CHAPTER 4

DATA SOURCES, COLLECTION AND EVALUATON

4.1 Introduction

This chapter organizes the collected data and the analyses according to the research questions. Results from the questionnaires, and the content analysis of the weblogs and forums are interpreted simultaneously for the flow of the ideas. The research questions to be answered in this chapter are as follows:

- What was the experience of the higher education learners in the using reflective learning technologies?

- Do the reflective learning technologies meet the criteria of a good design in the areas of instructional content, instructional design, and usability?

4.1.1 Methodology Summary

Multiple data collection methods such as interviews, questionnaires, and content analysis of the students' weblogs along with the online forums were applied for this study to help the researcher explore answers to the research questions. For both questions, first and foremost, the products which are the answers of the questioners (in this chapter), were evaluated using the designed rubric, and to validate and supplement findings from the web based learning systems, questionnaires, interviews, the students' weblogs and forums were used and analyzed.

The questionnaire data helped to obtain information regarding the postgraduate students of Faculty of Computer Science and Information Technology skills and background on reflection of learning technology. While, it also provided further

information on the construct of the research questions, i.e., learn ability and usability of the methods.

The data obtained from weblogs were analyzed to validate and supplement information on gained information regarding the process of design and their learning experience disclosed and discussed by the students in their weblogs. They also expressed their views on reflection learning. Lastly, the data gained from the forums illustrated the in-depth views of the students with respect to reflection learning technology.

4.2 Results Analysis

4.2.1 Questionnaire

The sample consisted of 35 master students educating in the Faculty of Computer Science and Information Technology, University Malaya. SPSS 16.0 (SPSS Inc., 2007, USA), was employed for statistical analysis of the data collected. As presented in Table 4.1 descriptive statistics showed that in this sample there were 20 males and 15 females. 18 of them varied in age from 26 to 30, while 13 of them aged under 26 and 4 were older than 30. The data indicated that 9 participants were majoring in Master of Software Engineering (MSE), 18 in Master of Management Information System (MIS), 5 in Master of Data Communication and Computer Networking (Network), 1 studying to obtain Master of Artificial Intelligent (MAI) and 2 majored in Master of Information Technology (MIT).

Table 4.1
The personal information based on sex, age and major

	Male			Female		
	<26	26-30	30<	<26	26-30	30<
MAI	0	0	1	0	0	0
MIS	5	5	0	3	3	0
MIT	0	1	0	1	0	0
MSE	1	1	0	2	3	0
Network	1	0	3	0	1	0

Analysis involved the identification and organization of the information collected into categories. Within some of these categories sub categories also emerged. These sub categories were learning style, using weblogs, e-portfolio, concept mapping, learning journals and multimedia techniques.

4.2.1.1 Background of Students in Using Reflection Learning Methods

In pre-assessment phase, students were asked about their learning style and previous experience on reflective learning. These experiences have been tabulated in Table 4.2. There are three different styles of learning by the students including, scientific, experiential, critical reflection. Among these three, experiential learning with the frequency of 18 was the most common style followed by critical reflection with 12 people using this method. Scientific learning was the least common method with only 6.3 % of the students using it.

Table 4.2
Students learning styles

	Frequency	Percent	Cumulative Percent
Scientific	2	6.3	6.3
Experiential	18	56.3	62.5
Critical Reflection	12	37.5	100.0
Total	32	100.0	

The adapted rubric to help evaluate the reflective learning was divided in to six sections which would measure the students' background on the following major criteria: learning style, e-portfolio, weblogs, learning journals, concept mapping and multimedia techniques. Each section contained a number of aspects which allowed the researcher assess the result in a more detailed prospect.

Result showed that all students had some experience in their academic programs. Visual representations of results of the evaluation are tabulated and presented using frequency and percentage. Findings related to each major criterion are described in sequence.

