CHAPTER IV
RESULT AND DISCUSSION

4.1 INTRODUCTION

This research had been conducted to achieve the three main objectives as stated in section 1.3. The results are presented according to the three main areas of concern namely the process of developing a prototype multimedia Black Cat Courseware (BC-C), the study on the effectiveness of the courseware, and finally the usability of the prototype courseware. The results for each area will be elaborated and discussed through out this chapter.

4.2 DEVELOPMENT OF THE PROTOTYPE MULTIMEDIA COURSEWARE

The development phase in BC-C life cycle consists of many processes starting from planning until the evaluation process as discussed in section 3.2. The processes could not have been implemented successfully without the development tools such the Macromedia Director 8.5, Macromedia Flash 8.0, Adobe Photoshop, Sound Forge 6.0, Windows Media Player, the Bytescout SWF to Video Scout software, Swishmax version 2.0 and Mix-FX software as explained in section 3.3. As mentioned in section 1.3, the main objective of this study is to develop a multimedia courseware for literature learning. Thus, in this section the outcomes from the development process will be discussed in detail.

A multimedia courseware for literature learning of the Black Cat story has been developed. The courseware starts with a montage page. As stressed by Scheneider (2006) in section 2.4.2, the initial key to build the cognitive theory for students is through the process of getting the students' attention. Therefore the purpose of having montage play as the opening page is to capture the attention among students because montage has the unexpected eye-catching movements of animation and attractive sound. However, students can skip the montage presentation if they so desire. The interface for the montage is as shown in Figure 4.1 below.

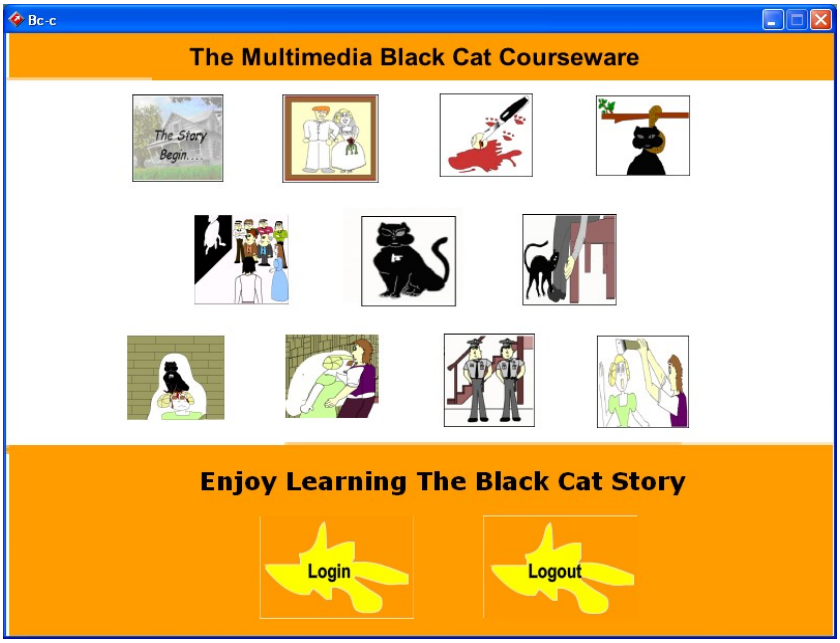


Figure 4.1 : Montage interface

The next page after the montage presentation is the main page. On the main page, students are required to login the courseware using their username. Figure 4.2 shows the interface of the main page. Students must enter their name as to fill the username field before clicking the 'Enter' button. The 'Enter' button must be clicked to start the courseware navigation. Again, according to Scheneider (2006) the second and fourth steps of cognitive approach are the processes to present the learning objective and the course contents. These elements have been incorporated in the BC-C by including the Introduction Module of the Learning Objective and the Topic Map. The Topic Map

presents the course content through mind-mapping technique. Figure 4.3 and Figure 4.4 show pages of the Learning Objective and Topic Map respectively.

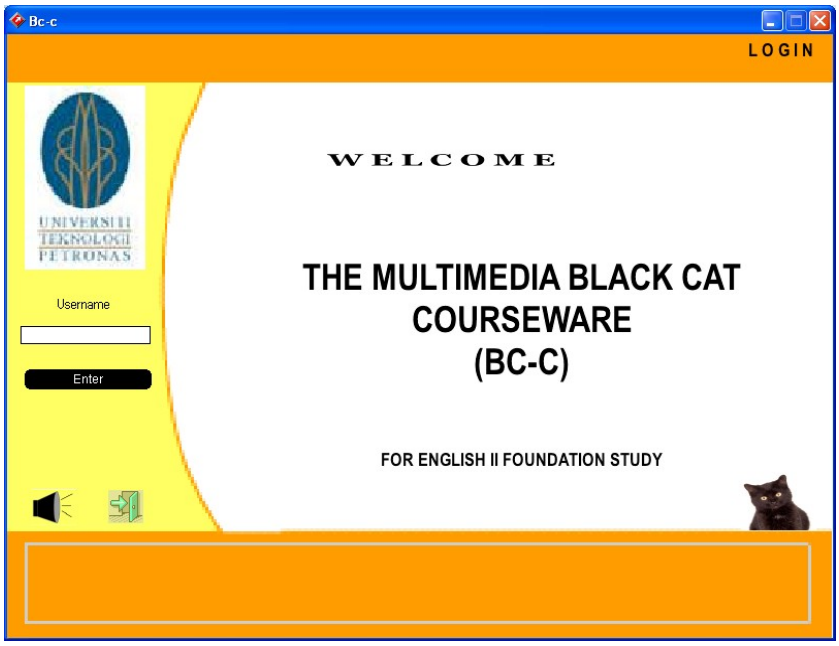


Figure 4.2 : Main Page Interface

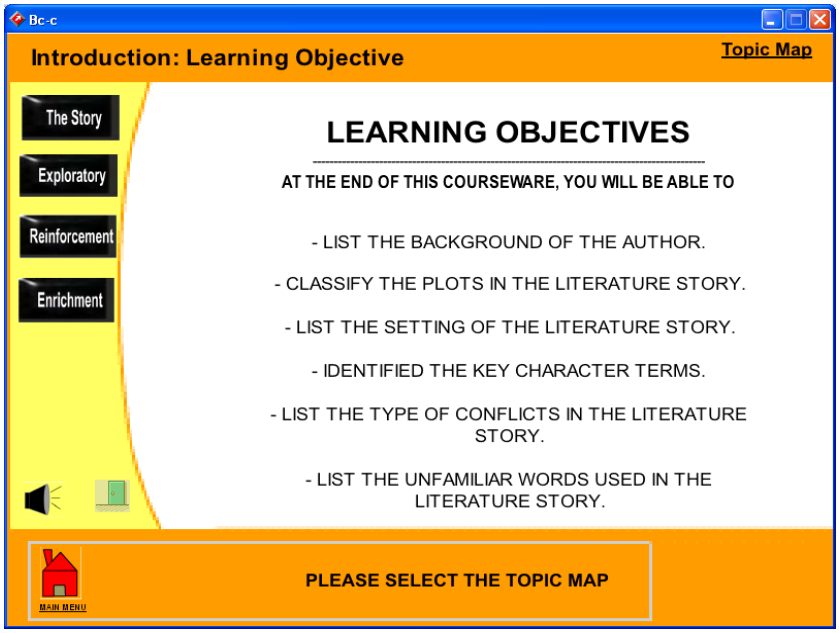


Figure 4.3 : Introduction Module - Learning Objectives

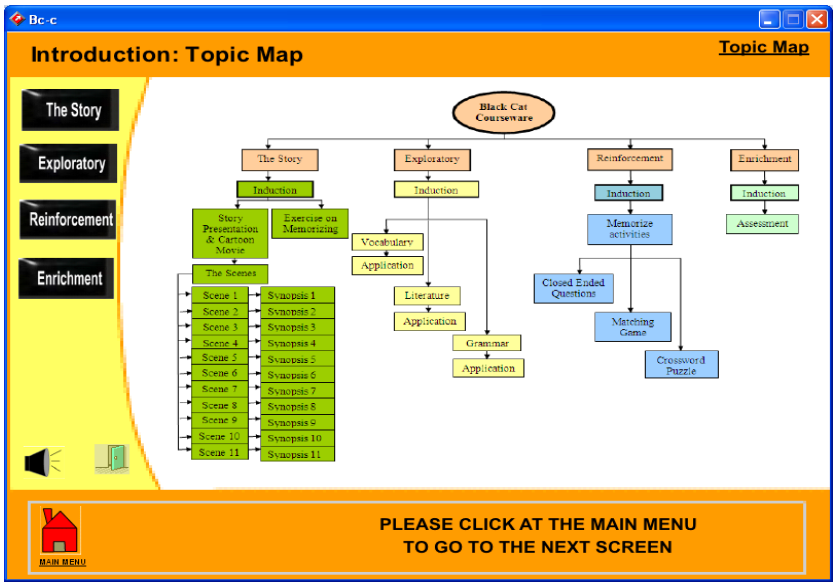


Figure 4.4 : Introduction Module - Topic Map

Then the users are free to explore and navigate the courseware since BC-C applies the perpetual navigation concept. The buttons that are created to accomplish the perpetual concepts follow the standard in order to be consistent in terms of size, location and function. According to the Topic Map, there are four modules which are The Story, Exploratory, Reinforcement and Enrichment as depicted in Figure 4.5. These modules have been designed according to the Black Cat syllabus and have adopted the educational theories such as behaviorism, cognitivism and constructivism.

