ERGONOMIC STUDY ON EYE DISCOMFORT FOR USING UMP WEBSITE HOMEPAGE BY APPLYING JAKOB NIELSEN'S HEURISTICS

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DECLARATION

I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged.

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SUPERVISOR DECLARATION

I hereby declare that I have read this thesis and in my opinion this thesis/report is sufficient in terms of scope and quality for the award of the degree of Bachelor of Computer Science ( )

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ABSTRACT

UMP website is the official page to disseminate information, notification of academic and co-curricular activities involving either to students, staffs and lecturers. The usability of a user interface becomes extraordinary important and the development of the website should be in accordance with the specifications and the proper principles. Therefore, ergonomics awareness about eye discomfort is an important thing when developing a website. The purpose of an ergonomic study of eye discomfort is to raise the level of development of a website and will create awareness about the importance use of the appropriate colour, font and size when the implementation process. On awareness, the project is carried out with the objectives is to identify which part of user interface design of UMP website that extremely exposed to ergonomic eye discomfort and proposed alternatives for improvement. Method used for the data collection process is through questionnaires about existing UMP websites and involving 20 respondents including admin, staff and students for all faculties of UMP Gambang. Jakob Nielsen's heuristics principles that related to describe eye discomfort used as a technique to be applied in the development process of a website in order to gain the proper specification of implementation.

ABSTRAK

Laman web UMP merupakan laman web rasmi untuk menyebarkan maklumat, aktiviti akademik dan kokurikulum yang melibatkan pelajar, kakitangan dan pensyarah. Kebolehgunaan antara muka pengguna adalah penting dan pembangunan sesebuah laman web hendaklah mengikut spesifikasi dan prinsip-prinsip yang betul. Oleh itu, kesedaran ergonomik tentang ketidakselesaan mata merupakan suatu perkara yang penting dalam pembangunan sesebuah laman web. Tujuan kajian ergonomik terhadap ketidakselesaan mata adalah untuk meningkatkan tahap pembangunan laman web dan memberikan kesedaran tentang betapa pentingnya penggunaan warna, tulisan dan saiz yang sesuai ketika proses pelaksanaannya. Atas kesedaran itu, projek ini dijalankan dengan objektifnya adalah untuk mengenalpasti antaramuka pengguna pada laman web UMP yang sangat terdedah kepada ketidakselesaaan mata dan mencadangkan penambahbaikan. Kaedah yang digunakan bagi proses pengumpulan data adalah melalui borang kaji selidik tentang laman web UMP yang sedia ada dan melibatkan 20 responden termasuk admin, staff dan pelajar daripada semua fakulti di UMP Gambang. Jakob Nielsen's heuristik digunakan sebagai teknik yang perlu diaplikasikan dalam proses pembinaan laman web supaya pelaksanaannya adalah mengikut spesifikasi yang betul.

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CHAPTER 1

INTRODUCTION

This chapter briefly discuss on the overview of this project. It contains five parts. The first part is introduction of the project. The second part is the problem statement and motivation of this project. The third part is the objectives where the projects goals are determined. The fourth part is the scopes of the project. And finally, the thesis organization which briefly describes the structure of this thesis is described in part five.

1.1 Introduction

Improving productivity is a key factor in a growth of a University. In reality, most organizations of University work hard to look for a new ways to make their overall output more effective. In a University, success and excellence in all areas is a pride, so, improving University productivity has become an important focus of management.

Improving University productivity can be accomplished by many aspects. It simply means that, in order to maximising University productivity, there is the need to focus on areas of personal motivation and the performance of the work environment, both of which form factor that affect the productivity of University and they are related absolutely to the ergonomic principles.

Thus, the consideration of ergonomic principles in develop website are so important and need to be highlight in all work activities in order to improve productivity. Any work task in develop website carried out without considering the

ergonomic principles, the users may have exposure to undue physical stress, dizziness, sore eyes and so on.