4.2.1.1.a Evaluation of Multimedia Techniques

An overall observation of Table 4.3 proves that, out of total number of valid products, i.e. nineteen (there are 14 data missing out of 33), the majority of the products have successfully achieved the Learnability aspect of multimedia techniques. It can be seen in this table that for all the questions no one was completely unsatisfied and for 3 out of 7 questions all agreed for minimum of good for the quality. For questions 3, 6 and 7 there were 3% of the students believing in fair quality while 6.1 % had the same idea for question 5. For all the questions the highest percentage of students voted for a very good quality except for question 2 and 4 which the highest quality percentage goes for good (27.3%) and excellent (24.2 %), respectively. This shows that students are in good agreement with the questions made.

Table 4.3
Evaluation of multimedia techniques

	Criteria	Quality - Frequency and Percentage				
		Poor	Fair	Good	Very Good	Excellent
1	Help to understand concepts qualitatively	0	0	2 (6.1%)	15(45.5%)	2(6.1%)
2	Help to understand the concepts' importance by the improvement in the importance scores.	0	0	9 (27.3%)	8 (24.2%)	2 (6.1%)
3	Help to in generating examples of when these concepts come into play	0	1 (3.0%)	6 (18.2%)	8 (24.2%)	4 (12.1%)
4	Help to understand the topic quickly	0	0	4 (12.1%)	7 (21.2%)	8 (24.2%)
5	I surge experiences when I use Multimedia Techniques.	0	2 (6.1%)	8 (24.2%)	7 (21.2%)	2 (6.1%)
6	When using Multimedia Techniques, I feel it brings me joy	0	1 (3.0%)	6 (18.2%)	9 (27.3%)	3 (9.1%)
7	Using Multimedia Techniques bring me the feelings of excitement	0	1 (3.0%)	6 (18.2%)	8 (24.2%)	4 (12.1%)

4.2.1.1.b   Evaluation of Learning Journals

In the next section of the rubric, criteria related to learning journals were evaluated which are presented in Table 4.4.

Table 4.4
Evaluation of learning journals

	Criteria	Quality - Frequency and Percentage				
		Poor	Fair	Good	Very Good	Excellent
1	helps me learn to think and write reflectively	1(2.9%)	1(2.9%)	12(34.3%)	11(31.4%)	3(8.6%)
2	Frequent journal writing improves my learning.	1(2.9%)	1(2.9%)	11(31.4%)	12(34.3%)	1(2.9%)
3	I can look good in front of my tutor when I write a qualitatively good reflective journal (RJ)	3(8.6%)	4(11.4%)	8(22.9%)	10(28.6%)	2(5.7%)
4	The RJ enables me to feedback to my tutors about my peers' performance.	3(8.6%)	8(22.9%)	5(14.3%)	9(25.7%)	2(5.7%)

Moreover, Table 4.4 illustrates result of evaluation of learning journals affected on students' understanding. The results show good acceptance or all the questions in general. For questions 3 and 4 nearly 8.6% did not agree with the question. 31.5 % of the students didn't agree that reflecting journals can make them feedback of their tutors about their peer performance. 31.4 % believed that frequent journal writing improves their learning good while 34.3 % agreed that to be very good. Data gained from the evaluation of learning journals show that most of the students have good experience on using learning journals.

4.2.1.1.c   Evaluation of Concept Mapping

The other construct in the research question deals with learning about the usability of the concept mapping. Table 4.5 demonstrates results of evaluation in terms of usability of the concept mapping. 60 % of the students agreed o strongly agreed that concept mapping helps them to memorize the key points. 28.6 % had no view while 11.5 % disagreed with this concept. 45.7 % of students agreed that concept mapping helps in getting to grips with the topic quickly and 8.6 % of people strongly agreed with that. Nearly half of the students had no view on this criterion. The highest agreement in total was with the fifth criteria mentioning the help of concept mapping in learning the topics.

