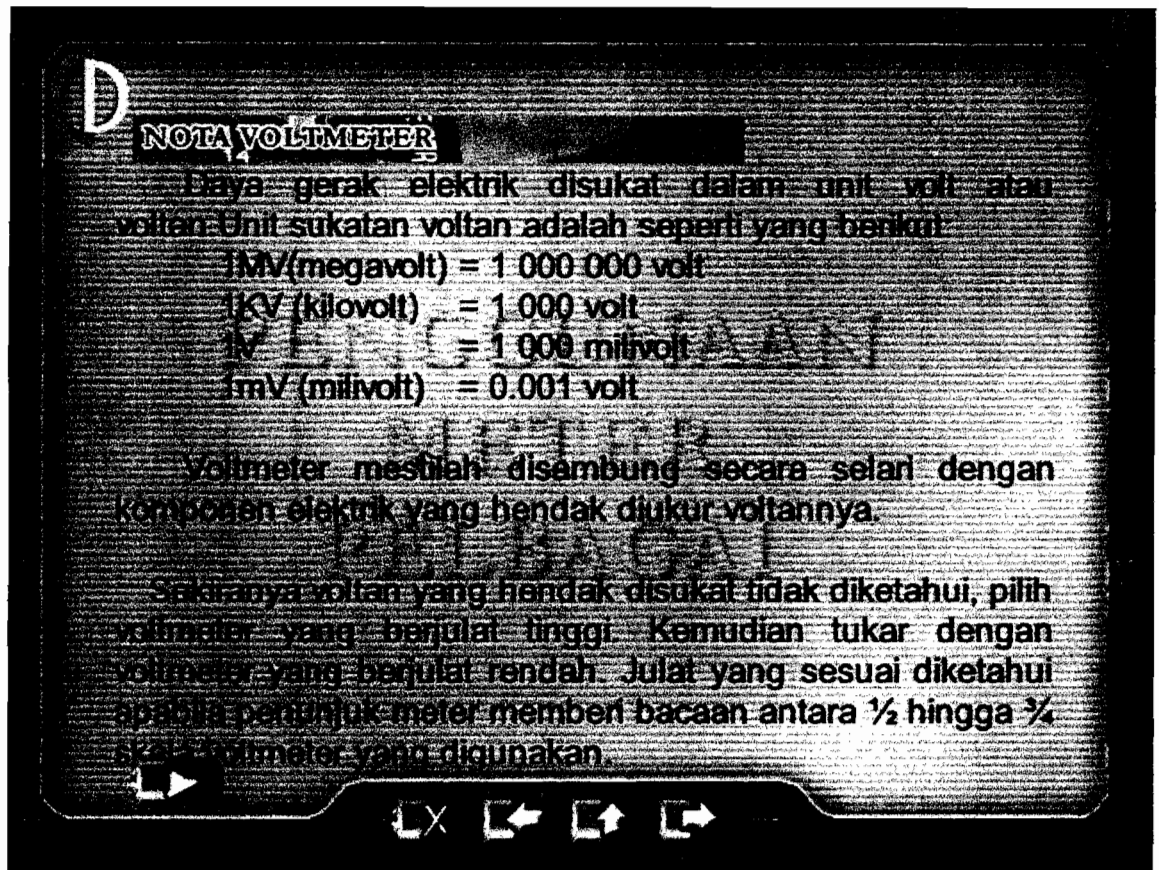


Figure F-10: Interface of voltmeter 2

Figure F-10 shows the detailed notes if the user roll over the mouse to the topic of the note. This interface gives the detailed about the topic. At the bottom left is the playback narrator explanation. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

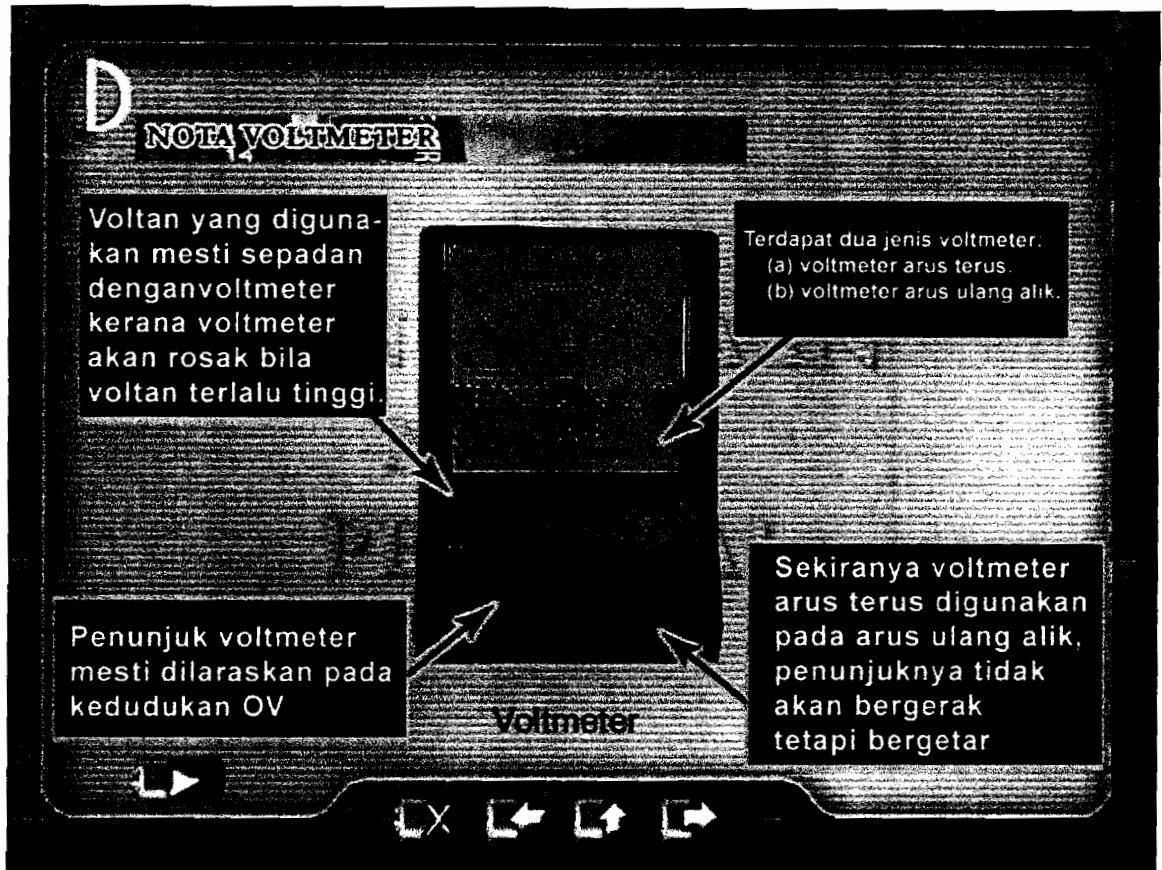


Figure F-11: Interface of voltmeter 3

Figure F-11 shows the detailed instruction to use the voltmeter. At the bottom left is the playback narrator explanation. At the middle bottom is the navigation link to main menu, notes menu, back to previous note and next note. The button is active when the icon changes into text.

1) Measure the movement of electricity

NOTA MENYUKAT DAYA GERAK ELEKTRIK

Sediakan alatan dan bahan seperti yang berikut:

- (a) sel 1.5 V dan sel 9V
- (b) bateri 12 V
- (c) voltmeter berjalat tinggi (0-100V) dan voltmeter berjalat rendah (0-50V, 0-10V, 0-30V)
- (d) pemegang sel

Sambungkan alat seperti ditunjukkan di atas dengan yang berjalat tinggi dan kebawah. Bincang dengan rakan anda tentang dapatan ini.

The interface also features a play button on the bottom left and navigation icons (back, forward, home, search) at the bottom center.

Figure F-12: Interface of measure the movement of electricity

Figure F-12 shows the notes if the user rolls over the mouse to the topic of the measure the movement of electricity note. The narrator gives a brief explanation about the topic. This note needs the user to discuss with their teacher about the result of the experiments. At the bottom left is the playback narrator explanation. At the middle bottom is the navigation link to main menu, notes menu, back to previous note and next note. The button is active when the icon changes into text.

2.3 NOTES FOR ELECTRIC CIRCUIT

2) Simple Circuit

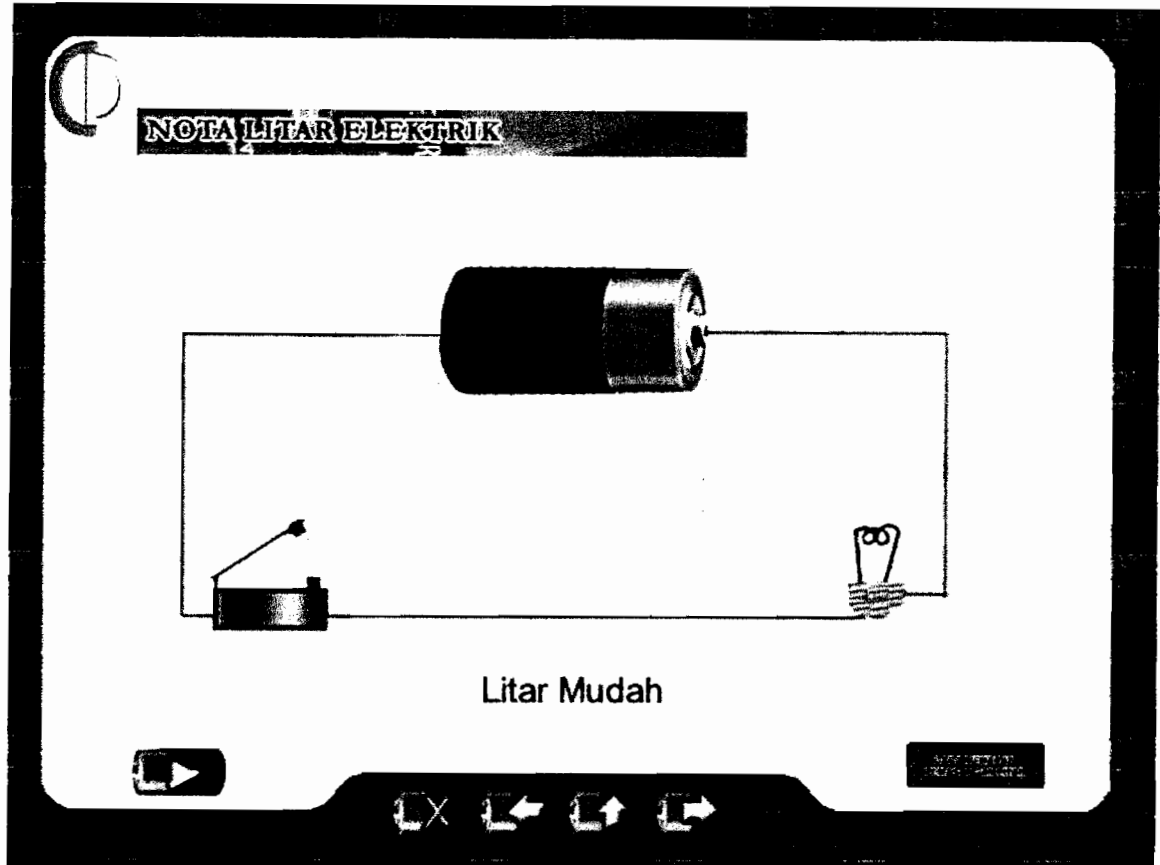


Figure F-13: Notes for simple circuit 1

Figure F-13 show the interface of notes for simple circuit. The interface shows the simple circuit but the narrator gives a brief explanation about the circuit. The user can move the mouse to the circuit to know what the object it is. At the bottom left is the playback narrator explanation. Opposite of that is the button to see the video. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

