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Evaluation of an Open-Source Web-Based Learning Environment (Future Learning Environment - Fle3)

MSc in Interactive Multimedia (IMM)
Dissertation (2001/2002)
by

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Abstract

The title of this dissertation: 'An evaluation of an Open-Source Web-Based Learning Environment (Fle3)- Future Learning Environment', describes a study which explored students' responses and reactions to web-based learning environment in supporting the student-centred and collaborative approach. The Future Learning Environment is design to produce an Internet-accessible applications to support learning and thinking, producing web-based multimedia learning material concerned with New Media, and developing the publishing process of network-based multimedia learning material. The study was using the latest version of Fle3 which is more specific as a server software for supporting computer supported collaborative learning (CSCL). The study was undertaken among undergraduate students in Sultan Idris, University of Education, Malaysia (UPSI) and postgraduate students at Department of Computing and Electrical Engineering (CEE), Heriot Watt University. The finding revealed that while the majority of the students saw valued to be gained from learning in a student-centred and collaborative setting, many expressed a preference for learning in more conventional teacher-directed forms. The study also sought to explore the potential of the environment to develop problem-solving skills and to determine factors, which impeded students' success and achievement.

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CHAPTER 1 : Introduction to Virtual Learning Environment and Collaborative Learning

1.0 Introduction

Virtual Learning Environment application are commonly used in the world as part of the media that help to conduct courses material, assessment, tracking student performance and etc, and widely used in the 'Online learning environment'. Virtual learning environments (VLEs) are a relatively new development in the provision of online learning. Initially, VLEs were developed for distance learning, providing alternatives to traditional teaching situations such as seminars and tutorials by using email and other communication software to support student-tutor and student-student interaction, and providing access to course materials over the Web. Practitioners soon realised that these tools could also support a traditional, campus-based course and not only are specifically used for the online learning environment. A bigger number of students in a particular courses and limited lecture hall or classroom in university campus, were one of the reasons that contribute to the used of VLE in campus-based learning environment. However, there are lots types of VLE that been offer by many difference companies or developed by the universities and each of them offer variety of tools that suit different needs. As a user, we need to look at each area that really suits the environment where they are going to be used it.

1.1 What is Virtual Learning Environment?

The Virtual Learning Environment term was described as software, which resides on a server and integrated solution to managing online learning, providing a delivery mechanism, student tracking, assessment and access to resources [1]. Where by the server software either provided by the vendor or home based development are either sits behind an existing web server or includes its own web server in the package. At a minimum level the server are usually capable of creating and serving up dynamic html pages, will allow messages to be posted up to conferences or a web notice-board and will maintain a database of information relating to users, groups, learning materials and course structure.

Types of Virtual Learning Environment:

- Material-centred
- Learner-centred
- Collaboration-centred

1.1.1 Material-centred VLEs

In this type of VLE, all the learning materials are intends to put and place at the centre of the system. There are sets of tools provided as the learner progression, which can be used through out the learning material. The delivery, transmission and accessibility of the learning material were been developed by this system centrally.

[1] ***By Colin Milligan***, Delivering Staff and Professional Development Using Virtual Learning Environments, Institute for Computer Based Learning, Heriot-Watt University.

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Examples of such commercial packages include:

- WebCT (http://www.webct.com/)
- TopClass (http://www.wbtsystems.com)
- Lotus Learning Space (http://www.lotus.com/)

1.1.2 Learner-centred VLEs

This type of VLE is using a learner centred approach. The set of tools provided in this VLE, allow the learner to construct around themselves in an environment for effective learning, by collecting together and constructing a set of resources relevant to the way in which they have understood the learning material.

Examples of this type of VLE include

- COSE (http://cose-www.staffs.ac.uk/)
- Learning Landscapes (http://toomol.bangor.ac.uk/ll/)

1.1.3 Collaboration-centred VLEs

An extension of this learner centred model can be found in environments, which support collaborative learning. Collaboration may be synchronous (through the use of video conferencing, audio communication or white boards) or it may be asynchronous (through the provision of shared workspaces).

An example of this type of VLE is CoMentor (http://comentor.hud.ac.uk/).

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1.2 Collaborative Learning Approach

Collaborative Learning encourages active student participation in the learning process. It encompasses a set of approaches to education, sometimes also called co-operative learning or small group learning. It creates an environment "that involves students in doing things and thinking about the things they are doing",[2] and reaches students who otherwise might not be engaged.

A lot of discussions on beneficial of collaborative learning have been done and they argue that it promotes active learning, critical thinking, conceptual understanding, long-term retention of material and high levels of student satisfaction. All-collaborative learning experiences is a distinctive set of assumptions about what teaching is, what learning is, and what the nature of knowledge is which knowledge is created through interaction, not transferred from teacher to student.

In computer supported collaborative learning, the traditional role of the teacher as information deliverer is changed to a role of facilitator and co-learner. What this means is it can facilitate collaboration between students, encouraging them to monitor their understanding (without directly giving them information), communicating with them and carefully examining knowledge produced by the students. This can help students to understand the information as part of learning experience.

[2] ***Bonwell, C., & Eison,*** J. (1991). Active learning: Creating excitement in the classroom (ASHE-ERIC Higher Education Report No. 1). Washington, DC: George Washington University, p. 2.

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1.2.1. Effectiveness in collaborative learning approach[3]

1.2.1.1.Group Composition :

The first factor that contributes to the efficiency of collaborative learning is the composition of the group. This can be defined by several variables such as the age and levels of participants, the size of the group, the difference between group members and etc. It was agree that a small groups seems to function more well than large groups. In the large group situation some members would intend to be 'asleep member' or excluded from interesting interactions.[4]

It is easier to maintain and keep track the student performance in smaller group because the tutor or teachers can spend more times concentrate on them. Small group teaching is considered as a situation in which students interact interactively with each other and engage sets of learning goals.[5] Member of the groups can work together to attain shared goals, although individual learning goals will also be important.

1.2.1.2.Task features

Collaboration during group learning may be face-to-face or distant, synchronous or asynchronous and may be discussion-based or focused around shared external tasks or material. In the collaborative learning, there will always be tasks involved. Some tasks are inherently distributed and lead group members to work on their own, independently from each other. Interaction occurs when assembling partial results, but not during each individual's reasoning process. Without interaction, there will be a problem in having the task succeed and done. Some tasks are so straightforward that they do not leave any opportunity for disagreement or misunderstanding. Some tasks do not involve any planning and hence create no need for mutual regulation. Some tasks cannot be shared, because they rely on processes (e.g. perception) which are not open to introspection or on skills (e.g. motor skills) that leave no time for interaction.

When in the distance learning environment, the teachers would want to take these features into account. By using collaborative learning in giving tasks it will get its optimal efficiency. Another solution is to modify the task to make them more suited for collaboration. For instance, the 'jigsaw' method consists of providing group members with partial data. This method artificially turns a monolithic problem into a task, which requires collaboration.

Task features also include the environment in which the task has to be performed. This is especially important in computer-based tasks. The software features may modify interactions among learners. For instance, if a computer-based task provides the learner immediately with a feedback on their actions, it may prevent them to discuss the consequences of their action

---

[3] **Dillenbourg, P. & Schneider, D.** Collaborative learning and the Internet, TECFA (unit of Educational Technology), School of Psychology and Education Sciences, University of Geneva, Switzerland.

[4] **Salomon, G. & Globerson, T.** (1989), When teams do not function the way they ought to. International journal of Educational research., 13 (1), 89-100.
Mulryan, C.M.(1992), Student passivity during co-operative small group in mathematics. Journal of Educational Research., 85 (5), pp. 261-273.

[5] **N.Hammond & C. Bennet,** (2002), ICT to support group-based leaning. Blackwell Science Ltd, journal of Computer Assisted learning,, 18 (1), pp 55-63.

1.2.1.3.Communication media

Whatever task and group members have been selected, the collaboration may not work because the medium used for communication is not adequate. Basically, most of current widely available Internet-based tools use text-based communication, synchronous or asynchronous, with mostly fixed graphics and images. Voice and video interaction or voice and video mails are of course available, but the overload of standard networks and the limits of currently available hardware have postponed their larger use in current distance education.

The cost of interaction being higher with text, the group members may reduce the number of disambiguating sub-dialogues used in social grounding. At the opposite, in asynchronous text messages, they have more time to build sentences, which are less ambiguous. Without video link, members' also loose facial expressions, which are useful to monitor the partner's understanding. Even with video images, they may see their partner but ignore where the partner looks, something which is important for understanding what she refers to. Some video system support eye contact with appears to be related to meta-cognitive aspects.

1.3 Collaborative Knowledge Building

The process of knowledge building in collaborative learning, first explored by Harasim (1989), involves mutual exploration of issues, mutual examination of arguments, agreements and disagreements, mutual questioning of positions, dynamic interaction and weaving of ideas (Harasim 1989; Kaye 1992; Sorensen 1997). Mason (1993) finds this view to be in agreement with the communicative potential of the online environment, although she also points out the weaknesses of the online dialogue being that it quite often never reaches synthesis or closure (Mason 1993).

In the principles of collaborative learning, the process of learning is viewed to be a fundamentally social phenomenon, regardless of the varying theoretical emphasis in each single approach (Dillenbourg et al. 1995). Several other learning theories confirm this view, e.g. Etienne Wenger in his latest book, "Communities of Practice" (Wenger 2000).

1.3.1 Collaborative Knowledge-Building Communities

The idea of developing this communities it was believed that schools should be restructured as communities which knowledge is constructed as a collective goal (Scarmadia & Bereiter, 1994). The main focus of the activities within these environments is on developing the collective knowledge base of the community and improving the problem-solving expertise of the learners. Bowen et. al, (1992) characterised knowledge-building communities with four traits ;[6]

- A focus on knowledge and the advancement of knowledge rather than tasks and projects.
- A focus on problem solving rather than performance of routines.

[6] **Nancy J. Gilbert & Marcy P. Driscoll,** (2002), Collaborative Knowledge Building: A Case Study. Educational Technology Research & Development (ETR&D),Vol.50,No.1,pp.59-79.

- Dynamic adaptation in which advances made by members of the learning community change the knowledge conditions requiring other members to readapt, resulting in continual progress.
- Intellectual collaboration as members pool intellectual resources, making it possible for communities to solve larger problems than can individuals or small groups.

1.3.2 Criteria of Collaborative Knowledge Building in Web-Based Learning [7]

In view of the generally recognised difficulties in fostering online student dialogue that converges (e.g., synthesising) rather than diverges (noted by Mason), Stahl (1999) suggests a set of factors that characterise quality in the KB process:

- *Brainstorming* is the introducing of new ideas that relate to the topic or task and offer a perspective not previously considered;
- *Articulating* includes explaining complex or difficult concepts;
- *Reacting* provides an alternative or amplified perspective on a concept previously introduced by a student;
- *Organising* refers to assembling existing thoughts or perspectives in such a way that a new perspective emerges;
- *Analysis* includes comparing or contrasting previously articulated views or puts new understanding on existing data;
- *Generalisation* takes comments or data already presented and extracts new information or knowledge that applies to a broader set of conditions.
- Implementing these learning quality criteria of collaborative KB requires a corresponding meta-functional pedagogy or instruction that facilitates and motivates such collaborative dialogue.

There are some increasing attentions which are concern to how computers can be used to support and facilitate learners as they interact and solve problems (Pea, 1994). This concerns are related to the design of tools that contribute to collective activity, and is characterised by authentic, collaborative work facilitates through the use of networked computers. The use of this networked computers provide alternatives to traditional teaching and learning as we move from single classroom to the concept of knowledge-building community of learners.

[7] **Elsebeth K. Sorensen & Eugene S. Takle** , Collaborative Knowledge Building in Web-based Learning: Assessing the Quality of Dialogue. IITAP (International Institute of Theoretical and Applied Physics.)

1.4 Dialogue and Learning[8]

Laurillard (1993) analyses different approaches to teaching and learning including intelligent tutoring systems, apprenticeship learning and situated cognition. She points out that these approaches all tend to emphasise the ability to abstract from a new concrete examples to novel situation and agrees that this is an appropriate approach for certain domains:

"Learning in naturalistic contexts synergistic with the context; the learning outcome is an aspect of the situation, an aspect of the relation between learner, activity and environment, so it is learning about the world and how it works."

(Laurillard, 1993,p22)

However she goes on to say that learning in many educational contexts is crucially different, particularly in higher education. It requires learning about descriptions of the world, knowledge derived from someone else's experience and from understanding someone else's arguments. Every academic discipline faces the challenge of encouraging learners to go "beyond the information given"- beyond their own experience. Education must be situated in the context of reflecting upon experience. The research reported here aims to understand exactly what is happening during this reflection, particularly through discussion and listening to discussion.

Dialogue is fundamental to education. It is, of course possible to learn without such discussion, but it is proposed that there are important aspects of learning, often called higher order thinking, which are only gained through this activity particularly by a novice. Through discussion the ability to use language as a tool of thought as the highest level of development (Piaget, 1952; van der Veer & Valsnier, 1991), will be develop and once it is developed, it will be the primary tool for acquiring new knowledge whether through speech with others, reading or private internal thought.

On the other hand, it seem that much of the learning which come through dialogue is being squeezed out the formal educational system particularly in higher education, often because of the growing emphasis or the use of educational technology to deliver content and activities. By exploiting the potential of the emerging networked communities, this component can be introduced and even expanded for those students who would not otherwise have had the opportunity at all, such as distance learners.

Having established the importance of dialogue as part of learning, a theoretical explanation of why it is crucial and what it contributes to the learning process, which cannot be easily squired in other ways, will be developed. Traditionally, logic was developed as theory of communication, specifically of argumentation, and this traditional view has much to offer as a conceptualisation of educational dialogue.

1.4.1 Why observing learning dialogue maybe beneficial

Why should observation ever better than actively participate? There are two distinctions in play- voyeurism versus participation and consumption versus construction. These two are not independent but neither are they identical. The voyeur as well as the participant may be actively engaged in constructions, checking them against those of the participants. The participant may be merely engaged in fact consumption.

[8] **J.Mckendree, K. Stenning, T.Mayes, J.lee & R.Cox , (1998),** Why Observing a dialogue may benefit learning, Journal of Computer Assisted Learning ,Vol : 14, Pg: 110-119

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It is suggested that in the struggler to understand a new topic, being able to 'play the voyeur' may be offering some important advantages. When speculating, there is a 'lower processing load' both emotional and cognitive. The student is not as emotionally caught up in trying to defend a position for struggle with a new idea publicly. There is less of a cognitive load when they concentrate on the content and process of what is being said. It allows a unique opportunity to reflect on the roles of the teachers and earner and to view each other from the others' perspective. In general, it allows focusing on the unfamiliar role of social derivation without the added stress of participating.

It is argued that situated learning is critical to unite learning with the real world in which the student must apply the knowledge. However, education involves more than applying knowledge to everyday situations. Educators are constantly striving to get students to take their knowledge beyond the current situation and to consider ideas, which they may never encounter during daily activities. It is also known to be possible to transfer learning to new situation. What needs to understood is how best to encourage this to happen.

Therefore, what is needed is to find better ways to help students easily move in and out of the new and different representations of the world at various levels of abstraction. The capture and reuse of particularly in interesting learning dialogues as a new learning resource for students is being investigated. Their ability to access these vicarious experiences can be used to help show them how derivation is done in an unfamiliar world as well as hearing the ' language in use'. They can see their peers and tutors modelling the process of interpretation and application; they can analyse and compare their own understanding to that of others. To see their peers struggling and benefiting from the struggle may help exhibit to them the social nature of the quest for understanding and demonstrate that they needn't view it, indeed shouldn't view it, as something they must conquer alone.

1.5 Student Centred Learning

1.5.1 Student Centred Learning (SCL) - working definition

"Student Centred Learning is an active and dynamic process through which students develop deep approaches as learners, taking responsibility for their own learning. It is an approach to teaching and learning which recognises the student as an individual and his/her personal development as important. The teacher - student relationship is characterised by collaboration, consultation and negotiation where students are seen as a learning resource and participants in a transparent process. The interaction quality between student and teacher is essential so that framework and objectives are agreed upon."

SCL is about students more actively participating in the learning process. A student centred learning environment will enable students to become more responsible for, and more fully involved in, their education. Their learning environment will be as stimulating as it is diverse in its accessibility and flexibility. In summary, it's about students becoming more active players in an academic environment where learning can take place anywhere, at any time, in many forms and by many means.

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Table 1: Concepts of SCL

Teaching methods	Students as participants
Active teaching methods,	Students identify learning needs
Active learning, student activity	Identify own strengths and weaknesses (self-assessment)
Learning by doing Research based learning	Students' needs in focus Self-directed
Problem based - not didactic	Feedback
Varied teaching methods flexibility	Students responsibility for shaping and completing task
Computer Assisted Learning (CAL)	Reflection on learning process
Group work	Development of skills

The working definition of student centred learning points at interactivity, activity and participation as well as more problems based and less didactic teaching. A difference from the working definition is that the working definition brings forward the relationship between teacher and student, which was never mentioned, in the departmental definitions.

A very detailed definition can, however, become an obstacle when trying to find good examples of SCL; if something does not exactly fit into the definition, it might be put aside. A literature review of concepts that can be relevant to reach such a definition will therefore be helpful. If academic disciplines are to be accessible to students with diverse learning styles, efforts must be made to provide varied methods of instruction and evaluation. Smith and Kolb (1986) have provided examples of preferred learning situations for those with strengths in the different learning styles:

- **Concrete experience:**
  Value methods such as games, role-plays, peer discussion and feedback and personalised counselling.
- **Reflective observation:**
  Value lectures, observing, seeing different perspectives and tests of their knowledge.
- **Abstract conceptualisation :**
  Value theory readings, studying alone, well-organised presentations of ideas.
- **Active experimentation:**
  Value opportunities to practice with feedback, small group discussions, and individualised learning activities.

1.5.2 Why student centred learning?

One important issue of why the university should move towards a more student centred learning approach that universities should "give high priority to developing learning and teaching strategies which focus on the promotion of students' learning". This includes a focus on educational philosophy, provision of learning and teaching and learning methods. The interviews provided material for the first

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and last of these three, however the provision of learning is left out, since mainly full-time courses were focused on.

1.5.3 Learning and Teaching philosophy

The learning and teaching philosophy expressed in the interviews is rather diverse, like the different apprehensions of SCL expressed earlier in this report. However, there seem to be a connection between learning philosophy and method of teaching. Teachers, who are focused on student centred learning, tend to be concerned about the experiential moment of learning. It can be expressed in terms of 'learning by doing', learning to learn, applying knowledge, giving feedback. It is also about an attitude towards the students, where the students are seen as 'colleagues' and participants and where the dialogue between teacher and student is important.

Many of these teachers also have an 'open door policy'. Students are invited to come and talk and ask questions when they need to. This was seen to be important because it gives the teacher a chance to meet the students as individuals and in that way it decreases the distance between teacher and students that often appear in lectures with very big classes. Another opinion that was expressed is that it is important that students can see that the teachers are not against them, but with them. One way of showing this is to show trust in the students, in their abilities, in that they will not cheat and to treat them as grown ups. If the teacher relies on the students, they also have to rely on each other, and in that way the individualistic thinking that has been complained about may decrease.

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Some of the suggestion to undertaking an SCL approach:

- Deep learning instead of surface learning
- By making students aware of their learning they become more effective learners
- Interactivity make people talk and get to know each other so that there is less misunderstanding.
- Interactivity can make people get to know each other. Even if the teacher might not be able to keep track of each student, the students might be able to keep track of each other, so if someone has a problem, there is an 'infrastructure' to receive the signals and help that person.
- Some methods like self and peer assessment can make students get more aware of what they are actually good at, and in that way improve their self confidence.
- Awareness of how the learning makes us direct our energy to the right things.

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1.6 Educational Modelling Language

1.6.1 Introduction EML

The work of Educational Modelling Language (EML) has been carried out by the Open University of the Netherlands (OUNL). The educational modelling comes from an R&D project funded by the Dutch national government through their structural funds for universities. The R&D work on learning technologies is paid from these funds with the objective of innovating education through the use of ICT. OUNL research is academic and independent of any vendor or other commercial stakeholder. Besides the work on EML, the OUNL's research and development activities in learning technologies include; competency based learning, new models of assessment (e.g. portfolio's), printing on demand, and others. The main outputs are specifications, prototypes and publications.

1.6.2 Brief explanation on EML

EML is the first system to achieve no comprehensive notational system exists that allows one to codify units of study (e.g. courses, course components and study programmes), in an integral fashion. EML describes not just the content of a unit of study (texts, tasks, tests, and assignments) but also the roles, relations, interactions and activities of students and teachers. The major EML implementation is in XML (eXtensible Mark-up Language), an internationally accepted meta-language for the structured description of documents and data.

Various kinds of specifications with which educational content may be codified are under development. Examples are initiatives taken by IMS, IEEE-LTSC, Dublin Core and ADL-SCORM. EML does not make these initiatives superfluous, nor does it run contrary to their aims. If anything, it takes many of the ideas voiced by them one step further by developing more comprehensive notational system.

EML allows variety modelling of pedagogies for education. One may use EML to model for instance a competence-based pedagogy, problem based learning, performance support, self study packages or even traditional face-to-face teaching. When using EML there is no need to worry about the delivery mode during content development. EML guarantees that investments in content will last for a long time; because of the uniformity of notation that EML brings, an instrument for comparative research on the effectiveness of educational structures emerges. Shortly, EML ensures the interoperability, re-usability, and compatibility of learning materials in the future.

1.6.3 Real Practice

From the time the OUNL started the design of EML as the solution to educational problems (e.g. inter-operability and re-usability), the R&D programme on Learning Technologies has been engaged in repeated testing and validation of the concepts behind EML. During this R&D phase of the EML project, companies and schools have been actively involved in pilot trials. Then after two years of internal development within the OUNL, EML version 1.0 was published in December 2000 as a free and open format for external use in education.

Now, for further engineering activities, tools for using EML are being taken up by commercial parties, but not on an exclusive basis. Organisations wishing to build these EML tools, for instance import/export filters are invited to do so and several companies are currently engaged in such engineering activities. For implementation, further testing and validation, there are collaborations with other

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institutions, such as the Consortium Digital University in the Netherlands and Flanders, and the University of South Africa (UNISA).

The OUNL itself aims to use EML as future format for all course development. Within the OUNL a number of courses from a variety of scientific domains have already been modelled and implemented in EML. All these pilots have produced real educational material that has been used in actual teaching practice by students and teachers. The outcomes have been thoroughly evaluated for learning effectiveness. So, the EML as developed by the OUNL, has already proven its effectiveness and flexibility under a variety of pedagogical models and in a number of different settings (both distance learning and mixed-mode delivery).

1.7 Conclusions

Collaborative Learning provide student with opportunity to think for themselves, compare their thinking with others, conduct small research projects, investigate subject matter with fellow students. It can be practice by using a higher level cognitive thinking skills and also by providing activities that encourage students to confront the logic of their own thinking, their own beliefs and accuracy of their understanding about the previous or current learning. A collaborative learning-building approach offers an alternative model for both the designs of classroom environments and distance courses. Educator have recognised the need of cultivate higher-order thinking skills and alternate views of teaching and learning even though they have disagreed about how to achieve these ends.

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CHAPTER 2 : Introduction to Future Learning Environment (Fle3)

2.0 Introduction

Future Learning Environment (Fle) were develop by Media Lab, University of Art and Design, Helsinki, team of educational staff at Department of Psychology and Media Education Centre, Department of Teacher Education at University of Helsinki Finland.[9] The project are funded by the Finnish Technology Development Centre, the Finnish Ministry of Education and it industrial partners. The project have been started in June 1997 and it latest version Fle3 was released in 15 February 2002.

The earliest Fle version is design to produce an Internet-accessible applications to support learning and thinking, producing web-based based multimedia learning material concerned with New Media, and developing the publishing process of network-based multimedia learning material. While the Fle2 version is a web-based GroupWare for computer supported collaborative learning (CSCL) and has been designed to support collaborative knowledge building and progressive inquiry. The latest version Fle3 is known more specific as a server software for supporting computer supported collaborative learning (CSCL).

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2.1 Fle Design Principle

The Fle design principal are based on four area below which are:

2.1.1 Problem based and inquiry learning.

- Using the questions and problems guide the process of progressive inquiry.
- By solving the problems a new knowledge is constructed through the solution explanation and understanding.
- Shared knowledge advancement by members of a course.

2.1.2 Collaborative Knowledge Building

- Questions and explanations derived from users' own understanding and scientific information.
- Provide tools for working with knowledge objects like explanations, theories, hypothesis, and interpretations and for monitoring the learning process.

2.1.3 Collaborative Design process

- Engaging users to generate new design ideas.
- Collaboratively work to further development of ideas.
- Tools for sharing conceptual and visual design.

[9] Future Learning Environment Web site, http://fle3.uiah.fi

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2.1.4 Sharing expertise.