Table 4.5
Evaluation of concept mapping

	Criteria	Quality - Frequency and Percentage				
		strongly disagree	disagree	No view	agree	Strongly agree
1	helps to memorize the key points	1(2.9%)	3(8.6%)	10(28.6%)	12(34.3%)	9(25.7%)
2	helps in getting to grips with the topic quickly	0	1(2.9%)	15(42.9%)	16(45.7%)	3(8.6%)
3	helps to understand the connections between the key points	0	3(8.6%)	13(37.1%)	13(37.1%)	6(17.1%)
4	helps by providing an overview of the topic	0	1(2.9%)	13(37.1%)	13(37.1%)	8(22.9%)
5	helps to learn the topic	2(5.7%)	0	10(28.6%)	16(45.7%)	7(20.0%)

4.2.1.1.d   Evaluation of E-portfolio

As illustrated in Table 4.6 there was great agreement with all the criteria varying in the range of 70.6 to 94.1% or criteria 2 and 4, respectively. There was no one answering for no view and a maximum of 29.4 % of disagreement was observed in criteria 2. In overall the results revealed that use of e-portfolio has a very good effect in improving the learning of the students.

Table 4.6
Evaluation of e-portfolio

	Criteria	Quality - Frequency and Percentage				
		strongly disagree	disagree	No view	agree	Strongly agree
1	helped me to record what I have learnt and done during the last weeks	2(5.9%)	2(5.9%)	0	27(79.4%)	3(8.8%)
2	I can show my best ability when using e-portfolio	0	10(29.4%)	0	21(61.8%)	3(8.8%)
3	Using e-portfolio provides a self-display opportunity	0	4(11.8%)	0	28(82.4%)	2(5.9%)
4	E-portfolio helps to make meaningful connections	0	2(5.9%)	0	26(76.5%)	6(17.6%)
5	By using e-portfolio, I do self-examination and it improves my ability.	1(2.9%)	6(17.6%)	0	22(64.7%)	5(14.7%)

4.2.1.1.e   Evaluation of Weblogs

By evaluating the data obtained from the questioner presented in Table 4.7 strong agreements can be noticed in all the 4 criteria. For encouragement and challenge all students agreed them to be good and above. Only 1 student making 2.9 % of the students believed that focus attention was poor. Playfulness had the least agreement among all other criteria with 22.9 % and 2 % of answering fair and poor respectively. For this criteria mostly agreed it to be good (48.6 %). The most acceptable criterion was found to be encouragement. The results confirmed the usefulness of weblogs in reflective learning.

Table 4.7
Evaluation of weblogs

	Criteria	Quality - Frequency and Percentage				
		Poor	**Fair**	**Good**	**Very Good**	**Excellent**
1	Encouragement	0	0	7(20.0%)	6(17.1%)	22(62.9%)
2	Challenge	0	0	6(17.1%)	15(42.9%)	14(40.0%)
3	Focus attention	1(2.9%)	0	6(17.1%)	11(31.4%)	16(45.7%)
4	playfulness	2(5.7%)	8(22.9%)	17(48.6%)	1(2.9%)	6(17.1%)

4.2.1.1.f   Evaluation of Reflection Learning Technology in the FSKTM

In the last part of the questionnaire the idea of the student on how the Faculty of Computer Science and Information Technology, observes the students was answered. As presented in Table 4.8 slightly less than half of the students share the same idea that the observation is based on the end of course evaluation. The same number of students (8) believed that curriculum projects and e-portfolio are the criteria for the observation. Self judgment with only 5.9 % was the least important criteria according to the students' answers to the questionnaire.

Table 4.8

Evaluation of reflective learning in Faculty of Computer Science and Information Technology (FSKTM)

	Frequency	Percent	Valid Percent	Cumulative Percent
End of course evaluation	15	44.1	45.5	45.5
Curriculum projects	8	23.5	24.2	69.7
E-portfolio	8	23.5	24.2	93.9
Self judgment	2	5.9	6.1	100.0
Total	33	97.1	100.0	

4.2.2 Content Analysis of Weblogs & Forums

In order to answer the first research question, 'Do the reflective learning technologies meet the criteria of usability?' the products were thoroughly evaluated and findings from the evaluation are discussed according to the constructs of usability. Apart from the rubric the literature related to these tools helped to validate the assessment.