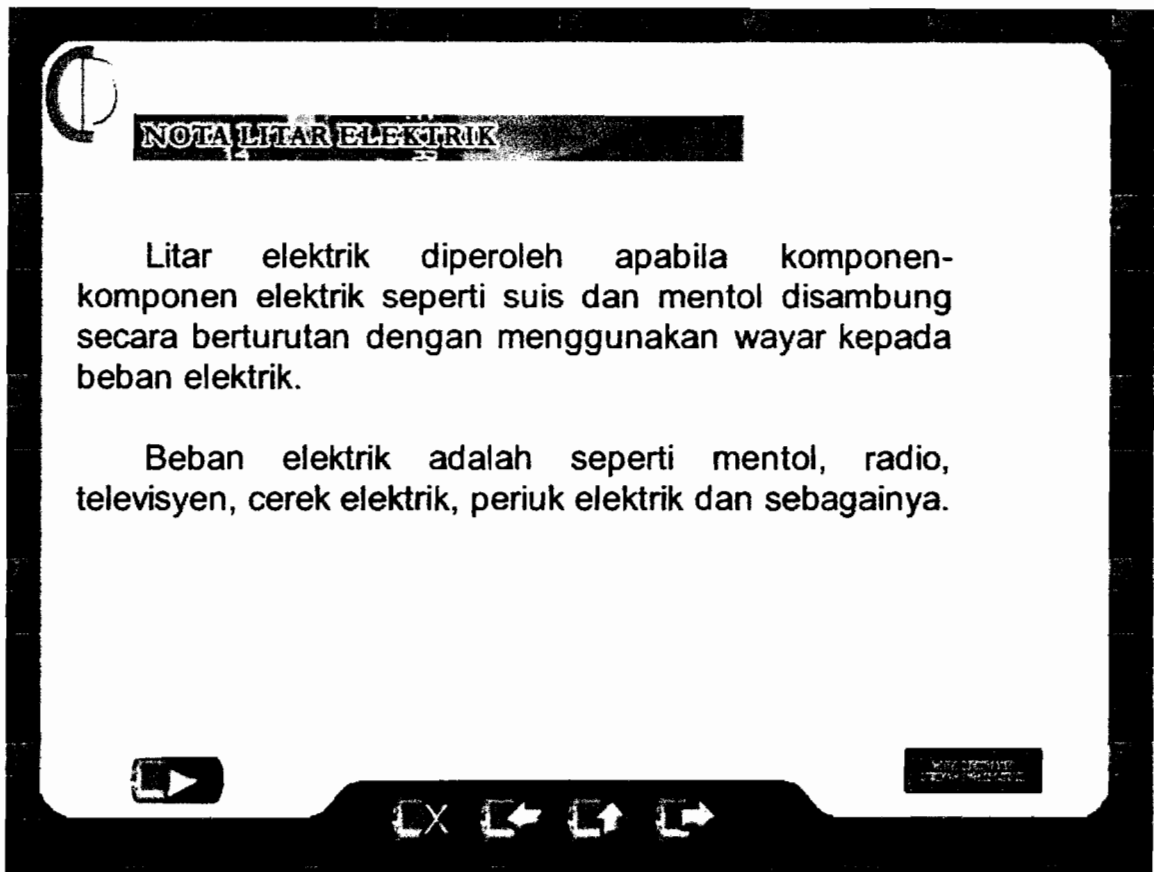


Figure F-14: Notes for simple circuit 2

The figure F- 14 will show if the user roll over the mouse to the topic of the note. This interface gives the detailed about the topic. At the bottom left is the playback narrator explanation. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

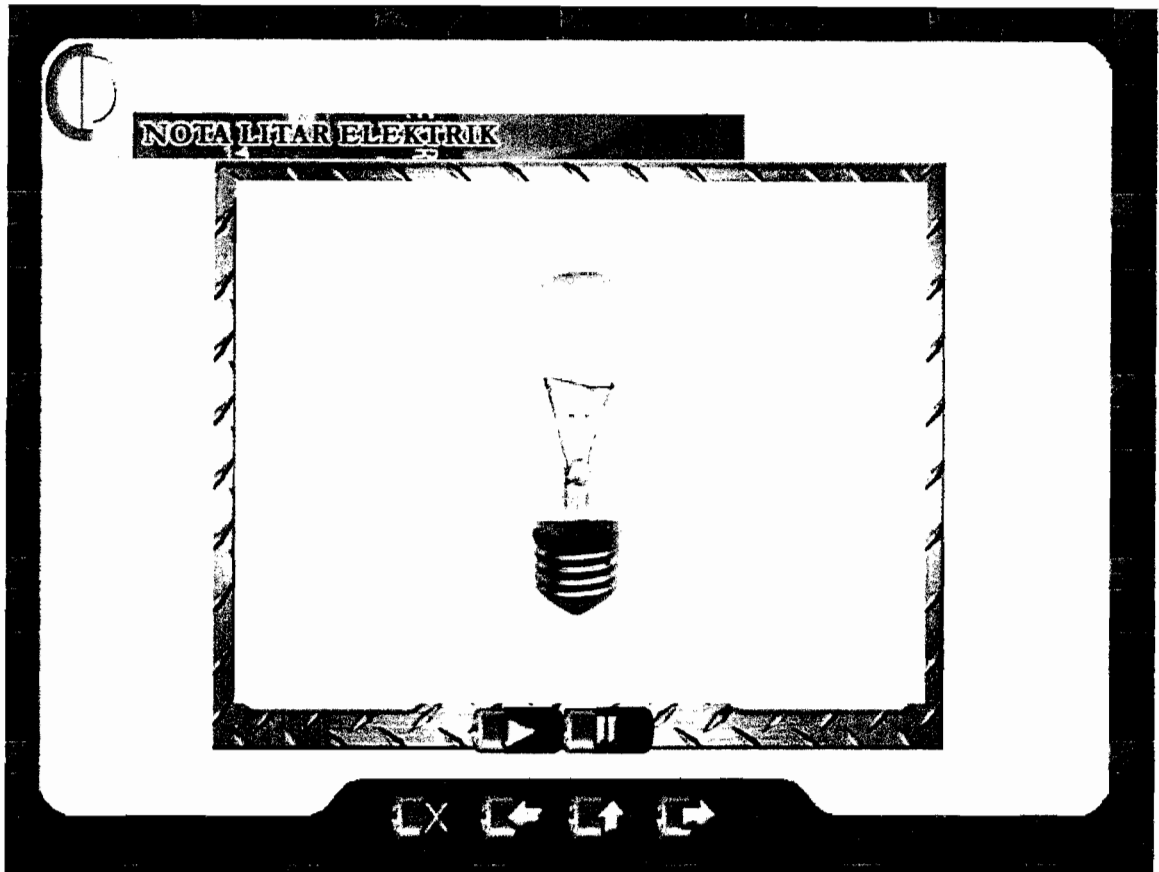


Figure F-15: Video notes how to make simple circuit

Figure F-15 show the video in how to make a simple circuit. Below the video is the controller for the video. User can control whether to play or to pause the video. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

3) Parallel circuit

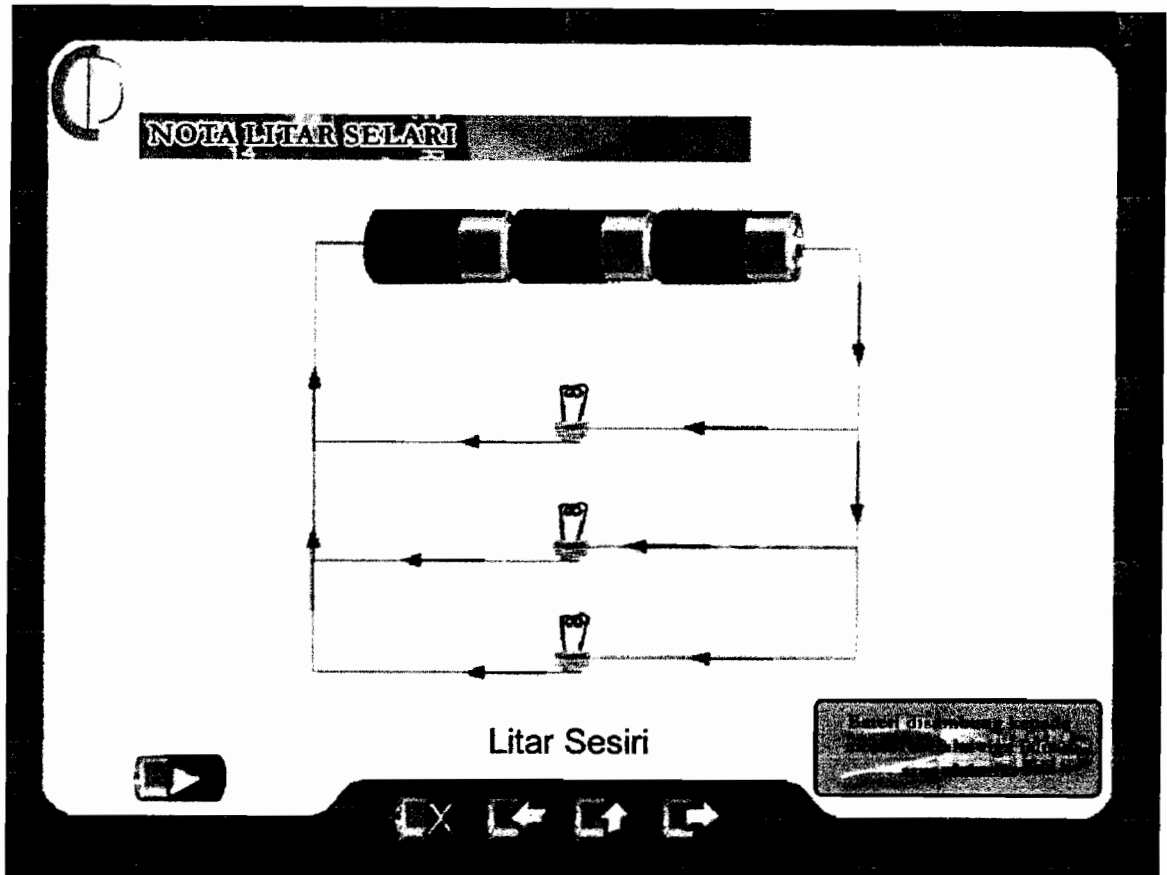


Figure F-16: Note for parallel notes 1

Figure F-16 show the interface of notes for parallel circuit. The interface shows the parallel circuit but the narrator gives a brief explanation about the circuit. The user can move the mouse to the circuit to know what the object it is. User can get the detailed explanation by roll the mouse to the header. At the bottom right is the explanation about the circuit. At the bottom left is the playback narrator explanation. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

