INTERFACE DESIGN AND USABILITY EVALUATION OF AN ONLINE LEARNING MODULE FOR IMAGE EDITING

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INTERFACE DESIGN AND USABILITY EVALUATION OF AN ONLINE LEARNING MODULE FOR IMAGE EDITING

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This project is submitted in partial fulfilment of the requirements for a Bachelor of Science with Honours (Cognitive Science)

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The project entitled ‘Interface Design and Usability Evaluation of an Online Learning Module for Image Editing’ was prepared by Siti Najibah Bt Aziz and submitted to the Faculty of Cognitive Sciences and Human Development in partial fulfillment of the requirements for a Bachelor of Science with Honours (Cognitive Science)

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Grade
Statement of Originality

The work described in this Final Year Project, entitled “Interface Design and Usability Evaluation of an Online Learning Module for Image Editing” is to the best of the author’s knowledge that of the author except where due reference is made.

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ABSTRACT

INTERFACE DESIGN AND USABILITY EVALUATION OF ONLINE LEARNING MODULE FOR IMAGE EDITING

Siti Najibah Bt Aziz

This study aims to design the interface and evaluate the usability of an online learning module on image editing for lecturers in UNIMAS. The module aims to enable the lecturers to obtain some basic knowledge and skills on how to edit images. The objectives of the project were to identify and to apply the web usability principles on the interface of the online learning module. Another, the objective was to evaluate the usability of the online learning module. In the process of identifying the web usability principles, it reviewed the principle of web usability on interface design from various researchers. Then, the comparison of usability principles between these researchers is proposed with 15 principles was recommended. However, only seven principles were used in this module, and they were chosen based on the principles which are closely related and suitable to be applied in this online module system. The learning module was evaluated by six lecturers from several faculties in UNIMAS by using the Cooperative Evaluation technique. They were evaluated in a separate one-to-one evaluation sessions and alteration was made after each evaluation session. Finally, the final interface design of the online learning module was created.
ABSTRAK

REKA BENTUK ANTARA MUKA DAN PENILAIAN KEOBELEHGUNAAN MODUL PEMBELAJARAN ATAS TALIAN UNTUK PENYUNTINGAN GAMBAR

Siti Najibah Bt Aziz

CHAPTER I
INTRODUCTION

1.0 Overview

This chapter discusses the background of study, problems, aims, objectives, scope as well as the significance of the project. The background of the study focuses on the online learning and its benefit in an educational setting and also the online learning used in UNIMAS. Then, it highlights the problems that arise which had directed the necessity to carry out this project. Besides, the general and specific objectives, scope and the significance of this project are also included.

1.1 Background Of The Study

As an increasing powerful, interactive, and dynamic medium for delivering information, the World Wide Web (Web) in combination with information technology (LAN, WAN, internet, etc.) has found many applications (Chang & Tonya, 2007). One popular application for educational use is the Web-Based, distance, distributed or online learning (Chang & Tonya, 2007).
There are many definitions of online learning in the literature. Carliner (1999) defines online learning as educational material that is presented on a computer. Khan (1997) defines online instruction as an innovative approach for delivering instruction to a remote audience, using the web as the medium. Based on these definitions, Ally (2004) defines online learning as the use of the Internet to access learning materials; to interact with the content, instructor, and other learners; and to obtain support during the learning process, in order to acquire knowledge, to construct personal meaning, and to grow from the learning experience.

According to CCA consulting, nearly 50% of higher education institutions currently engage in some type of online learning ("Educational Benefit," 2000). Academic and professional organizations agree that using web-based learning environments can offer sound pedagogical benefits in the educational setting ("Educational Benefit," 2000). According to researchers from Cornell University, the web provides significant new functionality in transmitting information to the student and providing forums for exchange ("Educational Benefit," 2000). The web is revolutionizing some areas of study through increased opportunities for learning and alternative formats for information (Dwyer et al., 1995).