UMP website is the main place to disseminate information, notification of academic and co-curricular activities involving either to students, staff and others. Therefore, the development of the site shall be in accordance with the specifications and the correct principles so that users feel comfortable while browsing the website. When viewing a website, eye comfort is the most important in order to make the website always have a lot of viewer. While, eye discomfort when viewing a website will cause users feel discouraged to browse it. For example, the font size which is too small or too big to use on website, not interesting color or unsuitable color pairing and bright colors is one of the causes why eye feel discomfort. Because of that, website development must to follow the guideline or right principles in order to create the best website and enhance the productivity.

However, in today's modern era the usability of a user interface becomes extraordinary important. We cannot underestimate the measuring of the usability because it can reveal the qualities of the product as well as lack of functionality, which usually arise during the design phase. Therefore, usability needs to be considered together when developing the system. To conduct the evaluation, the method used in this project is heuristic evaluation which is based on Nielsen's set of usability heuristics to implement a through and in-depth assessment.

Jakob Nielsen's heuristics is the most popular principles that applied in the development of website. Nielson defines heuristic evaluation as a measurement that utilizes heuristics in order to find usability problems (Nielson J, 1993). Nielson's method uses a small set of principles, guidelines, or heuristics that are systematically assessed against a target system in order to identify problems and their severity, as well consequences for the user. The guideline is suitable for any web application or websites.

Ergonomics or human factors is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to

optimize human well-being and overall system performance. It is also be defined as usability engineering is a discipline that investigates human or machine interface issues, using a wide array of methodologies (J Med Internet Res, 2009). The approaches for evaluating the human-computer interaction (HCI) characteristics of a system include inspection methods or user evaluations. Inspection methods are based on reviews of a system, often by experts, which can be guided by usability heuristics, user tasks, or other information.

By applying Jakob Nielsen's principles in order to create the website, eye discomfort will be overcome and the best website will be developed.

1.1 Problem Statement

UMP website is one of the website that regularly visited and use by membership of UMP especially lectures, admin and students. The UMP website developers need to ensure that there is nothing that could cause problems and discomfort to the user's navigation. Once the problem occurs, users will feel tired to use it again.

Website design by the use of appropriate colours, appropriate font, and simple design makes the website developed will not missed out to use by users because they feel comfortable when visiting it.

Eye is a major role while surfing the website. Therefore, proper care should be given to the eyes so that no occurrence of pain in the eye. Use bright colours and a variety of colours on a website can lead to eye discomfort when using the website with a long period. In addition, the use of unsuitable writing as too small or too large will also cause problems on the eye. Discomfort is a little bit of an impact when fewer users who will use the website. This problem will have an impact on productivity as UMP website is a place to disseminate information, activities and so on.

When users do not access the site, lots of information and latest activities did not know by them. Therefore, they do not involve in the program organized by the university or outside while that program is beneficial and may increase knowledge and their experience. This situation will affect academic performance and among lecturers, admin and students.

From research and survey that have done, there are many participants or testers on using UMP website who are dissatisfied with current UMP website. Therefore, the problem has attracted the interest and motivation to make a study of the case by applying appropriate techniques to solve the problem.

The usability heuristics by Dr. Jakob Nielsen Molich, R., Nielsen, J. (1990) Ed. Nielsen, J. (1994) that related in the research is first mention about the visibility of system status, second about flexibility and efficiency of use and third is consistency and standard.

1.2 Objective of the Project

1. To study the ergonomic method due to the eye discomfort while using UMP website homepage by conducting survey.
2. To identify which part of user interface design of UMP website homepage that extremely exposed to ergonomic eye discomfort.
3. To propose improvement on the website hence reduces discomfort of the eye by applying Jakob Nielsen's Heuristics of usability in prototype design development of UMP website homepage with usability testing.

1.3 Scope of the Project

1. Project only conduction on interface design of UMP website homepage.
2. The target respondents only comprises for administrator, lecturers and students of different faculty in UMP Gambang.
3. Specific Platforms: Project only be conducted using Mozilla Firefox and Windows OS as a platform.

1.4 Thesis Organization

This thesis will consist of six (7) chapters. The first chapter which is chapter 1 will explain briefly about the overview of the entire project including the problem statement of the project, objective and scope.