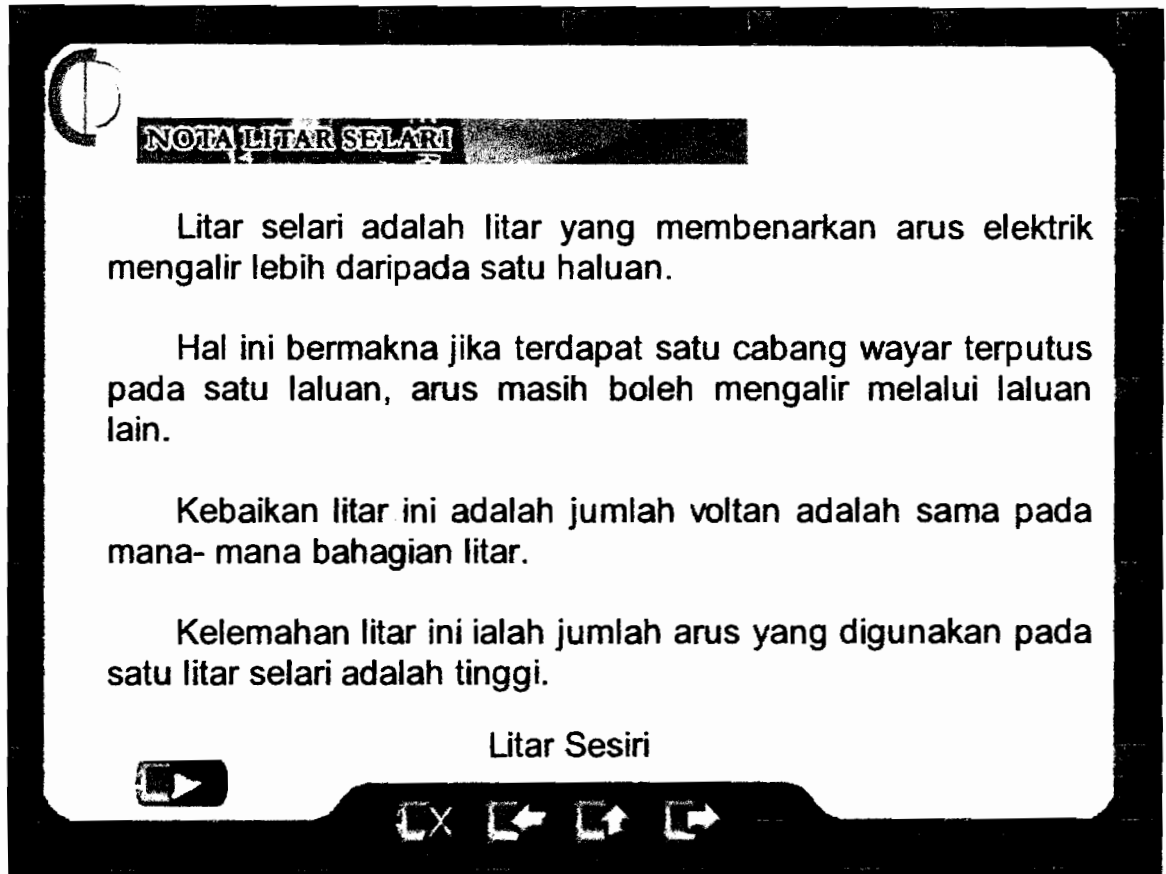


Figure F-17: Note for parallel notes 2

Figure F-17 shows the detailed notes if the user roll over the mouse to the topic of the note. This interface gives the detailed about the topic. At the bottom left is the playback narrator explanation. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

2.3 Serial circuit

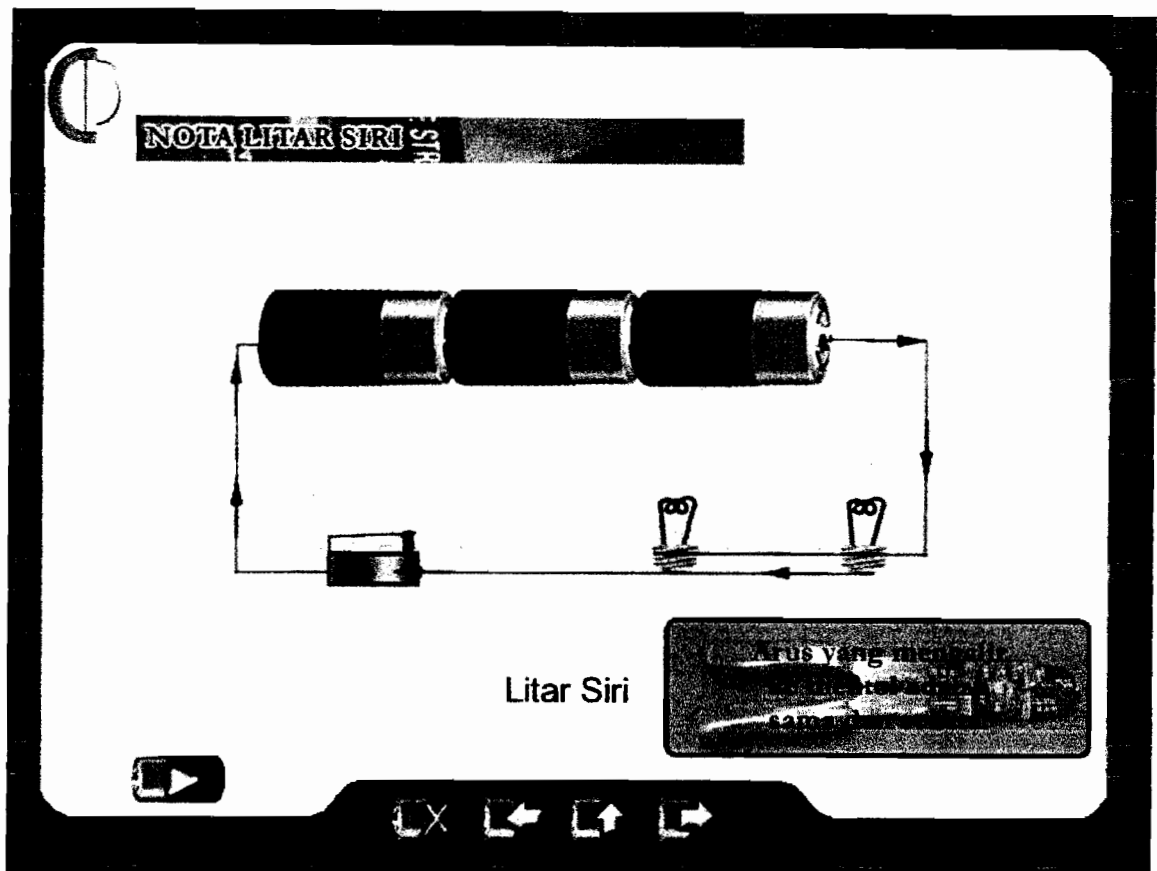


Figure F-18: Interface of serial circuit 1

Figure F-18 show the interface of notes for serial circuit. The interface shows the serial circuit but the narrator gives a brief explanation about the circuit. The user can move the mouse to the circuit to know explanation about the circuit. User can get the detailed explanation by roll the mouse to the header. At the bottom right is the explanation about the circuit. At the bottom left is the playback narrator explanation. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

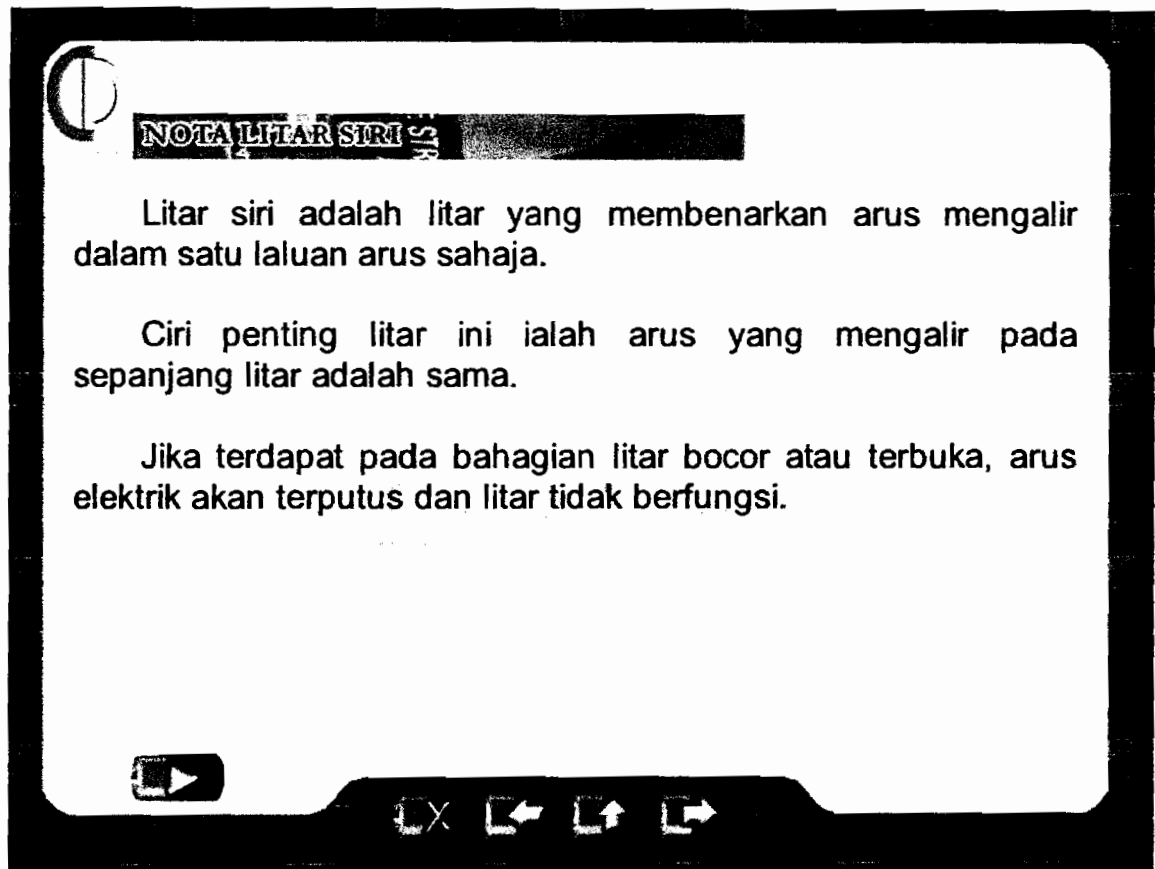


Figure F-19: Interface of serial circuit 2

Figure F-19 shows the detailed notes if the user roll over the mouse to the topic of the note. This interface gives the detailed about the topic. At the bottom left is the playback narrator explanation. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