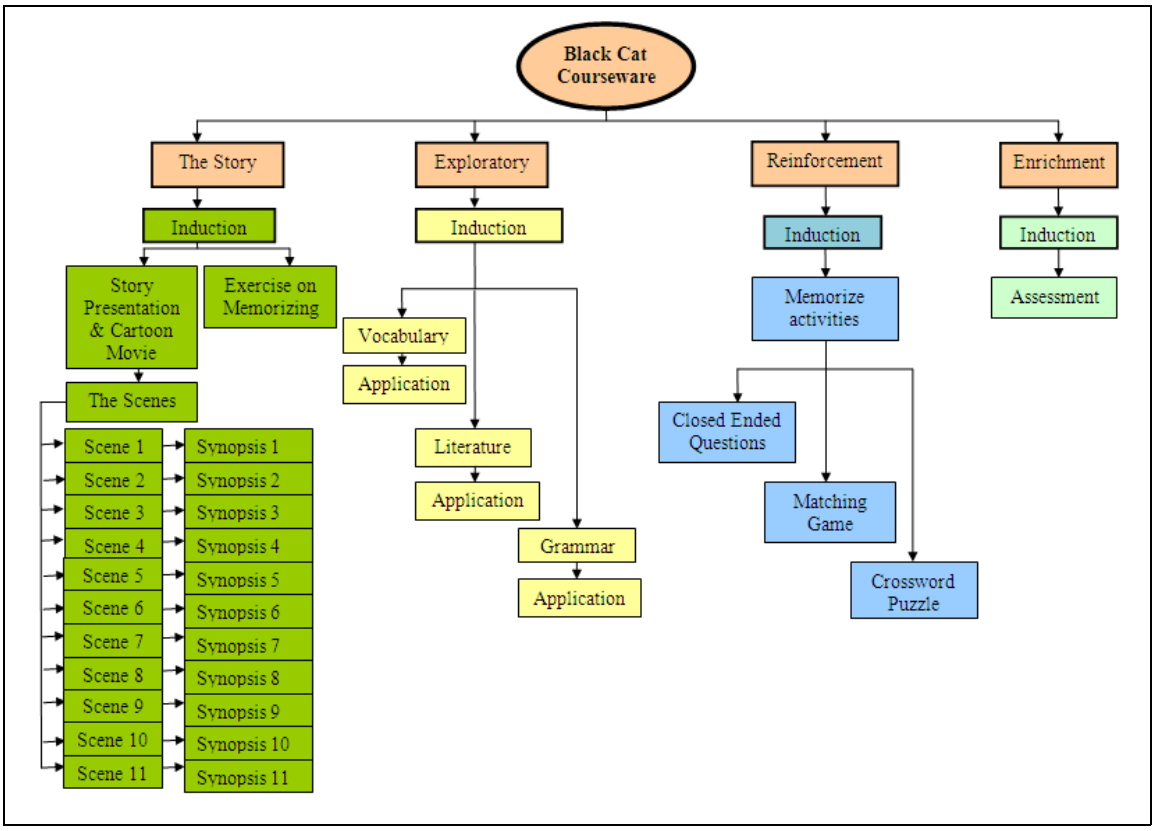


Figure 4.5 : The main modules in BC-C prototype

After the Introduction module such as shown in Figures 4.1 to 4.4, students can start to navigate The Story module. This module ends with the sub-module of the Memorizing Exercise. If their score is equal to or more than 65%, they will be allowed to enter the Exploratory module instead of the Reinforcement module, which is designed for scores of less than 65%. However, students in the Reinforcement module will have to return to the Memorizing Exercise in The story module, and the process will be repeated until they obtain a score of at least 65%. The rating of 65% is chosen as the measurement scale since it is equivalent to a B grade of the university grading system. After the Exploratory module the navigation process will continue with Enrichment module. This flow of navigation for the modules are depicted in Figure 4.6 as follows:

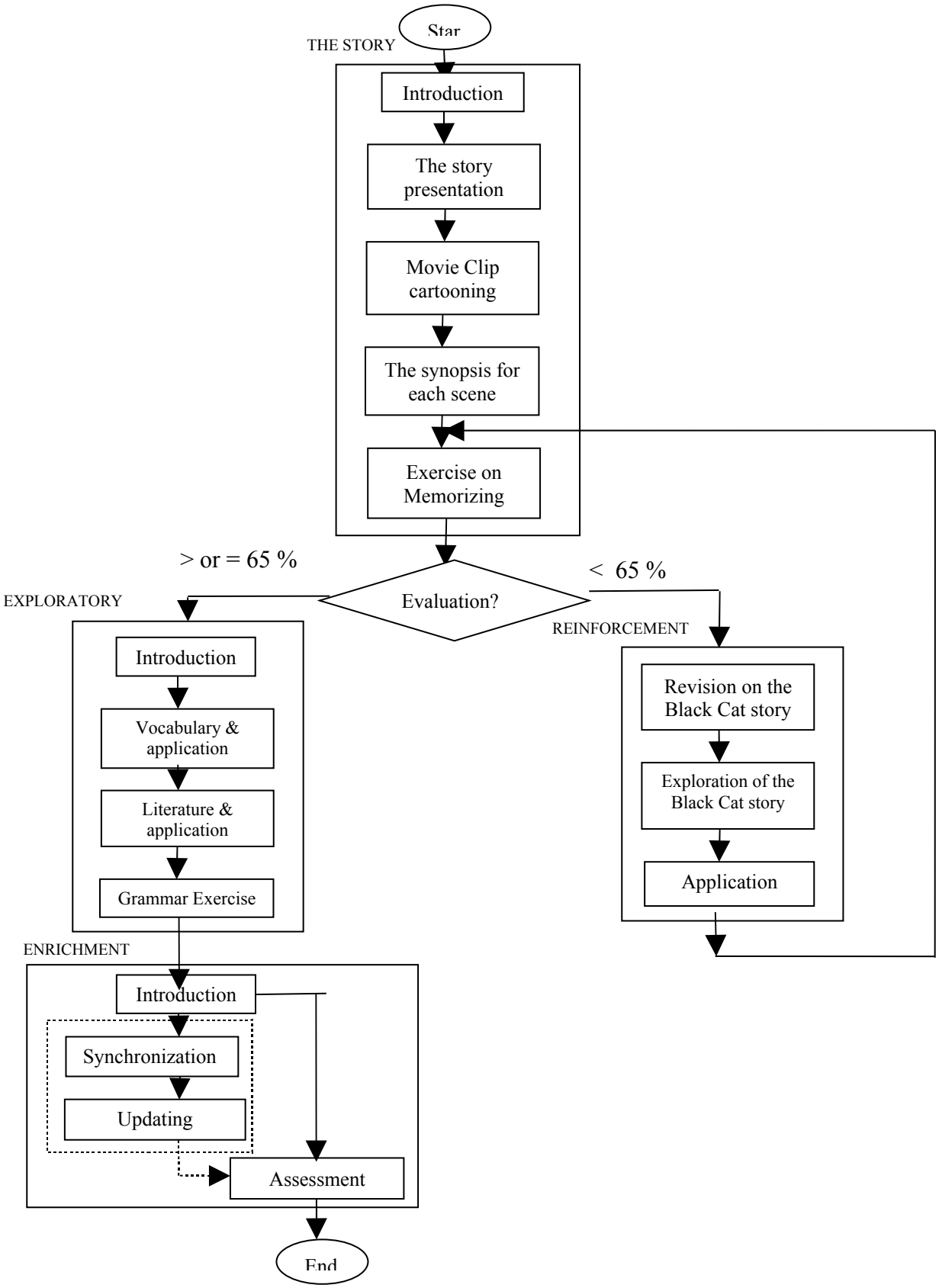


Figure 4.6: Module Flow Chart

4.2.1 The Story Module

In this module, there is an Introduction sub-module where students will be first introduced to the history of the Black Cat author who is Edgar Allan Poe. Figure 4.7 shows the History page. This sub-module is aimed to provide the information to students about the writer of the story that they are going to learn. The page contains the information about the author, his educational background, family background, mariage life and his career development. This page is presented in the form of animated slide presentation with accompanying narration which explains each slide. According to section 2.3, explanation is one type of pedagogical approach. Therefore, through the explanation, students can appreciate the author's background.

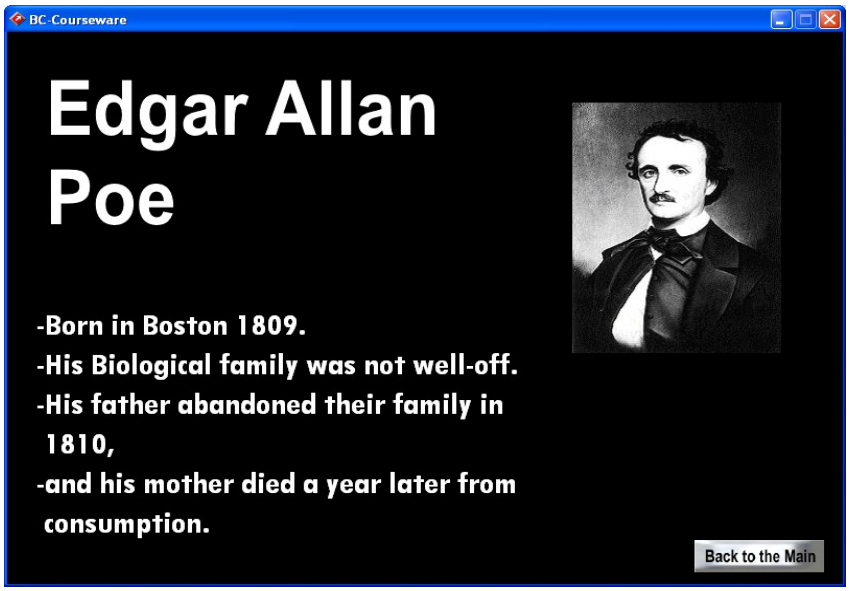


Figure 4.7: The History of Edgar Allan Poe

Following the introductory sub-module, there are several cartoon movie clips that are divided into 11 scenes in The Story module. The scene pages are designed based on the guided of the storytelling model as has been discussed in section 3.2.2 ii. (d). All of the story scenes are arranged according to the plots in the story which basically starts from the introduction of the story, climax, solution and the ending. Students have to understand the first scene before going on to the next scene even though BC-C provides

the option to navigate to any wanted scene by clicking the scene button in the sub-module. This option is provided since BC-C applies the interactive multimedia storytelling approach, which has been discussed earlier in sections 2.6.1 and 3.2.2 ii. (d). Some of the scene pages are shown in Figures 4.8 and 4.9 while the synopsis page is shown in Figure 4.10. The synopsis page is optional to assist students if they require further explanation with the presentation of the story.