Literature review in Chapter 2 will explain briefly about ergonomic on eye discomfort for using UMP website. The discussion is based on the technique of ergonomics that should be applied. Detail explanations on relevant techniques are shown and evaluate in this chapter by referring to the past research findings by other researchers that related to the project in order to get complete information and knowledge.

Chapter 3 is methodology that will discuss about the software process or flow process that is used for the study of ergonomic applications. This chapter also discussed the detail about the software and hardware specification that are being used for research of this project.

After the methodology explanations, next chapter which is chapter 4 will discuss about the design on the prototype of the system. The purpose of this chapter which may consist of interface design and explain briefly on design of process that is involved during development of this prototype. Besides that, this chapter also elaborates the output of the technique and all the constraints of completing the research.

Chapter 5 is about implementation of the system. This chapter will display the prototype interface that is developed based on the principles and will be compared to the current website that is not fully apply the principles in design development.

Result and discussion will be elaborate in Chapter 6 that interprets and evaluates the finding of the technique that have been applied for ergonomic problems and the advantages and disadvantages of this technique also will be discussed.

Chapter 7 discusses and summarizes the research of ergonomic eye discomfort and solution of the case study. Recommendation and suggestion for further research of the system also will de describes in this chapter.

CHAPTER 2

LITERATURE REVIEW

This chapter briefly discusses about ergonomic study of eye discomfort and system importance and functionality. The discussion is based on the principles that should be applied in order to study on existing system method. Detail explanations on relevant principles are shown and evaluate in this chapter and also describe about knowledge and understanding in project background. Some research of tools and technology used is also discussed in this chapter.

2.1 Background of Project

Eye comfort is an important aspect when surfing such websites, social sites and others. This is to ensure that activities of browse the internet run smoothly and do not cause a problem to users. Eye comfort is closely related to human factors and ergonomic which is concerned with the "fit" between the user, equipment and their environments. It takes account of the user's capabilities and limitations in seeking to ensure that tasks, functions, information and the environment suit each user. To assess the fit between a person and the used technology, human factors specialists or ergonomists consider the job or activity being done and the demands on the user depends on the equipment used such as size, design, how appropriate it is for the task and the information used that show how it is presented, accessed, and changed. In order to ensure that, the develop of design is cover all necessary aspects and consider of the ergonomic (human factor), the implementation must follow up the standard principles and accurate guidelines.

2.2 Studies on Ergonomic

The International Ergonomic Association (IEA) defines ergonomics is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that apply theory, principles, data and methods to design in order to optimized human well-being and overall system performance.

From a concise proposed by (Chapanis A., 1991) boils it down to its very fundamental nature. He defines ergonomics (human factors) is a body of knowledge about human abilities, human limitations, and other human characteristics that are relevant to design. Human factors engineering is the application of human factors information to the design of tools, machines, systems, tasks, jobs, and environments for safe, comfortable, and effective human use.

Ergonomic definitions from scientific literature (James H. Stramler, 1993) compiles and analyses that human factors is that field which is involved in conducting research regarding human psychological, social, physical, and biological characteristics, maintaining the information obtained from that research, and working to apply that information with respect to the design, operation, or use of products or systems for optimizing human performance, health, safety, and habitability.

The National Research Council (1093) said "Human Factors specialists are united by a singular perspective on the system design process: that design begins with an understanding of the user's role in overall system performance and that systems exist to serve their users, whether they are consumers, system operators, production workers, or maintenance crews. This user-oriented design philosophy acknowledges human variability as a design parameter."

By looking through all definition, it can be considered that ergonomics can be concerned with a lot of things that are not related to the “work” being done. It is a multidisciplinary activity responsible for the activities in order to bring the product, systems, jobs and environments, characteristic, limitations and needs, looking for optimize their effectiveness and to improve both health, comfort and productivity.

2.3 Studies on Eye Discomfort

Research into the human comfortable is a very important area to stay informed on and eye is an important role when browsing websites or internet. The human eye is an organ which reacts to light, font, colour and others for several purposes. Human eye is organ of vision. A vital organ of vision it plays a very important role not only in life but also the human body.