- Shared goal by creating a learning community.
- Expert support for developing and processing information.
- Provide multiple modules for user in various fields of expertise.
- Tools for monitoring advancement of comprehension in scientific and design inquiry.

2.2 Fle Pedagogy

There are four area which are consider in the Fle pedagogy which are

- Problem Based Learning (PBL)
- Inquiry Learning
- Collaborative Knowledge Building
- Distributed Expertise

The Future Learning Environment Fle is design to support problem-based learning (PBL) and inquiry learning. It help students and teachers to engage in co-ordinated efforts to solve problems and build knowledge together by involvement in Collaborative Knowledge Building and the expertise people. In the figure 1.1 the diagram show how the process of learning and teaching are conducted in the Fle system and there are eight process involve which are:

2.2.1 Setting up the Context

- Anchoring central conceptual principles of the domain of knowledge
- Establishing the learning community
- Joint planning and setting up of goals

2.2.2 Presenting Research Problems

- Generating problems and questions to direct the inquiry
- Studying is a problem solving process
- Large initial questions get more defined in the process

2.2.3 Creating Working Theories

- Phenomena are explained with existing background knowledge
- Creates a culture for writing about own thinking and reasoning
- Intended to make gaps in own knowledge and understanding more explicit

2.2.4 Critical Evaluation

- Assessment of the strengths and weaknesses of different explanations and approaches
- Helps the learning community to direct and regulate joint cognitive efforts
- Evaluation of what knowledge and skills are needed in the inquiry process

2.2.5 Searching Deepening Knowledge

- The questions and working theories direct the search for more information and answers

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2.2.6 Developing Deepening Problems

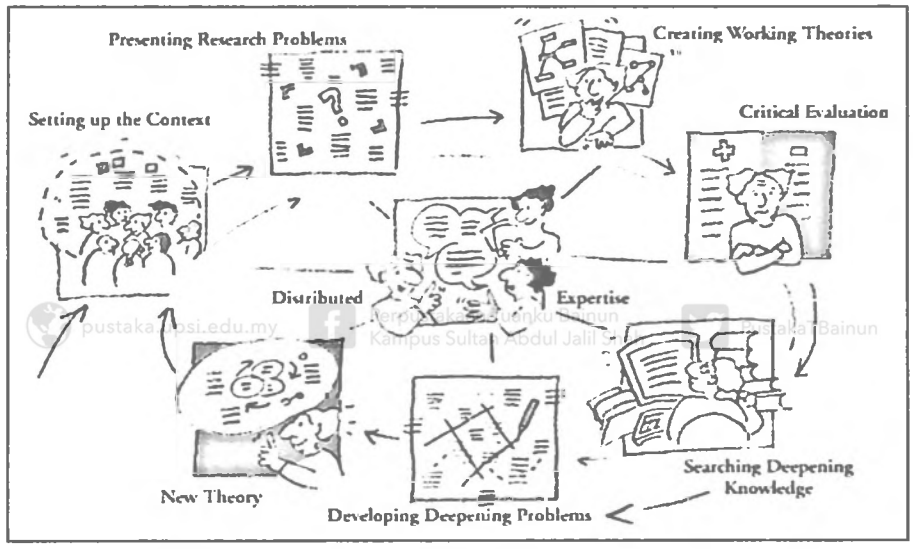
- Transformation of initial general and unspecific questions into more specific questions
- Focusing inquiry to specific research questions

2.2.7 New Theory

- New theories built on own explanations and deepening scientific knowledge
- Summaries of own and shared learning

2.2.8 Distributed Expertise

- Relying on socially distributed cognitive resources
- Diversity in expertise among course participants promotes knowledge advancement



2.0 Module of Progressive inquiry in process of study by using Fle.

2.3 Fle Tools

The FLE-Tools is a GroupWare system designed to support collaborative knowledge building over the Internet (TCP/IP) with any HTML 3.2 compliant WWW-browser such as Netscape Navigator 3 (or later). The FLE-Tools is a new-generation networked learning environment, which relies on recent achievements of cognitive research on educational practices and computer-supported collaborative learning (CSCL).

The FLE-tools are designed to help the students engage in productive work with knowledge objects and artefacts and generate new objects and designs. FLE-tools consist of several modules that are designed to facilitate collaborative knowledge building through a constructive process.
The modules include:

- WebTop (virtual desktop in the web)
- Knowledge Building module
- Jam Session module
- Library module
- Administration module for tutors and system administrator.

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2.3.1. WebTop

- A personal desktop in the environment
  The environment provides each user with a personal open 'Desktop' in the web ('WebTop') which user can change their information, password and except their userID.
- **To store and share digital materials with fellow users**

  Fle WebTop can be used by teachers and students to store different items (documents, files, links, knowledge building notes) related to their studies, organize them to folders and share them with others.
- **Access to evaluation tools**

  Contains tools for collaborative evaluation and self-evaluation like tasks and quizzes. It also access to thinking tools, viewing and sending personal short messages

2.3.2. Knowledge Building and Discussion Module.

- **Shared space for discussion and conferencing.**

  The discussion is constructed around the "Deep Principles" of the field. It is a shared space for discussing topics and concepts generated by the users. The discussion is guided by the 'Deep Principles' decided together with the tutor and the students of the course, which define the context of concern. It may carry out knowledge building dialogues, theory building and debates by storing their thoughts into a shared database.
- **Messages posted to the database labeled with a "Category of Inquiry" reflecting a step in inquiry.**

  In the knowledge building groups may use knowledge types (also called thinking types) to scaffold and structure their dialogues. Categories of scientific and design inquiry are default sets, other sets can be defined by course administrator. The discussion messages are added to the shared space and labelled by two type of knowledge type, which are 'Design Thinking' and 'Progressive Inquiry'.
- **The Design Thinking Knowledge types:**

  The design process is seen as a cyclical and iterative process of manipulating visual and technical design ideas. The most important part of the design process is the analysis of the design context, design constraints and generating new design ideas. The use of the Progressive Design Thinking Types based on the model of the collaborative design process.

  - **Design Context**

    Design context is typically specified in a design brief or in a negotiation with a client. The design brief does not completely specify all the requirements, guidelines and wishes for the product to be designed. It is often a general and vague description of the desired product, giving only partial information about the user, the purpose of the product or resources. These are external constraints for the design process.
    However, during the design process the designers have to specify the given design constraints and sometimes even modify them. The new information may also change the design context as the designer develops more internal

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constraints for the design. The analysis of design context is one of the most important aspects of the design process.

- **Design Challenge**

  Design challenge is individual definition of the problem that design needs to solve. During the design process design challenge can be divided into more specific design tasks (i.e. sub-problems). Design task is a smaller sub division of the Design challenge, which can be solved on it's own and which is a step closer to the actual implementation than the challenge.
  Design challenge and design tasks are tied to the principal design ideas and design context. Design tasks aim at helping designers find solutions to the main goal. Moreover, new information can emerge from the solutions of new specific design tasks.

- **My Design Idea**

  A design idea represents individual solution to the design challenge at hand. It is a sort of first sketch of a design idea - a visualisation of the idea or a verbal description of the main functions of a solution. Design idea can be conceptual. The different type of visual ideas (e.g. visual sketches) can be further labelled as thinking sketch, prescriptive sketch or final alternative. A design idea is not necessarily well defined or articulated early in the design process. However, it is crucial to understand that by creating design ideas visible to individual and others during the design process these ideas become more refined and developed. Thus, individual should avoid going straight from the first sketch to a final alternative, but rather make most all the sketches and design ideas visible to others.

- **New Information**

  A design idea is not necessarily well defined early in the design process. Further, there are probably lots of open questions related to design context and design challenges. Searching and providing new information and knowledge is important for further development of design ideas. Providing new information related to design constraints, the design ideas become more refined and developed. One can gather crucial new information by interviewing users and analysing context or earlier design approaches by others.

- **Evaluating an Idea**

  The evaluation of design ideas and design processes is crucial for collaborative designing. Tutor/Instructor should give feedback about design ideas to fellow designers. It is useful to note that sometimes the solution further refines the design problem and vice versa, making it worthwhile to go visit and reflect earlier design context analysis and ideas again.

- **Organising the Process**

  In a collaborative design process it is important to make general plans and division of labour between designers. With an "Organising the Process" it may make plans on how to proceed, evaluate (e.g. whether the process is progressing in the desired direction, whether appropriate methods are used), how sharing of tasks should be done and how design process is co-ordinated among the members of the design community.

- **Summary**

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With a summary individual draw pieces of the design ideas together and propose a solution to the design challenge or a sub-task. A Summary can pull together various pieces, such as design context, working ideas or design process, in order to illustrate how those concepts belong together.

- **Progressive Inquiry Knowledge Types**

Learning can be seen as a research practice aiming to solve a group's understanding of a subject by creating a visible discussion of research challenges, theories, scientific facts and summaries. The process aims to be progressive in its approach by starting from initial problems and ideas of the students and then becoming progressively more challenging through creation of more elaborate problems, theories and research practices.

The Progressive Inquiry knowledge types aim to scaffold a learning community to follow the process of setting up research problems, making current knowledge visible and working from there to deepen the understanding on the issue by creating discussion notes. The reading and writing of these notes is seen as the key momentum of the process, helping learners to structure their ideas based on the principle of scientific research.

- **Problem**

It is a study problem in research. The learning process aims at answering to the problems presented by the students. The purpose of defining a problem statement is to explicate the learning goals, to explain the research interests and also to introduce the questions that are directing to inquiry. After critically viewing the present working theories and by introducing new deepening knowledge to the discussion, also new subordinate problems can be defined.

- **My Explanation**

My Explanation presents individual conceptions (hypothesis, theory, explanation, and interpretation) about the problems presented by that individual or some of the fellow students. "My Explanation" is not necessarily well defined or articulated early in the inquiry process. However, it is crucial that the explication of the explanations evolves during the process and working theories become more refined and developed.

- **Scientific Explanation**

Scientific Explanation presents some scientific findings or other new knowledge. Under Scientific Explanation it may brings to the discussion some new points of view or otherwise helps the inquiry process to continue. It differs from individual own explanation (My Explanation) in that it represents knowledge produced by others, generally some authority or expert. My Explanations should be individual own ideas where as Scientific Explanation is some ones else idea in the area in concern.

- **Evaluation of the Process**

Individual comment that focuses on the inquiry process and its methods instead of the process outcomes - meta-comment. With a "Evaluation of the Process" may evaluate e.g. whether the process is progressing in the desired direction, whether appropriate methods are used, how sharing of tasks and inquiry process is accomplished among the members of the learning community.

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- **Summary**

  With a summary individual can draw pieces of the discussion together and provide inferences based on the discussion in the Knowledge Building. The summary may aim at identifying a new Course Context or may reflect the views of the writer on the progression of the inquiry learning process.

2.3.3. Jamming Tools

- **Experimentation with representation of ideas, concepts and sketches and representing the elaboration process graphically**

  It helps the students in the dynamic development of a project by providing graphical representations of its phases. Students may add their own digital artefacts (pictures, videos, audio, text, software) to the session and let other students continue and comment on the work in progress.

- **Collaborative construction of digital artifacts**

  It is a shared space for collaborative construction of digital artefacts (pictures, text, audio, video).

- **Work together in GroupWork and storing different versions of objects being developed**

  A study group may work together with some digital artefacts by simply uploading and downloading files. Versions are tracked automatically and different versions are displayed graphically.

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2.3.4. Library

- **Shared documents in various formats: text, graphics, audio, video, multimedia, or www-links**
- **Space to publish and browse multimedia learning materials**

  An adaptive medium to publish and browse multimedia learning materials.

- **Allows tutor to select relevant parts for course material**

  All additional learning materials are saved to the Fle-database from which the tutor or teacher may first search and choose relevant clips and then publish them in the Library. All the work of the study groups tasks will be saved to the Fle-database.

2.3.5 People (User & Staff) and Administration Module

- User-database, information entered by user
- Defining user-groups: basic users, tutors and system administrators
- Creating new, removing and editing courses
- Uploading and removing course materials
- Adding new users and tutors, removing and editing access rights

For teachers and administrators Fle offers tools to manage users and courses. The administrator may also export and import the content of the Fle database in XML format (compatible with the Educational Modelling Language - EML).

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2.4 Roles (Users) in Fle

There are three types of users in the Fle3, which each user has one 'global role' and one 'course specific role' in any course that he/she participates in. The three types of users (roles) are:

2.4.1 User

- Role for normal users of FLE and normally is the student.
- They can only log in and access the WebTop and participate in knowledge building as well as in the Jamming section. When they are participants in a course, they can access the content of the course and involve in their course specific role, which are authorising for them to do.

2.4.2 Staff

- It's the role for employees or any trusted users of the FLE system. Usually are the teachers, lecturer and tutors.
- Staff has the right to invite new users, change users' information (normally the students (user) and tutors/teachers except the FLEAdmins information), create and remove courses and assign users to different courses. Staff can also promote other users to Staff status or demote them to user status.
- Teacher has complete control over a course. Teacher can select users to participate in the course and select each user's course specific role. He can also administer all the contexts of the course.
- The tutor has all the rights as Student and in addition they can create new course contexts and manage those contexts.

2.4.3 FLEAdmin

- Is the super user of the FLE system and he/she will has the access to all system administration features and the same right as the Staff has. FLEAdmin can promote other users to FLEAdmin status or demote FLEAdmins to Staff or User status.

2.5 Open Sources

Fle3 is Open Source Software released under the GNU General Public Licence (GPL). The licence is protecting the freedom to use, modify and distribute Fle3.

Introduction

Open Source Initiative (OSI) is a non-profit corporation dedicated to managing and promoting the Open Source Definition for the good of the community, specifically through the OSI Certified Open Source Software certification mark and program.

Open Source Initiative exists to make this case to the commercial world. Open source software is an idea whose time has finally come. For twenty years it has been building momentum in the technical cultures that built the Internet and the World Wide Web. Open source doesn't just mean access to the source code.

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The distribution terms of open-source software must comply with the following criteria:

2.5.1 Free Redistribution

The license shall not restrict any party from selling or giving away the software as a component of an aggregate software distribution containing programs from several different sources. The license shall not require a royalty or other fee for such sale.

> ***Rationale:*** *By constraining the license to require free redistribution, we eliminate the temptation to throw away many long-term gains in order to make a few short-term sales dollars. If we didn't do this, there would be lots of pressure for co-operators to defect.*

2.5.2 Source Code

The program must include source code, and must allow distribution in source code as well as compiled form. Where some form of a product is not distributed with source code, there must be a well-publicised means of obtaining the source code for no more than a reasonable reproduction cost–preferably, downloading via the Internet without charge. The source code must be the preferred form in which a programmer would modify the program. Deliberately obfuscated source code is not allowed. Intermediate forms such as the output of a pre-processor or translator are not allowed.

> ***Rationale:*** *We require access to un-obfuscated source code because you can't evolve programs without modifying them. Since our purpose is to make evolution easy, we require that modification be made easy.*

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2.5.3 Derived Works

The license must allow modifications and derived works, and must allow them to be distributed under the same terms as the license of the original software.

> ***Rationale:*** *The mere ability to read source isn't enough to support independent peer review and rapid evolutionary selection. For rapid evolution to happen, people need to be able to experiment with and redistribute modifications.*

2.5.4 Integrity of The Author's Source Code

The license may restrict source-code from being distributed in modified form *only* if the license allows the distribution of "patch files" with the source code for the purpose of modifying the program at build time. The license must explicitly permit distribution of software built from modified source code. The license may require derived works to carry a different name or version number from the original software.

> ***Rationale:*** *Encouraging lots of improvement is a good thing, but users have a right to know who is responsible for the software they are using. Authors and maintainers have reciprocal right to know what they're being asked to support and protect their reputations.*
>
> *Accordingly, an open-source license* ***must*** *guarantee that source be readily available, but* ***may*** *require that it be distributed as pristine base sources plus patches. In this way, "unofficial" changes can be made available but readily distinguished from the base source.*

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2.5.5 No Discrimination Against Persons or Groups

The license must not discriminate against any person or group of persons.

> ***Rationale:*** *In order to get the maximum benefit from the process, the maximum diversity of persons and groups should be equally eligible to contribute to open sources. Therefore we forbid any open-source license from locking anybody out of the process.*
>
> *Some countries, including the United States, have export restrictions for certain types of software. An OSD-conformant license may warn licensees of applicable restrictions and remind them that they are obliged to obey the law; however, it may not incorporate such restrictions itself.*

2.5.6 No Discrimination Against Fields of Endeavour

The license must not restrict anyone from making use of the program in a specific field of endeavour. For example, it may not restrict the program from being used in a business, or from being used for genetic research.

> ***Rationale:*** *The major intention of this clause is to prohibit license traps that prevent open source from being used commercially. We want commercial users to join our community, not feel excluded from it.*

2.5.7 Distribution of License

The rights attached to the program must apply to all to whom the program is redistributed without the need for execution of an additional license by those parties.

> ***Rationale:*** *This clause is intended to forbid closing up software by indirect means such as requiring a non-disclosure agreement.*

2.5.8 License Must Not Be Specific to a Product

The rights attached to the program must not depend on the program's being part of a particular software distribution. If the program is extracted from that distribution and used or distributed within the terms of the program's license, all parties to whom the program is redistributed should have the same rights as those that are granted in conjunction with the original software distribution.

> ***Rationale:*** *This clause forecloses yet another class of license traps.*

2.5.9 The License Must Not Restrict Other Software

The license must not place restrictions on other software that is distributed along with the licensed software. For example, the license must not insist that all other programs distributed on the same medium must be open-source software.

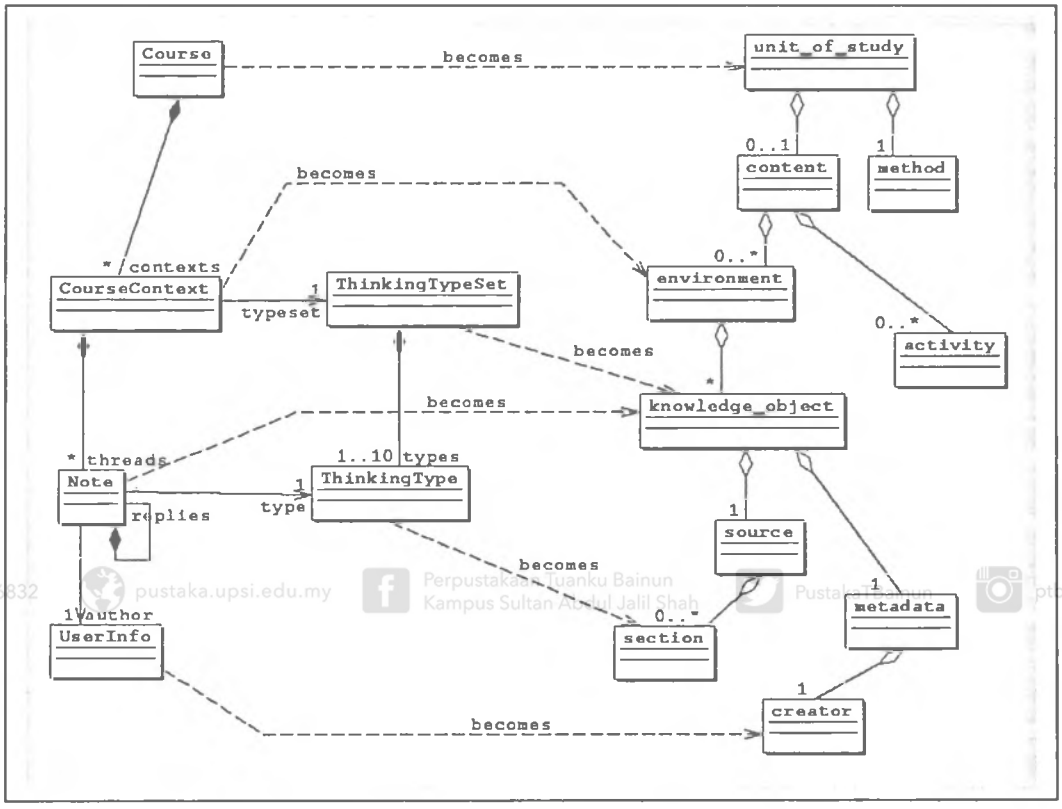
> ***Rationale:*** *Distributors of open-source software have the right to make their own choices about their own software.*
>
> *Yes, the GPL is conformant with this requirement. Software linked with GPLed libraries only inherits the GPL if it forms a single work, not any software with which they are merely distributed.*

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2.6 Educational Modelling Language and Fle

2.6.1 EML Export class hierarchy

This diagram shows the class hierarchy of FLE Knowledge Building on the left and the type containment hierarchy of EML documents (Educational Modelling Language, an XML application, The Open University of the Netherlands), and the dependency graphs showing what element types each class corresponds to.

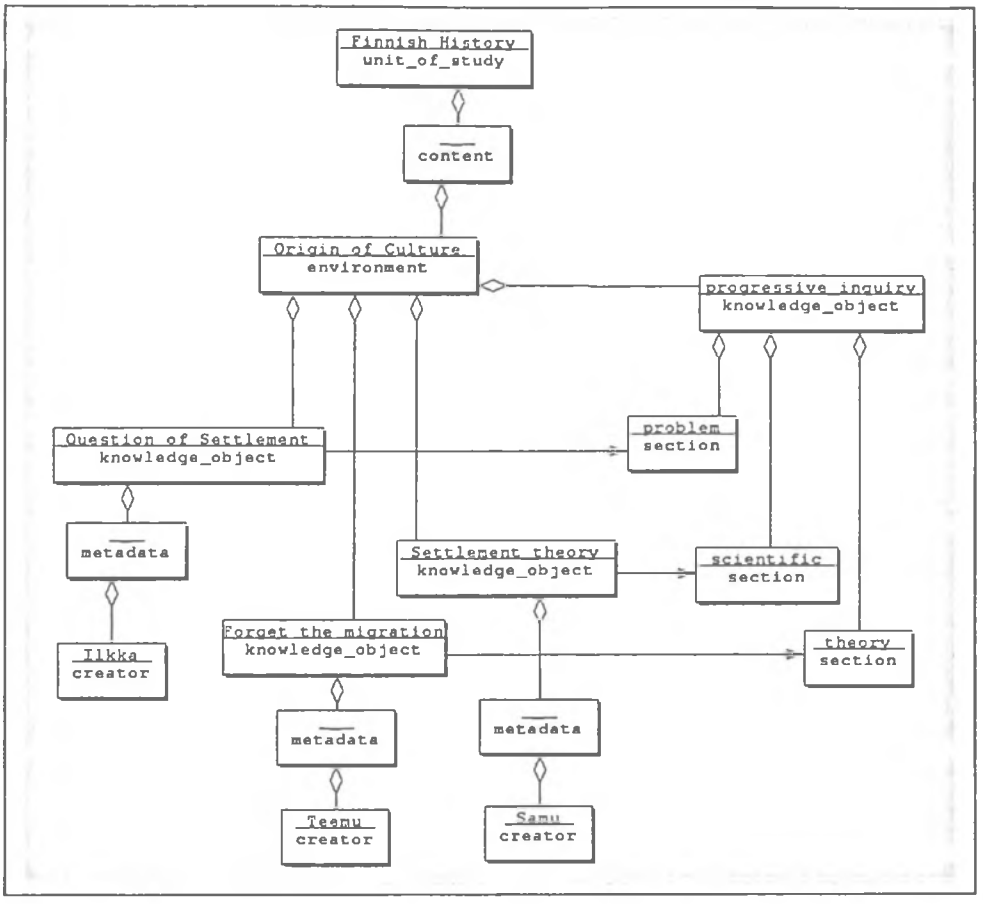


2.1 EML Export class hierarchy.

2.6.2 EML Export object structure

This diagram shows the same object instance example as the Knowledge Building object structure diagram shown before on this page. In this diagram, each object is shown as an EML document element type. The aggregation links show the containment of elements inside other elements. The association links depict id-refs to other elements by their unique identifiers. This example depicts the content portion of an EML unit-of-study, leaving other portions (like environment) out.

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2.2 EML Export Object Structure

The FLE environment consists of several modules that are designed to facilitate collaborative knowledge building in university and vocational education. In the design of FLE, special emphasis has been given to developing metacognitive tools for structuring users' activity. The environment provides each user "Virtual WebTop" for building his or her own knowledge objects. The Virtual WebTop has direct links to those of the other members of the study group, enabling all to share their process of inquiry. The "Discussion Environment" module facilitates between-user interaction and provides means for conducting multiple discussions simultaneously within a course. The "Jam Session" module encourages free flow of ideas and allows experimentation with different ways of representing knowledge. The "Library enables the user to share documents in various formats: text, graphics, audio, video, multimedia or WWW links. An important aspect of the Library is "Deep Principles", an environment for representing the conceptual foundations of each domain of knowledge.