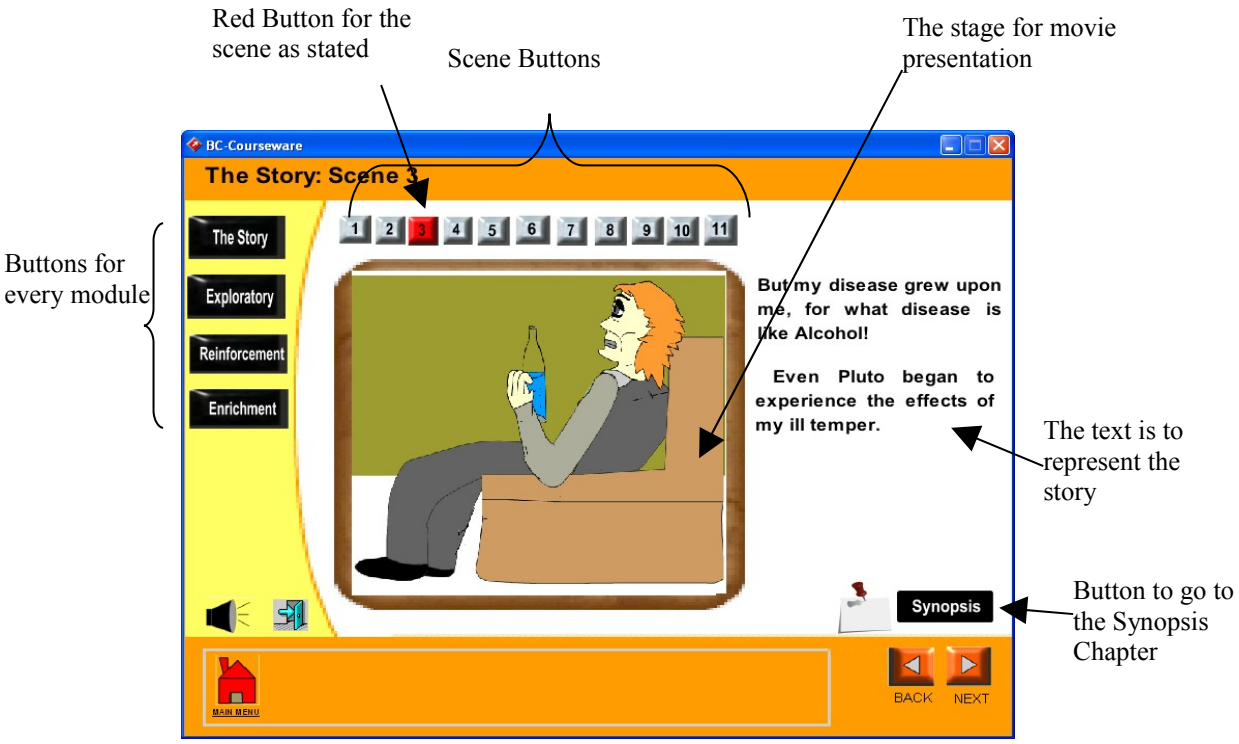


Figure 4.8 : The Story Module - Scene 3

Figure 4.9 : The Story Module - Scene 8

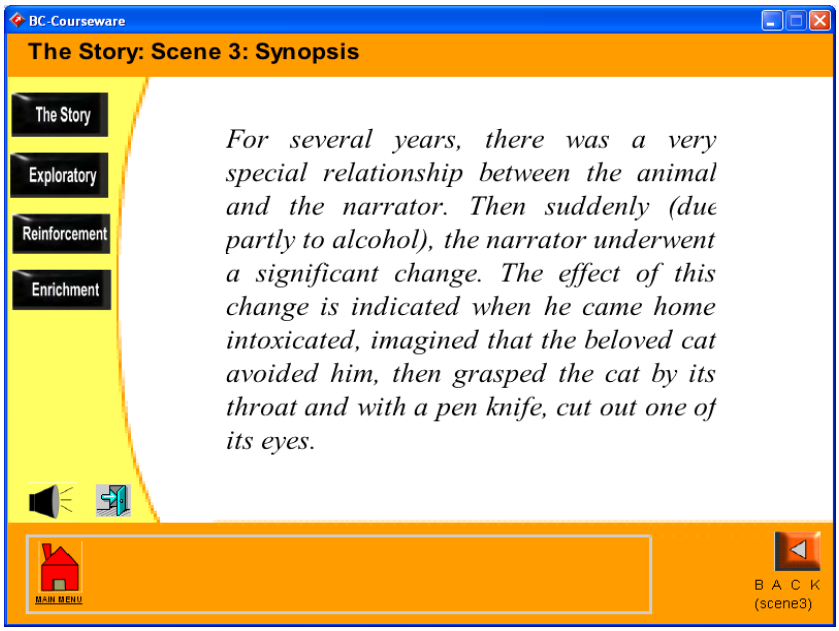


Figure 4.10 : The Story Module- Synopsis Scene 3

The Memorizing Exercise is to examine students' understanding on what they have learnt through the cartoon movie of the story. Figure 4.11 is the interface of the page.

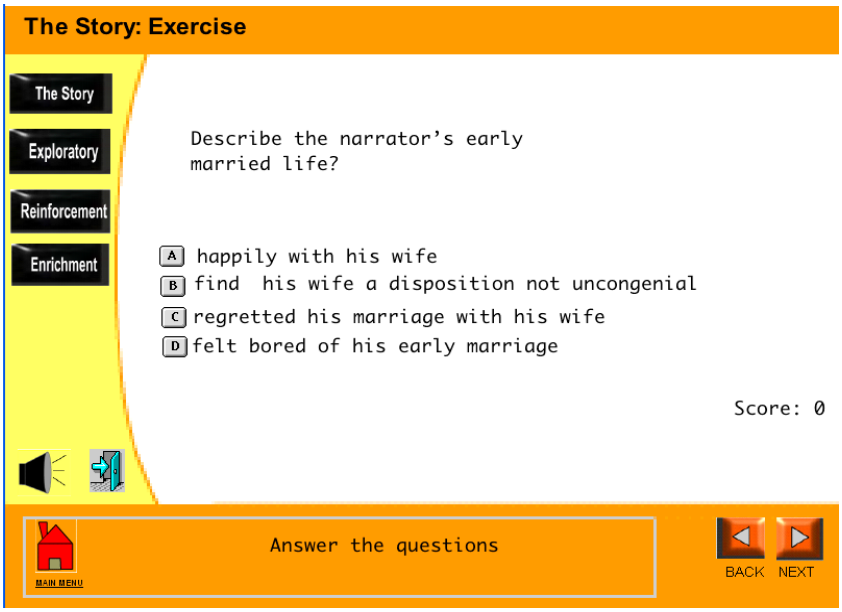


Figure 4.11 : The Story Module - Memorizing Exercise

4.2.2 Reinforcement Module

This module is an extra module for the weaker students who scored less than 65% in The Story module. It contains pages for revision, which act as Precious Buddy. Students are required to answer compulsory questions on the comprehension for each scene that will help them to better understand the whole story.

The Reinforcement module contains a sub-module which is called Memorize Activity. Three activities are included in this sub-module, which are aimed at helping the students to memorize the story scenes. The first activity is answering questions that will bring the weaker students to explore the close-ended questions, which will help them to memorize scenes 1, 2, and 3. There is a matching game for memorizing scenes 4, 5, 6 and 7. Some examples of the matching game for memorizing scenes 4 and 6 are shown in Figures 4.12 and 4.13. The matching game requires students to interact with the courseware by 'dragging and dropping' the answer to the question. Finally for scenes 8,9,10 and 11, students need to type the answers into a crossword puzzle as depicted in Figure 4.14. The adjusting movement of the hand and finger in this sub-module is one example of psychomotor approach contained in BC-C.