To learn more about the usability multiple resources were studied and analyzed. Data attained from the mentioned instruments and resources- books, articles, weblogs and forums- were analyzed and triangulated to complement the validity of the findings for this study.

By discussing what is interesting, relevant, and applicable to others, it was observed that online forum entries were typically well thought-out and targeted. The authors of the online forum topics contributed thoughts and resources that were interesting, relevant, and applicable to others. Several participants commented on the online forum topics and on discussions in general:

S1: The forums work for me. They appeal to me. Even if it's not relevant to what I'm doing right now, just having that touch stone, about what other people are doing.

S1's statement shows the ability of the system in making contributions among people. She is not doing exactly the same work as what has been implemented, but the main thing is that she can get ideas from other people through this system.

S2: Knowing that we can go back to a discussion. This is not relevant now. I can't tell you about how many times I saw things, and thought I have got to remember that's there because I am going to need that some day because I know that that's important. I think that the forums definitely provide that. You know a quicker answer. We're all a common community. Even if I can't find it I can go back and ask the question again.

According to what S2 commented it is understood that the need of memorizing things as it was common in book learning style is no longer needed. She has a great understanding of the website to be a common community. The website allows people to ask the same question as much as they want without feeling shy. This is a benefit that this system has as comparing with a classroom in which students maybe shy to ask questions even once.

S3: Two things that connected were something that you put together for the community based on their interest in hearing from some new people,

and the seeded forum about story telling that had a link in it. I think Christopher posted the link that was quite a nice piece of information. I saw other things that were interesting, but they didn't connect with me with what I was doing right now so I sort of put them on the shelf and said okay well fine if I want to follow that up it's there but those were the two things that connected.

The idea coming from S3 it is understood that sharing information among people in the forum sounds to be exciting. Even though, some information uploaded by others may not be useful on spot, but they can be interesting issues which can either be interesting to know or can be useful in another situation or topic. This information can be saved and accessed whenever useful. This makes a connection between the users which is one of the main ideas of developing this system.

Responding when people post questions or interesting points. It was evident that participants were reading the online forum entries posted by participants. In some cases, lively threaded discussions ensued around a topic of interest. This is really obvious in what S4 commented.

S4: The forum topics have been great for sharing concerns and gathering people's thoughts and ideas on issues.

Sharing occurred when stories were shared in the online forums, in presentations, and during meetings. The types of sharing that occurred include the following:

- Responding to questions or requests for information in the online forums by sharing applicable experiences

- Checking for validation on points of view in online forums

- Posting independent blog posts based on independent thinking

- Sharing expertise in presentation or by sharing a story

- Sharing a story to establish a common point of reference

- Asking probing question to seek validation or further understanding in online and live conversations

- Sharing perspective in focus group meetings

- Sharing experiences and generating ideas in live conversations

S5: *To use some of the tools with a group of online students may depend on whether all members of the group have access to the technology, eg, Skype is a useful tool for online discussions but if a class member isn't able to access it, it couldn't be a compulsory part of the course - although it could be optional.*

I can see that a wiki is a useful tool especially for online group work but it would probably take some time for a group of students to feel comfortable using a wiki - there may have to be quite a lot of direction at first.

The use of Blogs could make a course more attractive for younger students and it could be used for social purposes or for discussions about a particular topic.

The nice comment from S5 suggests the use of different online communication systems such as Skype or wiki. But she admits that these tools may not be applicable

always or some people may take time to get used to them. By using the blogs all the equipments needed can be provided in one package which makes the use of them easier and more uniform for all the learners.

S6 has discussed on the purposes and aims of blog entries in details. These aims highlight the contributing ideas, improving writing and discussions. It also can help the students to take risks of sharing the ideas even if they are not really valid. The classified aims and purposes offered by S6 are brought in the following paragraph.