Courses and seminars, that have adopted FLE as a tool for developing shared expertise, represent various academic domains (e.g., new media studies, psychology of thinking and learning, designing, language learning methodology, teacher education). Further, FLE has been used in developing teamwork and organisational planning (e.g., in the field of telecommunications and advertising). The preliminary results from academic domains indicate that the FLE environment has provided these groups means for structuring their efforts to produce new knowledge, and for collaborating without time constrains. More importantly, the environment has aided in mediating more developed practices of studying and discussing points of view, which were observed initially only in the products of the content experts and gradually adopted to the practices of others.

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2.7 Free Software

Fle3 is also free software. Free software is a matter of the users' freedom to run, copy, distribute, study, change and improve the software. The philosophy of Free Software goes back to the idea of freely exchanging knowledge and thoughts that can traditionally be found in scientific fields. Just like ideas, software is non-tangible and can be copied without loss. Passing them on is rather the basis of an evolutionary process, which fuels the development of thoughts.

In the early eighties, Richard M. Stallman was the first to succeed in formalising this for software in form of four freedoms.

0. freedom: The freedom to run the program, for any purpose.

1. freedom: The freedom to study how the program works, and adapt it to your needs.

2. freedom: The freedom to redistribute copies.

3. freedom: The freedom to improve the program, and release your improvements to the public, so that the whole community benefits.

Richard M. Stallman created the "Free Software Foundation" in 1984 and started the GNU-Project. The license of the GNU-Project, the GNU General Public License (GPL) not only grants the four freedoms described above, it also protects them. Especially because of this protection the GPL is the most-widely-used license for Free Software nowadays. Besides the GPL there are several other licenses granting these freedoms and hence qualifying as Free Software licenses. The major difference to the GPL is that it does not seek to protect the freedom.

When talking about Free Software, the most common misconception is the belief that it has to be gratis. This is not the case - in fact a very big part of the Free Software protagonists work on the field of commercial Free Software. In 1998 the "Open Source Definition" was written by the U.S. citizen Bruce Perens and was describe as the main author. Its goal was to describe the technical properties of Free Software and to serve as the fundamental document of the "Open Source" movement.

The "Open Source Definition" itself is a derivate of the "Debian Free Software Guidelines", which is derived from the four freedoms mentioned above. Therefore all three definitions describe the same licenses; the "GNU General Public License" (GPL) is the primary license for all definitions. It is the self-declared goal of the Open Source movement to be a marketing program for Free Software. This is sought by deliberately turning away from the philosophical and political background; they are seen as hazardous to commercialisation.

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2.8 Learners' Motivation and Fle3

Fle3 is designed to help study groups interested in collaborative learning to engage in research kind of learning process. However some people will have hard time adjusting themselves initially, but most who make an effort to try the process for themselves will feel rewarded. It is believe that a meaningful process (i.e. usually having a context and a shared meaning for the group) aiming to solve problems, will result in study group's deeper understanding of the subject and is motivating in itself.

2.8.1 Fle3 is not learning management System or courseware

Assuming the student are highly motivated and willing to work to improve and deepen their understanding on some topics of the course. It were propose that to use any of the LMS's (Learning Management Systems) available in the market, if they are only interested in study credits and get good grade in an exam. They are an effective way to assess rote memorisation of subject material under scrutiny.

It is very aware that in the field of learning technology solutions Fle3 has a very specific focus. There are some hope that Fle3 will be useful in constructive and inquiry like learning processes. It is also known that for a more traditional teacher, instruction and didactic-based training Fle3 might not be the right tool.

Fle3 does not lend itself easily to material based learning, where obligatory course material is delivered and then questioned. Nor does Fle3 offer much of a support for teacher centred models, where teacher tells learners exactly what to do and when to do. This is not to be taken as an explicit criticism of these. It just a matter of choosing the right tool for the problem. Fle3 is good for group centred work that concentrates on creating and developing expressions of knowledge (i.e. knowledge artefacts).

2.9 Conclusions

The effectiveness of Fle3–Tools were believed to be success in the inquiry learning process where all the students and tutors are sharing and distributing their existing knowledge to each other. These tools provided a medium of communication and understanding as well as for motivation and encouragement students to be more independent and contributed in the learning process. The collaborative learning and student centred learning are the main approach used together with the Fle3 system and it is not just stand for web learning or online learning environment but also in face to face environment. The used of this two approach hopefully can bring a new dimension and alternative way toward better tools in teaching and learning process.

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CHAPTER 3 : User Requirement Specification

3.0 Introduction

Future Learning Environment (Fle3) is . Fle3 is server software that need to be install on to a server which this can be access by all the user around the world. This means that to use Fle3 one must install Fle3 software to a server in a network. The network used can be the "public Internet" or local area network or Intranet using Internet protocol. This way Fle3 can be installed at classroom (teacher's computer), school, school district, national or international level depending on what kind of learning projects it will be used for. After setting up Fle3 server teachers and students may use it with a standard web browser (Netscape, Opera, Explorer, Mozilla, Konqueror, Nokia Communicator etc).

3.1 Objectives

- To investigate the used of Fle3 in the teaching and learning environment.
- To investigate and compare the system with the WebCT application, which has been used in the MSc courses before.
- To do an evaluation on the Fle3 with real user which indicate by using the collaborative learning approach.
- To investigate and do analysis on the result of the evaluation study.

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3.2 Purpose of study

- How effective is the Fle3 in face to face (traditional classes) and online learning environment.
- Does it help student to understand the task and solve it.
- Does it gain any experience and knowledge, critical thinking from the student.
- Others benefit the user get from the system.

3.3 Hardware Specification

3.3.1 General Hardware Specification

- 1GHz or faster Pentium III CPU
- ATX Motherboard (Socket FC-PGA370) using chipset (min 4 PCI slots)
- 256MB (PC133) RAM (with room to double memory)
- 40GB or larger 7200rpm IDE Hard Disk
- 1.44MB - 3.5" floppy
- CD-ROM drive
- 17" Monitor
- Creative Live Sound Card and speakers
- PS2 Keyboard & Mouse
- AGP NVidia GeForce MX Video Card or similar (min 16MB)
- 3Com Fast EtherLink XL PCI Ethernet Card - 3C905B-TX (10/100 Twisted Pair only)
- Desktop or Mini-tower Case with provision for monitor or 'Y' power cable

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3.4 Software Specification

3.4.1 Fle3 are used with a standard web browser

Fle3 is designed to work every web browser (Netscape, Opera, Explorer, Mozilla, Konqueror) on every operating system (Unix, Linux, Mac OS, Windows, etc.).

Fle3 server run on almost all Operating Systems (Linux, MacOS X, *BSD, etc.) and Microsoft Windows. Fle3 does not require the use of cookies, flash, javascript or Java. However it does use CSS (style sheets) to render the visuals on the page. While this is not 100% essential, the display can look a bit confusing without style sheet support. All modern browsers (IE5, Netscape4, Mozilla, Konqueror, Opera5 or later) support some type of style sheets.

3.5 Installation Requirement

3.5.1 Download and Install Python, Python Imaging Library and Zope

Fle3 is a Zope product, and it should be install in the first place (which requires Python, so if the version of Zope does not come with Python application then user need to install Python as well). If the user require the use of Jamming tool in Fle3, it is strongly recommended that the Python Imaging Library was install as well.

3.5.1.1. Zope :

Zope is a leading open source application server, specialising in content management, portals, and custom applications. Zope enables teams to collaborate in the creation and management of dynamic web-based business applications such as Intranets and portals.

Zope is a framework for building web applications. A web application is a computer program that users access with a web browser over the Internet. Some think of a web application as a dynamic web site that provides not only static information to users but lets them use dynamic tools to work with an application. Zope consists of several different components that work together to help build web applications.

Zope comes with:

- **A Web server**

  Zope comes with a built in web server that serves content to users. Zope works with existing web server, such as *Apache* or *Microsoft IIS*, and any other web server that supports the Common Gateway Interface (CGI).

- **A Web based interface**

  When the web application was build with Zope, the web browser can be used to interact with the Zope *management interface*. This interface is a development environment that lets user do things like create web pages, add images and documents, connect to external relational databases and write scripts in different languages.

- **An object database**

  When work with Zope, users are mostly working with objects that are stored in Zope's object database. Zope's management interface provides a

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simple, familiar way to manage objects that resembles the way many common file managers work.

- **Relational integration**

  User don't have to store all the information in Zope's object database if the user don't want to, because Zope works with other relational databases such as *Oracle*, *PostgreSQL*, *Sybase*, *MySQL* and many others.

- **Scripting language support**

  Zope allows to write web applications in a number of different languages, like Python, Perl, and Zope's own Document Template Markup Language (DTML).

3.5.1.2. Python :

What is Python?

***python**, (Gr. Myth. An enormous serpent that lurked in the cave of Mount Parnassus and was slain by Apollo) 1. any of a genus of large, non-poisonous snakes of Asia, Africa and Australia that suffocate their prey to death. 2. popularly, any large snake that crushes its prey. 3. totally awesome, bitchin' language that will someday crush the $'s out of certain other so-called VHLL's ;-).*

An Introduction to Python

Python is a portable, interpreted, object-oriented and high-level programming language with dynamic semantics. It is often compared to Tcl, Perl, Scheme or Java. Its development started in 1990 at CWI in Amsterdam, and continues at CNRI in Reston, Va. The language has an elegant (but not over-simplified) syntax; a small number of powerful high-level data types are built in. Python can be extended in a systematic fashion by adding new modules implemented in a compiled language such as C or C++. Such extension modules can define new functions and variables as well as new object types.

Python combines remarkable power with very clear syntax. It has modules, classes, exceptions, very high-level dynamic data types, and dynamic typing. There are interfaces to many system calls and libraries, as well as to various windowing systems (X11, Motif, Tk, Mac, MFC). New built-in modules are easily written in C or C++. Python is also usable as an extension language for applications that need a programmable interface.

Its high-level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasises readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

Often, programmers fall in love with Python because of the increased productivity it provides. Since there is no compilation step, the edit-test-debug

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cycle is incredibly fast. Debugging Python programs is easy: a bug or bad input will never cause a segmentation fault. Instead, when the interpreter discovers an error, it raises an exception. When the program doesn't catch the exception, the interpreter prints a stack trace. A source level debugger allows inspection of local and global variables, evaluation of arbitrary expressions, setting breakpoints, stepping through the code a line at a time, and so on. The debugger is written in Python itself, testifying to Python's introspective power. On the other hand, often the quickest way to debug a program is to add a few print statements to the source: the fast edit-test-debug cycle makes this simple approach very effective.

The Python implementation is portable: it runs on many brands of UNIX, on Windows, DOS, OS/2, Mac, and Amiga. The Python implementation is copyrighted but freely usable and distributable, even for commercial use.

3.5.1.3. The Python Imaging Library (PIL)

The Python Imaging Library (PIL) adds image processing capabilities to Python interpreter. This library support many file formats, and provides powerful image processing and graphics capabilities.

The current free version is 1.1.3, which has been tested with Python 1.5.2 and newer, including 2.2. The current development version is 1.2 beta 1. It's currently only available for PythonWare PIL supports customers.

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Platform	**How to install Python, Python Imaging Library and Zope**
Debian GNU/Linux	INSTALL_ZOPE.Debian
RedHat Linux and derivatives	INSTALL_ZOPE.Redhat
Mac OS X	INSTALL_ZOPE.Mac
OpenBSD, NetBSD and FreeBSD	INSTALL_ZOPE.BSD
General instructions other UNIXes (Solaris, IRIX etc)	INSTALL_ZOPE.Unix
Windows 32bit platforms	INSTALL_ZOPE.Win32

3.5.2 Download and Install Fle3

After having Python and Zope in the computer, installing Fle3 is easy to carry out. Below if type of files that are available to download:

Installing Fle3	**File**
Fle3 Debian package	Temporarily unavailable
Fle3 gzipped tar package for other systems	fle_1.3beta2.tar.gz
Fle3 pkzipped package for other systems	fle_1.3beta2.zip

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3.5.2.1.Download FLE

To download the Fle3, it can be archive from http://fle3.uiah.fi/download.html web site. The user can download the.tar.gz or .zip archive to install the Fle3.. The archive need to be unpack, which it will produce a new subdirectory FLE. This directory should be placed inside the Products folder of Zope.

Unarchiving the .tar.gz package (change directory as appropriate): % cd /usr/local/zope/lib/python/Products/ % tar zxf fle-x.y.z.tar.gz NOTE!

If user are upgrading from an earlier version of FLE3, it was suggest that:

1. Take a full backup of the current /lib/python/Products/Fle directory
2. More importantly, remove the old /lib/python/products/FLE directory before unpacking the new version into the products directory.

This procedure is done to avoid conflicts and problems arising from file name changes (old files showing in the system in addition to the new files that do the same thing).

3.5.2.2.Add FLE as a Zope Product

What's important here is that FLE is installed inside Zope's "Products" folder, inside a folder named "FLE". The FLE can place anywhere else but should then make a symlink inside the Products folder to the actual location.

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Restart Zope. It can be done from the management interface (http://hostname/manage) using a web browser or with the system tools (ie. zopectl). After Zope has restarted, it has located the FLE product. In the management interface, the Products list inside the Control Panel should list FLE and it should not be broken.

3.5.2.3.Create a New FLE Instance

To actually start using Fle3, user need to create an instance of it, using Zope's management. By using the browser, move to the root folder in the management view and from the drop-down box at the top right, select "FLE".

There will be presented with a form containing details on Fle3 environment where the courses will be develop. After fill out the form and submit it, the working Fle3 installation is ready to be use.

3.5.2.4.Troubleshooting

Crashing problems with ZOPE (2.5.x), Python and FreeBSD? It can be fix by following text sent by Geoff Fellows:

Change to Python2.1.2/config.h #define PTHREAD_SYSTEM_SCHED_SUPPORTED (seems this is not correctly set by configure)

Add a line to Python2.1.2/Python/thread_pthread.h after pthread_attr_setscope(&attrs, PTHREAD_SCOPE_SYSTEM); pthread_attr_setstacksize(&attrs, (1<<17)); (sets the thread stack size to 128KB - a bit excessive but much better than the default 1KB)

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3.5.2.5.Upgrading From a Previous Version Of FLE

If the user are using Fle1 or Fle2, there's no upgrade. Fle3 is a completely separate product. By using an older version of Fle3, user can move their existing Fle3 instances with their user information and knowledge building to the new version.

For a minor update, follow these steps:

1. Unpack the archive into the correct folder (remove the previous version)
2. From ZMI (Zope's Management Interface) inside Product Management refresh FLE.
3. Using ZMI, go to FLE's Tools tab and click "Reload everything" (this might take several minutes on a very large database).

If the program has changed significantly (see list below), user need to export the data from the previous instances, (re)move them, copy the new version over the old one, refresh the product and create new instances, importing the data back. Exporting can be done by the Fle administrator, by pointing the browser to http://server/fleinstance/fle_export.

User will get as a reply a zipped export file, which should save somewhere. Do this for all the FLE instances and next, remove the existing FLE instances. User need to remember that Zope has an undo feature, so user can restore them if something goes wrong. User can also just rename them to something else.

After unpack the new version of FLE and replace it with the old one. Then refresh the FLE product from Zope's management interface and create new FLE instances corresponding to the old ones.

In each case, when filling out the creation form, user need to remember to attach the proper zipped export file in the last field. This will reinstate the entire Fle3 instance with all users, knowledge building and so on.

3.5.2.6.Special Considerations When Upgrading

Here is a list of released FLE3 versions and special considerations when upgrading 1.0beta1 and 1.0beta2 - 1.1beta or newer.

User needs to export and import the data for this upgrade. The export data format was a bit crude in the first two versions and did not contain all the information that 1.1beta contains. To get a better export, first unpack the new version and refresh the FLE product from ZMI, and then do the export.

Note, though, that upgrading these two files will break the old version so that it cannot be used, it should quickly do the export and complete the upgrade. 1.2beta or older - 1.3beta Export the old data and import after upgrading. 1.3beta - 1.3beta2. Just refresh Fle3 product and then reload all dtml files.

(This instruction was written by Heimo Laukkanen Developer of the Fle from Helsinki University, Finland.)

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3.5.3 Download and Import Knowledge Type sets into installation Fle3

Download Knowledge Type sets and export them to the Fle3 installation. If a have a new knowledge type set was made or translated one of the existing ones, please send it to the developer.

Knowledge Type Set	Language	Version	Archive	Date	Author
(Progressive Inquiry)	Spanish	1.0	inv_prog.zip	2.8.2002	Kimera Multimedia

3.6 Conclusion

The fle3 application can be install in platform of Debian GNU/Linux, RedHat Linux and Derivatives, Mac OS X, OpenBSD,netBSD and FreeBSD, Solaris, Unix and Windows 32 bit Platform. Before the FLE3 application can be used, we need to install the Zope, Python and The Python Imaging Library (PIL) installation program.

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CHAPTER 4 : Planning Design and Implementation Process.

4.0 Introduction

The aim of this chapter is to investigate the FLE3 and make a modest contribution to knowledge. The planning design was the stage where the design of the application is planned and how the design is carry through out the implementation process. It is a continuous process and the planning design has been change continuously based on the suitable situation and condition.

4.1 Type of User, Location and Course

4.1.1 Type of users:

- User: Twelve Students of Sultan Idris, University of Education Malaysia.
- Teacher : One Course Instructor/Lecturer
- FLEAdmin: The developer or administration staff.

4.1.2 User Level:

Expert and Novice user.

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4.1.3 Background knowledge (Pre-requisite)

Students that are currently registered in the TT3023 Interface design and Electronic Publishing as their compulsory course for 2002/2003 semester.

4.1.4 Location

Sultan Idris, University of Education, Tanjong Malim, Perak Malaysia

4.1.5 Course

TT3023 Interface Design and Electronic Publishing for third year students in Information Technology Education Degree (Bachelor of Education in Information Technology, B.Ed (Info. Technology))

4.2 Group Selection and Size Setting

4.2.1 Selection:

The group selection can either be formed by self-selection, random assignment or criterion-based selection. In this case the original number of students are around 30 but because the Fle3 application is using a collaborative learning approach, a smaller amount of students should be used to get an effective result.

The course instructor made the group selection by using criterion-based selection. Criteria of selection was based on

- Knowledge of writing and speech in English language because the course is conducted in Malay language and it is much easier for me as administrator and my supervisor to view their comments.

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- Knowledge and experiences of using other virtual learning application like WebCT.
- Active and willingly to contribute ideas, comments in discussions or forum.

4.2.2 The Selection Objectives are:

- To get a smaller number of students around 8-12 students.
- To get a few numbers of students that are active and lots of ideas to contribute in the discussion.

4.3 Implementation of Plan

4.3.1 Tools and software used

Software's and programs uses are:

4.3.1.1.Python 2.2.1 version:

This version was launch on April 10, 2002. The reason, this version was chosen because of it ability to be used together with the Zope program. The Python program for Windows known as "Python-2.2.1.exe" was download in the Windows installer. It is easy to run and user just needs to follow the friendly instructions on the screen to complete the installation.

The Python 2.2.1 program was download from the Python web site http://www.python.org/2.2.1/

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4.3.1.2.Zope 2.5.1 version :

This version was launch on April 23, 2002. It can be install in Windows 32 and X86 operating systems. Zope is an Open Source application server and portal toolkit used for building high-performance, dynamic Web sites. The Zope program file name is 'Zope-2.5.1-win32-x86.exe (5501265 bytes)'.

The Zope 2.5.1 was download from Zope web site :
http://www.zope.org/Products/Zope/2.5.1

4.3.1.3.Python Imaging Library (PIL) 1.1.2 version:

The Python Imaging Library (PIL) adds image-processing capabilities to the Python interpreter. This library support many file formats, and provides powerful image processing and graphics capabilities. This version was used because it goes together with the Python 2.2b1 version. The PIL program file is py-22b1-pil-1.1.2-20011022.exe (Windows only) (328k EXE).

The Python Imaging Library (PIL) 1.1.2 was download from the Pythonware web site http://www.pythonware.com/products/pil/

4.3.1.4.Apache HTTP Server Version 2.0

The Apache HTTP Server is used to develop and maintain an open-source HTTP server for modern operating systems including UNIX and Windows NT.

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It can provide a secure, efficient and extensible server that provides HTTP services in sync with the current HTTP standards.

Apache has been the most popular web server on the Internet since April of 1996. The August 2002 Netcraft Web Server Survey found that 63% of the web sites on the Internet are using Apache, thus making it more widely used than all other web servers combined. The Apache server can be download from http://www.apache.org/dist/httpd/

4.3.1.5.Future Learning Environment 1.3 version :

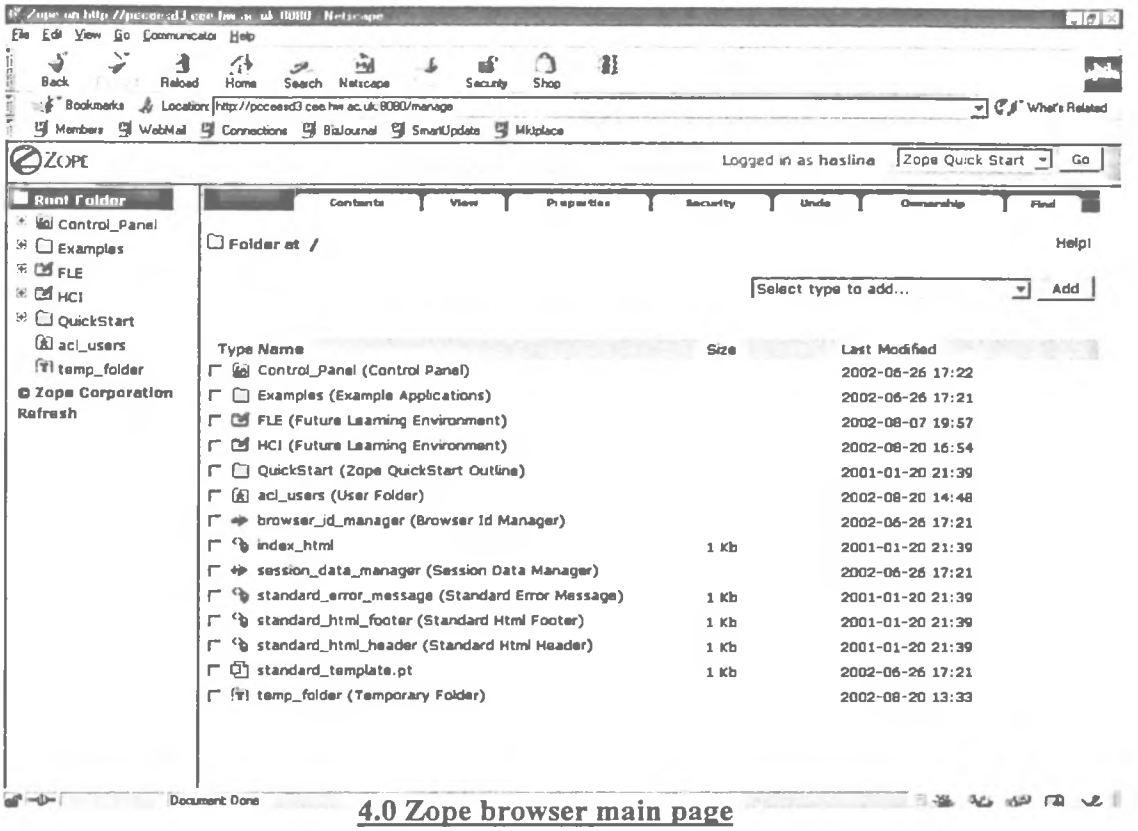
The Fle3 1.3beta2 has been launch at 5 August 2002. The program has been download from the Fle3 web site http://fle3.uiah.fi/download/ known as fle_1.3beta2.zip. (Zip file)

4.3.2 Installation Implementation :

Below are some of the explanation how the Python, Zope, PIL and Fle3 program have been install in the PC known as 'pcceesd3'.