Besides that, the human eye is the organ which gives us the sense of sight, allowing us to learn more about the surrounding world than do with any of the other four senses. The eye allows us to seer and interprets the shapes, colours, and dimensions of objects in the world by processing the light that reflect or emit. The eye is able to see in bright light or in dim light, but it cannot see objects when there is no light.

Eye used to fix the eye on, to look on, to view, to observe particularly, to observe or watch narrowly, or with fixed attention and to hold in view. The eyes are attracted on simple, nice, easy to read faces and interesting design. Be aware of fonts and text sizing because they influence behaviour. Viewers tend to scan more across larger text, while smaller fonts increase focused viewing behaviour. When browse website, we may want to scan, or may want focused attention, but its decision that should be made purposefully and not randomly.

2.4 Studies on Website Design

Web design is defined as “the art and process of creating a single web page or entire web sites and may involve both the aesthetics and the mechanics of a web site’s operation although primarily it focuses on the look and feel of the web site (2010, January 19) “.

Web design is kind of like graphic design in the sense that you are styling and designing different parts of the internet. Graphic design is defined as the art or profession of visual communication that combines images, words, and ideas to convey information to an audience, especially to produce a specific effect (Van Der Sluis, B, 2004).

Website design means planning, creation and updating of websites. Website design also involves information architecture, website structure, user interface, navigation ergonomics, website layout, colours, contrasts, fonts and imagery (photography) as well as icons design.

Briefly, the meaning of design is perceived solely as a visual aspect. In reality, website design includes more abstract elements such as usability, ergonomics, layout traditions, user habits, navigation logic and other things that simplify the using of websites and help to find information faster.

Design elements and principles by (Lidwell W., 2010) stated design elements are the basic units of a painting, drawing, design or other visual piece. The elements explain that colour can play a large role in the elements of design with the colour wheel being used as a tool, and colour theory providing a body of practical guidance to colour mixing and the visual impacts of specific colour combination. The uses are colour can aid organization so develop a colour strategy and stay consistent with those colours.

Simplicity is the one of the design principles. Although gaining attention is an important part of any communication act, it is important to try to keep your message as simple as possible (Schwier and Misanchuk, 1993). Use only the amount of text and graphics as is absolutely necessary to get your point across which superfluous graphics can interfere with understanding (Anglin, Towers & Levie, 1996; Levie & Lentz, 1982) and an overabundance of fonts or colours can distract rather than assist learning.

2.5 Current Design of UMP Website

Figure 2.1: Current UMP Website

UMP website as shown in figure 2.1 is the website that be a focus point for members of the organization. As usual, university website was developed to viewing and get some information. Through UMP website, students especially are able to visit page such as e-learning in order to know the information about every subject taken and so on by login with input username and password. That means, they need to use the website every single day in long period. When the website was be a focus point, eye comfort must be an important part when view the page. From the research of UMP website, the design development is not follow the accurate rules. Font size, background color, color pairing, font type, content display, image use is not follow the website standard. On the bottom part, the font that use is too large compared to other part and will show that the design is not consistent and standard.

2.6 Case Studies

Studies on existing websites are required to study the elements that are on every website. Elements of the research includes the design, use of type and font size, use of colour and how the website give the impact on consumers whether to expert or novice user who browse the website. UTM website, UIA website and UiTM website is the example of website that have own advantages in terms of design.

2.6.1 Studies on UTM Website

UTM website as shown in figure 2.2 is the official website which developed in order to provide news or up-to-date information about their organization. The website act as gateway to all member of UTM that give benefits to them contains activity of their university, information about studies and organisation, and etc. UTM website design has a simple design interface. Amount of text and graphics that placed as is absolutely necessary to get point across and text on the website is not too much and need to click at another sub menus in order to achieve more information. Colour used is suitable and not excessive, does not cause eye discomfort particularly when visiting this site for too long. The colour that use is can categories in “save colour” because use the

whitey colours as a background and only apply no more than three colours for text and additional background.