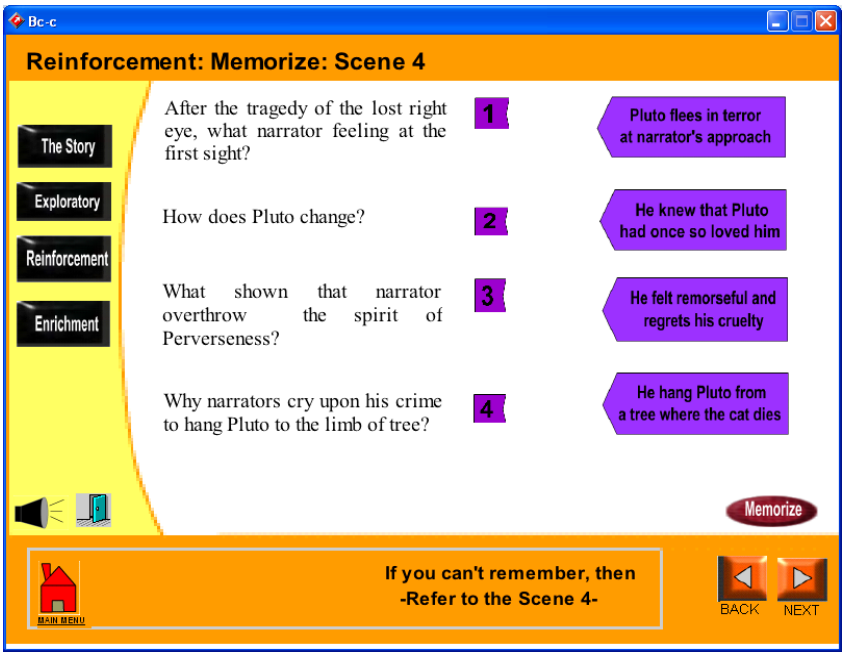


Figure 4.12 : Reinforcement Module - Memorize - Scene 4

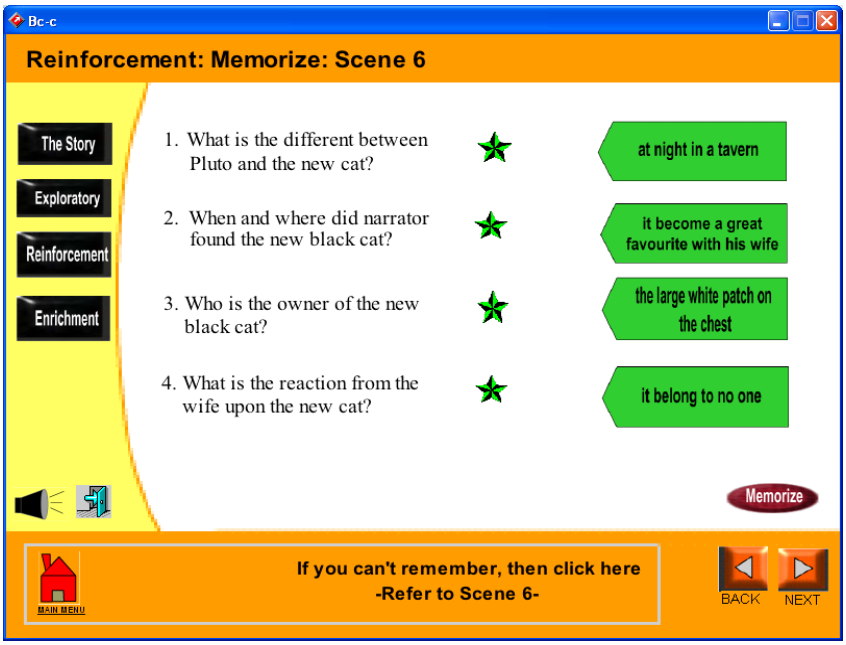


Figure 4.13 : Reinforcement Module - Memorize - Scene 6

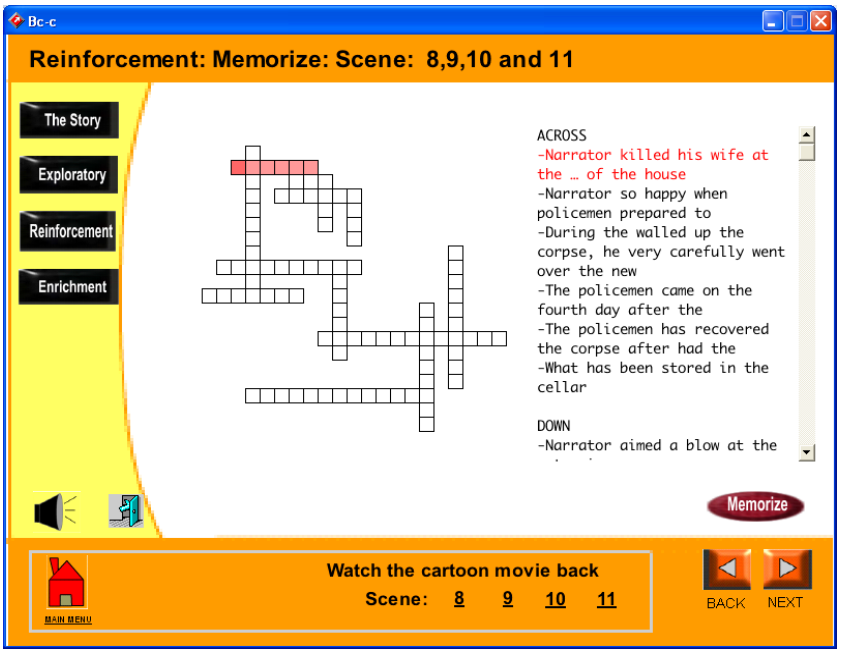


Figure 4.14 : Reinforcement Module - Memorize - Scene 8,9,10 and11

Apart from that in the Memorizing Activity for each scene, students are also recommended to refer back to every single scene such as in Figure 4.15. This will help them to answer the questions provided in the close-ended, matching game and crossword puzzle. However, the scenes in the Reinforcement module are presented in quite a different way compared to the scenes in The Story module. This is to assist students in the memorizing process by providing a larger view of the movie. The pages are presented without any text or the sequence of buttons; an example can be seen in Figure 4.8. All of the Memorizing Activities are aimed to increase students' understanding of the Black Cat story so they can obtain a score of 65% or more in The Story module.

Figure 4.15 : Reinforcement Module - Memorize - the story for scene 4

4.2.3 Exploratory Module

In the Exploratory module, students will navigate the sub-module of grammar, vocabulary and literature. Each sub-module is presented as a simple game. The grammar sub-module is designed in terms of exercise (see Figure 4.16) as a complementary to support English learning in BC-C. After the grammar exercise, students will explore the sub-modules of vocabulary and literature.

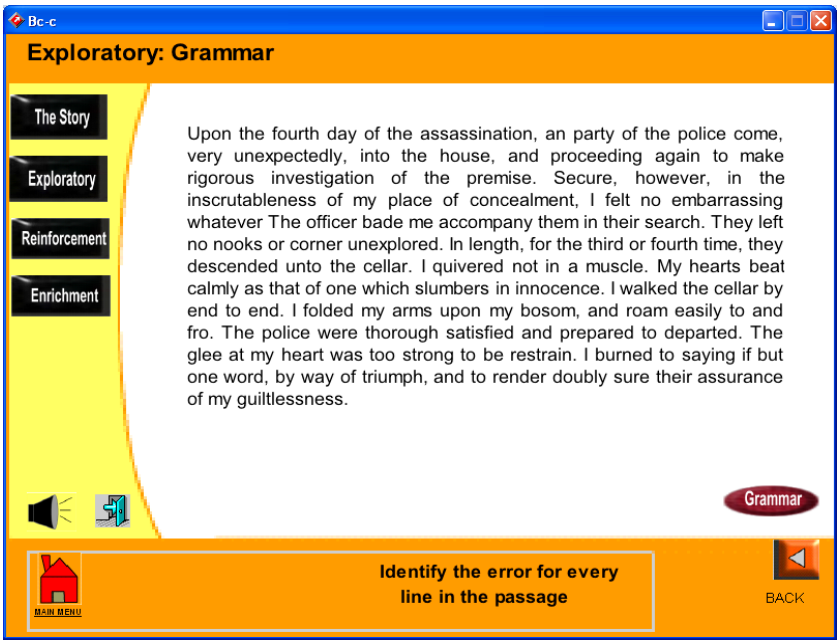


Figure 4.16 : Exploratory Module - Grammar

In the sub-module of vocabulary, all unfamiliar words in each scene will be explained one by one. Students can choose any of the scenes by clicking the button as presented on that sub-module. The words are presented on a slide presentation; an example is given in Figure 4.17. The story text in which the word can be found is presented alongside the meaning of the word. Next, after the students are done with the vocabulary exploration for every scene, they can play word catching game included as an application of this sub-module. This application is aimed for students to familiarize themselves with the unfamiliar words used in the story text. Figure 4.18 show a page of the catching game.

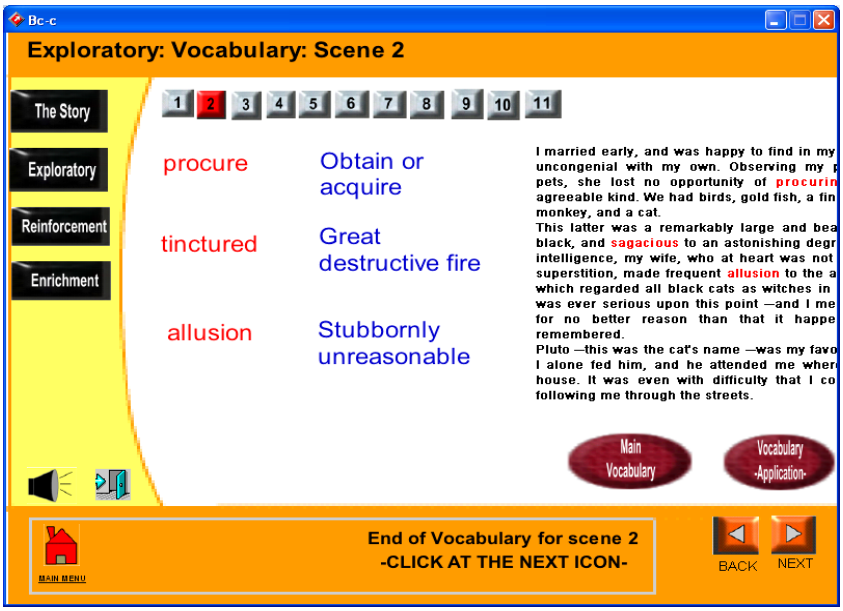


Figure 4.17 : Exploratory Module - Vocabulary for scene 2

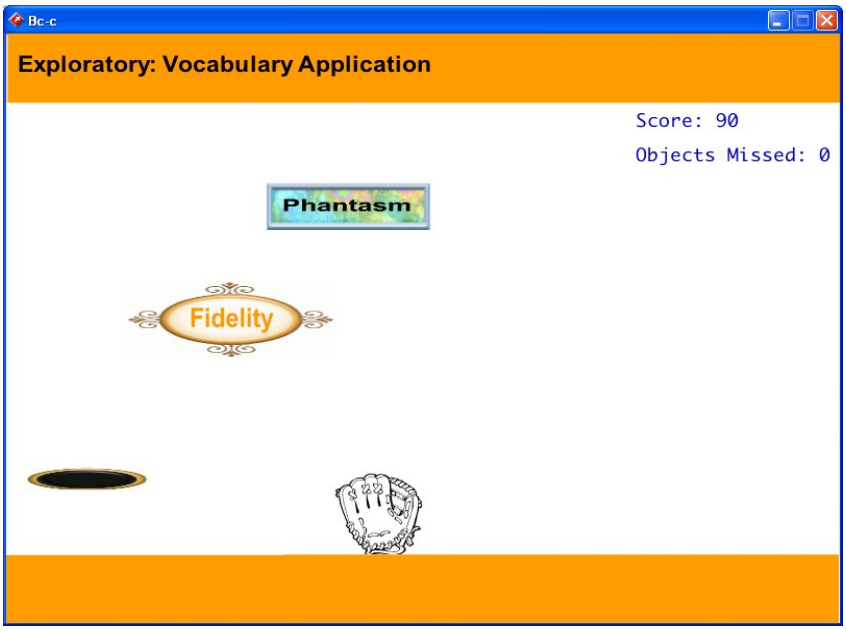


Figure 4.18 : Exploratory Module - Vocabulary Application

The exploratory module for literature is divided into three sections which are the learning of setting, characters and conflicts in the story. These terms of literature elements are designed based on UTP syllabus. The sub-module of setting (Figure 4.19) presents the location and plot of the Black Cat story. While the sub-module of characters

in Figure 4.20 presents the six main characters: the narrator, the wife, Pluto, second black cat, the crowd and the policeman. The third section in the literature exploration contains the conflicts that happened throughout the whole story which are the conflicts against nature, conflict against antagonist, characters struggles against society besides the internal, emotional, intellectual and moral conflicts. This sub-module of conflict is depicted in Figure 4.21. The literature application that has been created in Exploratory module is the game of Hangman. This game is to test students understanding of the literature elements (setting, character and conflict) in the story. Through this game, students will learn the literature by answering some questions in a fun and enjoyable way. The interface of Hangman game is shown in Figure 4.22.