2.4 Domestic main supply controller unit

1) Distributor board

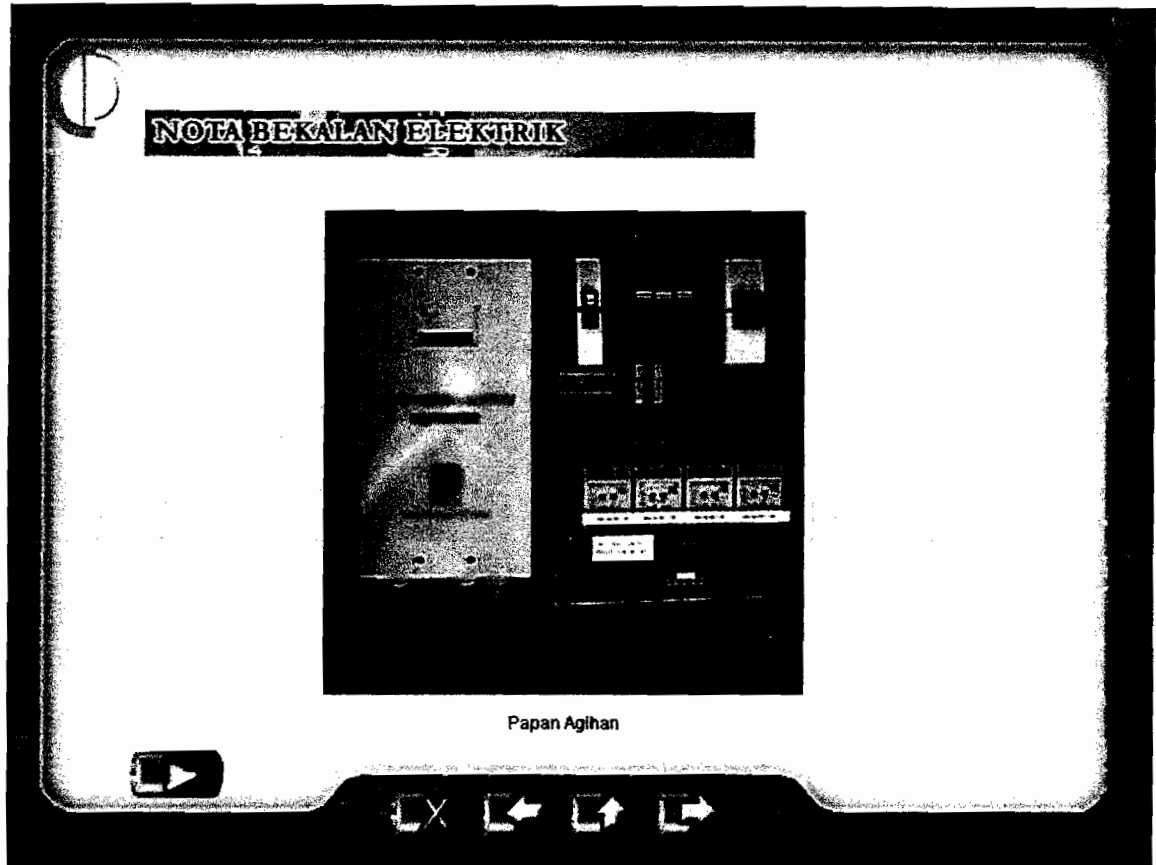


Figure F-20: Interface of distributor board 1

Figure F-20 shows the notes about the distributor board. The user can get the detailed information about the part in the distributor board by roll over the mouse above the picture. At the bottom left is the playback narrator explanation. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.



Figure F-21: Interface of distributor board 1

Figure F-21 shows the detailed information about the part in the distributor board by roll over the mouse above the picture. At the bottom left is the playback narrator explanation. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

2) Electricity supplies

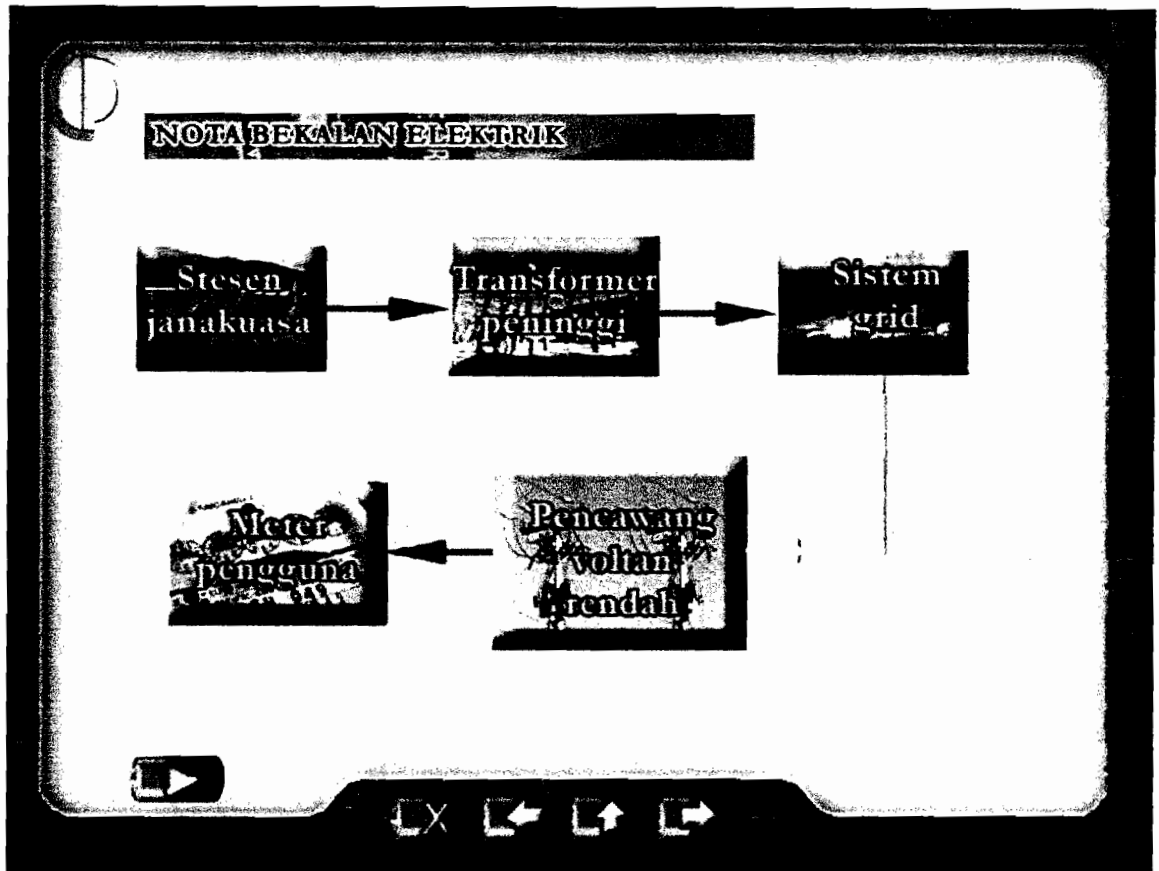


Figure F-22: Interface of electricity source

Figure F-22 shows the notes about the supplies of electricity. The user can get the detailed information by clicking the mouse above the picture. At the bottom left is the playback narrator explanation. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

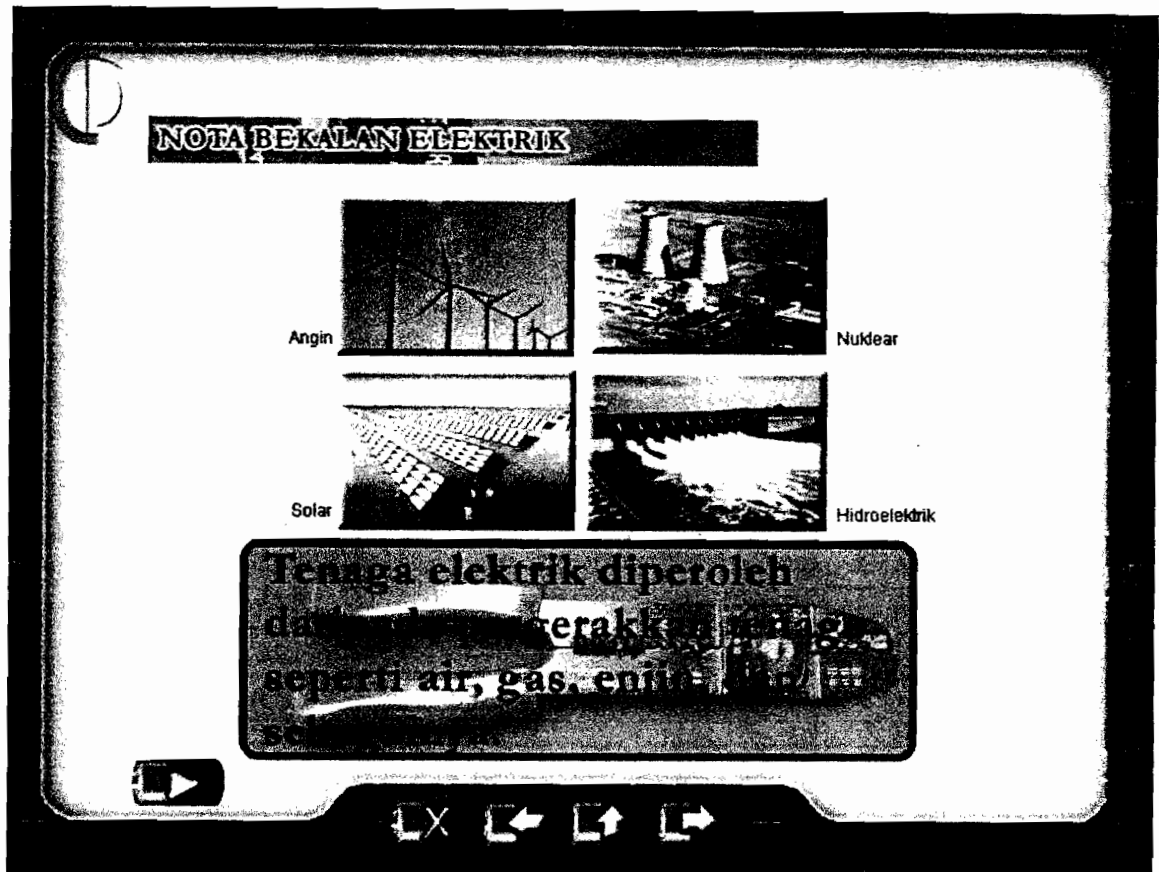


Figure F-23: Interface of electricity source 1

Figure F-23 shows the notes about the supplies of electricity. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.