S6: Blog entries you write can have a number of purposes and aims. They can be:

- *Your thoughts about what you are learning, what you understand and don't understand, how it extends or contradicts what you already know and understood, what questions still need to be answered, what needs further clarification or what still needs to be demonstrated for you to be convinced.*

- *Making connections to your learning by exploring what others have written about it on the web*

- *Contributing your ideas on how particular modules could be restructured or modified in some way to have you excited about and believing that you will actually use the information you have acquired and it is relevant to your life. What's relevant to you and what and why do you need or want to learn?*

- *Strive to improve your writing and take risks with expressing your ideas and bouncing those ideas off of a much larger audience*

- *Developing a distinct voice for communicating and discussing ideas - your ideas, your thoughts, your take on things, your enthusiasms and interests*

- *Expressing your opinion but backing it up with well thought out reasons*

- *Learning to collaborate in the development of ideas by expressing ideas, sharing information and resources, commenting on other's entries and responding to comments made on your blog entries.*

- *Asking questions and raising issues that will make a reader think and want to comment.*

S6 in another comment is highlighting the effectiveness of a chat window in the blog. According to him the chat window can be a really good way for sharing ideas and brainstorming besides the ability of the instructor to monitor what the students are more interested in or in which parts more concentration and effort is required. The other benefit he brings up is that he didn't feel these discussions boring. The students can easily communicate and learn and discuss in a friendly environment. This friendly discussion can also help the toleration of serious discussions as well.

S6: I was surprised how useful the chat window was for sharing ideas, making comments and asking questions. There was some real brainstorming going on. It contributed significantly to the value of the presentations and is an aspect of on-line conference sessions that would be difficulty to replicate in a 'real' conference (unless everyone had a laptop and used a web service like Cover It Live - now there's a thought). The chat really enhanced the sessions, made it easy for the presenter to see what was interesting the audience and helped give a

focus to the audio and text discussion at the end and the summing up. It also was very sociable and entertaining! At times it was a bit like a group of naughty school kids chattering, swapping jokes, and winding up each other and the presenter. Personally I felt the sense of community grow throughout the 3 days and felt this made a significant contribution to ambience of the serious discussion too.

S7: Blogging allows me to look at things differently. I should admit that when I met my friend's blogs, I discover many new things and different perspectives. This really enriches my learning experience hence I suppose this is what we call discovery and co-operative collaborative learning.

This comment brings up the personal idea of the student on how blogs can be effective for him. He believes that using this method improves his learning.

By evaluating the comments it is found that all the people who have commented on this issue recognize blogs to be useful. The communication and discussion besides the learning improves. Sharing ideas become much easier and accessible for all the users. In general, the use of blogs in teaching should be more emphasized.

4.3 Accomplishment of Research Objectives

This research project planned to address 3 objectives. The first objective was to utilize technology to facilitate reflective learning. By developing a website based on internet technology a reflective learning system was designed. According to the results

obtained from the questionnaire effectiveness of this system to reach the objective was revealed.

By developing a questionnaire, investigation on the awareness of reflective learning among postgraduate students in University Malaya (UM) was carried out. This stage could fully cover the second objective defined for this research project.

The website designed in this project with the abilities of uploading different types of files and easy access for both the tutor and the students developed a suitable reflective learning environment. This method not only suits the tutorial programs of Computer Science but also can be used in different majors as well with a simple training. This ability fulfills the requirements of the 3rd objective of the project.

4.4 Conclusion

This chapter concentrated on the results obtained from the questionnaire distributed among the students using the website designed for the reflective learning. The results were divided into different methods including multimedia techniques, learning journals, e-portfolio, concept mapping and weblog. Although all the methods were found to be effective, the results showed better agreement with concept mapping and weblogs as compared to the other methods. In an overall view, use of these methods can improve the students in learning and performing themselves in different educational programmes. A website was designed to develop the reflective learning system for the students in the Faculty of Computer Science and Information Technology, University of Malaya. The results also indicated that nearly half of the students believe that observation of the students' activities is more based on the end course evaluation. Based

on the results obtained from the analysis of these data a framework for reflective

learning was developed which has been discussed in details in the following chapter.