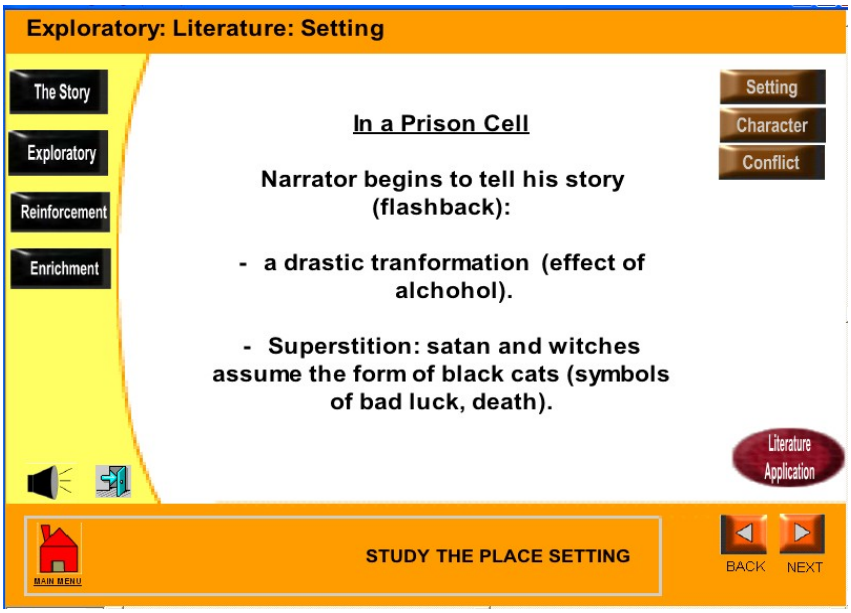


Figure 4.19: Exploratory Module - Literature - Setting

Figure 4.20 : Exploratory Module - Literature - Character

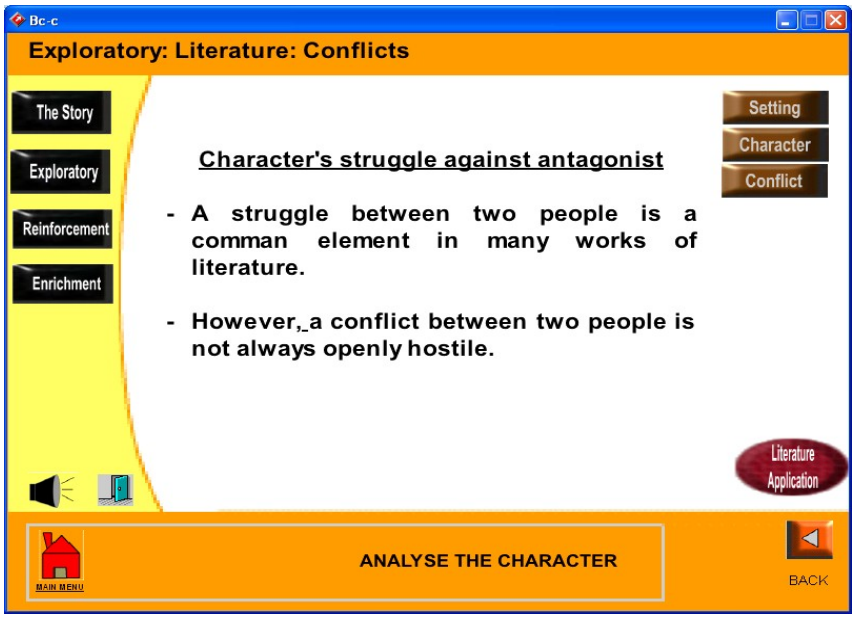


Figure 4.21 : Exploratory Module - Literature - The Conflict

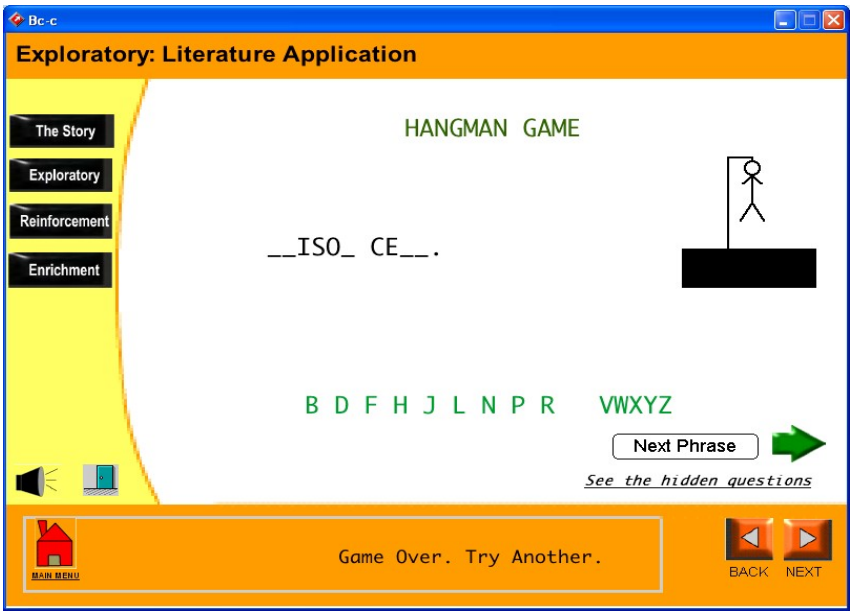


Figure 4.22 : Exploratory Module - Literature Application

4.2.4 Enrichment Module

The final navigation module is the Enrichment Module. In this module, students' understanding of the Black Cat story is tested through the comprehension questions as shown in Figure 4.23. The processes of system synchronization and updating will be switched on every time a student reaches this module. Scores will be automatically given upon completion of the assessment exam. After the students have completed answering the question in the assessment section, there will be the final page to exit the courseware as shown in Figure 4.24. Students can choose either to exit or to explore the courseware. If a student chooses to leave the courseware, the courseware will ask for confirmation as in the interface shown in Figure 4.25.