Figure F-24: Interface of electricity source 2

Figure F-24 shows the notes about the supplies of electricity. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

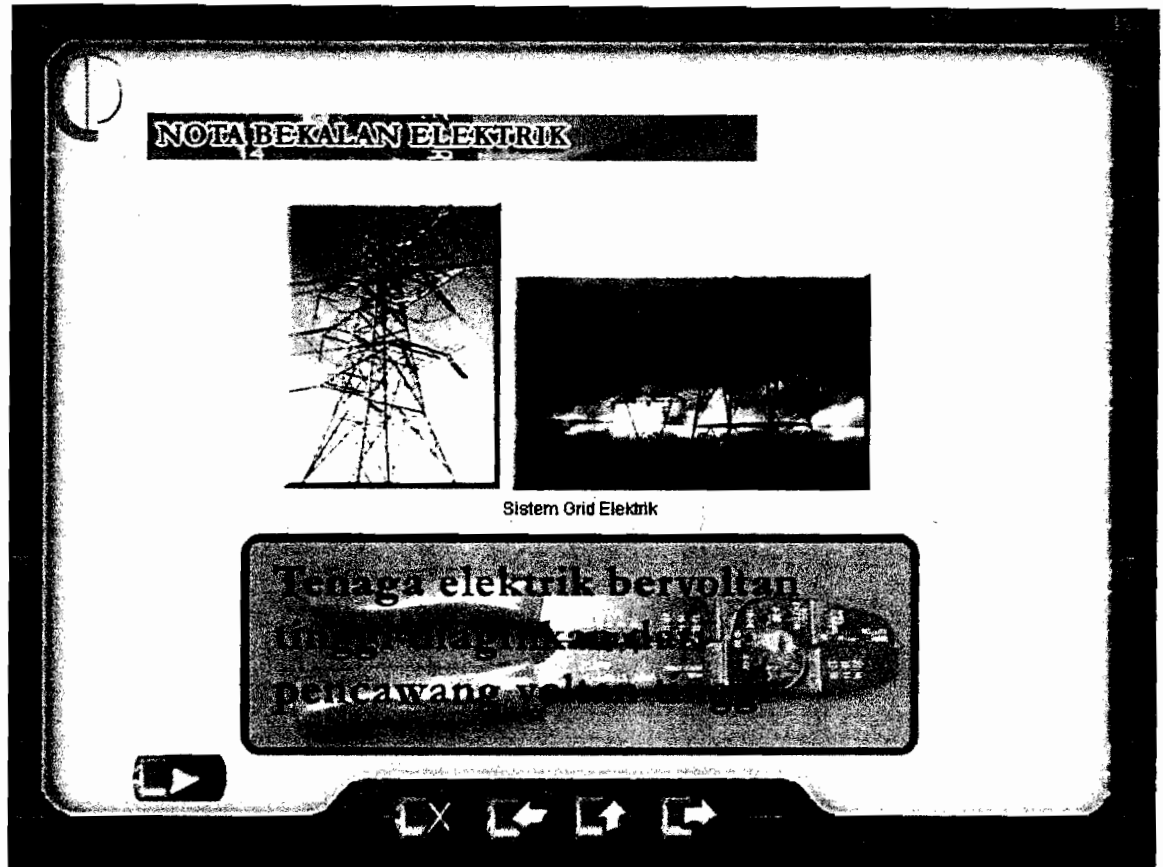


Figure F-25: Interface of electricity source 3

Figure F-25 shows the notes about the supplies of electricity. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

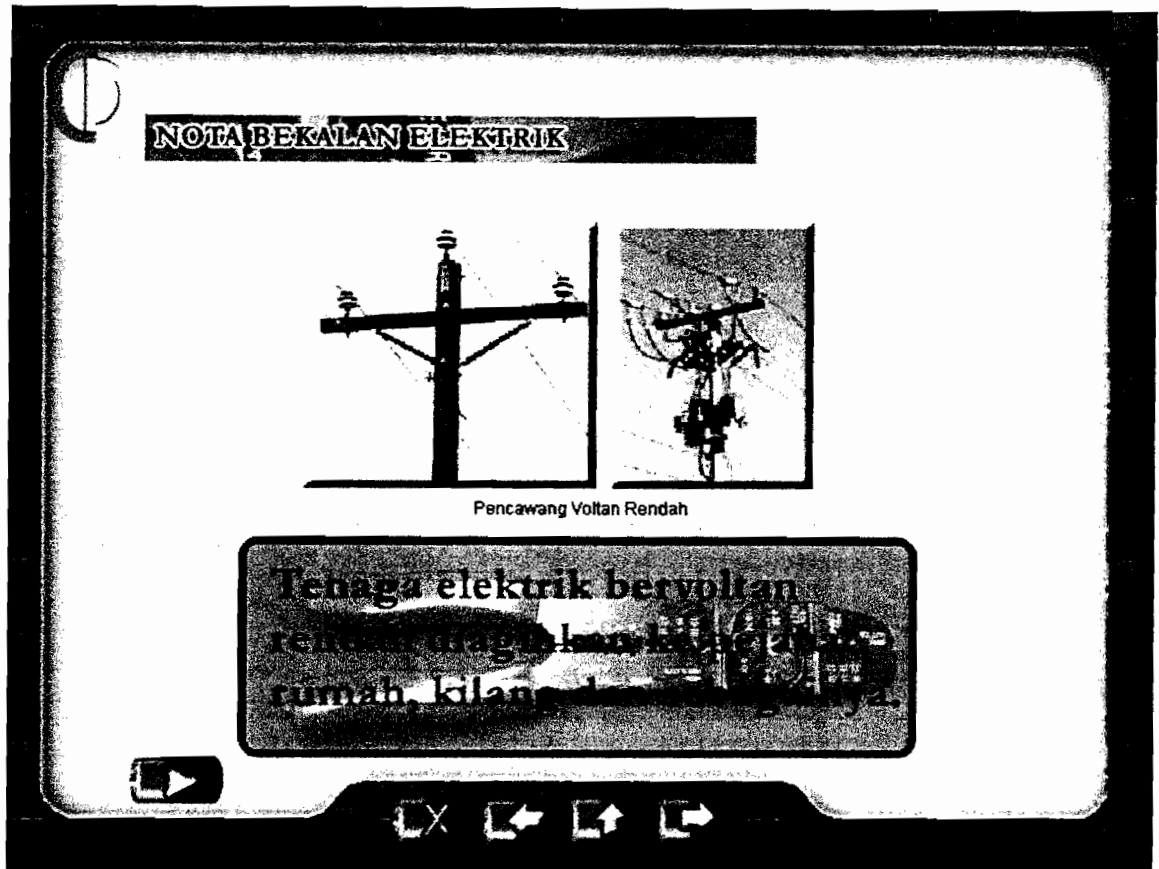


Figure F-26: Interface of electricity source 4

Figure F-26 shows the notes about the supplies of electricity. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

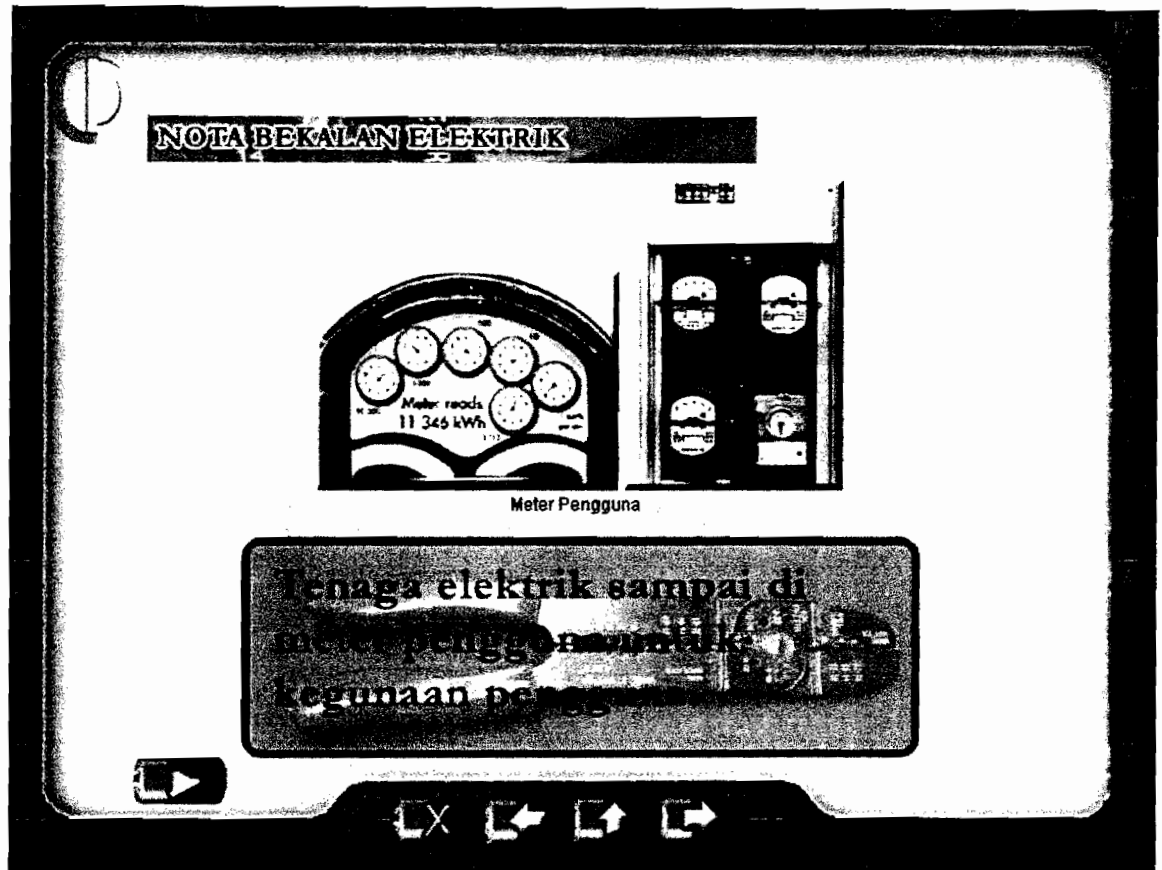


Figure F-27: Interface of electricity source 5

Figure F-27 shows the notes about the supplies of electricity. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