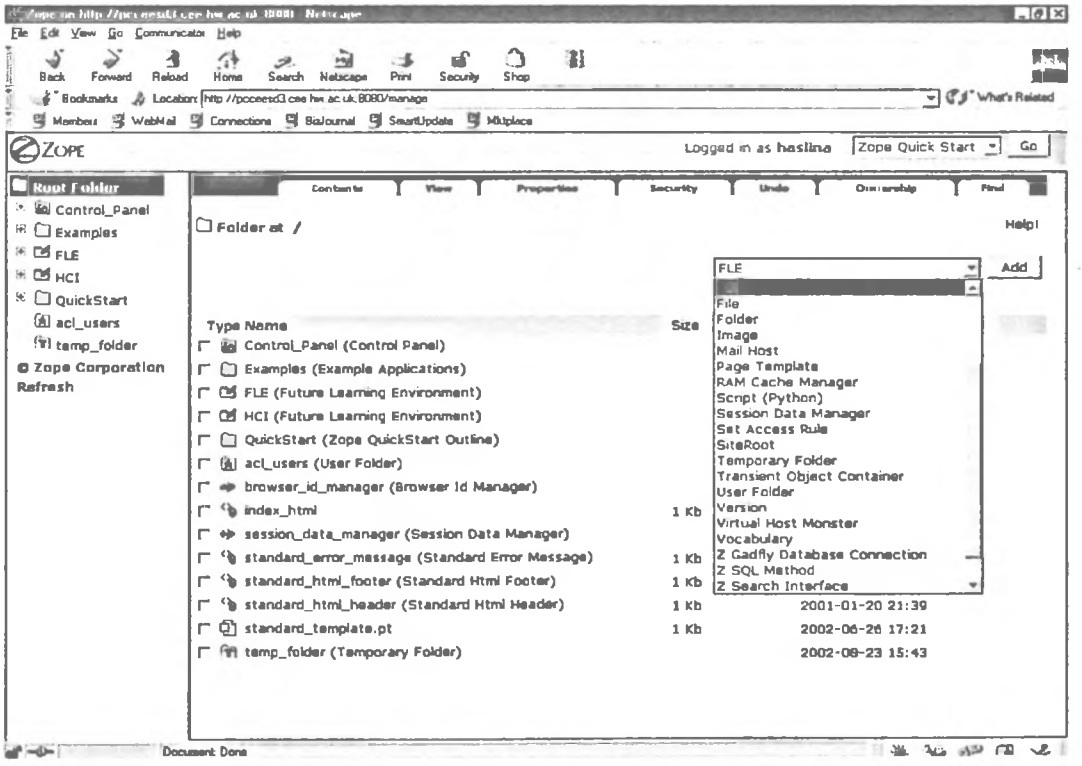
1. The Python2.2 program was install in the 'c:/Program Files' directory as 'Python2.2' folder.
2. The Zope 2.5.1 version was install under directory c:/Program Files as 'Zope' Folder. During the installation process, as a manager to the Zope program, username and password have to be set as a security matter.
3. In the Fle3 1.3 version there is a 'Jamming Tool' and the PIL program need to be install. This is because the Python Imaging Library adds image-processing capabilities to the Python interpreter.
4. The PIL1.1.2 (Python Imaging Library) was automatically install in the c:/ directory as 'pys22 folder. I have moved this folder to c:/Program Files/Zope/bin directory. When the Fle3 browser is running, it will automatically detect the PIL files where by all the images from jpg, bmp, gif and whatever is the picture format, it can be created by the program and be available to view by the users..
5. The Fle3 1.3beta2 zip file was unpacked and it has creates 'Fle' folder. This folder has been move to the c:/Program Files/Zope/lib/Python/Product. It is important to make sure the 'Fle' folder have been move into this correct directory because when the Zope program started, it will automatically detect the Fle program and the course setting up process can be done smoothly.
6. In the early stage, an Apache HTTP server version 2.0 has been install in the PC. This is an important step because we need a running server for the Zope and the Fle program to be access from the world user. In the earlier stage, the server can be only be access through out anywhere in the Computing and Electrical Engineering building as long as it in the university area. The server can only be available to outside world after a permission is given by the authorise person from the university computing service department.
7. After all the programs install, the Zope browser program need to be access. The URL link for the Zope browser is http://pcceesd3.cee.hw.ac.uk:8080/manage. The 'pcceesd3.cee.hw.ac.uk' is the PC name, while the :8080 is the port name for the server. At this stage, login name and password need to be enter to get full access to the Zope browser.
8. The Zope web browser main page are shown on the next page :

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4.0 Zope browser main page

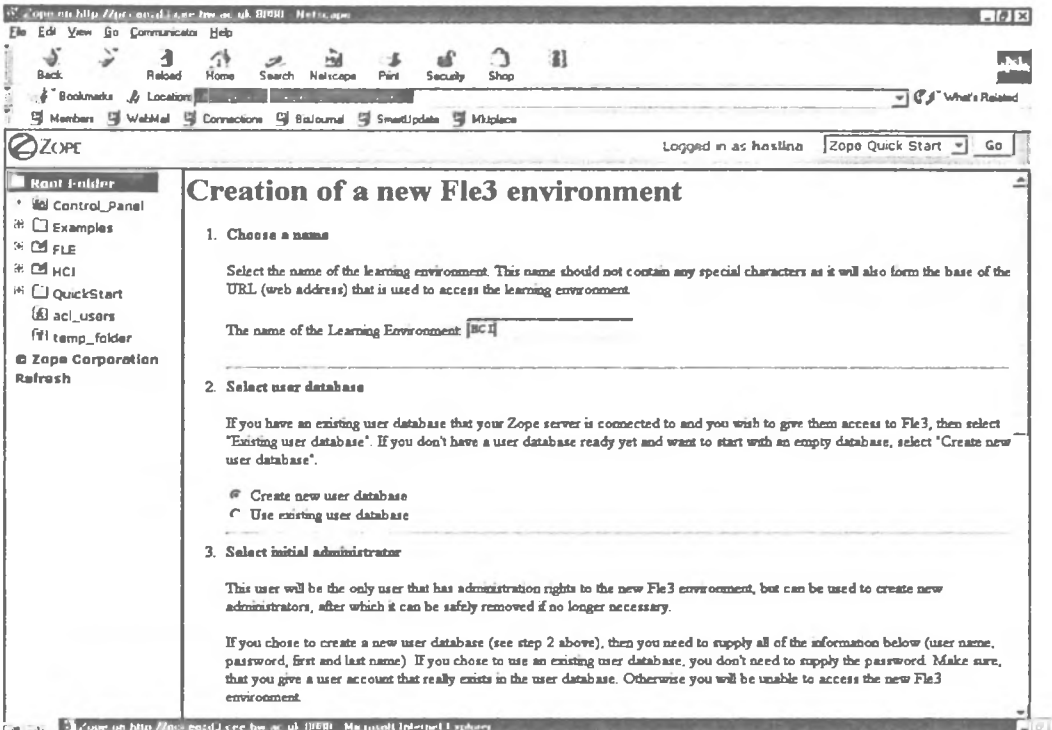
9. From the main page, the FLE program needs to be add to the root folder in the Zope browser.

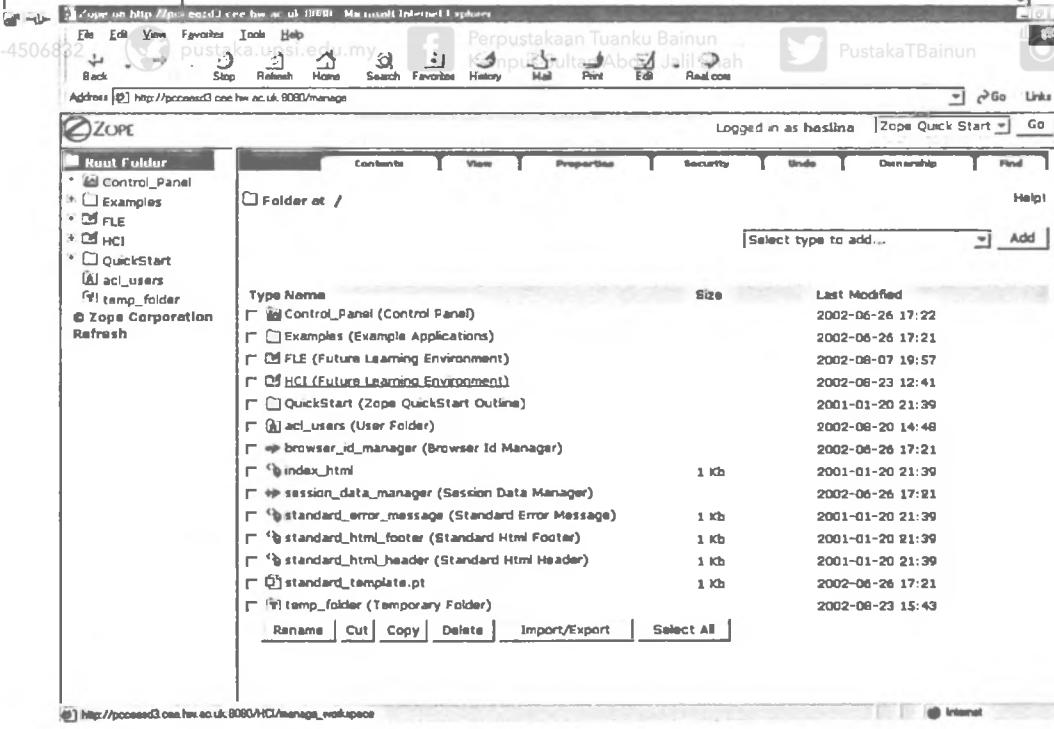


4.1 Adding the FLE program.

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10. After adding the Fle name as HCI and the setting of the FLEAdmin name and password, first and last name, mail server and request to import any existing Fle files have done, the HCI folder will be add in the Zope root folder.

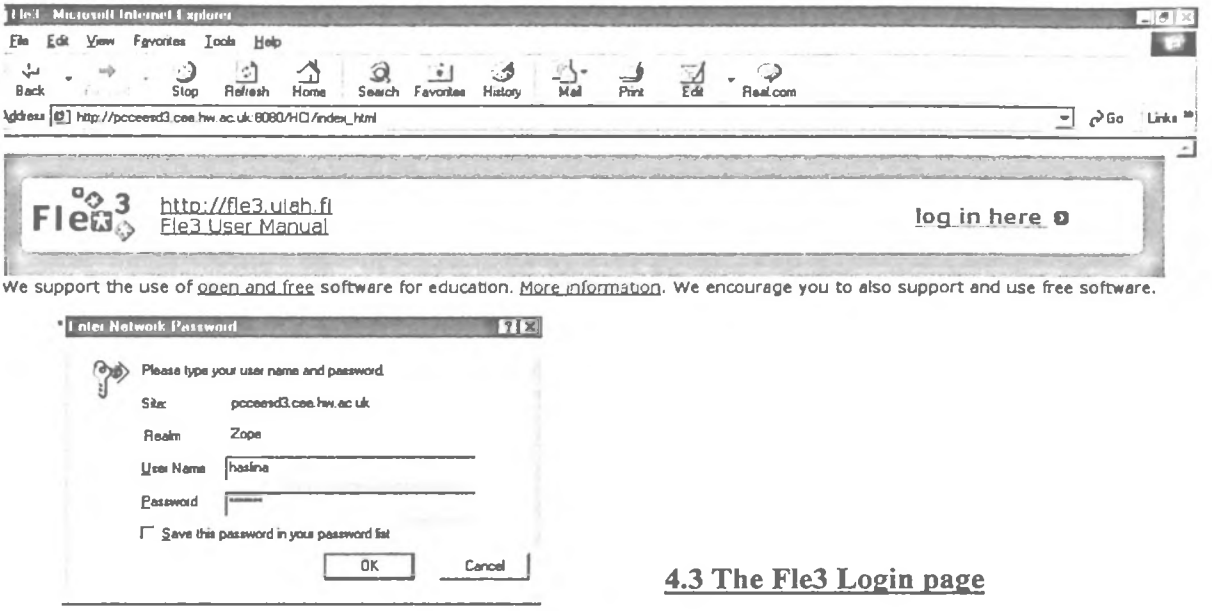




4.2 The 'Creation of a new Fle3' page

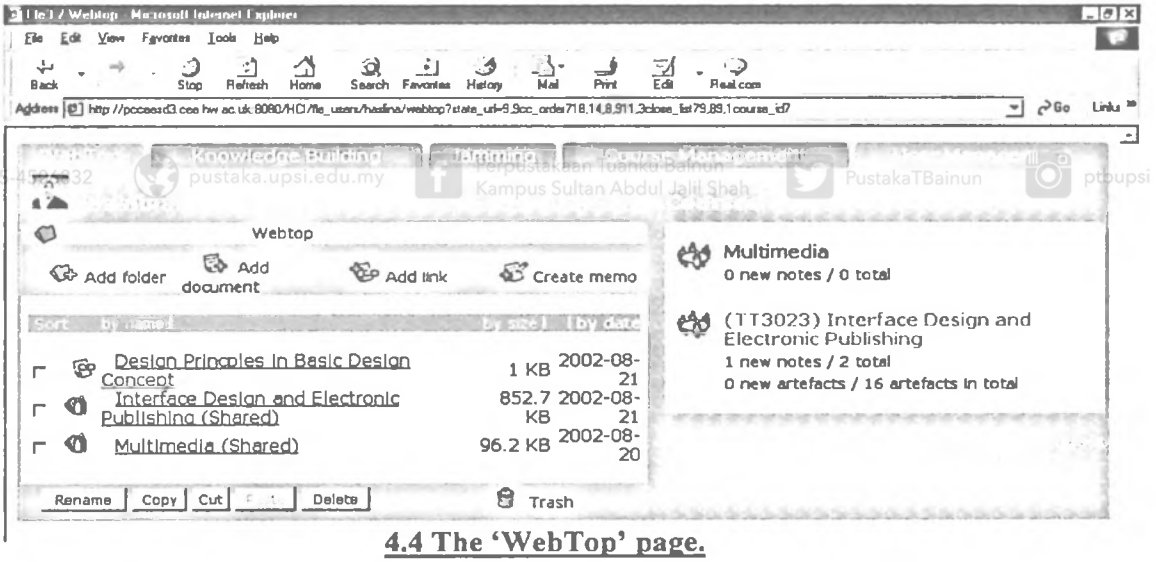
11. Now the Fle3 web browser is ready to used and known as HCI. To access the HCI course structure user need to go to URL http://pcceesd3.cee.hw.ac.uk:8080/HCI and login the 'User Name' and 'Password'.

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4.3 The Fle3 Login page

12. After entering the 'User Name' and the 'Password', the main page of the Fle3 web browser, the 'WebTop' will appear.



4.4 The 'WebTop' page.

13. At this level new courses, new users, any course contexts, discussion points and etc can be added into the new Fle3 web browser database. Now, the Fle3 web browser name as HCI is ready to be used by the students at the Sultan Idris, University of Education, Malaysia.

4.3.3 Course Development and Structure

The course that are going to be use in the Fle3 program is actually a course that is currently running at Sultan Idris, University of Education, Malaysia. The course is for third year students in Information Technology Education Degree (B.Ed in Information Technology). The course is a campus-based taught course known as TT3023 Interface Design and Electronic Publishing. This course exposes the student to theoretical and the various design of interface of PEOPLE-MACHINE and type of electronic publishing that are used in web page development production, kiosk and etc. In the Fle3 web browser, there are five tools (sections)

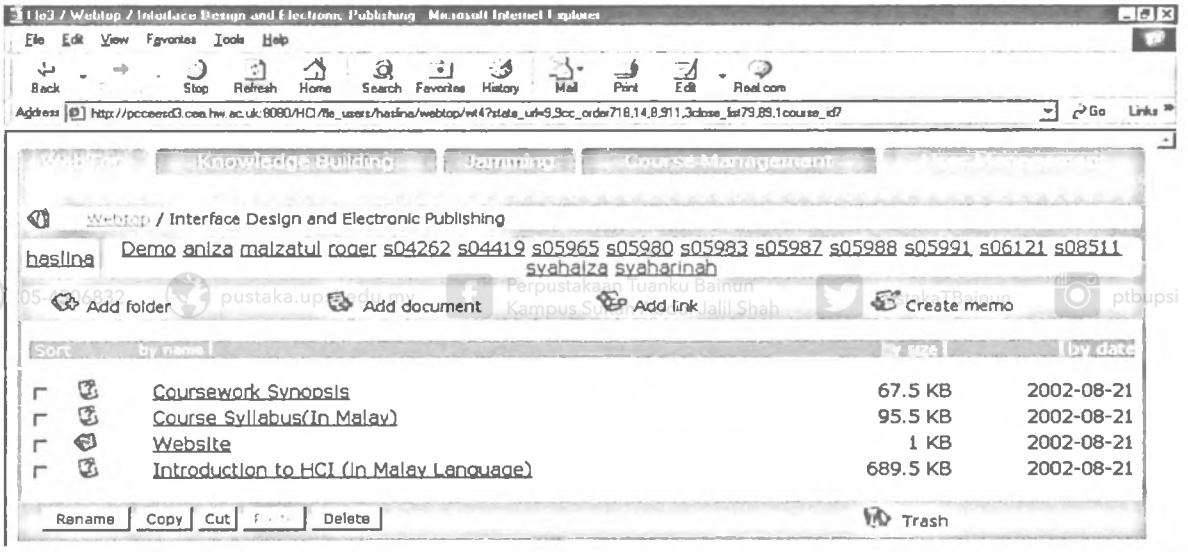
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available which are only provide to the 'FLEAdmin' and 'Staff' user, which are the WebTop, Knowledge Building, Jamming, Course Management and User Management. The course students usually were set as 'User' and can only access three from the five tools, which are WebTop, Knowledge Building and Jamming.

4.3.3.1.WebTop Tool

The WebTop module is used to store digital materials and to share them with other students. It also contains tools for sending messages, collaborative evaluation and self-evaluation. User can add new folders or files and inside each folder they can create new subfolders. They can also rename and remove the files from his or her own WebTop. Students that register in the same course can visit each other WebTop and download copies of the files to their home directory storage.

Below is the WebTop browser page of the TT3023 Interface Design and Electronic Publishing Course:



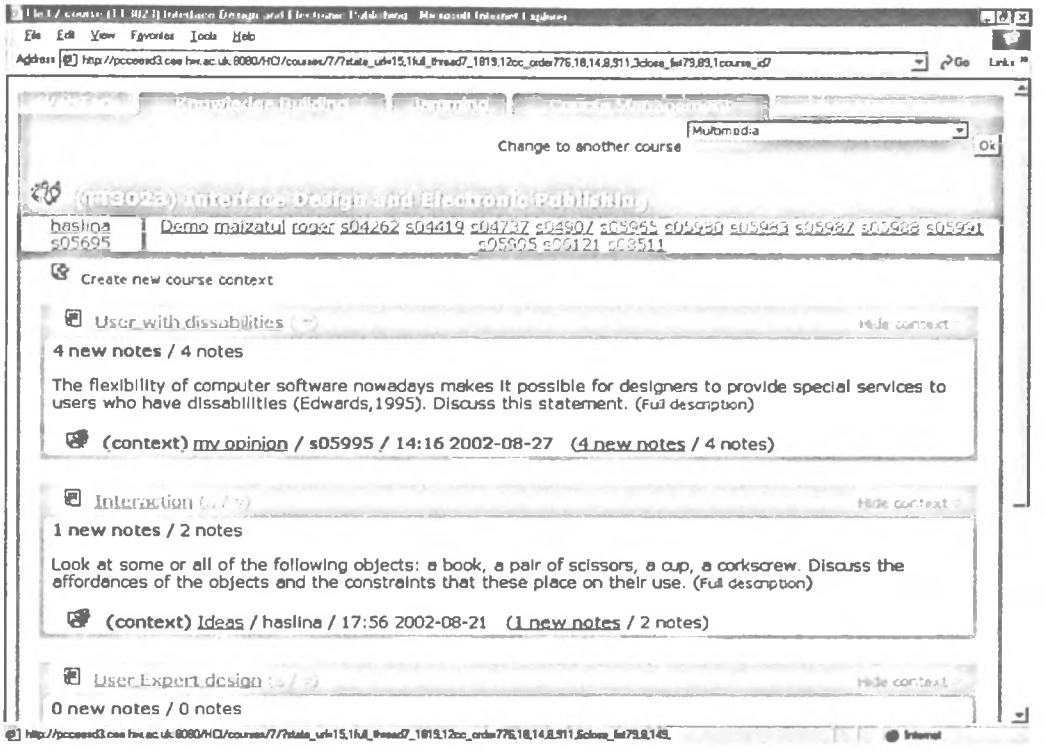
4.5 TT3023 Interface Design and Electronic Publishing 'WebTop' browser page.

4.3.3.2. Knowledge Building Tool

The Knowledge Building tool is a shared space for discussing topics and concepts generated by the users. The discussion messages are added into the shared space and labelled by the users with two different categories, which are 'Design Thinking Type' and 'Progressive Inquiry'. The 'Design Thinking Type' categories are label as Design Context, Design Challenge, My Design Idea, New Information, Evaluating an Idea, Organising the Process and Summary. While the 'Progressive Inquiry' categories are label as Problem, Scientific Explanation, Evaluation of Process and Summary.

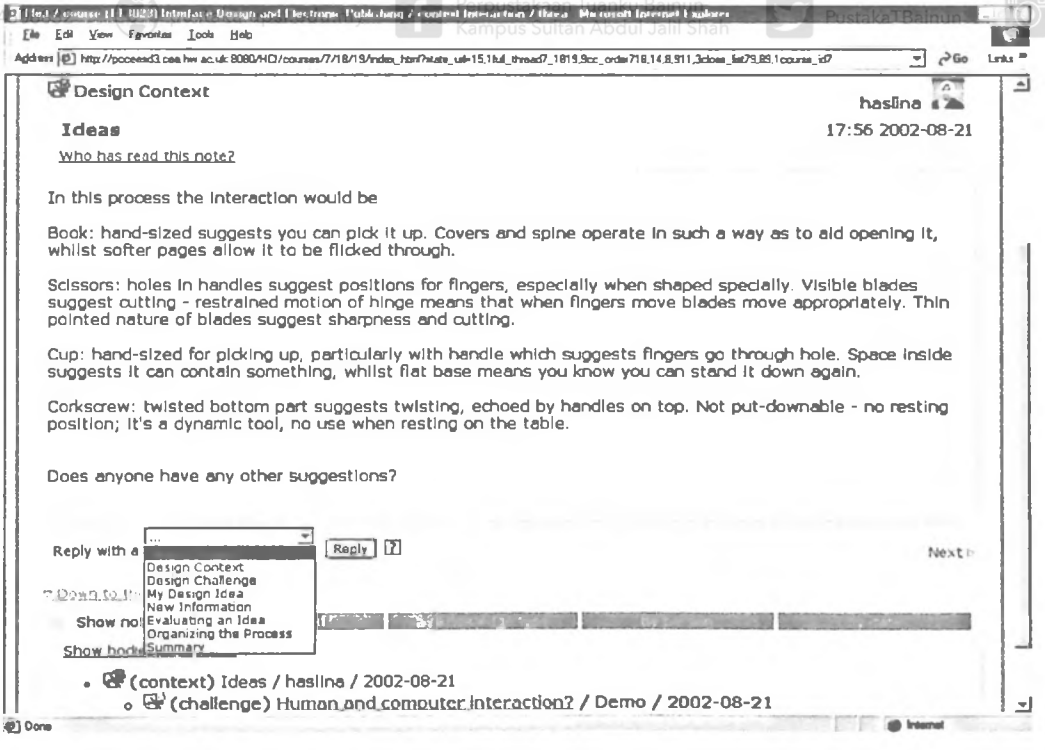
On the next page is the main page of Knowledge Building for the TT3023 Interface Design and Electronic Publishing course.

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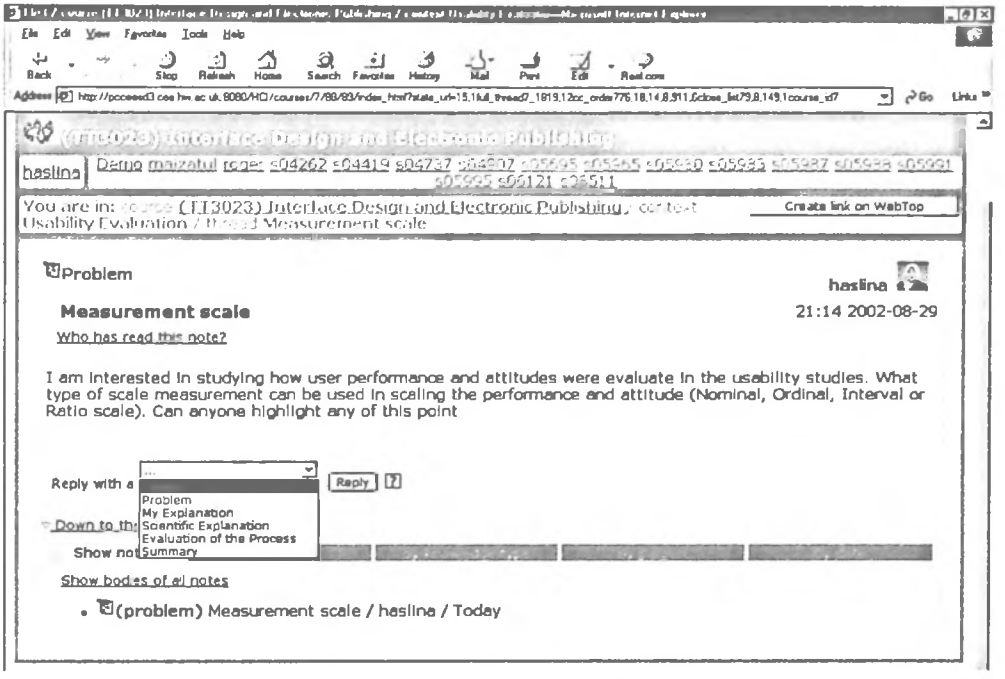
4.6 The Knowledge Building page.