Figure 2.2: UTM Website

2.6.2 Studies on UIA Website

Every website developed for an organization to be a focal point for members of the organization. Similarly, the UIA website as the place or space for students and staff to obtain current information, find activities that will be organized, campus news, and so on. UIA website that shown in figure 2.3 is the simplest website that has quite good and effective user interface. One element that can be highlighted is the clarity of a design. So far users are able to interact with the system by communication meaning and function. The text not too much, colours use are suitable, and no blinking text which

commonly found on a website that makes a user's eyes feel discomfort. Elements that be applied in the development of this site will facilitate whether novice and expert users.

Figure 2.3: UIA Website

2.6.3 Studies on UiTM Website

UiTM website as shown in figure 2.4 is the official website that gives advantages of using this web-based which is contain a lot of features for staff, student and admin itself. This website provides the informatiob about the univrsity in general such as the overview, academic programs, current news of university, activities and etc. UiTM website is one of the simplest features and attractive design. The development of the website decrease amount of text in the main page and spread out only one graphic which makes this website views not too dense. Standard colours are used for links and visited links and match with the background colour. One of the elements that can be

highlighted is the amount of colour of the design. It not more than three colours and is a good aspect to the designing website.

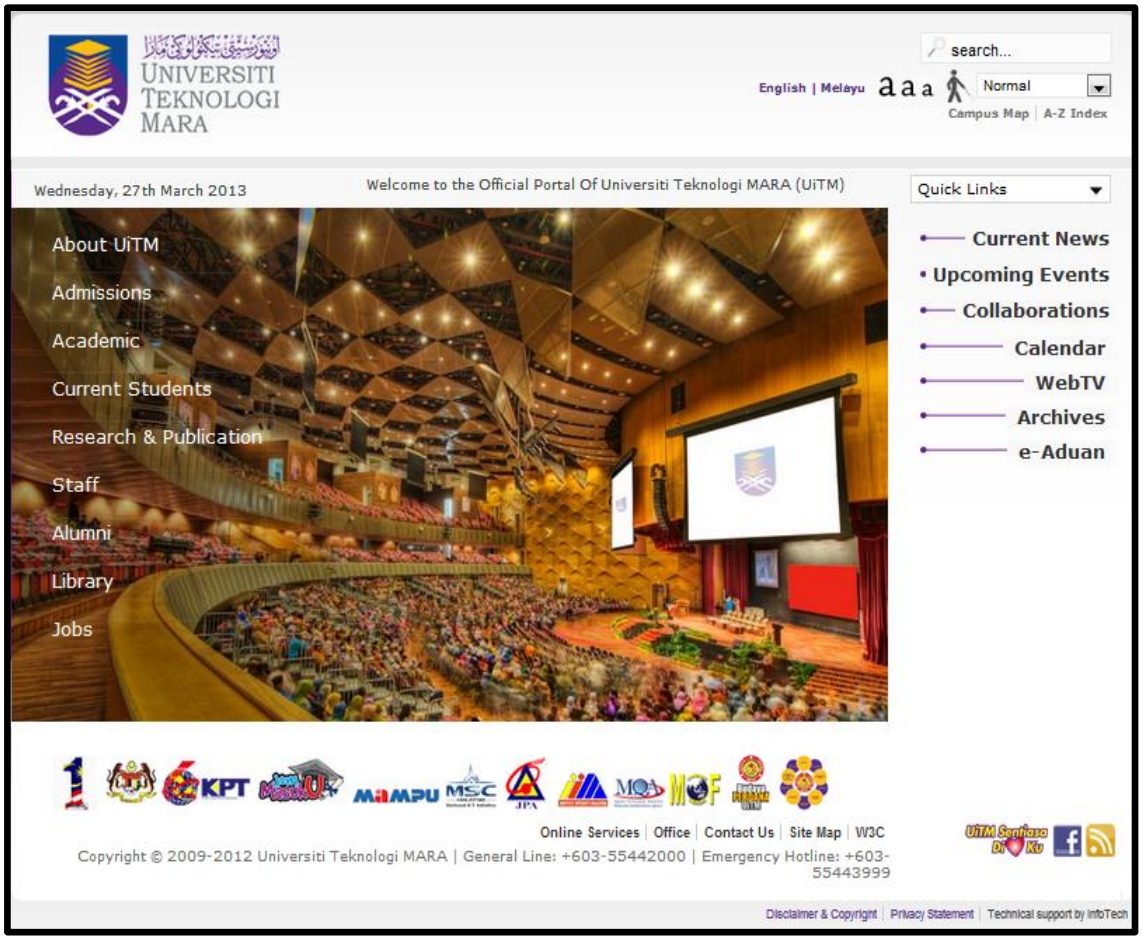

Figure 2.4: UiTM Website

2.7 Studies on Heuristic Evaluation

Heuristic evaluation is a discount usability engineering method for quick, cheap, and easy evaluation of a user interface design. It is the most popular of the usability inspection methods. Heuristic evaluation is done as a systematic inspection of a user interface design for usability. The goal of heuristic evaluation is to find the usability problems in the design so that they can be attended to as part of an iterative design process. Heuristic evaluation involves having a small set of evaluators examine the interface and judge its compliance with recognized usability principles. It specifically involves evaluators examining the interface and judging its compliance with recognized

usability heuristic evaluation principles. Heuristic evaluations are one of the most informal methods of usability inspection in the field of human-computer interaction. There are many sets of usability design heuristics; they are not mutually exclusive and cover many of the same aspects of user interface design. Furthermore, heuristic evaluation is a good method of identifying both major and minor problems with an interface, but the lists of usability problems found by heuristic evaluation will tend to be dominated by minor problems, which is one reason severity ratings form a useful supplement to the method (Nielsen J, 1995). There are three collection of heuristic evaluation which is Norman's Seven Principles, Shneiderman's Eight Golden Rules and Jakob Nielsen's Ten Usability Heuristics.