3.0 SYMBOLS IN ELECTRIC

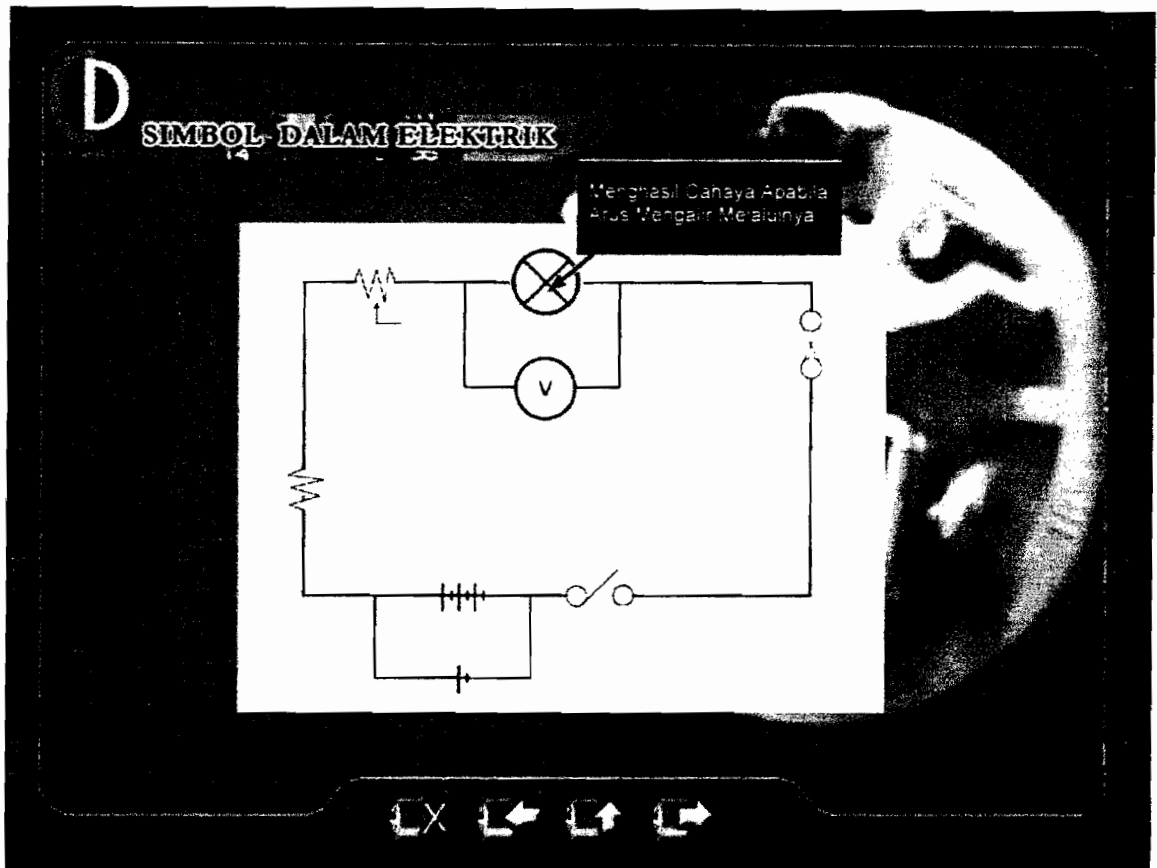


Figure F-28: Interface the symbols used in electric

Figure F-28 shows some of the symbols used in electric subject. User just needs to roll over the mouse at the symbol and the narrator will say the symbol and display the function of it. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

4.0 EXERCISE



Figure F-29: Interface detailed power source of electric

Figure F-29 shows the topics for exercise. The exercise is covered for each topic and one of the exercises is interactive game. The interactive game needs the user to make connection to the internet. The user needs to click on the topic and the subtopic will scroll down. User can choose what ever exercise that they need according to the topic. At the bottom of left is the exit button to main menu.

4.1 POWER OF ELECTRIC

1) Source of electric

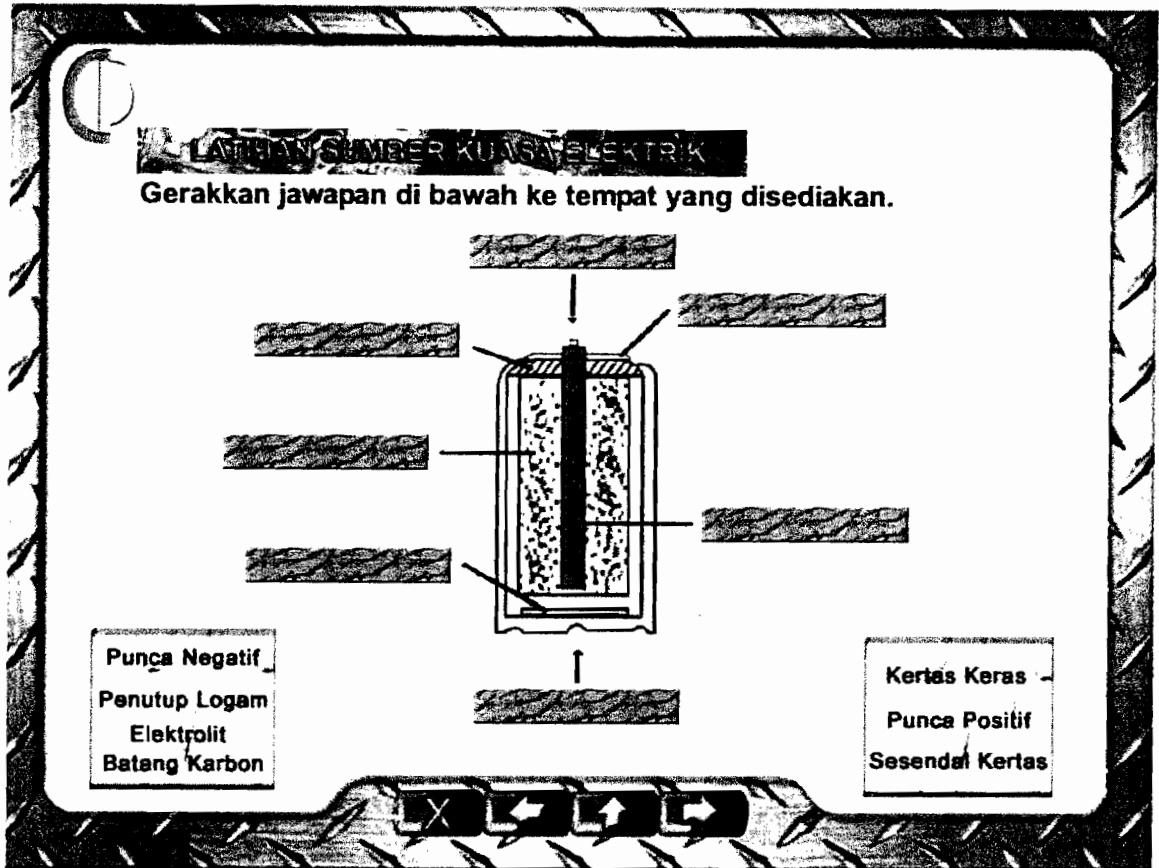


Figure F-30: Interface exercise for source of electric

Figure F-30 shows the exercise for source of electric. The exercise is need the user to drag the answer bottom of the page to the suitable place across the screen. If the answer is true, the answer will stick at the answer box. If wrong, the answer will return to the answer box below. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

2) Usefulness of electric

The screenshot shows a digital interface for an exercise. At the top left is a circular icon with a vertical line. Below it is a title bar with the text "LATIHAN KEGUNAAN ELEKTRIK". The main content area contains four paragraphs of text with blank lines for answers. At the bottom, there is a horizontal box containing five words: "pemanas", "lampu", "bunyi", "tenaga", and "motor". Below this box is a navigation bar with five icons: a crossed-out square, a left-pointing arrow, a right-pointing arrow, a left-pointing arrow, and a right-pointing arrow.

LATIHAN KEGUNAAN ELEKTRIK

Padankan setiap yang berikut dengan betul.

Elemen _____ digunakan dalam cerek elektrik, periuk nasi elektrik, seterika dan pengering rambut.

Alatan elektrik yang menukar tenaga elektrik kepada tenaga gerakan atau tenaga mekanik ialah _____.

Alat- alatan elektrik yang menukarkan tenaga elektrik kepada _____ ialah radio, mikrofon, televisyen dan sebagainya.

Alatan elektrik yang menukarkan _____ elektrik kepada tenaga cahaya ialah _____.

pemanas lampu bunyi tenaga motor

Figure F-31: Interface exercise for usefulness of electric

Figure F-31 shows the exercise for usefulness of electric. The exercise needs the user to drag the answer bottom of the page to the suitable place across the screen. If the answer is true, the answer will stick at the answer box. If wrong, the answer will return to the answer box below. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

4.2 MULTI USE OF METER MEASUREMENT

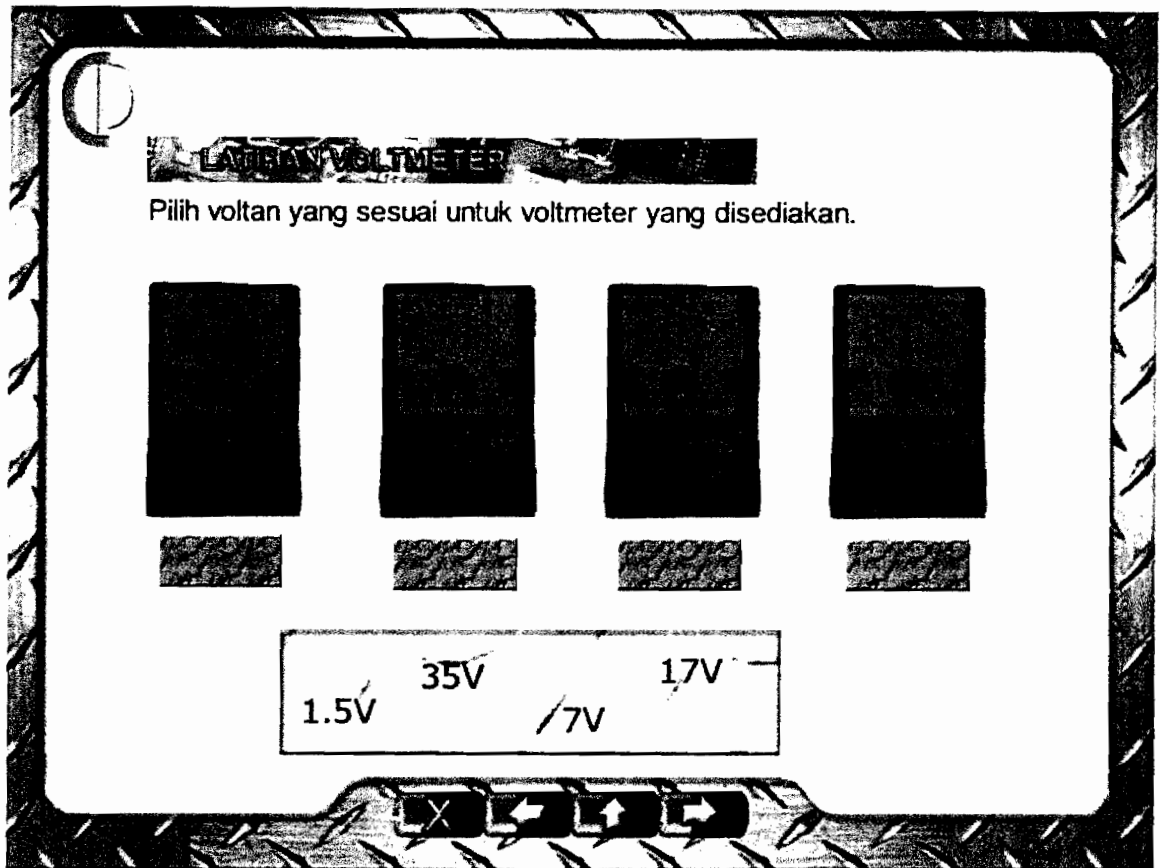


Figure F-32: Interface for voltmeter exercise

Figure F-32 shows the exercise for voltmeter exercise. The exercise needs the user to drag the answer bottom of the page to the suitable place across the screen. If the answer is true, the answer will stick at the answer box. If wrong, the answer will return to the answer box below. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