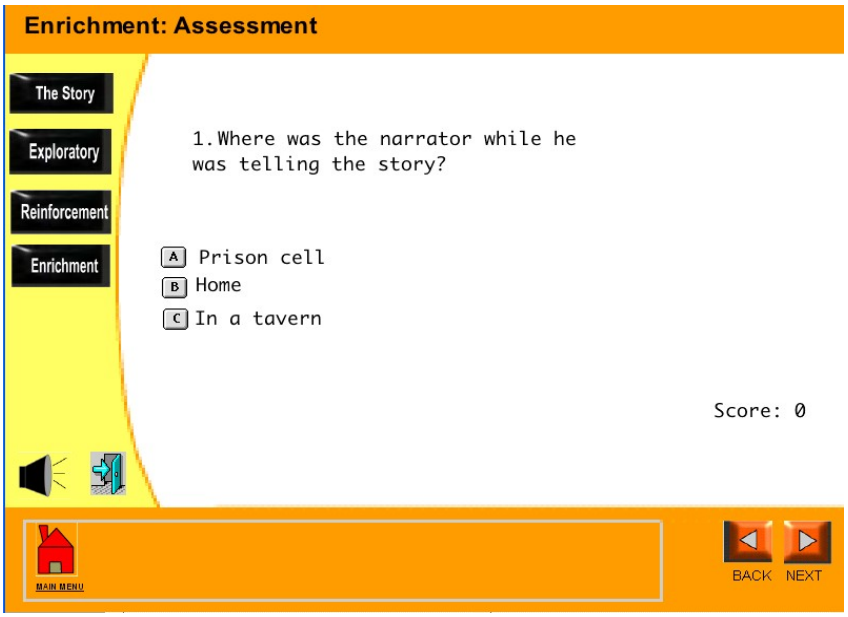


Figure 4.23 : Enrichment Module - the Assessment

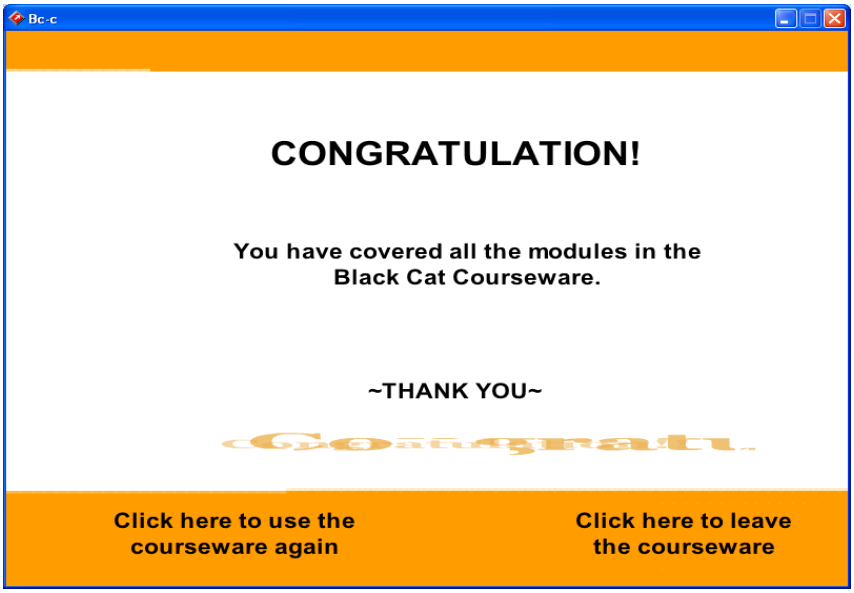


Figure 4.24 : Final page in the Enrichment module

Figure 4.25 : Confirmation page of leaving the courseware

4.2.5 **Summary of the Section**

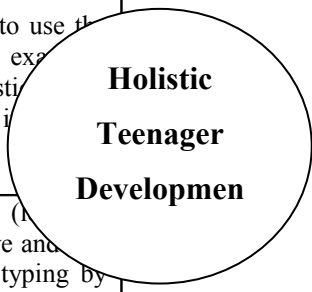
The objective to develop a multimedia courseware prototype for English Literature has been achieved as presented and discussed in sections 4.2.1 to 4.2.4. Four main modules of the Story, Exploratory, Reinforcement and Enrichment have been created in the prototype of BC-C. The modules are designed based on UTP English literature course syllabus for foundation study. This multimedia courseware for literature learning has adapted several techniques such as storytelling approach, educational theories, holistic teenager development and interactivity for effective multimedia courseware. These techniques have been applied indirectly in the BC-C prototype. Table 4.1 summarizes the various techniques that have been applied in BC-C prototype.

Table 4.1: The Techniques applied in the BC-C prototype

Technique	Type	Sub-module / Module	Explanation
Approach	Interactive Multimedia Storytelling	11 scenes / The Story module (e.g: Figures 4.8 and 4.9)	There is a narrator who tells the story according to every scene.
		Separated scene in Memorize Activities / Reinforcement module (e.g: Figure 4.14)	There is a storyteller for every memorizing scene.
		Selective 11 scenes / The Story module (e.g: Figures 4.8 and 4.9)	Interactive storytelling is applied when students are given the option to go to any wanted scene.

Educational Theory	Pedagogical	Introduction / The Story module (e.g: Figure 4.7)	The author's background is presented via explanation in an animated slide presentation accompanied by an audio explanation.
		Literature / Exploratory module (e.g: Figures 4.19, 4.20 and 4.21)	The literature elements are presented via explanation in of the form of animated slide presentation.
	Behaviorism	Memorize Activities / Reinforcement module (e.g: Figures 4.12, 4.13 and 4.14)	Reinforcement and Evaporation aspects where students need to repeat or erase the reaction while answering the memorize activities (as explained in Table 2.2). The process can repeated until students are satisfied with their learning.
	Cognitivism	Montage Presentation (e.g: Figure 4.1)	A technique to capture the students' attention (Gagne theory).
		Learning Objectives / Introduction module (e.g: Figure 4.3)	A technique to present the learning objective (Gagne theory).
		Topic Map / Introduction module (e.g: Figure 4.4)	A technique to present the course contents (Gagne theory).
		The Story module (e.g: From Figure 4.7 until Figure 4.11)	Collecting data through listening, watching, touching and reading, then processing and memorizing the information. Then data can be recalled when needed to answer the questions in the modules.
		Reinforcement module (e.g: From Figure 4.12 until Figure 4.15)	
		Exploratory module (e.g: From Figure 4.16 until Figure 4.22)	
	Constructivism	Enrichment module (e.g: Figure 4.23)	A technique to examine how the students have related the learning materials with their lives, make a guess for what they believe in by answering the questions in the module.

Holistic Teenager Development	Affective	All modules	Technique to ask students to use th acceptability, reaction, exp organization and characteristi the learning (as depicted i 3.6).
	Psychomotor	11 scenes / The Story module (e.g: Figures 4.8 and 4.9)	The adjusting movements (the scenes through hand, eye and drag and drop the mouse, typing by using the hand and finger) and nonverbal communication (face expression while watching the movie).
		Separated scene in Memorize Activities / Reinforcement module (e.g: Figure 4.14)	
		Memorizing Activities / Reinforcement module (e.g: Figures 4.12, 4.13 and 4.14)	



<table>
<tr><td rowspan="7">Interactivity</td><td>Mouse click</td><td>All modules</td><td rowspan="7">Mouse click is an Interactive feature that allows students to control their learning using the courseware.

Besides, the interactivity aspect provides the opportunity to transform the information, give or get feedback between the courseware and students.</td></tr>
<tr><td>Drag and drop</td><td>Memorizing Activities for scenes 4, 5, 6, and 7 / Reinforcement module

(e.g: Figures 4.12 and 4.13)</td></tr>
<tr><td rowspan="2">Typing</td><td>Memorizing Activities for scenes 8, 9, 10, and 11 / Reinforcement module

(e.g: Figure 4.14)</td></tr>
<tr><td>Literature Application / Exploratory module

(e.g: Figure 4.22)</td></tr>
<tr><td>Up and down the mouse</td><td>Vocabulary Application / Exploratory module

(e.g: Figure 4.18)</td></tr>
<tr><td>Text link</td><td>Memorizing Activities / Reinforcement module

(e.g: Figures 4.12, 4.13 and 4.14)</td></tr>
<tr><td>Navigation</td><td>All modules</td></tr>
</table>

4.3 EFFECTIVENESS EVALUATION ON BC-C

As mentioned in section 1.6, an evaluation on the BC-C prototype must be conducted to determine its effectiveness towards enhancing students' understanding of the Black Cat story. The evaluation was done in a Quasi experiment by comparing the performance of students from two groups; one using the BC-C and the other using the traditional method of teaching and learning. The evaluation on the effectiveness aimed to answer the following questions:

- Is the multimedia Black Cat courseware, using the storytelling approach, able to improve students' comprehension of the Black Cat literature compared to the conventional teaching method?
- Has the multimedia Black Cat courseware, using the storytelling approach, been effective to students in literature learning?

As discussed in section 3.4.1, the Quasi experiment has been designed to include pre-test and post-test on the selected samples, which consist of a total of 30 students each from ME and PE programs. There were 16 female and 14 male students in the control group while the experiment group consists of 10 female and 20 male students. The groups according to gender and program classification are summarized in Table 4.2.

Table 4.2: Sample of Students according to program and gender classification

	Number of students				Total
Program	ME		PE		
Gender	Male	Female	Male	Female	
Control Group (X_1)	8	7	6	9	30
Experiment Group (X_2)	9	6	11	4	30
Total no. of students	30		30		60

4.3.1 Pre-test and Post-test Analysis for Effectiveness Evaluation on BC-C

The pre-test was conducted prior to the treatment class to obtain a baseline performance of students for comparison with results from the post-test. The comparison will indicate the effectiveness of the BC-C in terms of improved performance. Results of both tests for X_1 and X_2 groups are presented in Tables 4.3 and 4.4.

Table 4.3: Control Group X_1: The result of Pre-test and Post-test

Student	Pre-test Mark (%)	Post-test Mark (%)	Incremental (%)
C1	44.44	72.22	27.78
C2	61.11	72.22	11.11
C3	55.56	72.22	16.67
C4	27.78	66.67	38.89
C5	33.33	50.00	16.67
C6	33.33	38.89	5.56
C7	16.67	27.78	11.11
C8	22.22	27.78	5.56
C9	44.44	72.22	27.78
C10	16.67	72.22	55.56
C11	61.11	72.22	11.11
C12	27.78	55.56	27.78
C13	44.44	55.56	11.11
C14	33.33	66.67	33.33
C15	66.67	66.67	0
C16	33.33	72.22	38.89
C17	61.11	72.22	11.11
C18	66.67	72.22	5.56
C19	61.11	66.67	5.56
C20	38.89	72.22	33.33
C21	33.33	66.67	33.33
C22	33.33	66.67	33.33
C23	38.89	55.56	16.67
C24	66.67	72.22	5.56
C25	44.44	61.11	16.67
C26	61.11	66.67	5.56
C27	38.89	61.11	22.22
C28	27.78	27.78	0
C29	50.00	55.56	5.56
C30	44.44	72.22	27.78

Average	42.96	61.67	18.70

From Table 4.3, the lowest mark in pre-test was 16.67% and the lowest mark in post-test was 27.78% while the highest marks in pre-test and post-test were 66.67% and 72.22%.

Table 4.4: Experiment Group X_2: The result of Pre-test and Post-test

Student	**Pre-test Mark (%)**	**Post-test Mark (%)**	**Incremental (%)**
E1	61.11	72.22	11.11
E2	22.22	77.78	55.56
E3	61.11	66.67	5.56
E4	55.56	77.78	22.22
E5	55.56	94.44	38.89
E6	27.78	77.78	50.00
E7	50.00	83.33	33.33
E8	33.33	94.44	61.11
E9	50.00	83.33	33.33
E10	33.33	83.33	50.00
E11	44.44	88.89	44.44
E12	44.44	83.33	38.89
E13	61.11	94.44	33.33
E14	61.11	94.44	33.33
E15	66.67	88.89	22.22
E16	38.89	50.00	11.11
E17	66.67	72.22	5.56
E18	50.00	94.44	44.44
E19	55.56	100	44.44
E20	61.11	66.67	5.56
E21	33.33	88.89	55.56
E22	38.89	61.11	22.22
E23	38.89	83.33	44.44
E24	61.11	72.22	11.11
E25	61.11	94.44	33.33
E26	61.11	100	38.89
E27	88.89	94.44	5.56
E28	38.89	61.11	22.22
E29	55.56	100	44.44
E30	16.67	38.89	22.22

Average	49.81	81.30	31.48

From Table 4.4, the lowest mark in pre-test was 16.67% and the lowest mark in post-test was 38.89%, while the highest mark in pre-test was 88.89% and two students obtained the highest mark of 100% in post-test.