According to Ally (2004), the benefits of online learning for learners are: online learning knows no time zones, and location and distance are not an issue. He stated in asynchronous online learning, students can access the online materials at anytime, while synchronous online learning allows for real time interaction between students and the instructor. Learners can use the Internet to access up-to-date and relevant learning materials, and can communicate with experts in the field in which they are studying. He also defined that situated learning is facilitated, since learners can complete online courses while working on the job or in their own space, and can contextualize the learning.
Besides, Ally (2004) also stated that for the instructor, tutoring can be done at anytime and from anywhere. Online materials can be updated, and learners are able to see the changes immediately. When learners are able to access materials on the Internet, it is easier for instructors to direct them to appropriate information based on their needs. If designed properly, online learning systems can be used to determine learners' needs and current level of expertise, and to assign appropriate materials for learners to select from to achieve the desired learning outcomes (Ally, 2004).

In Universiti Malaysia Sarawak (UNIMAS), an online learning system, Morpheus was introduced in 2006 (Chen, 2009). According to Chen (2009), this online learning system is powered by Moodle, a free learning management system that enables us to create powerful, flexible, and engaging online learning experiences. She stated that Morpheus runs as an interactive web site that allows various learning resources and activities to be incorporated to create engaging, collaborative, and student-centered learning environments.

Chen (2009) also stated that UNIMAS practices a blended learning policy, in which online learning is not to replace the lecturer but rather to enhance the teaching-learning process. The learning solution is created through a mixture of face-to-face and online learning so that the online component becomes a natural extension of the face-to-face learning. In other words, she concludes that lecturers are expected to give a well-structured introductory lesson in the lecture room and then provide follow-up online materials and activities to enrich as well as enhance students' learning experience.

1.2 Problem Statement

The Centre of Applied Learning and Multimedia (CALM) is an entity in UNIMAS that holds the responsibility to provide training to academic staff members
on how to utilize the Morpheus system. In this particular context, there is a need for
lecturers to be exposed to the basic skills on image editing so that they are able to
make use of this knowledge in developing the lecture notes and materials in
Morpheus. Image editing is the process of changing or improving graphic images
which typically refers to bitmapped images rather than vector graphics (Encyclopedia).

According to the recent survey that has been conducted by CALM in 2010,
many of the lecturers in UNIMAS request training on image editing as most of them
faced difficulty in editing the images for their academic purposes (Syarifah Norizan
bt Wan Zain, personal communication, September 25, 2010). However, she stated
that it is often an issue to arrange available time slots that enable all lecturers to
attend the training as they have different working commitment. In fact, it is also not
financially feasible if one-on-one session is to be conducted with every lecturer as too
many training sessions will be needed (Chen, personal communication, September
20, 2010). Due to the limitations faced in conducting training for lecturers, an
alternative solution to the matter needs to be sought.

The learning materials must also be designed properly to engage the learner
and promote learning. According to Chang and Tonya (2007), for a web-based
supplemental learning environment to be successful, it is also important to effectively
facilitate learner interactions with the learning environment. An effective user
interface in web-based learning environments is important because it determines how
easily learners can focus on learning materials without having an effort to figure out
how to access them (Lohr, 2000). Therefore, a good interface design for training
module should be identified.
1.3 Project Objectives

1.3.1 General objectives

The objective of this project is to design the interface and evaluate the usability of an online learning module on image editing for lecturers in UNIMAS.

1.3.2 Specific objectives

The specific objectives of this project are to:

i. identify appropriate principles of web usability to guide the interface design of the online learning module
ii. design the interface of the online learning module based on the identified web usability principles
iii. develop the interface designed for the online learning module
iv. evaluate the usability of the online learning module

1.4 Project Scope

Basically, this project only focuses on two preliminary phases of developing an online learning module for image editing, which are designing the interface design of the learning module and evaluating the learning module. The interface design is carried out based on the web usability principle proposed by Nielsen (1993), Shneiderman (2005) and Giuliana (2000). The evaluating phase is based on the cooperative usability testing which is proposed by Monk, Wright, Haber and Davenporr (1993). Besides, this online learning module for image editing is mainly for the use of all the academic members in UNIMAS and not accessible to others.
1.5 Significance Of The Project

This project is expected to produce a usable interface of an online learning module for image editing through the application of web usability principles and usability evaluation of the module for UNIMAS lecturers. According to Giuliana (2002), a user interface bug is a user interface design that does not do what it was intended to do, such as poorly organized data and the use of ambiguous terminology. She stated that by incorporating usability into the design process, these bugs can be avoided before development takes place, thus producing a higher quality product with fewer costly changes. Therefore, a well designed online learning module on image editing can significantly affect the quality of the learning. The evaluation part of the learning module also plays an important role in order to make the module usable.
2.0 Overview

This chapter presents an overview of the literature which is related to this project. It provides the definitions of usability and web usability from Nielsen (1993). Besides that, it reviews the principle of web usability on interface design from three researchers, Nielsen (1993), Shneiderman (2005) and Giuliana (2002). Then, the comparison of usability principles between these researchers is proposed. This chapter also briefly describes the evaluation technique, which focuses on Cooperative Evaluation proposed by Monk et al. (1993).