4.3 ELECTRIC CIRCUIT

1) Electric circuit

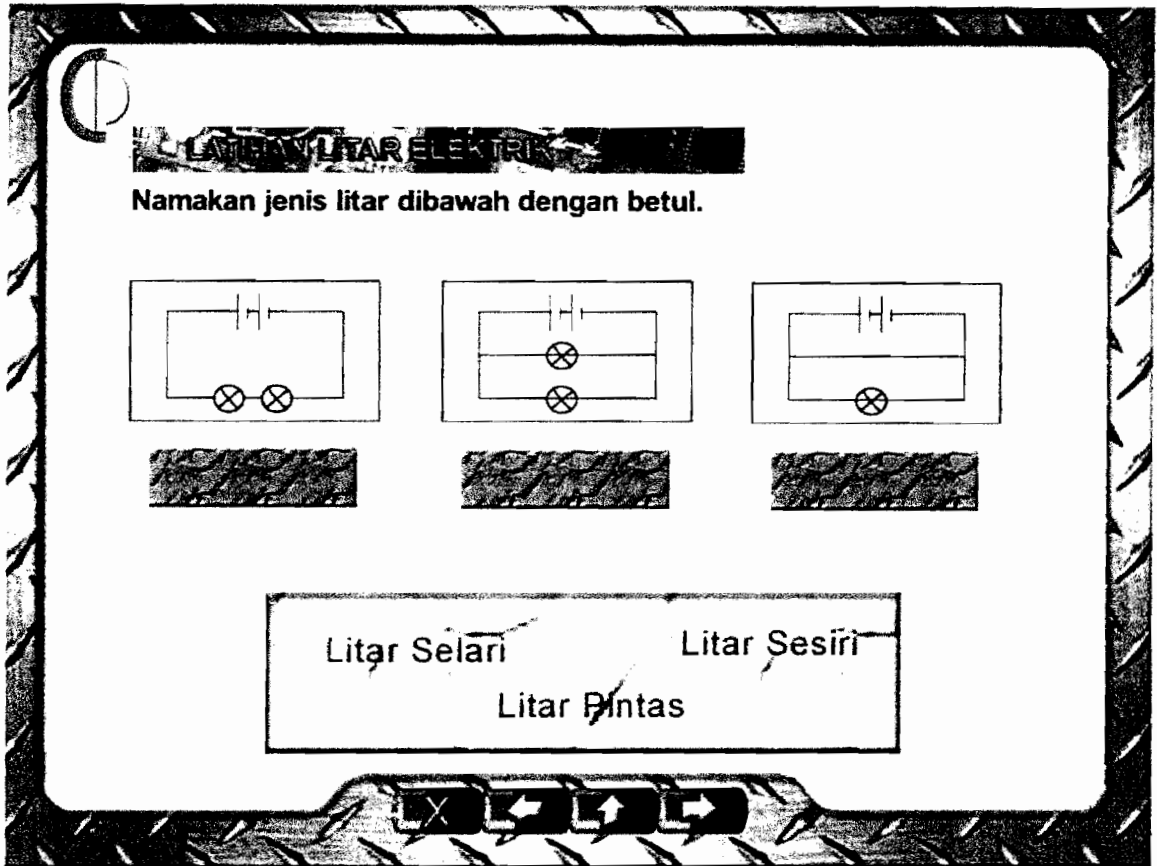


Figure F-33: Interface for electric circuit

Figure F-33 shows the exercise for electric circuit. The exercise needs the user to drag the answer bottom of the page to the suitable place across the screen. If the answer is true, the answer will stick at the answer box. If wrong, the answer will return to the answer box below. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

2) Series circuit

LATIHAN LITAR SESIRI

Padankan setiap yang berikut dengan betul.

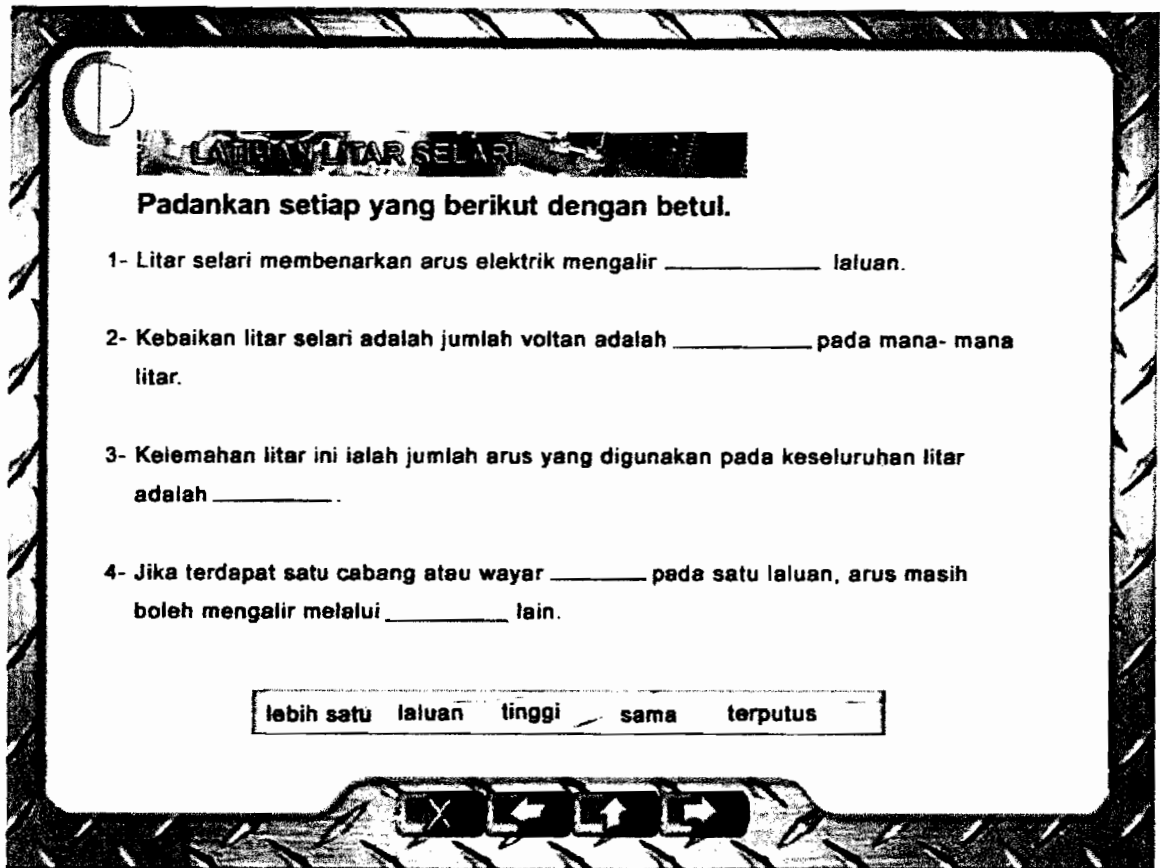
- 1- Litar siri adalah litar yang membenarkan arus elektrik mengalir dalam _____ laluan sahaja.
- 2- Jika bahagian litar terputus atau terbuka, litar _____ berfungsi.
- 3- Ciri penting litar siri ialah arus mengalir pada sepanjang litar adalah _____.
- 4- Kelemahan litar ini ialah litar tidak akan berfungsi jika terdapat mana- mana bahagian pada litar _____ kerana arus tidak dapat _____.

terputus satu sama tidak mengalir

Figure F-34: Interface for series circuit

Figure F-34 shows the exercise for series circuit exercise. The exercise needs the user to drag the answer bottom of the page to the suitable place across the screen. If the answer is true, the answer will stick at the answer box. If wrong, the answer will return to the answer box below. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

3) Parallel circuit



LATIHAN LITAR SELARI

Padankan setiap yang berikut dengan betul.