Below is the 'Design Thinking Knowledge Type' page with list of it categories:



4.7 The Design Thinking Knowledge Type page.

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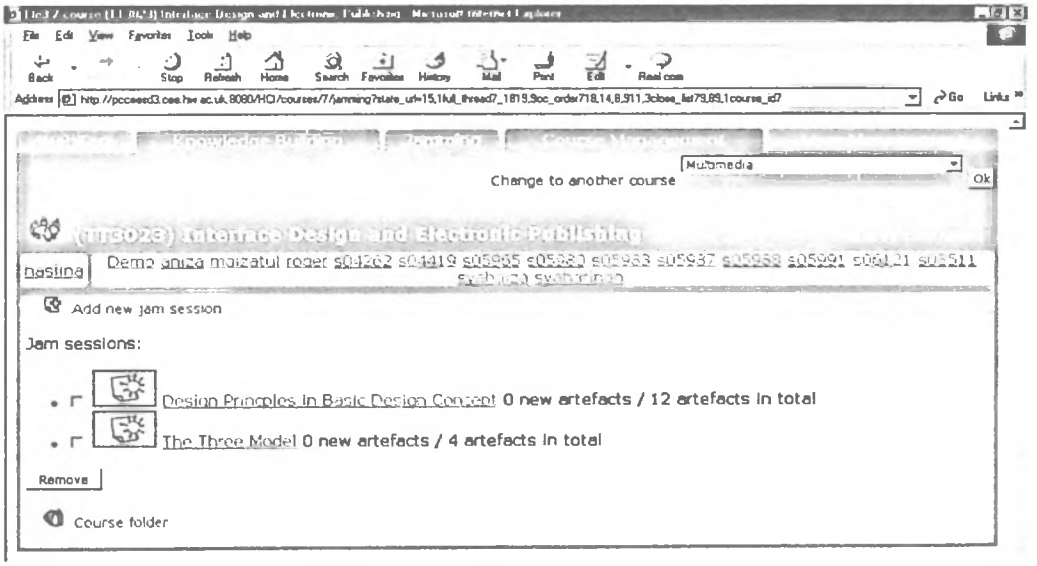


4.8 The Progressive Inquiry Knowledge Type page.

4.3.3.3. Jamming Tools.

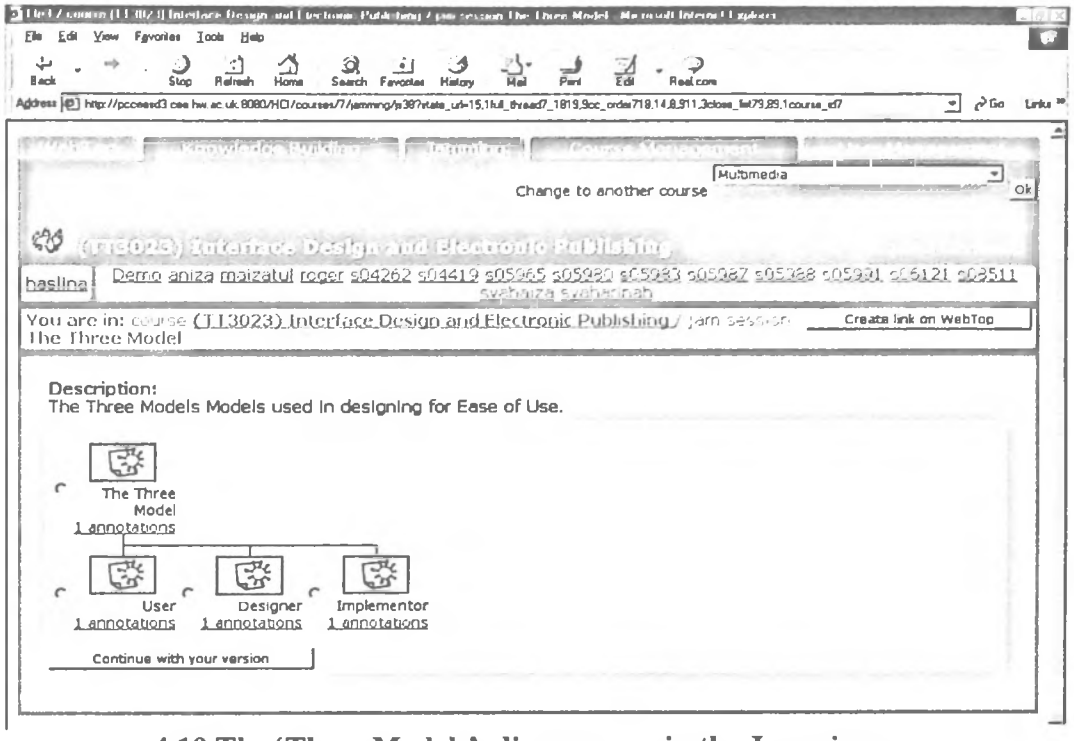
The Jamming tool is a space for the collaborative construction of the digital artefact. It helps the students in the dynamics development of a project by providing graphical representations of its phases. Students may add their own digital artefact (pictures, videos, audio, text, software) to the session and let other students continue and comment on the work in progress.

Below is the Jamming Tool session:



4.9 The 'Jamming' page.

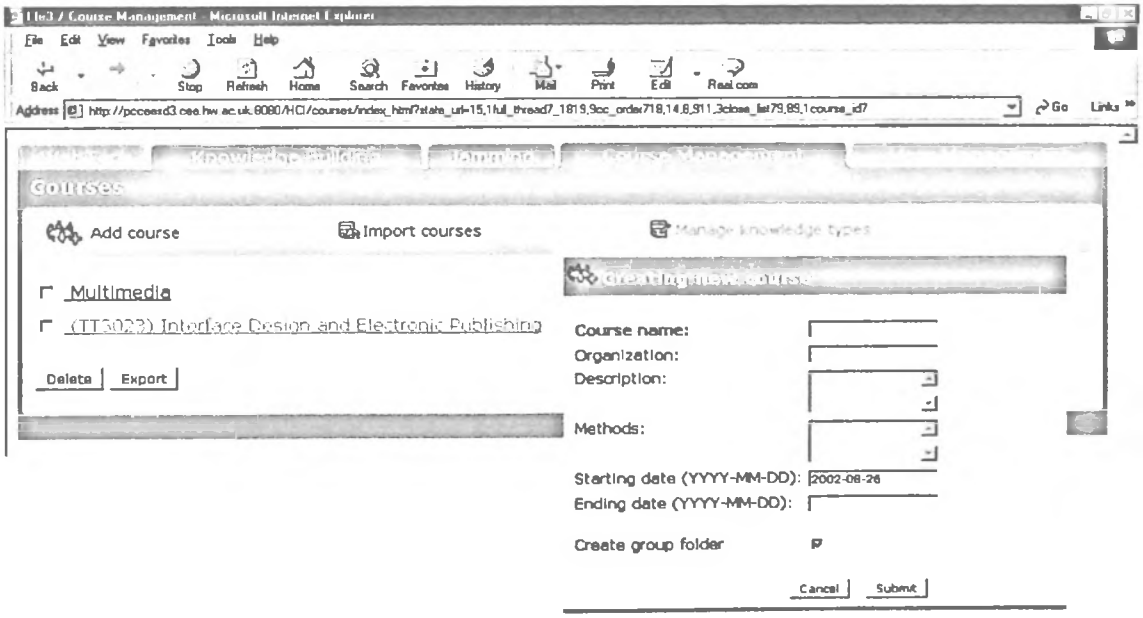
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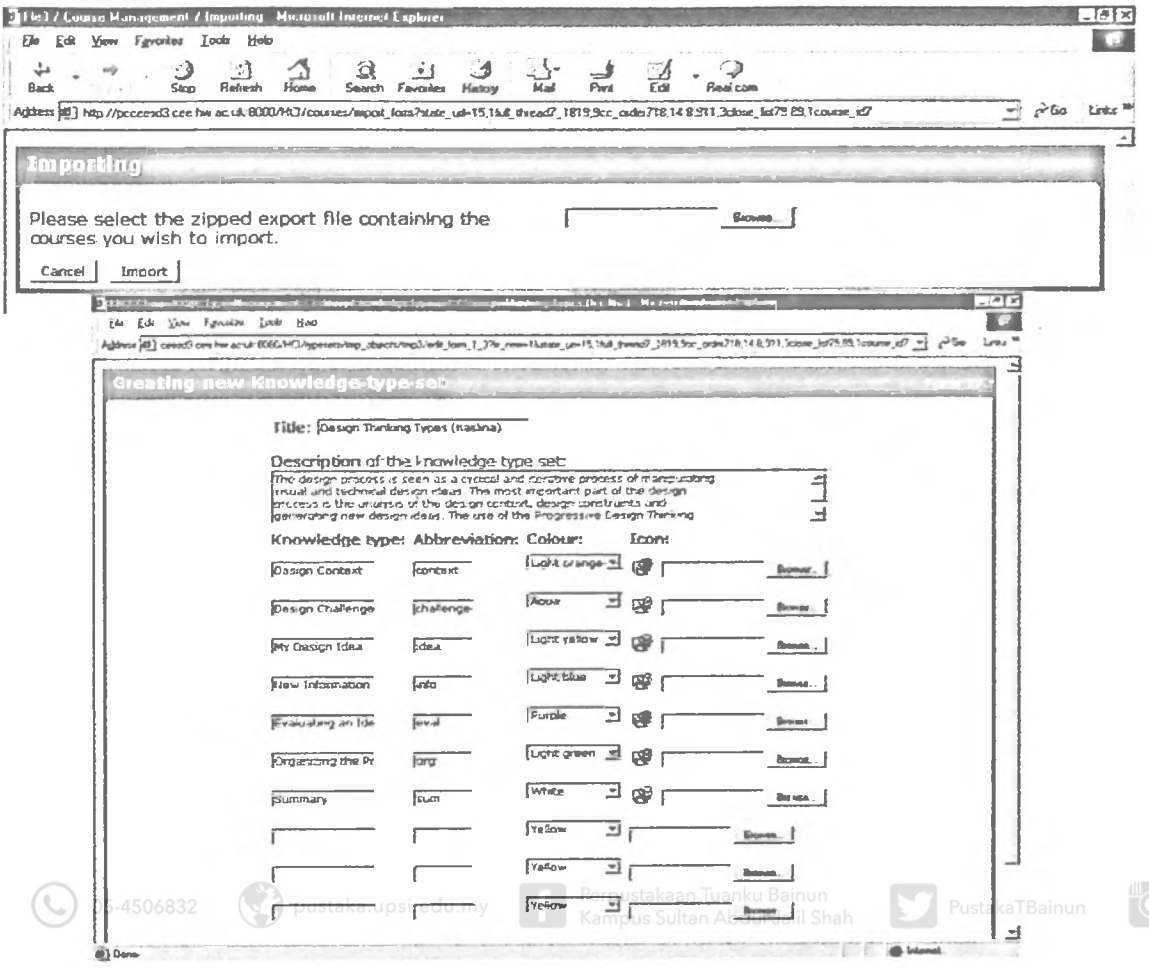
4.10 The 'Three Models' diagram use in the Jamming.

4.3.3.4.The Course Management Tool.

The Course Management section provided tools for the Fleadmin or staff users to add new courses or import existing courses from the previous version of Fle3 such as version 1.0 to 1.2. All the new courses information and description need to be fill in the form provided by the 'Add course' tool. There is also a 'Manage Knowledge Type' tool where all the categories in the 'Design Thinking' and 'Progressive Inquiry' of knowledge type can be edit, add or remove.

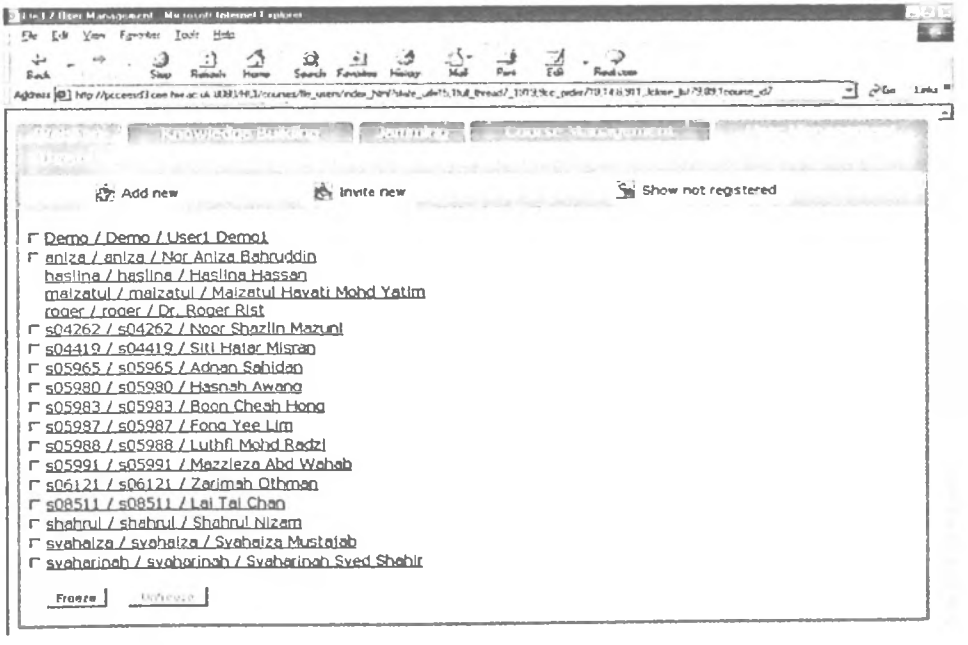


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4.11 The tools option provided in the 'Course Management' tool.

4.3.3.5. The User Management tool.

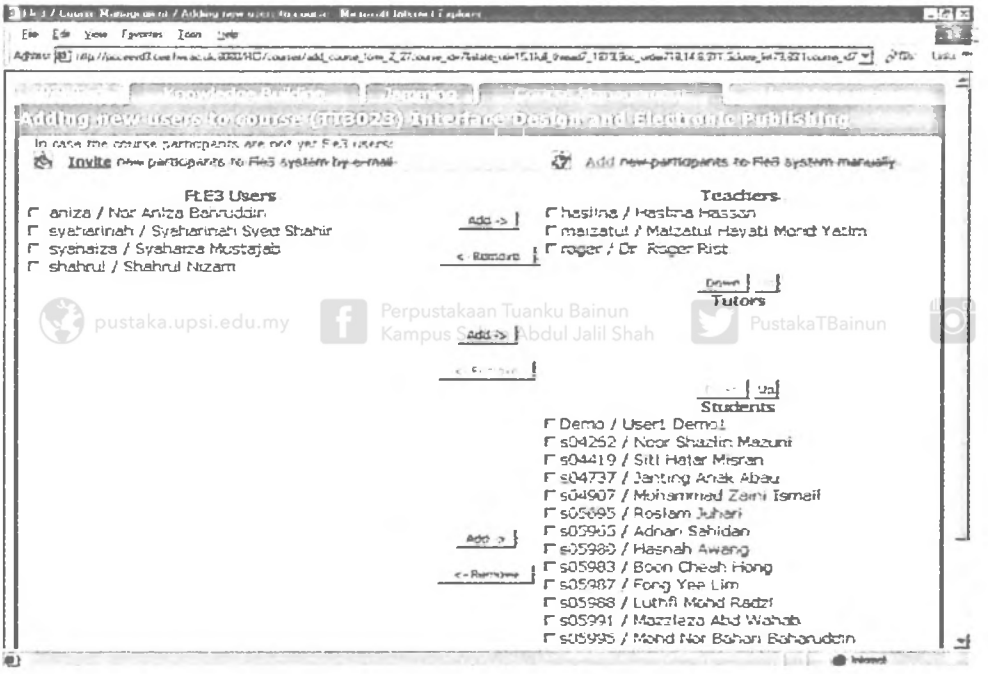


4.12 The 'User Management' tool.

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User Management is type of tool provided in the Fle3 for adding or inviting new users to join the courses. This option is only available to Fleadmin and staff user of the Fle3. Adding user can be done manually from the web based user interface or by inviting them by email address. When inviting users by email they will get an email from the Fleadmin or staff with a URL where they may create their own user name and password to the system. Usually when students' names are added in the fle3 database, a 'user' status will be given and they are restricted to view only three types of tools.

When the Fleadmin or staff user have add new user to the fle3 database, they need to allocate the user into the course. This option is available under the 'Course Management' section. If there are more than one course in the Fle3 program, the Fleadmin need to choose the appropriate course and add the new user under that particular course. On the next page is the template page where the new user were added in the TF3023 Interface Design and Electronic Publishing course.



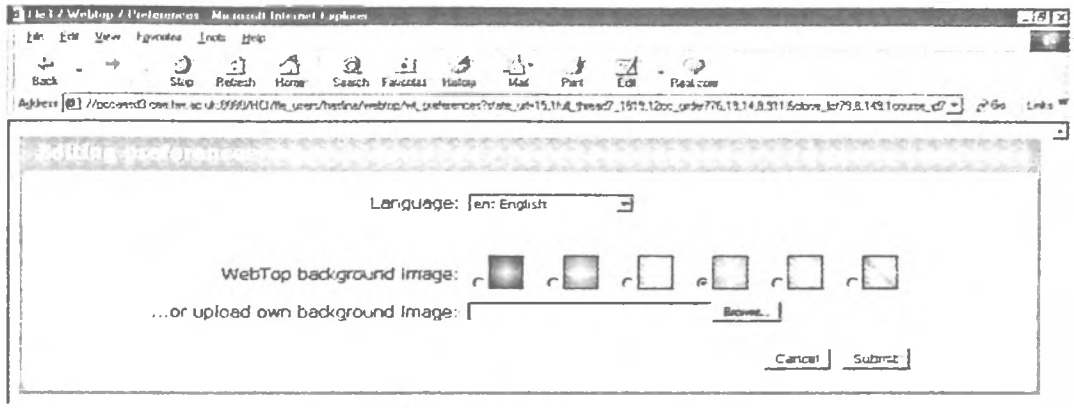
4.13 Adding user to the course page.

4.3.4 Screen Design and Layout

The Fle3 is design to support problem based learning and inquiry learning which help students and teachers to engage in co-ordinating effort to solve problems and build knowledge together. It also concentrates on creating and developing expressions of knowledge (i.e. knowledge artefacts).

User can change the background image of the WebTop either by choosing the images provide in the Fle3 database or uploading their own background images. They can also change the language that is easy to localise to different languages. Currently users may choose their user interfaces language to be Finnish, English, Spanish, French, Portuguese, Dutch, Italian, Lithuanian or German.

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4.14 Editing preferences on the 'WebTop' page.

The Fle3 web browser is a default template and because it is free software, the entire users who install this program into their own directory will get the same layout design. However, the course layout design, button images, font type, style and size, navigation toolbar and etc can only be change in the Zope web browser by the Zope manager (owner).



4.15 Editing 'Course.html index page' in Zope web browser.

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4.3.5 Practical restriction

The practical restrictions for this web browser implementation are:

1. If the user was using a web server that comes bundled with Zope, this server is very unstable. It may crash under load, and not come back up without explicit actions. However, Daemontools application can be used to monitor Zope status, and restart a crashing Zope.
2. When running Apache the character encoding don't work, even though on every page the character encoding is set to utf-8 with a meta tag. The reason is Apache and its behaviour in 'AddDefaultCharset' to set default encoding to ISO-8859-1. If nothing else is set, and it also overwrites whatever is set in the html head section. This can be solve by setting in the 'VirtualHost' section 'AddDefaultCharset' Off, which then preserves the encoding directives, set by Zope.
3. If the user has been using the Fle1 and Fle2 version, they can not upgrade it into Fle3 version. This is because the Fle3 version is a completely separated product. They need to install the Fle3 version and started the course all over again.

4.4 Conclusion

In the earlier stage the previous version of the Fle3 (Fle3 version 1.0 and 1.1), has been install in the system but there are few technical problems with the installation process. After the installation done, the Fle3 web browser was not working and the process of reinstallation had been done again but the same problem occurs again. However, when the Fle3 version 1.3 was release earlier on August 2002, the installation finally succeed and the Fle3 web browser can be run and a new course can be set up into the program. After all the implementation and setting up course contents, users and discussion messages, an evaluation study was conducted and explained in the next chapter.

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CHAPTER 5 : Evaluation Studies

5.0 Methodology Introduction

The purpose of this evaluation study is to evaluate the course structure of TT3023 Interface design and Electronic Publishing created in the Fle3 application. This evaluation is to assess the effect of the interface on the target user and identify any specific problem with the Fle3 web browser.

5.1 Objectives of the evaluation study

- To get some feedback on the look and feel of course structure in term of colour, background, navigation and consistency and all the media type that are used in the Fle3 web browser.
- To examine opinions, attitudes, comments, feedback and problems during discussion in the Knowledge Building.
- To access the impact of capability of both tutors teachers, instructor and students who will highlight the nature of it success and problems.
- To draw up for further implementation of teaching materials, tasks, feedback and their evaluation.

5.2 User Sampling

There are two types of user used in this evaluation study, which are:

5.2.1 Target User:

Twelve users which are B.Ed (Information Technology) students from Sultan Idris, University of Education, Malaysia. (UPSI)

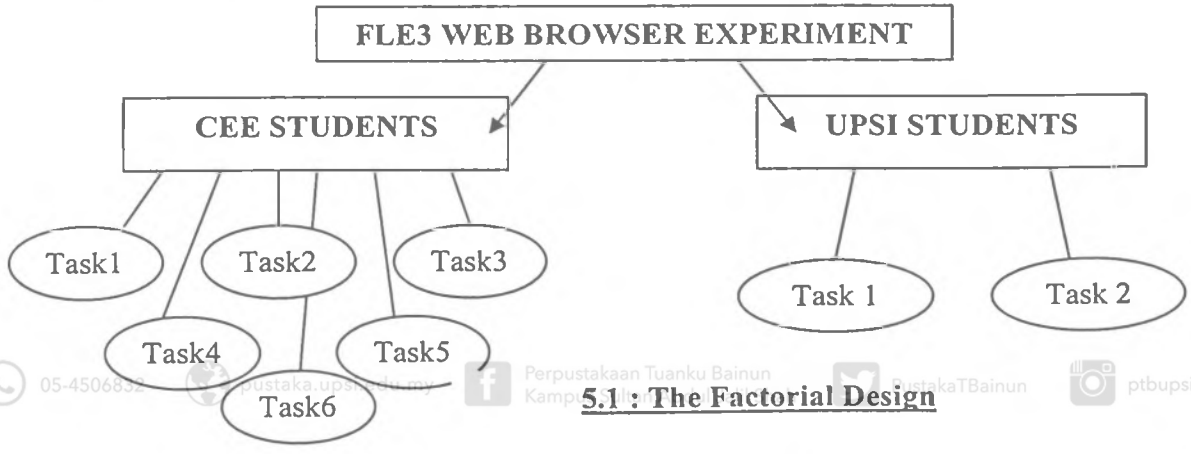
5.2.2 User Associates (Colleagues):

Nine users (postgraduate students) from the department of computing and electrical engineering (CEE). Six of the users have taken the 'Design for Online Learning' course during the first semester 2001.

5.3 Evaluation Design

5.3.1 Treatment

Between user:



5.1 : The Factorial Design

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5.3.2 Independent Variables

Independent variables are an investigation that the researcher changes or manipulates. It was a method of instruction. The experimenter and levels of treatment has controlled the variables in this investigation.

The variables are:

- Users (Undergraduate students and Postgraduate students).
- Number of users.
- Background of users.
- Internet browser (Netscape browser or Internet Explorer).
- Computers and Internet network.

5.3.3 Dependent Variables

Dependant variables are what the experimenter measures in both the experimental and control groups. In this questionnaire for CEE users, the variables are

- Time (How long users took to finish task)
- Errors (How many times errors happened to users)
- Helps (How many times helps users call for)
- Pages (How many times clicks or pages users used in this task process)
- Overall (Overall satisfaction of the users)
- Access (Ability user to access the web browser)
- Navigation (How easier the users navigate through out the web browser)
- Content (How clearly was the content)
- Format (How the content format was set and identify)

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While for the UPSI user the dependent variables are feedback and responses on:

- Discussion activities.
- Student-centred learning.
- Group activities.
- Learning with technology.

5.3.4 Confounding Variables

Confounding variables are uncontrolled extraneous variable or other flaw in the research design that yields alternative explanations for the results and thus limits the study's internal validity. The confounding variables in this evaluation study are:

5.3.4.1. Users Experiences

Some of the users have never experiences using virtual learning environment or online discussion software.

5.3.4.2. User Attitudes and contribution.

The target user was user in Malaysia. They are the actually user whose using the Fle3 web browser while the course is conducted in class. However, most of the users are not an active user and less interested to contribute in the online discussion.

5.3.4.3. Environment

In online evaluation, which is handle in Malaysia, observation can not be made because of the distance.