2.1 Usability

According to Nielsen (1993), usability of a system is multi-faceted and consists of five properties which are learnability, efficiency, memorability, few errors and user's satisfaction. The description for each property is as follows:
• Learnability (easy to learn): The ease of learning the functionality and the behavior of the system.
• Efficiency (efficient to use): The level of attainable productivity, once the user has learned the system.
• Memorability (easy to remember): the ease of remembering the system functionality, so that the casual user can return to the system after a period of non-use without the need to learn how to use it again.
• Few errors (low error rate): the capability of the system to feature a low rate, support users making few errors, to help them to easy recover.
• User's satisfaction: the measure in which the user finds the system pleasant to use.

2.2 Web Usability

As mentioned earlier, according to Nielsen (1993), usability of a system is multifaceted and consists of five properties: easy to learn; efficient to use, easy to remember; low error rate, and meets user satisfaction. According to Matera, Rizzo and Carugh (n.d.), the Nielsen's usability principle can be interpreted as follows:

• **Web application learnability**: the ease for Web users to understand the contents and services made available through the application from the Home Page, and how to look for specific information using the available links for hypertext browsing. Learnability also means that each page in the hypertext front-end should be composed in a way that contents are easy to understand and navigation mechanisms are easy to identify.

• **Web applications efficiency**: users who want to find some contents can reach them quickly through available links. When users get to a page, they must be
able to orient themselves and understand the meaning of the page with respect to their navigation starting point.

- **Memorability**: after a period of non-use, users are still able to get oriented within the hypertext, for example by means of navigation bars pointing to landmark pages.

- **Few errors**: in case users have erroneously followed a link, they should be able to return to their previous location.

- **Users’ satisfaction**: the situation in which users feel that they are in control with respect to the hypertext, thanks to the comprehension of available contents and navigational commands.

### 2.3 Web Usability Principles

A well-designed user interface is based on principles (Giuliana, 2002). To improve the usability of an application it is important to have a well designed interface. Hence, this section discusses the principles proposed by researchers.

#### 2.3.1 Jacob Nielsen

Jacob Nielsen is the principal of Nielsen Norman Group and has been called "the world's leading expert on Web usability" by U.S News and World Report. According to him, there are ten general principles for user interface design and evaluation of interactive systems. They are called "heuristics" because they are more in the nature of rules of thumb than specific usability guidelines (Nielsen, 1993).
<table>
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<th>Heuristic</th>
<th>Description</th>
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<tr>
<td>Visibility of system status</td>
<td>The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.</td>
</tr>
<tr>
<td>Match between system and the real world</td>
<td>The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.</td>
</tr>
<tr>
<td>User control and freedom</td>
<td>Users often choose system functions by mistake and will need a clearly marked &quot;emergency exit&quot; to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.</td>
</tr>
<tr>
<td>Consistency and standards</td>
<td>Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.</td>
</tr>
<tr>
<td>Error prevention</td>
<td>Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.</td>
</tr>
<tr>
<td>Recognition rather than recall</td>
<td>Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.</td>
</tr>
</tbody>
</table>
Flexibility and efficiency of use

Accelerators -- unseen by the novice user -- may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

Aesthetic and minimalist design

Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

Help users recognize, diagnose, and recover from errors

Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

Help and documentation

Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

| Table 2.1: The ten Nielsen's heuristic for user interface design |

2.3.2 Ben Shneiderman

According to Konigi (2007), these rules were obtained from the text Designing the User Interface by Shneiderman (1993). Shneiderman proposed this collection of principles that are derived heuristically from experience and applicable in most interactive systems after being properly refined, extended, and interpreted. He asserted that in order to improve the usability of an application it is important to have