There was no 0 mark for pre-test since they have been preliminarily exposed through their own understanding via reading the text book. Normally, during the foundation study, UTP students are basically required to study the Black Cat and the other four narratives at the early semester. So, there were no 0 mark for pre-test result. The mean of pre-test score for X_1 group is 42.96% and X_2 group is 49.81%.

As observed from the tables, most students in both groups X_1 and X_2 show improvements in their post-test scores except for two students in X_1 group who do not show any increase in the post-test score. Comparing the two groups, the group which had used the courseware (X_2) gained 81.3% mean score in the post-test compared to 61.67% by group X_1. The average score increment also differs between both groups where X_2 group obtained about 31.48% but X_1 group shows only 18.7% increase.

Table 4.5: Statistical Analysis of Post-test Marks for X_1 and X_2 Groups

Mark	X_1 Group		X_2 Group		Total	
	Freq.	Percent	Freq.	Percent	Frequency	Percent
0 - 39	4	13.33	1	3.33	5	8.33
40 - 49	0	0	0	0	0	0
50 - 59	5	16.67	1	3.33	6	10
60 - 69	9	30	4	13.33	13	21.67
70 - 79	12	40	6	20	18	30
80 - 100	0	0	18	60	18	30
Total	30	100.0	30	100.0	60	100.0

Table 4.5 presents the statistical analysis of the results in Tables 4.3 and 4.4. According to Table 4.5, 13.33% and 3.33% of students from the respective X_1 and X_2

groups obtained a score in the 0-39% range. None of them scored in the 40-49% range, while 16.67% and 3.33% students of both groups achieved the average score of 50-59%. About 30% of students in X_1 group achieved 60-69% score and only 13.33% for X_2 group, 40% from X1 and 20% from X2 obtained 70-79% score, and none in X_1 group obtained 80-100% while 60% of X_2 students obtained a score in that range. These results clearly demonstrate that the Black Cat courseware is able to improve the students' performance, which answers the question of *"Is the Multimedia Black Cat Courseware able to improve students' comprehension of the Black Cat literature compared to conventional teaching method?"*

4.3.2 Hypotheses Testing for Effectiveness Evaluation on BC-C

Apart from the pre-test and post-test evaluation, there are hypotheses testing to evaluate the effectiveness of the BC-C. According to Sekaran (2000), *"a hypothesis can be defined as a logical conjectured relationship between two or more variables expressed in the form of a testable statement"*. The variables are tested to examine whether the relationship that have been postulated does in fact, hold true (Sekaran 2000). However, in this study, there are five hypotheses as mentioned in section 3.4.4 i. These hypotheses have been made to find the difference between the variables and to prove the effectiveness of BC-C as "true". The hypotheses were tested through the Independent T-Test. The data analyses were performed using the SPSS version 11.5.

1) *Hypothesis 1 ($H_0$1) - There is no significant difference in pre-test scores between the Control and the Experimental Groups*

   The result from this hypothesis is given in Table 4.6. The mean score for pre-test of X_1 is 42.9623 while the mean score for X_2 is 49.815. However, the significant (2 tailed) value, $p = 0.088$ is greater than $\alpha = 0.05$. The result failed to reject the null hypothesis $H_0$1 and there is no significant difference in the pre-test scores

between the two groups. If there is no significant difference in the pre-test scores for both groups, then the BC-C prototype is effective.

Table 4.6: Independent T-Test for $H_0 1$

Variable	Mean	SD	t-value	Sig. (2 tailed)
Pre-test X_1	42.9623	15.158	-1.733	0.088
Pre-test X_2	49.815	15.474	-1.733	0.088

2) *Hypothesis 2 ($H_0 2$) - There is no significant difference in the post-test scores between the Control and the Experimental group.*

The result from this hypothesis is given in Table 4.7. The mean score for post-test of X_1 is 61.667 while the mean score for X_2 is 81.295. The mean score comparison shows that group X_2 has achieved more in the post-test. However, the significant (2 tailed) value, $p = 0.00$ is less than $\alpha = 0.05$, which implies that the $H_0 2$ should be rejected. This means that there is a significant difference in the post-test scores between the two groups; thus the BC-C prototype is effective.

Table 4.7: Independent T-Test for $H_0 2$

Variable	Mean	SD	t-value	Sig. (2 tailed)
Post-test X_1	61.667	14.095	-5.174	0.00
Post-test X_2	81.295	15.265	-5.174	0.00

3) *Hypothesis 3 ($H_0 3$) - There is no significant difference in students' increment scores between the group that uses the BC-C compared to the group subjected to conventional methods of learning.*

The result from this hypothesis is given in Table 4.8. The mean score for increment of X_1 is 18.705 while the mean score for increment of X_2 is 31.481. This comparison shows that group X_2 has performed better in learning the Black Cat using the courseware. For $H_0 3$ the significant (2 tailed) value, $p = 0.02$ is less than $\alpha = 0.05$, which implies that the $H_0 3$ should be rejected. This shows that there

is a significant difference in the increment scores between the two groups, which indicates that the BC-C prototype is effective.

Table 4.8: Independent T-Test for $H_0 3$

Variable	Mean	SD	t-value	Sig. (2 tailed)
Increment X_1	18.705	13.877	-3.221	0.02
Increment X_2	31.481	16.719	-3.221	0.02

As a conclusion for this section, the pre-test and post-test that have been conducted on the control (X_1) and experimental (X_2) groups have shown that; students in X_2 group have achieved more in the Black Cat lesson through the BC-C prototype compared to the students in X_1 group who were taught using conventional methods. This has proven that the use of courseware as a teaching aid has helped the students to perform better than learning through conventional methods. Thus, the BC-C prototype is effective for enhancing students' performance in literature.

In addition, five hypotheses analyses also have shown the effectiveness of the BC-C prototype. Thus, the hypothesis statement of 'BC-C is an effective prototype for students in learning the literature story' is TRUE. These results have answered the question of *"Has the multimedia Black Cat courseware using the storytelling approach been effective to students in literature learning?"* Thus it can be concluded that the BC-C is an effective teaching aid to help students in literature learning.

4.4 USABILITY EVALUATION ON BC-C

In section 3.4, usability has been divided into four key factors which are efficiency, satisfaction, learnability and the screen layout. In this study, the usability evaluation has been extended to include the evaluation on the effect of multimedia elements in the BC-C

prototype. This section of usability evaluation is to answer the following questions, which have been previously stated in section 1.4.

- Are the interactivity elements in BC-C able to help students during the literature learning?
- Are the multimedia elements in BC-C able to help students during the literature learning?
- Do the students agree with the usability elements in BC-C?

Hence, this section is divided into three sub-sections that address the above questions: the quantitative analysis to the multimedia elements in BC-C, the quantitative, and qualitative analyses on the usability in BC-C.

4.4.1 Quantitative analysis on multimedia elements in BC-C

Group X_2 has been assigned to using the BC-C courseware in their Black Cat lesson. During the lesson, students in group X_2 are required to evaluate the multimedia elements in the BC-C by answering a questionnaire. The evaluation was carried out in order to discover the effect of multimedia elements in BC-C towards students' learning. As mentioned in Table 2.1 and Hofsteter (1995) in section 2.2.1, multimedia elements can help students in learning through the growth of receptor and stimuli processes and good multimedia presentation will influence learning. In the evaluation on multimedia elements, students in group X_2 were required to respond to the questionnaires according to the Likert Scale: Strongly Agree is '5', Agree is '4', Neutral is '3', Disagree is '2' and Strongly Disagree is '1' .

Six multimedia elements were evaluated: text, graphic, audio, video, animation, interactivity and interfaces. The scoring for each multimedia element by every student in X_2 group is tabulated in Table 4.9.

Table 4.9: Results of Multimedia Elements Evaluation in BC-C

Student	Text	Graphics	Audio	Video	Animation	Interactivity	Interface	Mean
E1	3.00	3.75	3.00	4.00	3.67	4.50	4.00	3.70
E2	3.00	3.00	3.50	3.00	3.00	3.50	3.00	3.14
E3	3.50	3.50	2.50	5.00	4.00	5.00	4.00	3.93
E4	4.50	3.75	4.50	5.00	4.67	4.50	4.00	4.42
E5	5.00	5.00	3.00	5.00	5.00	5.00	5.00	4.71
E6	5.00	5.00	3.50	5.00	5.00	5.00	5.00	4.79
E7	4.25	4.25	4.00	5.00	5.00	4.50	4.00	4.43
E8	3.75	3.50	3.50	4.00	4.00	4.50	3.50	3.82
E9	3.50	3.50	3.00	4.00	3.33	3.50	4.00	3.55
E10	3.75	5.00	4.50	4.00	4.67	3.50	5.00	4.35
E11	3.25	2.50	4.00	5.00	3.00	4.00	2.50	3.46
E12	4.00	4.00	4.00	3.00	4.00	4.50	4.00	3.93
E13	4.00	4.00	4.50	5.00	4.00	4.50	4.00	4.29
E14	4.75	4.50	3.00	4.00	4.33	4.00	4.50	4.15
E15	4.00	4.50	4.50	5.00	4.00	4.00	4.50	4.36
E16	3.75	4.00	3.00	4.00	4.00	4.00	4.50	3.89
E17	3.75	3.00	3.50	3.00	3.33	4.00	3.00	3.37
E18	3.00	2.50	3.00	2.00	3.33	3.00	3.00	2.83
E19	3.25	1.50	3.00	5.00	2.67	3.50	1.50	2.92
E20	3.25	3.00	3.50	3.00	3.00	3.00	3.00	3.11
E21	3.50	3.67	3.00	4.00	3.33	4.00	4.00	3.64
E22	3.25	3.25	3.00	3.00	3.00	3.50	3.00	3.14
E23	3.00	2.00	2.50	3.00	2.00	3.00	2.00	2.50
E24	3.50	3.25	3.00	3.00	3.00	3.50	3.50	3.25
E25	2.75	2.50	2.00	3.00	2.67	3.00	3.00	2.70
E26	3.25	2.25	3.50	3.00	2.33	4.50	2.50	3.05
E27	3.00	3.25	2.50	3.00	3.67	3.50	3.00	3.13
E28	3.25	2.25	2.00	3.00	2.67	3.50	2.50	2.74
E29	3.75	3.50	3.50	3.00	3.33	4.00	3.00	3.44
E30	5.00	4.25	3.50	4.00	4.33	4.00	4.50	4.23
Mean	3.68	3.46	3.32	3.83	3.61	3.95	3.57	3.63

From Table 4.9, the mean score for every multimedia element was calculated and the results are: text application - 3.68, graphic - 3.46, audio - 3.32, video -3.83, animation - 3.61, interactivity - 3.95 and interface - 3.57. From these results, the interactivity element has the highest mean score, which indicates that most students agree that interactivity has been most useful in the learning. The interactivity features in the BC-C prototype courseware consist of drag and drop, click, typing, mouse movement and navigation. Thus, according to the evaluation results, the question of *"Are the interactivity elements in BC-C able to help students during the literature learning?"* has been answered.