2.7.1 Norman's Seven Principles

Norman's Seven Principles model of interaction in human computer interaction is the fact that is gives an understanding between the human and the computer and aim to facilitate the user's interaction with the system. The Design of Everyday Things is a best-selling book is about the design of simple objects, and why some objects please their users while others frustrate them. Norman uses case studies to describe the psychology behind what he deems good and bad design, and proposes design principles. The book spans several disciplines including behavioural psychology, ergonomics, and design practice. In the book, it helps in designing systems that facilitate the user in forming the correct actions and give the correct and expected feedback. Furthermore, the Norman's Seven Principles a widely recognized expert on design strongly believes that the things we use in our everyday lives should be easy to use and it should be more than obvious how to use them. Table 2.1 show the Norman's Seven Principles with descriptions.

Principles	**Descriptions**
Use both knowledge in the world and knowledge in the head *(conceptual models)*	Even though the design should facilitate intuitive operation, there should be consideration towards making it efficient for the experienced user. The designs are made intuitive by using the knowledge in the world. However, in some cases the user can internalize this knowledge
Simplify the structure of tasks	The tasks can be restructured or the designs can provide aids to make the same task simpler. There are four our approaches to make the tasks simples. First, keep the task same, but provide mental aids. Seconds, improve visibility, thus improving feedback and the ability to keep control. Third, automate the complex tasks, keeping them the same and lastly, restructure the tasks so that they are simpler.
Make things visible	Consider both visibility on the execution side of the action and the evaluation side. On the execution side, good visibility helps people to match their intentions to actions that can be executed on the system, bridging the so called Gulf of Execution. On the evaluation side, good visibility refers to feedback of system status and helps the users to evaluate the action's effects.
Get the mappings right	The designs should make sure that the user can determine the following mappings between intentions and possible actions; actions and their effects; actual system state and perceived state of the system and the needs and intentions of the user.
Exploit the power of constraints, both natural and	In formulating the right action, it would be helpful if the number of choices made available to the user was

artificial	constrained in some way. The use of natural and artificial constraints is a very effective design technique. This also helps is reducing the errors that the user makes.
Design for error	Slips are inevitable, thus the designers should take this into consideration while designing systems and the system should allow the user to recover from errors.
When all else fails, standardize	It is not always possible to design intuitive systems without arbitrary mappings. Thus standardize can helps the user as he has to undergo the learning process only once.