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5.4 Measurement Technique :Questionnaires

This evaluation study has been conducted by using the questionnaire method, which were using 2 types of questionnaire, which are SUS (System Usability Scale) and Modified Shneiderman. Questionnaire is design in a reliable manner suing carefully constructed and unambiguous question posted in systematic logical pattern. There are two ways of conducting the questionnaire, which are by conventional version and online-real time version. In online, real-time questioning, the timing of question must correspond to the interactive event and phases or function currently experienced by the user.

The online version questionnaire was conducted for user in Malaysia because of the distance between Edinburgh, UK and Malaysia. Users in Malaysia, access the WebCT application by using the WebCT ID and password provided and answer the online questionnaire which the evaluation are based on the course content, task and discussion point. It is easier to do the online questionnaire in the WebCT because they access the Fle3 web browser through the WebCT application. At this point the evaluation can be done anytime and anywhere.

There are also nine users from the School of Mathematical and Computer Science. Most of the users are the MSc student and six of them have taken the Design for Online Learning course. The evaluation has been conducted manually and an observation has been carried out during the evaluation.

5.4.1 The System Usability Scale (SUS)

The System Usability Scale (SUS) is a simple, ten-item scale giving a global view of subjective assessments of usability. SUS is a Likert scale which is simply one based on forced-choice questions, where a statement is made and the respondent then indicates the degree of agreement or disagreement with the statement on a 5 (or 7) point scale.

5.4.1.1.Using SUS

The SUS scale is generally used after the respondent has had an opportunity to use the system being evaluated, but before any debriefing or discussion takes place. Respondents should be asked to record their immediate response to each item, rather than thinking about items for a long time. All items should be checked. If a respondent feels that they cannot respond to a particular item, they should mark the center point of the scale.

5.4.1.2.Scoring SUS

SUS yields a single number representing a composite measure of the overall usability of the system being studied. Note that scores for individual items are not meaningful on their own.

To calculate the SUS score, first sum the score contributions from each item. Each item's score contribution will range from 0 to 4. For items 1,3,5,7,and 9 the score contribution is the scale position minus 1. For items 2,4,6,8 and 10, the contribution is 5 minus the scale position. Multiply the sum of the scores by 2.5 to obtain the overall value of SU.

SUS scores have a range of 0 to 100.

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5.4.2 Modified Shneiderman Questionnaires

Shneiderman (1992), the well-designed things can have a sizeable impact on learning time, performance speed, error rates, and user's satisfaction. In the Shneiderman's principles, they were created to make program designing more user/object oriented. In this type of questionnaires there are six sections to be evaluate which are:

5.4.2.1. Past Experience

This section is asking about user experiences in using the WWW/Internet and knowledge in using any virtual learning environment, messenger, discussion or collaborative software.

5.4.2.2. Overall reaction

This section is about knowing user overall reaction on the Fle3 web browser.

5.4.2.3. Access

This section is to know the user ability in accessing the web browser in-term of time, difficulty in 'Log In' and downloading the main page of the fle3 web browser.

5.4.2.4. Navigation

This section is to evaluate the navigation around the web browser in-term of finding information, files or documents, moving between each category, creating and sending messages and the overall navigation.

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5.4.2.5. Content

This section is to look at the usefulness of the Fle3 web browser in-term of it category names, page layout, information in each pages and ability to create memo and add folder, links and documents.

5.4.2.6. Format

This section is to evaluate the ability to read the messages, spacing involve, any form of highlighting, replying option and read documents in Words and PowerPoint format.

5.4.3 Online Questionnaire for UPSI users

The online questionnaire has been developed by using the WebCT application. Students at UPSI, Malaysia need to login their username and password into this application. At UPSI, Malaysia, WebCT application has been used as web learning application in campus-based situation. It is easy to conduct an online questionnaire by using the WebCT because the students access all the course notes and discussion through this application every day, anywhere and anytime.

This study sought to explore the response of the learners to alternative form of learning environment. In particular students' responses to 4 particular aspects of the learning environment were of interest: the discussion activities, working in-groups, the student-centered modes of learning and use of the technology to support learning. The questionnaire used a Likert scale response with 5 categories arranged so that the middle category indicated an expected level of satisfaction with the item while the other responses enabled students to show higher or lower levels of satisfaction.

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The responses used in this questionnaire are:

- Not at all
- Not much
- Reasonably
- Quite a lot
- Lots & lots

Here are the aspects of the online questionnaire:

1. **Student feedback and responses to discussion activities.**

   This section is to question concerning student's impressions of the discussion activities.

2. **Student feedback and responses to student-centred learning.**

   This section is to question about individual respond toward the way lecture, activities and discussion was conducted either online or in class.

3. **Student feedback and responses to groups activities.**

   This section is to get respond from students based on their ability to work in-group or individual.

4. **Student feedback and responses to learning with technology.**

   This section is to look at respond from student toward the usage of technology.

5.4.4 Task.

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5.4.4.1. CEE User Tasks

There are two types of task set in these evaluation studies and each tasks are different for different users. There are six tasks set for user at the school of Mathematical and Computer Science, which are

1. When you log in into the Fle3, what is the name of the category that you are in
2. What is the course name that you have access in the Fle3 web browser:
3. How many categories (tools) are use in the Fle3 web browser:
4. What is inside the 'Jamming' tools, can you name the title
5. How many artefact inside the 'The Three Models' under the Jamming category.
6. Under which categories can you fmd the 'Website' link folder?

5.4.4.2. UPSI User Tasks

There are two task set for user at UPSI, Malaysia, which involve discussion issues. Here are the two topic that the user have discuss:

1. Look at some or all of the following objects: a book, a pair of scissors, a cup, a corkscrew. Discuss the affordances of the objects and the constraints that these place on their use.
2. The flexibility of computer software nowadays makes it possible for designers to provide special services to users who have disabilities (Edwards, 1995). Discuss this statement.

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5.5 Materials

The following materials were used in the evaluation study:

- Any Windows NT PC used in the School of Mathematical and Computer Sciences, Heriot Watt University, Edinburgh.
- Any PC network to the Internet at the Information Technology Laboratory at Sultan Idris, University of Education, Malaysia.
- SUS questionnaire
- Modified Shneiderman questionnaire.
- Online questionnaire.
- Task sheet.

5.6 Procedure

This procedure has been conducted for the CEE users:

1. Users were identify and selected. An appointment has been arranged with them.
2. Each user interview alone with an observer. This would allow the observer to pay more attention on how the user react to the system and provide the help when the user has some problem with the task and questionnaire.
3. At beginning of the experiment, the background and experience will be surveyed by the evaluator.
4. Then the observer introduces the task to the user and gives out the instruction sheet for the user to do.
5. The user was asked to complete the task :
   At the same time the observer recorded the time taken to complete each task and filled in the Measuring Usability sheet. The Measuring Usability sheet contains 5 questions related to how the user performs with the task. The observer has note down the reaction time, page clicked and times of help user called. When there are an error the observer will note down the type of error user made. If the error was not clear, the user will be interview afterwards.
6. The user was asked to fill in the SUS questionnaire.
7. The user was also asked to fill in the Modified Shneiderman questionnaire.

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5.7 Conclusion

During the process of conducting the evaluation studies there are also certain aspects of evaluation need to be consider. There are two different questionnaire distributed to two different users. An observation technique together with two types of questionnaire (SUS and modified Shneiderman) has been conducted for the CEE users, while only online questionnaire has been used for the UPSI users. On the next chapter, the evaluation studies will be analysed and the result will be explained in more detail.

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CHAPTER 6 : Analysis of Evaluation Studies.

6.0 Introduction

This chapter includes all the compilation of the data collection from the evaluation study carry out in the previous chapter. The experiment results are based on probabilities that were set in the earlier stage of the evaluation.

6.1 Result and Analysis of System Usability (SUS) Questionnaire

There is only one domain involves which is from the CEE users. The CEE users have carry out six (6) tasks. The CEE user domain consisted of nine (9) users, making the total number of attempts for the domain is 36.

The SUS questionnaire was scored using the standard method. Table 6.1 shows the SUS scores for the CEE user domain. An average of the individual scores of the CEE users was calculated to provide an overall SUS score.

CEE Users	Score	Mean	Different	Ignore +/-	Squared
User 1	87.5	66.4	21.1	21.1	445.2
User 2	70.0	66.4	3.6	3.6	13.0
User 3	30.0	66.4	-36.4	36.4	1325.0
User 4	54.0	66.4	-12.4	12.4	153.8
User 5	50.0	66.4	-16.4	16.4	269.0
User 6	77.5	66.4	11.1	11.1	123.2
User 7	85.0	66.4	18.6	18.6	346.0
User 8	77.5	66.4	11.1	11.1	123.2
User 9	50.0	66.4	-16.4	16.4	269.0
Total score	**581.5**			**147.1**	**3067.2**
Average score	**64.6**				
Mean Deviation	**16.34**				
Standard Deviation	**19.49**				

Table 6.1 SUS score of the CEE users.

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6.2 Analysis of Modified Shneiderman Questionnaire

The modified Shneiderman questionnaire was used to record user opinion. As mention in the previous chapter there are six section of user reaction in the modified Shneiderman questionnaire, which are past experiences, overall, access, navigation, content and format.

User Past Experiences				
	Less 1 year	Between 1-2 years	Between 2-3 years	More than 3 years
Question 1.1		1		8
	Less 1 hour	Between 1-4 hours	Between 4-10 hours	More than 10 hours
Question 1.2		1	1	7

Table 6.2 User Past Experience Table.

Table 6.2 on the previous page shows 89% of the CEE user has been using the Internet for more than 3 years, while 78% of them used the internet more than 10 hours a week. This is result shows that most of the users are familiar with the usage of Internet and help them to understand the propose of using this application.

To analyze the result from this five section, three distinct categories of emotion were employed. The allocations are based on the scale rate of 1 to 7 as shown in the following format:

- Response '1', '2' and '3', the reaction counts as 'Poor'.
- Response '4, the reaction counts as 'Indifferent'.
- Response '5', '6' and '7', the reaction counts as 'Good'.

Table 6.3 shows the number of questions and the total amounts of allocate reaction. Based on the table below, 83% of the users consider the overall reactions on the Fle3 web browser are 'Good'.

User Overall Reaction			
Questions	Poor (1-3)	Indifferent (4)	Good (5-7)
Question 2.1	1		8
Question 2.2	1		8
Question 2.3		1	8
Question 2.4		2	7
Question 2.5	1	1	7
Question 2.6		2	7
Total	3	6	45
Percentage	6%	11%	83%
Overall Total	54		

Table 6.3 User Overall Reaction on the Fle3 web browser.

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On table 6.4, 81% of the users agree that the downloading speed of the page is fast enough and only 4% of them claimed the opposite situation. The Fle3 program was set on a server in the CEE department and all the users have access this program through the Windows NT PC in the department. In this situation they should get fast access to the server and this can be identify through the result in table 6.4.

User Access Reaction			
Questions	**Poor (1-3)**	**Indifferent (4)**	**Good (5-7)**
Question 3.1		4	5
Question 3.2	1		8
Question 3.3			9
Total	**1**	**4**	**22**
Percentage	**4%**	**15%**	**81%**
Overall Total	27		

Table 6.4 User Access Reaction on the Fle3 web browser.

Eighty two percent of the users claimed that the navigation around the Fle3 web browser is 'Good' but 9% claimed it was poor and indifferent to them (table 6.5). Some agree that navigate to each category in the Fle3 web browser was easy and understandable. They also easily identify the page indication (information show which page they are in at the moment).

User Navigation Reaction			
Questions	**Poor (1-3)**	**Indifferent (4)**	**Good (5-7)**
Question 4.1	2	1	6
Question 4.2	1	1	7
Question 4.3			9
Question 4.4		1	8
Question 4.5	1	1	7
Total	**4**	**4**	**37**
Percentage	**9%**	**9%**	**82%**
Overall Total	**45**		

Table 6.5 User Navigation Reaction on the Fle3 web browser.

In table 6.6, 69% of the users agree that the content and information provided in the course set up in the Fle3 was useful while 18% of the user rated this as poor. Some of the reason contribute to this outcome are; user does not seem to understand the purpose of the Fle3 program which this program was develop by building knowledge based on discussion and giving feedback in collaborative approach. Some of the users think that this application are like other online or web based learning environment where user access the web browser and get the notes, tutorials and etc, which in this program that was not the main aspect and usage of this program. Few of the users have asked the purpose of the fle3 because they didn't seem to see the objective of using it. The observer has provided clear information in this situation.

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User Content Reaction			
Questions	**Poor (1-3)**	**Indifferent (4)**	**Good (5-7)**
Question 5.1	1	2	6
Question 5.2	2		7
Question 5.3	3	1	5
Question 5.4	3	1	5
Question 5.5		1	8
Total	9	5	31
Percentage	20%	11%	69%
Overall Total	45		

Table 6.6 User Content Reaction on the Fle3 web browser.

In the table 6.7, most of the users (80%) agree that the format used in the Fle3 web browser is easy to read and it also including format in line spacing, words highlighting and document formats used such as Words, PowerPoint were consistently design and used. Some of the user comments that in the knowledge building, the messages are quite long and they need to used the scroll bar to look at the whole content messages. However, to solve this problem, the user was inform to use the 'hide text' option, which this will shorten the list of messages and make reading more flexible.

User Format Reaction			
Questions	**Poor (1-3)**	**Indifferent (4)**	**Good (5-7)**
Question 6.1			9
Question 6.2	1	1	7
Question 6.3	2		7
Question 6.4	1	1	7
Question 6.5	2	1	6
Total	6	3	36
Percentage	13%	7%	80%
Overall total	45		

Table 6.7 User Format Reaction on the Fle3 web browser.

6.3 Analysis of Tasks

The task analysis below was based on evaluation study carry out by the CEE users.

6.3.1 Analysis of Task Completion

Table 6.8 shows the number of times the task was successfully carried out within the stipulated time of two minutes. In this task, the optimal-path (optimal number of navigational link) used to complete the task was recorded. The optimal path was recorded only when each task was found successful. The result shown in table 6.8 was converted as percentages.

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Completed Task	CEE Users	
	Rate/9	Percentage
Task1 Overall	**8**	**88.9%**
Optimal Path	1	**11.1%**
Task2 Overall	**8**	**88.9%**
Optimal Path	2	**22.2%**
Task3 Overall	**9**	**100.0%**
Optimal Path	3	**33.3%**
Task4 Overall	**7**	**77.8%**
Optimal Path	7	**77.8%**
Task5 Overall	**7**	**77.8%**
Optimal Path	6	**66.7%**
Task6 Overall	**7**	**77.8%**
Optimal Path	7	**77.8%**
Total Task Completed	**46**	**511.1%**
Total Optimal Path used	**26**	**288.9%**
Task Average	**7.7**	**85.2%**
Optimal Path Average	**4.3**	**48.1%**
Overall Tasks & Optimal Path (Number of User X Number of Tasks	**(9X 6 Task)=54**	**100%**

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Table 6.8 Task Completion Analysis Table.

6.3.2 Analysis of Confusion Time During Task

Tasks	CEE Users	
	Rate/9	Percentage
Task1	1	12.5%
Task2	1	12.5%
Task3	1	12.5%
Task4	3	37.5%
Task5	1	12.5%
Task6	7	87.5%
Total Confusion	**14**	**175.0%**
Confusion Average	**2.33**	**29%**
Overall Tasks (Number of User X Number of Tasks	**(9 X 6 Task)=54**	**100%**

Table 6.9 Confusion Time Count by Task and User Domain.

Table 6.9 above show the number of time recorded when user was confused while carrying out each task. The result above showed each individual task and it percentages in overall figure.

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6.3.3 Analysis of Responses Times

Tasks	CEE Users		
	Total Time(s)	*Average Time*	*Standard Deviation*
Task1	62	6.89	3.98
Task2	77	8.56	3.91
Task3	72	8.00	3.46
Task4	129	14.33	5.89
Task5	64	7.11	3.06
Task6	342	38.00	10.75
Overall Total	746		

Table 6.10 The Average Time per Task and It Standard Deviation Table.

Table 6.10 above shows the total and average time taken to complete each of the tasks. The standard deviation for each task is also included in the table. The entire users manage to complete task before the stipulated time of two minutes.

6.3.4 Analysis of Error Times

Tasks	CEE Users		
	Total Error	Average Time	Standard Deviation
Task1	1	0.125	**0.35**
Task2	1	0.125	**0.35**
Task3	0	0.000	**0.00**
Task4	1	0.125	**0.35**
Task5	2	0.250	**0.46**
Task6	2	0.250	**0.46**
Overall Total	7		

Table 6.11 User Error Time Table.

Table 6.11 shows the average time of error occur during the tasks. Based on the table, we can conclude that most of the users manage to complete task 3 without any error. In addition the table also shows the error standard deviation for each tasks.

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6.4 Analysis of Online Questionnaire (UPSI Users)

There are twelve users involve in evaluating the online questionnaire. There are five (5) evaluation aspects and five (5) responses used in the online questionnaire. The middle response (*reasonably*) was used to interpreted what would be expected from satisfied students while the higher scales (*quite a lot* and *lots and lots*) and the lower scales (*not at all* and *not much*) was taken as responses from the students who were expressing more positive and negative attitudes.

6.4.1 User Past Experiences:

Below are the data summaries of the user past experience from the online questionnaire.

1.1 How long have you used the WWW/Internet:

1. Less than a year. *2. Between 1-2 years*
3. Between 2-3 years. *4. More than 3 years*

1	2	3	4
2	1	4	5
16.7%	8.3%	33.3%	41.7%

Table 6.12 Table of User Experience using WWW/Internet.

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1.2 On average, how many hours do you spend per week using the WWW?

1. Less than 1 hour. *2. Between 1-4 hours*
3. Between 4-10 hours. *4. More than 10 hours*

1	2	3	4
1	2	4	5
8.3%	16.7%	33.3%	41.7%

Table 6.13 Table of hour users spend using WWW/Internet.

In table 6.12 and shows that 41.7% of the users have been using the Internet for more than 3 years, while in table 6.13 shows, 41.7% of the users have been using the internet for more than 10 hours a week.

6.4.2 Student Feedback and Responses to Discussion Activities:

In this section, students responses to question concerning their impressions of the discussion activities were generally quite positive (table 6.14). Ninety two percent of the students appeared satisfied with what they learned from the discussion activities while eight percent (8%) claimed not to learn very much (Question 2.1). The other responses showed that the learners were generally encouraged to read and think by the activities (question 2.2 & 2.4) although in both instances a large number of learners (8% and 24%) claimed not to have done this much. In terms of the difficulty experienced in the discussion activities (question 2.3), 50% found the tasks to be a reasonable level of difficulty while the remainder of the students found them either too difficult or too easy.

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Question		Not At all	Not much	Reasonably	Quite a lot	Lots & lots
2.1	How much did you find doing the discussion helped you to learn?	1 (8%)	2 (17%)	6 (50%)	3(24%)	0 (0%)
2.2	How much did you find doing the discussion encourages you to read?	1 (8%)	1 (8%)	7 (58%)	3(24%)	0 (0%)
2.3	How difficult did you find it to get a good answer for the discussion issues?	1 (8%)	5 (42%)	6 (50%)	0 (0%)	0 (0%)
2.4	Doing the discussion made me think about the discussion content.	0 (0%)	3(24%)	5 (42%)	4 (33%)	0 (0%)

Table 6.14 Student Feedback & Responses to Discussion Activities.

Interpretation of these findings suggested that while the students generally were quite positive about the discussion environment, there were many students whose responses suggested a degree of discomfort with the activities. The results suggested the need to revisit the feedback/comments, which were given, and to explore ways for students to contribute more ideas or comments rather than just agree with others people opinion.

6.4.3 Student Feedback and Responses to Student-Centred Learning :

In response to questions concerning their preference for learning by themselves or being taught, the group appeared equally divided (e.g. questions 3.2 & 3.4). The spread of responses in table 6.15 suggest that among these students there was a preference towards higher level of teacher directing in their learning as distinct from total learner control. Interestingly in response to a question seeking their impression of how much they learned by being active learners (question 3.3), the result demonstrated that majority of these students (100%) saw active learning as more effective than passive learning.

Question		Not At all	Not much	Reasonably	Quite a lot	Lots & lots
3.1	How enjoyable did you find doing the discussion was?	1 (8%)	2 (17%)	7 (58%)	2 (17%)	0 (0%)
3.2	How much would you prefer the material to be taught to you?	0 (0%)	0 (0%)	4 (33%)	8 (67%)	0 (0%)
3.3	How much more do you learn by being active rather than just listening to the lecturer?	0 (0%)	0 (0%)	8 (67%)	4 (33%)	0 (0%)
3.4	How much do you prefer to be taught things than to have to learn them yourself.	0 (0%)	0 (0%)	6 (50%)	6 (50%)	0 (0%)

Table 6.15 Student Feedback & Responses to Student-Centred Learning.

The high level of student preference for the environment where they are taught rather than having to learn by themselves was not surprising. Student-centred environments are typically more work for the students and require them to be more organised and more responsible. It appeared that having more than 50% of the students claiming to favour student-centred learning was quite a good outcome and one that suggested that this form of environment might be able to be altered to raise this number even higher.

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6.4.4 Student Feedback and Responses to Group Activities :

The group work tended to be viewed positively by the majority of the students (question 4.1), but still 24% gave negative responses. Nearly 67% of the learners indicated that they felt the group activity aided their learning (question 4.2), but still leaving a sizeable proportion of 32%, who get a little value from it. Responses to question 4.3 revealed that 74% of the learners would still prefer to work on their own. However, only 42% indicating that they felt the group work was shared (question 4.4) while more than 50% learners claimed that not all of them willingly to share their work in-group. It is highly likely that students' lack of appreciation of group works was connected to the unstructured processes that many tended to use and the fact that little guidance was given to direct the students as to what might be appropriate ways to work in groups. There is also still a wide communication barrier between the learners and the discussion activities should be revisited again to develop and motivate more group work and group-consciousness.

Question		Not At all	Not much	Reasonably	Quite a lot	Lots & lots
4.1	How much did you enjoy working in-group?	3(24%)	2 (17%)	5 (42%)	2 (17%)	0 (0%)
4.2	How much did you find doing the discussion in a group helped your learning?	1 (8%)	3(24%)	6 (50%)	2 (17%)	0 (0%)
4.3	How much would you prefer to do the activities on your own?	1 (8%)	2 (17%)	7 (58%)	1 (8%)	1 (8%)
4.4	How much did people in the group share the work.	2 (17%)	5 (42%)	5 (42%)	0 (0%)	0 (0%)

Table 6.16 Student Feedback & Responses to Group Activities.

The result in table 6.16 provides yet further evidence of a considerable mismatch between learners' expectation and this form of learning environment. Despite high levels of enjoyment and equally high perceptions of perceptions shared learning and effective learning, half of the cohort were still not predisposed to the forms of collaborative learning provided in this environment.

6.4.5 Student Feedback and Responses to Learning with Technology :

A characteristic feature of this learning setting was its strong use and reliance of web based tools and facilities to support the learning. The study sought to find out from the learners how to use of the technology impacted on their learning and whether there were ways to modify this aspect of the course to improve learning outcome. More than 65% of the learners expressed positive views about the utility of the web as an information source and its capacity to support this learning activity (question 5.1 and 5.3). This was not an unexpected result given the nature of the task and the support provided by the web for their information seeking activities. Ninety-two percents of the learners expressed positive views about the use of the web and e-mail: as a learning support (question 5.2). This also reflected the numbers of learners who met face to face and didn't need e-mail to communicate (table 6.17).

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Question		Not At all	Not much	Reasonably	Quite a lot	Lots & lots
5.1	How useful did you find the WWW as a source of information for the discussion.	0 (0%)	2 (17%)	4 (33%)	5 (42%)	1 (8%)
5.2	How useful did you find the internet for communication with the group members.	0 (0%)	1 (8%)	8 (67%)	2 (17%)	1 (8%)
5.3	How useful did you find the WWW as a means for organising the problem-solving process?	0 (0%)	4 (33%)	5 (42%)	3(24%)	0 (0%)
5.4	How reliable did you find the technology in supporting the learning process in this unit?	0 (0%)	3(24%)	5 (42%)	3(24%)	1 (8%)

Table 6.17 Student Feedback & Responses to Learning with Technology.

In question 5.4, nearly 80% of the learners find the technology help to support them in learning. However, it also identify an inherent weakness in the environment and one that was very obvious during the running the activities is the question of web reliability. The learners were very critical throughout the course of the reliability of this form of learning environment. Some of the students reported such problems as broken web links, servers not responding, long download times, insufficient access to computers and network problems as strong impediments to their learning. Despite every effort this was not always delivered and probably led to a good deal of the dissatisfaction expressed by some learners.

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6.5 Conclusion

The result of the evaluation used in this study was conducted to test the Fle3 web browser alone without need to compare it with different groups of user. Each user in this evaluation study was using different type of questionnaires and these contribute to different type of outcome. The CEE users were used to get some feedback on the overall design and layout (usability study), while the UPSI users were used to get some responses based on the learning outcome that they get after using this web browser in web-based learning environment.