The second highest mean score in the evaluation is the video element which has been created using the storytelling approach (3.83). For video element, students agreed on its accuracy and suitability in the courseware. The lowest mean score for multimedia element used in the courseware is the audio element. This element will be considered for future improvements by providing more attractive sound.

The average score for all of the multimedia elements in BC-C is 3.63, which is higher than the median score (2.50) of the courseware evaluation. This average score of 3.63 implies that the multimedia elements such as text, graphic, audio, video, animation, interactivity and interfaces in BC-C are sufficient to assist students during the Black Cat learning; at the same time it answers the question of *"Are the multimedia elements in BC-C able to help students during the literature learning?"* .

4.4.2 Quantitative analysis on usability elements in BC-C

As discussed in section 3.4, the usability evaluation for BC-C will be on the screen layout, satisfaction, learn-ability and the efficiency, which have been used to test the capability of the courseware in providing assistance to the students in learning the Black Cat literature. Besides, these four factors were chosen because they can potentially influence students' achievement. For instance during the learning process, if students are

satisfied with the courseware in terms of ease of navigation, and then the learning will become easier and more fun. The results for quantitative analysis of the four factors of usability are tabulated in Table 4.10.

Table 4.10: Results of Usability Evaluation on BC-C

Courseware Usability					
Student	Screen Layout	Satisfaction	Learnability	Efficiency	Average
E1	3.71	4.10	3.91	4.75	4.12
E2	3.14	4.25	4.18	4.00	3.89
E3	4.00	4.35	4.82	5.00	4.54
E4	4.14	4.85	4.27	5.00	4.57
E5	5.00	4.70	4.91	5.00	4.90
E6	4.86	5.00	4.91	5.00	4.94
E7	4.00	4.30	4.36	4.00	4.17
E8	4.00	3.90	4.36	4.50	4.19
E9	3.29	3.40	3.64	4.25	3.65
E10	4.00	4.15	4.36	4.25	4.19
E11	3.43	4.20	4.55	4.25	4.11
E12	3.86	4.00	4.33	4.25	4.11
E13	4.00	4.10	4.18	4.50	4.20
E14	3.29	4.50	4.36	4.00	4.04
E15	4.29	4.25	4.18	4.75	4.37
E16	3.71	3.95	3.91	4.00	3.89
E17	3.29	3.85	4.09	4.00	3.81
E18	3.29	3.50	3.91	3.75	3.61
E19	3.14	3.15	3.64	3.75	3.42
E20	2.86	3.35	3.18	3.00	3.10
E21	3.71	3.80	4.36	4.25	4.03
E22	3.29	3.75	4.09	4.00	3.78
E23	3.00	3.00	3.09	3.00	3.02
E24	3.14	3.35	3.82	3.50	3.45
E25	2.86	3.20	3.91	3.75	3.43
E26	2.86	4.05	4.00	4.25	3.79
E27	3.00	3.60	3.36	2.75	3.18
E28	3.00	3.95	3.82	4.75	3.88
E29	2.71	3.50	3.64	4.75	3.65
E30	4.71	4.05	4.45	4.75	4.49
Average	3.59	3.94	4.09	4.19	3.95

The mean value for the efficiency factor is 4.19 (see Table 4.10). Efficiency factor is measured based on the students' improvement after using the courseware. The result also shows that efficiency factor has the highest score. The second highest mean score is learnability, with a value of 4.09. Learnability is measured based on the ease of using the courseware and completing the task that have been designed in the courseware. The third is satisfaction with a mean score of 3.94 based on the students' satisfaction level while using the software, and finally is screen layout, which has a mean score of 3.59. Screen layout is about the courseware screen characters, screen organization, color scheme, interfaces design and so forth.

Nonetheless, the whole usability testing on the courseware obtains a mean value of 5.95, which is higher than the median score (2.50). This result shows that the students agreed with the tested usability elements in prototype of BC-C. Thus, the BC-C prototype has met the requirement of usability elements in literature learning.

4.4.3 Qualitative Analysis on Usability of BC-C

In section 3.4.3, the tools for qualitative analysis of the courseware usability involve the survey data, questionnaire, direct observation and the pre and post-tests. The close-ended questions in the questionnaire have been analyzed using the quantitative analysis as discussed in sections 4.4.1 and 4.4.2. Quantitative analysis on the pre-test and post-test data was also conducted to measure the courseware efficiency. However, the qualitative analysis is done using the Descriptive method by elaborating and explaining the data in the type of descriptive structure. Many researchers in qualitative research stated the qualitative analysis as an inductive process in which the themes and categories appear through analysis of data collected by the techniques such as interviews, observations and case studies (AECT 2001; William 2006).

Besides that, the direct observation in this study used the Thinking Aloud Protocol technique. Students' questions, opinion and interpretation have been written and

recorded manually as the qualitative data. The mistake and the actions that students made have been observed to be analyzed in terms of why students have done that kind of action in the courseware.

As mentioned in section 3.3.3, there were two ways of BC-C direct observations which are the pilot implementation to 5 students and the implementation to 30 students of Experimental group (X_2). In the direct observation for the pilot implementation, there are several questions from the five students regarding some problems that occurred during the process of downloading the video presentation file into the courseware. Some of the video files representing the scenes can not be reached since the files were corrupted. However, there were positive interpretations given by the 5 students for every kind of BC-C features such as the screen, color and the interfaces.

Similarly, the Thinking Aloud Protocol had been done to the X_2 group during the implementation. Based on the observation, it was showed that there was no problem occurred with regards to the process of downloading the video file since the corrupted video files have been fixed. There were also positive interpretations given by the 30 students for every kind of BC-C features. They seemed to be excited and attracted while using the BC-C in learning especially when watching the video of 2D cartoon. Besides, about 11 of 30 students stated their opinions in the open-ended question where they suggested for the BC-C upgrading in terms of navigation and games to make the courseware more interesting.

In addition to those two techniques described earlier, the interview sessions for students in control (X_1) and experiment (X_2) groups were also conducted after the Quasi Experimental execution. The interview was handled to know the students' opinion regarding the treatments that they have participated either by through the conventional method or via the multimedia courseware. According to Ratcliff (2009), the qualitative data must be categorized in terms of data which seem similar or related. Then, according to him over again, the data should be compared. Therefore, the interview data in this

study were analyzed descriptively into two categories: advantage and disadvantage. The result of descriptive analysis is showed in Table 4.11 as follows.

Table 4.11: Results on Descriptive Analysis

X_1 Group	X_2 Group
Advantage: • Learning and teaching using slide presentation, overhead projector (OHP), printed handout and the story text. • Students have many times to discuss with friends about the story. • Students learn through lecturer presentation. • Learning objectives achieved. Disadvantage: . • Students still need to read the story text before the class (according to the survey result about more than 2 hours is needed to complete reading the story). • More time is needed to complete the Black Cat syllabus (about 3 weeks). • Students have to experience the same teaching and learning method since the process is conducted in lecture hall. • Students need to prepare for the drama presentation, which requires extra time for practice and preparation.	Advantage: • Exposure to new learning process. • Experience of using Multimedia courseware in learning literature. • The use of multimedia package makes learning interesting. • Students enjoyed learning through the games application in the courseware. • Learning time is reduced. Students able to reduce the learning time to two hours compared to 5 hours (2 hours by own reading + 3 hours lecture class) by conventional method. • Learning objectives achieved. Disadvantage: • Limited time for discussion with friends but they can learn on their own from the courseware. • Comprehension Exercise in the courseware is limited. • 2D cartoon makes the courseware video less interesting unlike a 3D cartoon, which is able to create more excitement.

This section has elaborated the results of the usability evaluation on BC-C prototype. The evaluation has been made to examine the multimedia and usability elements in the

courseware. Through the statistically calculation on the questionnaire, the BC-C is agreeable to be as a multimedia courseware with suitable range of usability elements. So, that means the third objective of the study has been achieved via this evaluation process.

4.5 CONCLUSION

This chapter has presented the results for the Multimedia Black Cat Courseware (BC-C) prototype. It is divided into three sections to answer the five research questions. First section discussed the prototyping of BC-C. The courseware has been successfully developed according to the design and the adapting of approaches and theories. The courseware is evaluated for the effectiveness and usability. For the effectiveness evaluation in the second section, it was proven that the BC-C is effective for students in learning the literature story of the Black Cat. Additionally, the evaluation on usability in the third section also showed positive results when students agreed for the multimedia and usability elements in the BC-C. Besides, there is also the qualitative results on usability that were analyzed using the observation, Thinking Aloud Protocol and interview methods. Therefore, the evaluation has been analyzed via quantitative and qualitative analyses. The following chapter shall discuss on the conclusion for the whole research study.