- 1- Litar selari membenarkan arus elektrik mengalir _____ laluan.
- 2- Kebaikan litar selari adalah jumlah voltan adalah _____ pada mana- mana litar.
- 3- Kelemahan litar ini ialah jumlah arus yang digunakan pada keseluruhan litar adalah _____.
- 4- Jika terdapat satu cabang atau wayar _____ pada satu laluan, arus masih boleh mengalir melalui _____ lain.

lebih satu laluan tinggi sama terputus

Figure F-35: Interface for parallel circuit

Figure F-35 shows the exercise for parallel circuit exercise. The exercise needs the user to drag the answer bottom of the page to the suitable place across the screen. If the answer is true, the answer will stick at the answer box. If wrong, the answer will return to the answer box below. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

4.4 DOMESTIC MAIN SUPPLY CONTROLLER UNIT

1) Distributor board

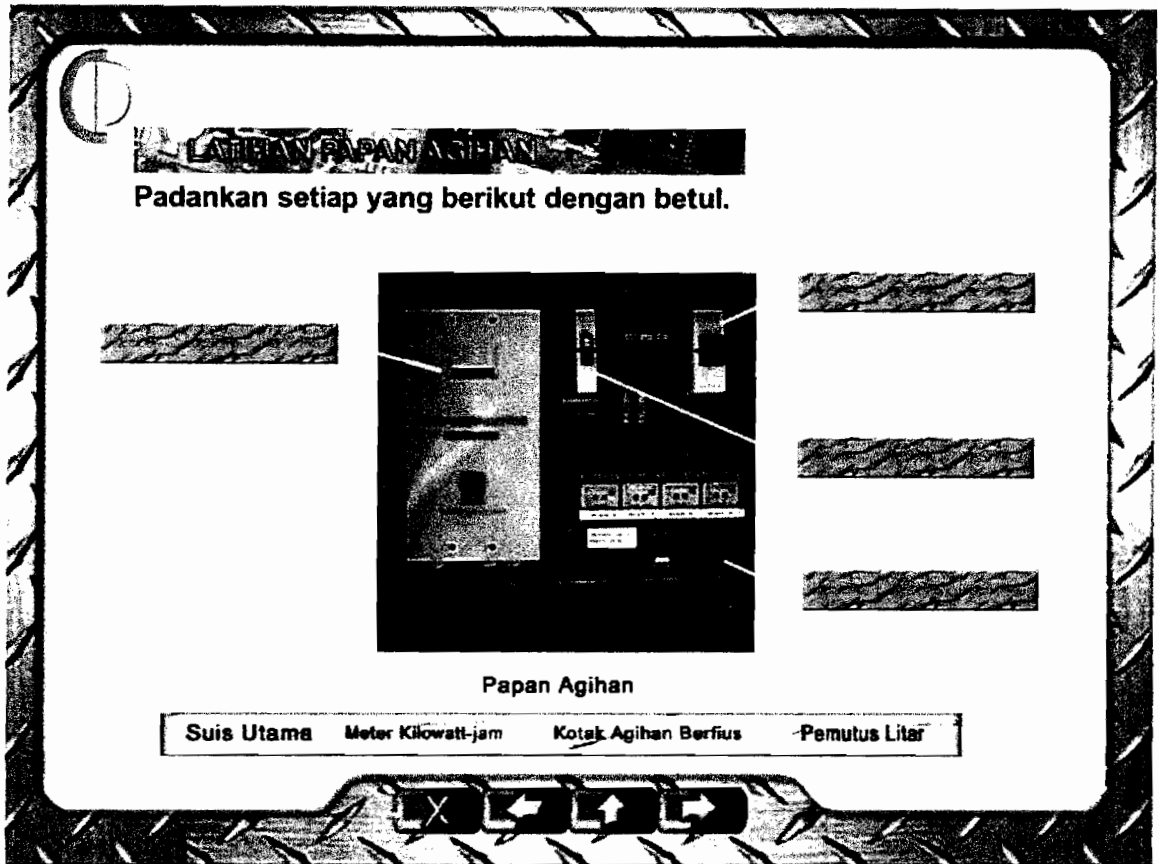


Figure F-36: Interface for parallel circuit

Figure F-36 shows the exercise for distributor board exercise. The exercise needs the user to drag the answer bottom of the page to the suitable place across the screen. If the answer is true, the answer will stick at the answer box. If wrong, the answer will return to the answer box below. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

2) Domestic main supply controller unit

LATIHAN BEKALAN ELEKTRIK

Padankan setiap yang berikut dengan betul

- 1- Dalam _____, tenaga elektrik diperoleh daripada pergerakan tenaga seperti air, gas enjin, dan sebagainya.
- 2- Tenaga elektrik dari stesen janakuasa dihantar ke punca pencawang voltan tinggi menggunakan proses _____.
- 3- Dalam _____, tenaga elektrik dari pencawang voltan tinggi akan dihantar ke pencawang voltan rendah untuk diagihkan kepada pengguna.
- 4- Voltan yang diperlukan oleh industri berat ialah _____ volt.
- 5- Pejabat, sekolah, kedai dan kilang industri ringan memerlukan _____ volt.
- 6- Rumah kediaman hanya memerlukan _____ volt.

415 sistem penghantaran	240 sistem penjanaan	11 000	sistem pengagihan
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Figure F-37: Interface for parallel circuit

Figure F-37 shows the exercise for domestic main supply controller exercise. The exercise needs the user to drag the answer bottom of the page to the suitable place across the screen. If the answer is true, the answer will stick at the answer box. If wrong, the answer will return to the answer box below. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

5.0 SYLLABUS

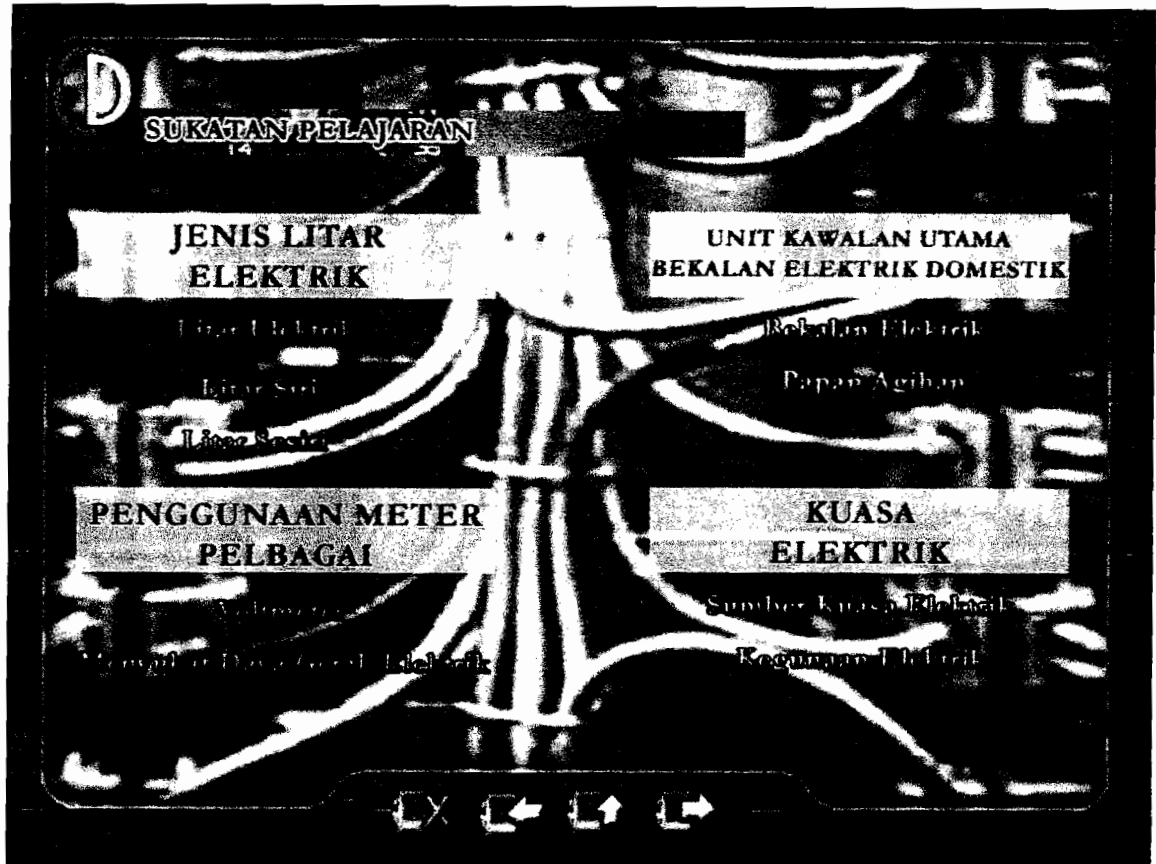


Figure F-38: Interface for syllabus

Figure F-38 shows the syllabus that cover in the courseware. The syllabus is like the shortcut to go the specific topic without need to browse each of the topics. The syllabus is only for the notes.. At the middle bottom is the navigation link to main menu, notes menu, back too previous note and next note. The button is active when the icon changes into text.

6.0 EXIT SCREEN

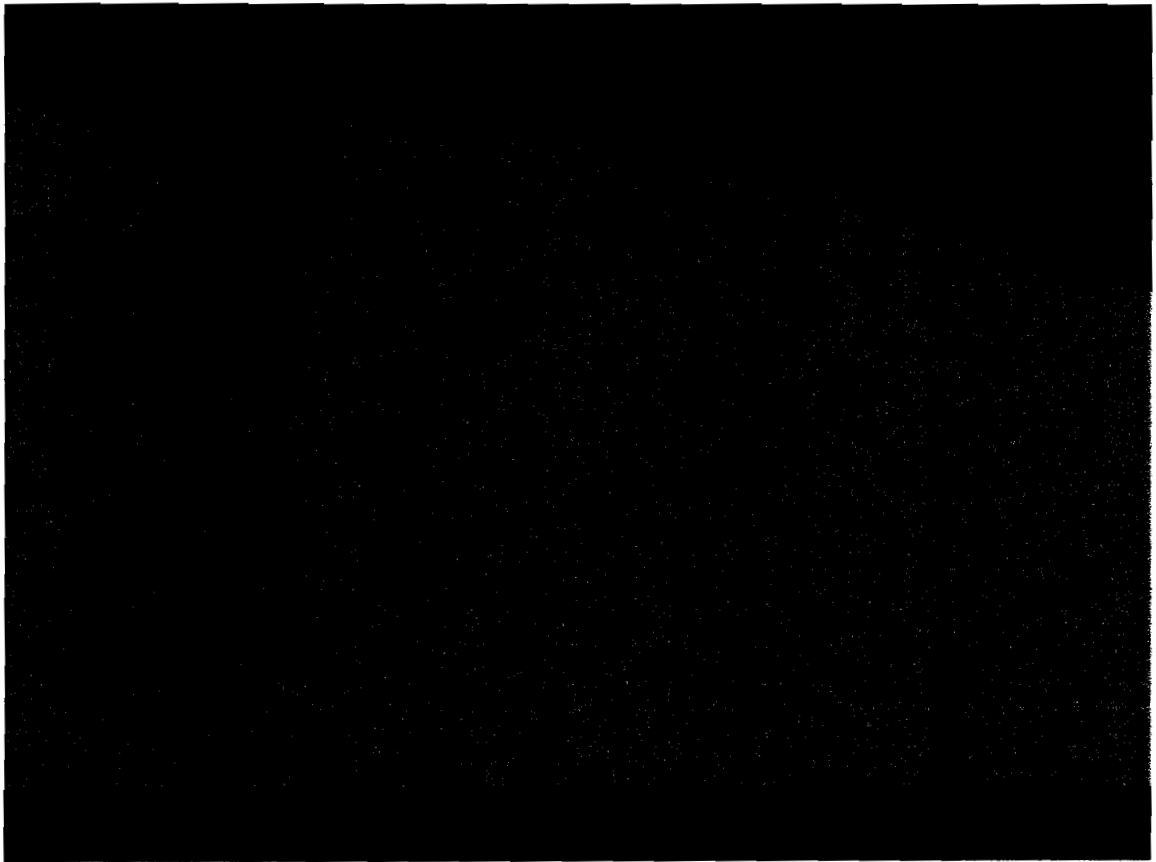


Figure F-39: Interface before exit

Figure F-38 shows the verification the courseware. If the user want to exit the courseware they need to click on Yes and No for not ready to go out.