The study carry out on the UPSI users have explored students' learning strategies and successes in web-based learning environment, which was designed to support problem-based learning using student-centred and collaborative approach. The result based from the online questionnaire indicated that nearly 50% of the users does not prefer this form of learning. Similarly, the majority of the students stated level of enjoyment and success in the collaborative learning settings but nearly 50% said that they would prefer to work alone rather than work in-group. Those undertaking this research are committed to developing student-centred and collaborative learning settings which are known to be good for the learner and provide some of the best forms of cognitive engagement for tertiary students. The finding suggest that a useful first step will improve the Fle3 web browser to provide more structure and guidance to students in the organisation and management of the group activities.

The study also revealed that participation in the discussion activities setting was not sufficient to develop students' problem-solving skills. There was no discernible improvement in the scores achieved by the students for problem solutions between the commencement and conclusion of the study. The development of these skills it would

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appear must come from some deliberate strategy aimed at helping students to reflect on their learning process and through feedback, which informs and encourages their progress. These issues will be explored further through some modification to the discussion tasks and problem solving skill and more structured feedback mechanism to guide the learners will be implemented.

The result also indicated that nearly 85% of the CEE users appeared satisfied with the Fle3 web browser in-term of the downloading access, navigation, layout, content and formatting. This type of user was used to evaluate the look and feel of course structure in term of colour, background, navigation and consistency and all the media type that are used in the Fle3 web browser and was successful carry out. In the SUS questionnaire the average overall result was 65% and this shows that most of the CEE users agree that the system usability of the Fle3 was good but there are still some space for restructuring and reorganising the course knowledge building. Each user also manages to complete an average of 85% of all the tasks given in the study. This result indicated the tasks that were used in this study were not difficult but there is also some confusion and error occurs happen.

Overall the study has provided with a considerable number of issues to consider about the use of the alternative teaching strategies. It is clear that consideration of the practical issues associated with their implementation is needed, if the full ranges of opportunities are to be gained. The information from this study is wide and varied and while it provides some sound advice to guide the further refinement and development of the collaborative learning environment, it also poses important questions about how such system can be implemented to provide the most advantage to all learners. The future research and development in this area, can be continue with the view to refining the web-based learning environment so that it meets all expectation for supporting and enhancing student learning using a collaborative knowledge model.

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CHAPTER 7: Conclusion

7.0 Introduction

This dissertation has focused on the evaluation of an open-source web-based learning environment Fle3 web browser. This final chapter briefly summarises the findings of the author research in this area. In this chapter all the technical and general problems that occur during the implementations and evaluation process of the Fle3 web browser will also be stated. A number of recommendations will be outlined which hoped would result in a successful reorganise the Fle3 course structure. The final part of this chapter will consider other areas of research that can be studied in this field

7.1 Summary

This dissertation has taken a look at scope and area where this application can be implement as a different approach to web-based learning. The main focus of this dissertation was to evaluate and investigate the used of the Fle3 system in developing collaborative approach in the web-based learning environment. Unlikely from others type of virtual learning environment software, this type of application has used a collaborative and student centred approach in developing learners knowledge. Working in-groups traditionally, has been a central feature of learning in Higher Education. Group work may occur in a variety of circumstances. It serve a range of purpose which are to further students' understanding or refine their critical thinking skills and focus of the dialogue activity but in other context it also be more integrate practical and conceptual knowledge, with a focus on procedural form of activities

7.2 General and Technical Problems

7.2.1 Computer Facilities

In the first place, when the investigation of the application was done, the need of installation of the application was require to see the basic design and structure of the system. In the beginning, the entire program requires such as Zope, Python, and PIL program were download into author main directory in the *'ceehh' on surya.cee.hw.ac.uk (H:)'*. However, all of these programs cannot be install into this directory because of the limited space available. The other reason is a computer need to be set up as a server and this require a stand alone PC in preferably Windows NT operating system.

7.2.2 Working area

The working area for the PC server has to be set up because the author need to access the computer to do all the installation and setting up process. This working place is also needed so that no unauthorised person can access the computer and modify the content or the setting up menu. When the PC was running as a server the computer must be switch 'On' all the time because the user in Malaysia will be going to access the server at night-time (because of the different time between UK and Malaysia; different in 8 hours).

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7.2.3 Computer support

The application was develop by the developer at Helsinki University of Finland, every time the author have problem with the application, the developer at this university need to be contacted. Some of the problems that happen during the implementation process such as installation or running the Zope web browser really need some time to solve. It is really depend on the nature of the problems, especially when it came to problem that are difficult to be explain by words which you need a person to attend to it. It indeed a big problem because sometimes it hard to asked the problem manager at the department to solve it when the you know the only person who understand the programming structure or solving the bugs are from those people in Finland.

7.2.4 Server access permission

When the Apache server was set up, it can only be access by user in department. To have it available to the 'world' (outside the university), permission from the computing services was needed. It takes some times and this does delay the process of evaluation study.

7.3 Implementation Problems

The implementation process was when all require programs were download, installed and set up in the computer. Here are few of the problems that occur during the process:

7.3.1 Downloading and Installation

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There are few programs need to be install in the computer before the Fle3 can be running into the server. This installation need to follow by installing Python, PIL, Zope and Fle3 not the other ways around because the Zope application will automatically scan for Python file before the installation begin while installing Fle3 is through the Zope web browser. However, when the author tries to unpack the Fle3 file, which was set in '. zip' format file, the file was not successfully unpack, there are some errors occur during the unpacking of the 'Fle3.zip' file. When the unpacking process happen, the zip file has created a numbers of folder in a directory folder name FLE, however inside each of the folders, there were no files. The author have to copy and paste each files to it appropriate folder one by one, when the files were inserts manually, some of the files was incorrectly copy to different folders and this produce errors when the Fle3 program was create in the Zope web browser.

7.3.2 Reinstallation

The installation process was done more than once during the implementation process, this happen because of the Zope web browser was not working properly. When the installation was done again, a different user name and password need to be set up and the previous Zope program(install) need to be remove from the program Files in the C:/ directory. To access the Zope web browser, the user need to log in by using their user name and password where they have set up during the installation. After the Zope program was install, the unpack files of the Fle3 need to be move into the Zope directory. At this stage when the user started the Zope web browser, it will automatically detect the Fle3 files and the course setting up process can be done.

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7.3.3 Upgrading version

When the first downloading of the Fle3 was done in the middle of June 2002, the latest version of the program was 1.1 and 1.2. There are lots of unstable errors occur when this version of Fle3 was install and used in the Zope application. The Zope web browser cannot detect the Fle3 files and this file has appeared as a broken sign, which mean the file was corrupted. However, when a new version of fle3 was released on 8 of August 2002, known as Fle3 version 1.3, the author have install the new version and the Fle3 program was successfully run in the Zope web browser.

7.3.4 Log in

The Zope and Fle3 web browser were two types of difference web browser and needed two different user name and password. In the earlier stage, the log in process has a problem because of the different user name. To solve this problem the author has used the same password and user name for the Fle3 web browser, which was also used in the Zope web browser. At this point the process of managing and setting up all the content, option and adding process can be done easily and smoothly.

7.3.5 Management

To management both of the web browser, the author has to make certain changes to the security access menu in the Zope web browser. There are also some problem occur in process of changing course document, or adding users, files and setting menu option. This happen because some of this process was disabled during the installation of Zope application. The author need to enable all the require process manually through the Zope web browser using a bit of programming code.

7.4 Evaluation Problems

There are limitations in the evaluation study and here are lists of problems happen during the evaluation study of the Fle3 web browser:

7.4.1 User Selection

The Fle3 was developed not only to support online learning but also used in face to face situation (in class). This mean that the users that are going to be used in this evaluation should be a real users who are taking a on going course. In the beginning, the author has planned to use real users in Heriot Watt University, but because all the undergraduate students was on summer break for 3 months, this option was not suitable for the evaluation studies. However, after discussing the matter with author supervisor, he has suggested that the author could use students at UPSI, Malaysia. By doing this evaluation with long distance users, the authors did aware that some part of the discussion, which would be more applicable to be handle in class, could not be done in this situation.

7.4.2 CEE User Criteria Selection

As mention in chapter 5, there are two types of user used in this evaluation study. Each user has different type of questionnaires and released different outcome from the evaluation. The CEE user selection was made based on those who has taken the online learning course last semester 2001 but out of nine users only six of them have taken the online learning course. The important reason why those who have taken the online learning course was chosen as a user, it was because of all the

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students (who has taken the course) has the same exposure to web-based learning environment especially in online discussion. It was assume that the users would understand more of the application and compare it, based on their experiences in using web-board in that particular course. However, it's not easy to get all the course members' participant in this evaluation (because of time and space limitation), three of the users was choose from other courses. In this situation, there was some negative feedback and quite a few confusion matters asked by the users about the purpose used of the Fle3 web browser. If the all the nine users has taken the course and willingly to evaluate the application (which I found quite difficult to do), the result would indicated differently.

7.4.3 UPSI user selection

The actually students that register to the 'TT3023 Interface Design and Electronic Publishing' course in Sultan Idris, University of Education, Malaysia was about 33 students. Only 12 students have been selected to participate in this evaluation study, which were selected based on their ability to speak and write in English. However not all of them are an active participant in online discussion which was conducted in the Fle3. Some of them prefer to be on their own and become a passive participant. It is difficult to identify which students are active or not in this situation especially when distance was one of the main factor that limited communication between the author and the users.

7.4.4 Web Reliability and Distance.

During the evaluation the web reliability was one of the main problems. It was not only because of the problem to access/communicate with the lecturer in UPSI, Malaysia but also when the students trying to access the Fle3 server. The author has always face the same problem to contact the course instructor in Malaysia because of the e-mail server problem at the university in Malaysia was not accessible. It sometimes takes the author for a week before the person (course instructor) and her students can be contacted. Even the evaluation study was conducted quite late because some of the students was on holiday during the mid semester break and graduation days.

7.4.5 Task Selection and Observation.

The user at UPSI, Malaysia has been given 2 tasks to discuss in the Fle3 web browser. However, the students did only 1 task in the evaluation study. It quite difficult to observe the students when your are million miles away from the students. In reality, the Fle3 system should be used in both face to face and online environment. It doesn't applicable if the tasks was done only online without any feedback or comment in face to face situation as well, where some of the students might find more afford to discuss the tasks when it done in both ways. It is also difficult to observe the students behaviour in-term of usability, comfort and usable in using the Fle3.

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7.5 Solutions Taken to Solve Problems :

1. PC and Work Place Set Up

The authors has been given the stand alone PC, to install the Apache server and all required programs. A work place was also given to the authors at room 2.40 (the Institute of Computer Based Learning (ICBL) laboratory and later was move to room G.41 at department of Computing and Electrical Engineering.

2. Installation of Fle3 latest version (1.3 beta 2.0)

The author has selected to used the latest released version of Fle3, after months of struggle to install the Fle3 into the server. The latest version was the stable version after the Fle3 developer in Helsinki University in Finland, has solve all the bugging and problems that occur in the previous versions. When this latest version was install, all the problems that happen in setting up courses, content and etc (as mention in 7.3 Implementation problems) was solve immediately.

3. Using CEE Users to Evaluate the System Usability

The online questionnaire does not provide opportunities to observe the users behaviour and this was solved by using the CEE users in the evaluation study. By doing the observation, the authors can assume the same probability situation would also be occur if the real users was using the system. Even though, the assumptions made based on the CEE user might be difference but it would also suggest the similar probabilities result. During the evaluation planning, this option was the only solutions that the author can do at those particular moments.

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7.6 Recommendation

1. Use more appropriate tasks

The tasks given in the Fle3 web browser should be revisit and restructure again. The author suggests by giving more tasks, will be able to judge the user and web site ability skill in various areas.

2. Involve the actual course instructor.

It is also important, if the actual course instructor (lecturer) who handles the class should also involve in developing the content and tasks. This could provide better and clear ideas of any relevant points that are associate with the course contents, which were taught in class.

3. Use a lot number of user and variety of user background.

By using more users and variety of user backgrounds could be one ways to avoid biases (round head and square head problems) on the web site and on the questionnaire itself. The result could be more accurate and might indicate different outcome.

4. The author, the course instructor and the users should meet and discuss about the Fle3 before the evaluation was carried out.

Because of the long distance separation between the author, course instructor and UPSI students, it was difficult to explain the purpose of using the Fle3 and the outcome that they can get form the system. The users need to be expose to what is knowledge building and why collaborative approach can help them to improve their ability to understand the course. In this situation, the users just used the

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system without any detail explanation about the overall use of the system. The author found difficulty to explain to the course lecturer without the ability to show and explain in detail of each category used in this system. All the explanation was done briefly by using e-mail and explaining in words document, which was, attach in the e-mail. If the author has the opportunities to meet them in face to face, the outcome result would be a lot different and all the confusion occurs during the evaluation can be avoided.

5. The improvement of the web reliability.

The web reliability access should also be improved especially at the UPSI, Malaysia. This was not a new problem and has been going on for quite a while since the author has started working at the University. The access at Heriot Watt University, especially at the CEE department was good but not at the UPSI, University in Malaysia. This should be considered because it could be the confounding variables, which could produce biases in the evaluation studies. The improvement should also the hardware, software components, network and Internet access. The facility should be in standard level, so that all the users should get the same level of confidence.

7.7 Review of Further Work

The author would like to suggest that the future work of this evaluation study should be done with actual students and handle by the course instructor himself or herself. By doing this, the outcome from the evaluation would be more accurate and an observation can be done to look at the effectiveness of using this alternative form of learning approach. Some of the students might not be familiar with the collaborative and student centred approach used in the Fle3 but this skill could be developed step by step in long term.

The time used to do the evaluation was also not appropriate. The authors would like to suggest that the evaluation study should be done from the beginning of the course until the end of semester, which the students performance and skill can be develop together with the on going course. This could give the observer more time and opportunities to identify the problems and errors.

It is also not easy to introduce the students to others types of learning approach when most of them still prefer to do the tasks by themselves than doing it in-group. A lot of patient and afford need to be put in before they can finally used it as one of the way to help and develop the ability of understanding the learning. As a conclusion, the evaluation study should be done with different types of users and in real course situation.

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APPENDIX A: SYSTEM USABILITY QUESTIONNAIRE (SUS) FOR CEE USERS

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(SUS) Usability Scale Questionnaire (26 August, 2002)
(http://pcceesd3.cee.hw.ac.uk:8080/HCI) Log in : Demo, Password : demo

Sex: Male: ☐ Female: ☐

Students Status: PostGraduate: Msc,Phd **Courses :** _____

	Disagree				Agree	SUS Score
1. I would like to use this Fle3 web browser frequently.	1	2	3	4	5	
2. I found the Fle3 unnecessarily complex.	1	2	3	4	5	
3. I thought the Fle3 was easy to use.	1	2	3	4	5	
4. I think that I would need the support of a technical person to be able to use this Fle3.	1	2	3	4	5	
5. I found the various functions in this Fle3 were well integrated.	1	2	3	4	5	
6. I thought there was too much inconsistency in this Fle3.	1	2	3	4	5	
7. I would imagine that most people would learn to use this Fle3 very quickly	1	2	3	4	5	
8. I found the Fle3 very cumbersome.	1	2	3	4	5	
9. I felt very confident using this Fle3.	1	2	3	4	5	
10. I needed to learn a lot of things before I could get going with Fle3.	1	2	3	4	5	
Total						

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APPENDIX B: MODIFIED SHNEIDERMAND QUESTIONNAIRE FOR CEE USERS

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2: EVALUATION QUESTIONNAIRE

SECTION 1 : Past Experience

1.1 How long have you used the WWW/Internet:

Less than a year _____
Between 1-2 years _____
Between 2-3 years _____
More than 3 years _____

1.2 On average, how many hours do you spend per week using the WWW?

Less than 1 hour _____
Between 1-4 hours _____
Between 4-10 hours _____
More than 10 hours _____

1.3 Have you ever use any virtual learning environment, messenger, discussion or collaborative software's below?

Yes/No (if yes please tick the appropriate software)

Yahoo messenger _____
Msn messenger _____
ICQ _____
Microsoft NetMeeting. _____
WebCT _____
WebBoard _____
Blackboard _____
Others(please mention) _____

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SECTION 2 : Overall reaction on the Fle3 web browser

2.1 Terrible	1	2	3	4	5	6	7	N/A	Wonderful
2.2 Frustrating	1	2	3	4	5	6	7	N/A	Satisfying
2.3 Dull	1	2	3	4	5	6	7	N/A	Stimulating
2.4 Difficult	1	2	3	4	5	6	7	N/A	Easy
2.5 Inadequate	1	2	3	4	5	6	7	N/A	Adequate
2.6 Rigid	1	2	3	4	5	6	7	N/A	Flexible

SECTION 3 : Access to the Fle3 web browser

3.1 Accessing the Fle3 web browser was									
Difficult	1	2	3	4	5	6	7	N/A	Easy
3.2 The time taken to download each page in the web browser was									
Frustrating	1	2	3	4	5	6	7	N/A	Satisfying
3.3 Log in to the web browser was									
Difficult	1	2	3	4	5	6	7	N/A	Easy

SECTION 4 : Navigation on the Fle3 web browser

4.1 Finding information in the web browser was									
Difficult	1	2	3	4	5	6	7	N/A	Easy
4.2 Finding file documents and link to other web site was									
Difficult	1	2	3	4	5	6	7	N/A	Easy

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4.3 Navigation between the WebTop, Jamming and Knowledge Building was									
Difficult	1	2	3	4	5	6	7	N/A	Easy
4.4 Creating and Sending messages in the web browser was									
Difficult	1	2	3	4	5	6	7	N/A	Easy
4.5 How well does the overall navigation in Fle3 web browser									
Terrible	1	2	3	4	5	6	7	N/A	Wonderful

SECTION 5 : Content on the Fle3 web browser

5.1 The category (tools) name used in the web browser was									
Confusing	1	2	3	4	5	6	7	N/A	Clear
5.2 The page layout was									
Confusing	1	2	3	4	5	6	7	N/A	Clear
5.3 The information on each page was									
Sparse	1	2	3	4	5	6	7	N/A	Congested
5.4 It is difficult to tell if this program useful									
Agree	1	2	3	4	5	6	7	N/A	Disagree
5.5 Adding folder, documents, links and creating memos in the WebTop categories was									
Difficult	1	2	3	4	5	6	7	N/A	Easy

SECTION 6: Format on the Fle3 web browser

6.1 Reading the messages text in the Knowledge Building was									
Difficult	1	2	3	4	5	6	7	N/A	Easy
6.2 Were the different types of information (command syntax, description, examples and so on) in the Knowledge Building clearly separated by spacing?									
Confusing	1	2	3	4	5	6	7	N/A	Clear
6.3 Heading or some form of highlighting (such as underline, boldface, indenting or extra line spacing) used to identify the different types of information was used									
Always	1	2	3	4	5	6	7	N/A	Seldom
6.4 Replying a message in the Knowledge Building was									
Difficult	1	2	3	4	5	6	7	N/A	Easy
6.5 The document files (such as Microsoft words or PowerPoint) in the WebTop category were easy to read and view in the browser.									
Agree	1	2	3	4	5	6	7	N/A	Disagree

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APPENDIX C: TASK SHEETS FOR CEE USERS

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3: Fle3 Web Browser Task.

1. **When you log in into the Fle3, what is the name of the category that you are in : _____**

2. **What is the course name that you have access in the Fle3 web browser:**

   _____

3. **How many categories (tools) are use in the Fle3 web browser:**

   _____

4. **What is inside the 'Jamming' tools, can you name the title :**

   _____

5. **How many artefact inside the 'The Three Models' under the Jamming category.**

   _____

6. **Under which categories can you find the 'Website' link folder?**

   _____

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Any Comments :

_____
_____
_____
_____
_____
_____
_____
_____
_____

Thank you for your co-operation. ☺ Fle3 Evaluation Study by Haslina Hassan

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APPENDIX D: OBSERVER MEASURING USABILITY SHEETS FOR CEE USERS

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Observer Measuring Usability Sheets

Name of observer : Haslina Hassan

Subject Gender : M____ F____

6. When you log in into the Fle3, what is the name of the category that you are in :

Answer : 'WebTop'

URL answer : http://pcceesd3.ce.hw.ac.uk:8080/HCI/WebTop
Browsing path : Fle3 home/WebTop

Subject Action :

Browsing Path :
Number of clicks used :_____
Did the subject find the answer : ___ Yes ___ No
Time Taken :____

Observer comment :

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7. What is the course name that you have access in the Fle3 web browser:

Answer : 'TT3023 Interface Design and Electronic Publishing'

URL answer : http://pcceesd3.ce.hw.ac.uk:8080/HCI/WebTop
Or http://pcceesd3.ce.hw.ac.uk:8080/HCI/Knowledge_Building

Browsing path : Fle3 home/WebTop OR Fle3 home/Knowledge_Building

Subject Action :

Browsing Path :
Number of clicks used :_____
Did the subject find the answer : ___ Yes ___ No
Time Taken :____

Observer comment :

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8. How many categories (tools) are use in the Fle3 web browser:

Answer : 'Three (3) '

Subject Action :

Browsing Path :
Number of clicks used :_____
Did the subject find the answer : ___ Yes ___ No
Time Taken :____

Observer comment :

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9. What is inside the 'Jamming' tools, can you name the title :

Answer : 'Design Princples in Basic Design Concept and The Three models '

URL answer : http://pcceesd3.ce.hw.ac.uk:8080/HCI/Jamming
Browsing path : Fle3 home/Jamming

Subject Action :

Browsing Path :
Number of clicks used :_____
Did the subject find the answer : ___ Yes ___ No
Time Taken :____

Observer comment :

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10. How many artefact inside the 'The Three Models' under the Jamming category.

Answer : 'Four (4) '

URL answer : http://pcceesd3.ce.hw.ac.uk:8080/HCI/Jamming/The Three Models
Browsing path : Fle3 home/Jamming/The Three Models

Subject Action :

Browsing Path :
Number of clicks used :_____
Did the subject find the answer : ___ Yes ___ No
Time Taken :____

Observer comment :

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7. Under which categories can you find the 'Website' link folder?

Answer : 'WebTop'

URL answer : http://pcceesd3.ce.hw.ac.uk:8080/HCI/WebTop/Interface Design and **Electronic Publishing**
Browsing path : Fle3 home/WebTop/ Interface Design and Electronic Publishing

---

Subject Action :

Browsing Path :
Number of clicks used :_____
Did the subject find the answer : ___ Yes ___ No
Time Taken :____

Observer comment :

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APPENDIX E: OBSERVER CODING SCHEME

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NUMBER	ABBREVIATION	TASK
1	S	Commence a Task
2	E	Task completed
3	T	Time exceed
4	X	User did not follow optimal path
5	C	User confused
6	TS	Task stopped

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APPENDIX F: BRIEFING OR DEBRIEFING SHEETS FOR CEE USERS

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Evaluation Study Questionnaire by Haslina Hassan:

Thank you for agreeing to take part in this evaluation study today. The purpose of this evaluation is to gather information about the Fle3 web browser in terms of it usability and effectiveness. The Fle3 program was developed by the Helsinki University in Finland and was used to introduce a new approach of learning in web-based environment. The Fle3 web browser was using the student-centred and collaborative learning approach to help the students to learning effectively in certain courses.

There are 3 section of the evaluation which are the

- Task Sheets: Part 1
- SUS Questionnaire : Part 2
- Modified Shneiderman Questionnaire : Part 3

Please do the task section first before you carry on with the evaluation questionnaires. There are 6 task and please work at your own speed and each task is limited to 2 minutes only. If you have any questions, please ask the observer and she will try to help and explain it to you.

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Again, thank you for all the time and space that you have spend to do this evaluation. All the information given are only to be used by the author for purpose of usability evaluation of the Fle3 web browser and will not be used for other purpose. If you feel that your are not agree and comfortable with the purpose of this evaluation, you can simply asked to be excuse from doing this evaluation study.

Thank You

Haslina Hassan
(Msc in Interactive Multimedia, department of Computing & Electrical Enginering).

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APPENDIX G: ONLINE QUESTIONNAIRE FOR UPSI USERS

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SECTION 1 : Past Experience

1.1 How long have you used the WWW/Internet:

Less than a year _____
Between 1-2 years _____
Between 2-3 years _____
More than 3 years _____

1.2 On average, how many hours do you spend per week using the WWW?

Less than 1 hour _____
Between 1-4 hours _____
Between 4-10 hours _____
More than 10 hours _____

1.3 Have you ever use any virtual learning environment, messenger, discussion or collaborative software's below?

Yes/No (if yes please tick the appropriate software)

Yahoo messenger _____
Msn messenger _____
ICQ _____
Microsoft NetMeeting. _____
WebCT _____
WebBoard _____
Blackboard _____
Others(please mention) _____

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SECTION 2 : Student Feedback and Responses to Discussion Activities

	Question	Not At all	Not much	Reasonably	Quite a lot	Lots & lots	N/A
2.1	How much did you find doing the discussion helped you to learn?						
2.2	How much did you find doing the discussion encourages you to read?						
2.3	How difficult did you find it to get a good answer for the discussion issues?						
2.4	Doing the discussion made me think about the discussion content.						

SECTION 3 : Student Feedback and Responses to Student-Centred Learning

	Question	Not At all	Not much	Reasonably	Quite a lot	Lots & lots	N/A
3.1	How enjoyable did you find doing the discussion activities was?						

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3.2	How much would you prefer the material to be taught to you?						
3.3	How much more do you learn by being active rather than just listening to the lecturer?						
3.4	How much do you prefer to be taught things than to have to learn them yourself.						

SECTION 4 : Student Feedback and Responses to Group Activities

Question		Not At all	Not much	Reasonably	Quite a lot	Lots & lots	N/A
4.1	How much did you enjoy working in-group?						
4.2	How much did you find doing the discussion in a group helped your learning?						
4.3	How much would you prefer to do the activities on your own?						
4.4	How much did people in the group share the work.						

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SECTION 5: Student Feedback and Responses to Learning with Technology

Question		Not At all	Not much	Reasonably	Quite a lot	Lots & lots	N/A
5.1	How useful did you find the WWW as a source of information for the discussion.						
5.2	How useful did you find the internet for communication with the group members.						
5.3	How useful did you find the WWW as a means for organising the problem-solving process?						
5.4	How reliable did you find the technology in supporting the learning process in this unit?						

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APPENDIX H: RESULT OF EVALUATION FOR CEE USERS

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User response time

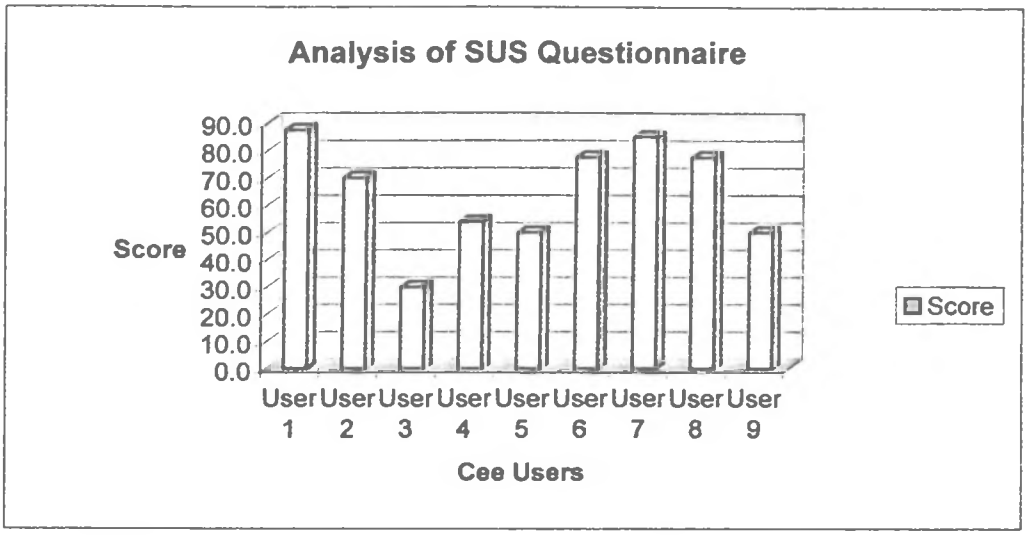
	Task1	Task2	Task3	Task4	Task5	Task6	Total	Average
User 1	5	10	5	10	7	28	65	10.83
User 2	8	9	14	22	7	41	101	16.83
User 3	6	5	5	10	5	26	57	9.50
User 4	7	13	10	12	8	33	83	13.83
User 5	5	6	4	9	5	46	75	12.50
User 6	5	16	10	23	14	42	110	18.33
User 7	17	5	8	20	9	60	119	19.83
User 8	4	8	5	15	5	29	66	11.00
User 9	5	5	11	8	4	37	70	11.67
							746	
Overall Total	62	77	72	129	64	342	746	
Average	6.89	8.56	8.00	14.33	7.11	38.00	82.89	
Standard deviation	3.98	3.91	3.46	5.89	3.06	10.75		

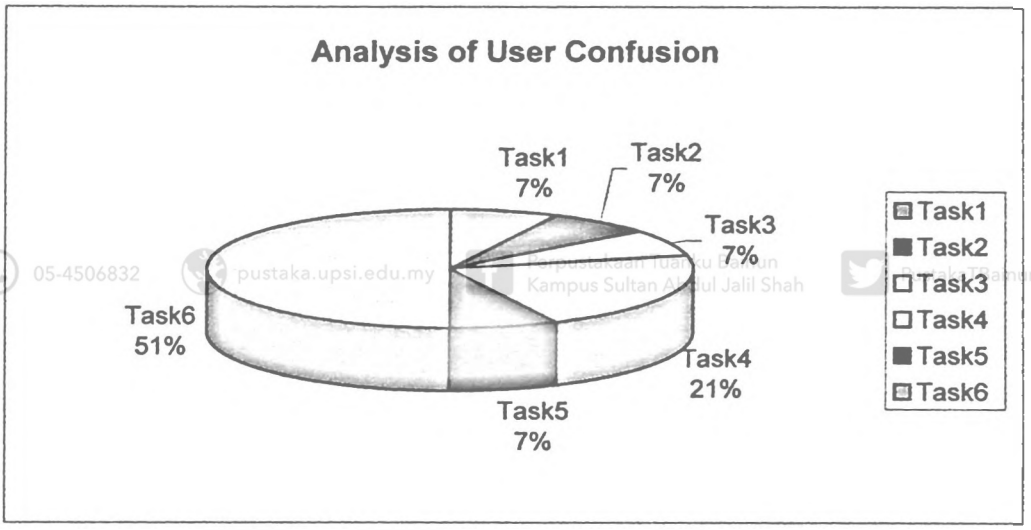
User Error time

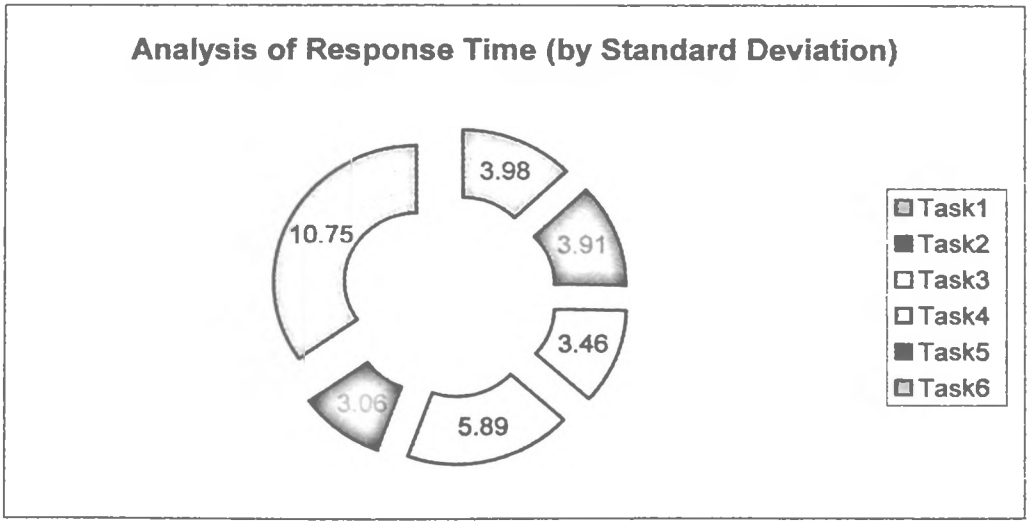
	Task1	Task2	Task3	Task4	Task5	Task6	Total	Average
User 1	0	0	0	0	0	0	0	0.00
User 2	1	0	0	0	0	0	1	0.17
User 3	0	0	0	0	1	0	1	0.17
User 4	0	1	0	0	0	1	2	0.33
User 5	0	0	0	0	0	0	0	0.00
User 6	0	0	0	1	0	1	2	0.33
User 7	0	0	0	0	1	0	1	0.17
User 8	0	0	0	0	0	0	0	0.00
User 9								
Overall Total	1	1	0	1	2	2	7	
Average	0.13	0.13	0.00	0.13	0.25	0.25	0.88	
Standard deviation	0.35	0.35	0.00	0.35	0.46	0.46		

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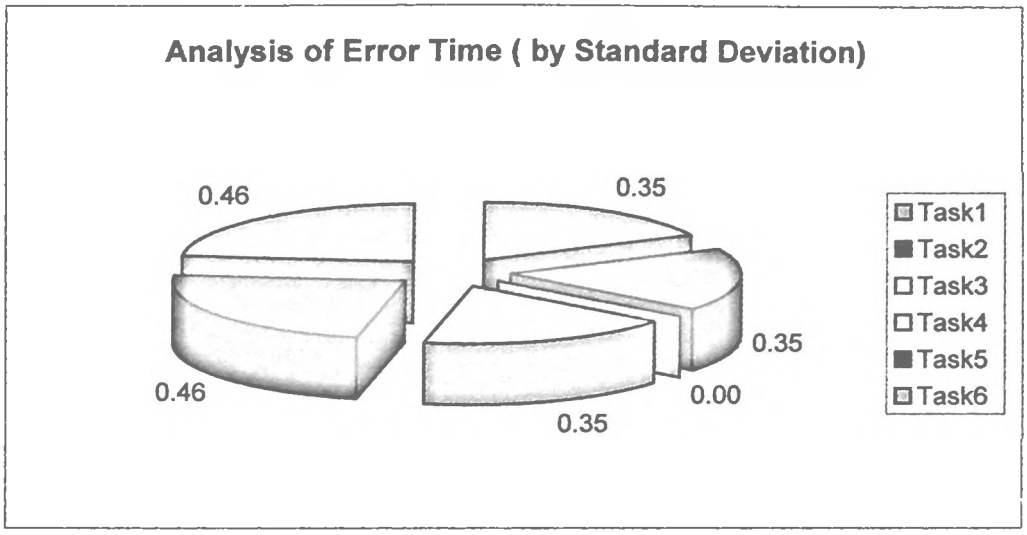


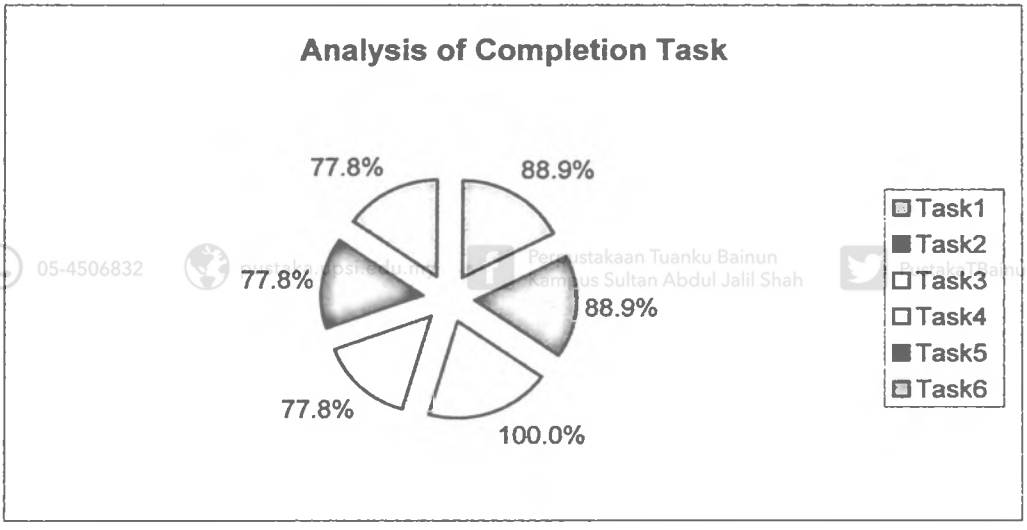


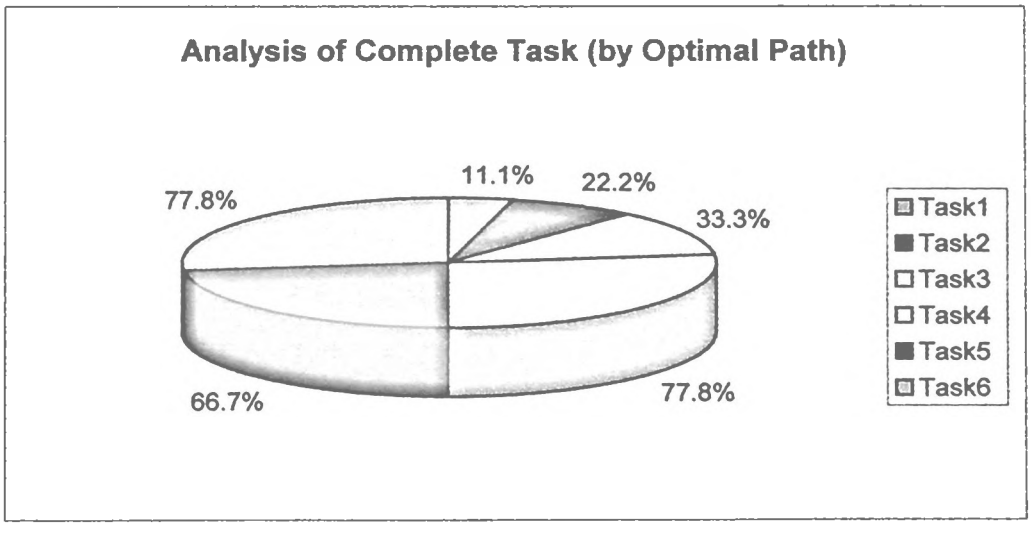


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APPENDIX I: ONLINE QUESTIONNAIRE RESULT FOR UPSI USERS

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			User Experience					FR to Discussion Activitie			
No:	First Name	User ID	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4
1	Nur farhana Abdullah	s04270	3	4	yes	1,2,4	google messenger	3	4	3	4
2	Janting Anak Abau	s04737	3	3	Yes	4		3	3	3	3
3	Mohd Nor Bahari Baharuddin	s05995	4	4	Yes	1,4		3	3	2	4
4	Mohamad Zaini Ismail	s04907	4	3	Yes	3,4,5		2	3	3	2
5	Mohamad Ihsan Ramli	s05992	1	3	Yes	2,4		2	1	2	3
6	Norhamiza Abdul Hamid	s06006	1	1	No			1	2	1	2
7	Joanna Haida Haron	s04239	3	4	Yes	1		3	3	3	4
8	Zuraida Mukhtar	s04292	4	2	Yes	1,2,4,5		3	3	3	4
9	Roslam Johari	s05695	2	2	Yes	1,2,3		4	4	2	2
10	Joanna Haida Haron	4239	4	4	Yes	1,4	SMS service on-line	4	4	2	3
11	Mohd Esa Mohd Amin	s06043	4	4	Yes	1		4	3	3	3
12	Salmi Mohd Noor	s08545	3	3	Yes	2		3	3	2	3

			SFR to Student-centred learnin				SFR to Grou Activities			
No:	First Name	User ID	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Nur farhana Abdullah	s04270	4	4	3	4	3	3	5	3
2	Jantin Anak Abau	s04737	3	4	3	3	3	3	3	3
3	Mohd Nor Bahari Baharuddin	s05995	3	3	3	3	2	3	3	2
4	Mohamad Zaini Ismail	s04907	1	4	4	3	2	1	3	2
5	Mohamad Ihsan Ramli	s05992	2	4	3	3	1	2	3	1
6	Norhamiza Abdul Hamid	s06006	3	4	3	4	1	2	1	1
7	Joanna Haida Haron	s04239	3	4	4	4	3	3	2	3
8	Zuraida Mukhtar	s04292	2	3	4	4	3	4	3	2
9	Roslam Johari	s05695	3	3	4	4	1	2	4	2
10	Joanna Haida Haron	4239	3	3	3	3	4	4	3	3
11	Mohd Esa Mohd Amin	s06043	4	4	3	4	3	3	3	2
12	Salmi Mohd Noor	s08545	3	4	3	3	4	3	2	3

			SFR to Learnin with Technolo			
No:	First Name	User ID	Q1	Q2	Q3	Q4
1	Nur farhana Abdullah	s04270	5	3	4	4
2	Jantin Anak Abau	s04737	4	4	3	4
3	Mohd Nor Bahari Baharuddin	s05995	4	3	4	3
4	Mohamad Zaini Ismail	s04907	3	3	3	3
5	Mohamad Ihsan Ramli	s05992	2	2	2	2
6	Norhamiza Abdul Hamid	s06006	2	3	2	2
7	Joanna Haida Haron	s04239	3	3	3	3
8	Zuraida Mukhtar	s04292	3	3	2	2
9	Roslam Johari	s05695	4	3	2	3
10	Joanna Haida Haron	4239	4	5	4	5
11	Mohd Esa Mohd Amin	s06043	3	4	3	3

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Detailed Statistics Summary: Survey: an evaluation study on web based learning

Update Statistics | Add to Question Stats | More Info | Return to Detail Summary

Statistics: Survey: an evaluation study on web based learning

Title	N	% Correct Of:			Discrimination	Frequency					
		Whole Group	Upper 25%	Lower 25%		-	1	2	3	4	5
User Experiences Q1	12	0	0	0	0.00	***0***	2	1	4	5	
User Experiences Q2	12	0	0	0	0.00	***0***	1	2	4	5	
SFR to discussion activities Q1	12	0	0	0	0.00	***0***	1	2	6	3	0
SFR to discussion activities Q2	12	0	0	0	0.00	***0***	1	1	7	3	0
SFR to discussion activities Q3	12	0	0	0	0.00	***0***	1	5	6	0	0
SFR to discussion activities Q4	12	0	0	0	0.00	***0***	0	3	5	4	0
SFR to student centred learning Q1	12	0	0	0	0.00	***0***	1	2	7	2	0
SFR to student centred learning Q2	12	0	0	0	0.00	***0***	0	0	4	8	0
SFR to student centred learning Q3	12	0	0	0	0.00	***0***	0	0	8	4	0
SFR to student centred learning Q4	12	0	0	0	0.00	***0***	0	0	6	6	0
SFR to groups activities Q1	12	0	0	0	0.00	***0***	3	2	5	2	0
SFR to groups activities Q2	12	0	0	0	0.00	***0***	1	3	6	2	0
SFR to groups activities Q3	12	0	0	0	0.00	***0***	1	2	7	1	1
SFR to groups activities Q4	12	0	0	0	0.00	***0***	2	5	5	0	0
SFR to learning with technology Q1	12	0	0	0	0.00	***0***	0	2	4	5	1
SFR to learning with technology Q2	12	0	0	0	0.00	***0***	0	1	8	2	1
SFR to learning with technology Q3	12	0	0	0	0.00	***0***	0	4	5	3	0
SFR to learning with technology Q4	12	0	0	0	0.00	***0***	0	3	5	3	1

Note: In the table above, the frequency of the correct answer is displayed as italic and bold.

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More Detailed Statistics Summary: Survey: an evaluation study on web based learning

Return to Detailed Statistics Summary

Information: Survey: an evaluation study on web based learning

Question: User Experiences Q1

How long have you used the WWW/Internet:

1. Less than a year 2. Between 1-2 years 3. Between 2-3 years 4. More than 3 years

N	-	1	2	3	4
12	*0* 0.0%	2 16.7%	1 8.3%	4 33.3%	5 41.7%

Question: User Experiences Q2

On average, how many hours do you spend per week using the WWW?

1. Less than 1 hour _____ 2. Between 1-4 hours 3. Between 4-10 hours 4. More than 10 hours

N	-	1	2	3	4
12	*0* 0.0%	1 8.3%	2 16.7%	4 33.3%	5 41.7%

Question: SFR to discussion activities Q1

How much did you find doing the discussion helped you to learn?

1. Not at all 2. Not much 3. Reasonably 4. Quite a lot 5. Lots & lots

N	-	1	2	3	4	5
12	*0* 0.0%	1 8.3%	2 16.7%	6 50.0%	3 25.0%	0 0.0%

Question: SFR to discussion activities Q2

How much did you find doing the discussion encourages you to read?

1. Not at all 2. Not much 3. Reasonably 4. Quite a lot 5. Lots & lot

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N	-	1	2	3	4	5
12	*0* 0.0%	1 8.3%	1 8.3%	7 58.3%	3 25.0%	0 0.0%

Question: SFR to discussion activities Q3

How difficult did you find it to get a good answer for the discussion issues?

1. Not at all 2. Not much 3. Reasonably 4. Quite a lot 5. Lots & lots

N	-	1	2	3	4	5
12	*0* 0.0%	1 8.3%	5 41.7%	6 50.0%	0 0.0%	0 0.0%

Question: SFR to discussion activities Q4

Doing the discussion made me think about the discussion content.

1. Not at all 2. Not much 3. Reasonably 4. Quite a lot 5. Lots and lots

N	-	1	2	3	4	5
12	*0* 0.0%	0 0.0%	3 25.0%	5 41.7%	4 33.3%	0 0.0%

Question: SFR to student centred learning Q1

How enjoyable did you find doing the discussion was?

1. Not at all 2. Not much 3. Reasonably 4. Quite a lot 5. Lots & lots

N	-	1	2	3	4	5
12	*0* 0.0%	1 8.3%	2 16.7%	7 58.3%	2 16.7%	0 0.0%

Question: SFR to student centred learning Q2

How much would you prefer the material to be taught to you?

1. Not at all 2. Not much 3. Reasonably 4. Quite a lot 5. Lots and lots

N	-	1	2	3	4	5
12	*0* 0.0%	0 0.0%	0 0.0%	4 33.3%	8 66.7%	0 0.0%

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Question: SFR to student centred learning Q3

How much more do you learn by being active rather than just listening to the lecturer?

1. Not at all 2. Not much 3. Reasonably 4. Quite a lot 5. Lots & lots

N	-	1	2	3	4	5
12	*0* 0.0%	0 0.0%	0 0.0%	8 66.7%	4 33.3%	0 0.0%

Question: SFR to student centred learning Q4

How much do you prefer to be taught things than to have to learn them yourself.

1. Not at all 2. Not much 3. Reasonably 4. Quite a lot 5. Lots & lots

N	-	1	2	3	4	5
12	*0* 0.0%	0 0.0%	0 0.0%	6 50.0%	6 50.0%	0 0.0%

Question: SFR to groups activities Q1

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How much did you enjoy working in-group?

1. Not at all 2. Not much 3. Reasonably 4. Quite a lot 5. Lots & lots

N	-	1	2	3	4	5
12	*0* 0.0%	3 25.0%	2 16.7%	5 41.7%	2 16.7%	0 0.0%

Question: SFR to groups activities Q2

How much did you find doing the discussion in a group helped your learning?

1. Not at all 2. Not much 3. Reasonably 4. Quite a lot 5. Lots & lots

N	-	1	2	3	4	5
12	*0* 0.0%	1 8.3%	3 25.0%	6 50.0%	2 16.7%	0 0.0%

Question: SFR to groups activities Q3

How much would you prefer to do the activities on your own?

1. Not at all 2. Not much 3. Reasonably 4. Quite a lot 5. Lots and lots

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N	-	1	2	3	4	5
12	*0* 0.0%	1 8.3%	2 16.7%	7 58.3%	1 8.3%	1 8.3%

Question: SFR to groups activities Q4

How much did people in the group share the work.

1. Not at all 2. Not much 3. Reasonably 4. Quite a lot 5. Lots & lots

N	-	1	2	3	4	5
12	*0* 0.0%	2 16.7%	5 41.7%	5 41.7%	0 0.0%	0 0.0%

Question: SFR to learning with technology Q1

How useful did you find the WWW as a source of information for the discussion.

1. Not at all 2. Not much 3. Reasonably 4. Quite a lot 5. Lots and lots

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N	-	1	2	3	4	5
12	*0* 0.0%	0 0.0%	2 16.7%	4 33.3%	5 41.7%	1 8.3%

Question: SFR to learning with technology Q2

How useful did you find the internet for communication with the group members.

1. Not at all 2. Not much 3. Reasonably 4. Quite a lot 5. Lots & lots

N	-	1	2	3	4	5
12	*0* 0.0%	0 0.0%	1 8.3%	8 66.7%	2 16.7%	1 8.3%

Question: SFR to learning with technology Q3

How useful did you find the WWW as a means for organising the problem-solving process?

1. Not at all 2. Not much 3. Reasonably 4. Quite a lot 5. lots & lots

N	-	1	2	3	4	5
12	*0* 0.0%	0 0.0%	4 33.3%	5 41.7%	3 25.0%	0 0.0%

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Question: SFR to learning with technology Q4

How reliable did you find the technology in supporting the learning process in this course?

1. Not at all 2. Not much 3. Reasonably 4. Quite a lot 5. Lots & lots

N	-	1	2	3	4	5
12	*0* 0.0%	0 0.0%	3 25.0%	5 41.7%	3 25.0%	1 8.3%

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