Table 2.1: Norman's Seven Principles

2.7.2 Shneiderman's Eight Golden Rules

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. These rules were obtained from the text "Designing the User Interface" which is describe the strategies for effective human-computer interaction. To improve the usability of an application it is important to have a well-designed interface, Shneiderman's "Eight Golden Rules of Interface Design" are a guide to good interaction design. Table 2.2 describe the Shneiderman's Eight Golden Rules with descriptions.

Principles	**Description**
Strive for consistency	Consistent sequences of actions should be required in similar situations; identical terminology should be used in prompts, menus, and help screens; and consistent commands should be employed throughout
Enable frequent users to use shortcuts.	As the frequency of use increases, so do the user's desires to reduce the number of interactions and to increase the pace of interaction. Abbreviations, function keys, hidden commands, and macro facilities are very helpful to an expert user.
Offer informative feedback	For every operator action, there should be some system feedback. For frequent and minor actions, the response can be modest, while for infrequent and major actions, the response should be more substantial
Design dialog to yield closure	Sequences of actions should be organized into groups with a beginning, middle, and end. The informative feedback at the completion of a group of actions gives the operators the satisfaction of accomplishment, a sense of relief, the signal to drop contingency plans and options from their minds, and an indication that the way is clear to prepare for the next group of actions.
Offer simple error handling	As much as possible, design the system so the user cannot make a serious error. If an error is made, the system should be able to detect the error and offer simple, comprehensible mechanisms for handling the error.

Permit easy reversal of actions	This feature relieves anxiety, since the user knows that errors can be undone; it thus encourages exploration of unfamiliar options. The units of reversibility may be a single action, a data entry, or a complete group of actions.
Support internal locus of control	Experienced operators strongly desire the sense that they are in charge of the system and that the system responds to their actions. Design the system to make users the initiators of actions rather than the responders.
Reduce short-term memory load	The limitation of human information processing in short-term memory requires that displays be kept simple, multiple page displays be consolidated, window-motion frequency be reduced, and sufficient training time be allotted for codes, mnemonics, and sequences of actions.

Table 2.2: Shneiderman's Eight Golden Rules

2.7.3 Nielson's Ten Principles

Jakob Nielsen's heuristics are probably the most-used usability heuristics for user interface design. A Heuristic Evaluation, or Usability Audit, is an evaluation of an interface by one or more human factors experts. Evaluator measures the usability, efficiency, and effectiveness of the interface based on ten usability heuristics originally defined by Jakob Nielsen in 1994. These are ten general principles for user interface design which have continued to evolve in response to user research and new devices. They are called "heuristics" because they are more in the nature of rules of thumb than specific usability guidelines. Table 2.3 elaborate Ten Usability Heuristics by Jakob Nielsen.

Principles	**Description**
Visibility of system status	The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.
Match between system and the real world	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.
User control and freedom	Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.
Consistency and standards	Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.
Error prevention	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.
Recognition rather than recall	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.

Flexibility and efficiency of use	Accelerators which 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 2.3: Nielson's Ten Principles

2.7.4 Analysis for Studies of Heuristics Evaluation

Based on the studies of three different heuristics, those have different opinion and information to be featured and presented. One particular heuristic rule will be used for the assessment that related to the eye discomfort for using UMP website which is Nielsen's Ten Heuristics. That is consisting of ten rules. These ten rules are chosen based on its priority. This is due to the ten basic parameters that are highlighted of the

research by Nielsen and will ensure that the chosen rules will cover all objectives of Nielsen’s rules into the propose prototype.

The first heuristics is match between system and the real world. 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. The system should match the real world of the user’s experience as much as possible. The concepts that will be applied in design web should be familiar for the expert and novice users. On the Web, you have to be aware that users will probably be coming from diverse backgrounds, so figuring out their "language" can be a challenge.

Second heuristics which is user control and freedom where Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo. Many of the "emergency exits" are provided by the browser, but there is still plenty of room on your site to support user control and freedom. Or, there are many ways authors can take away user control that is built into the Web. A "home" button on every page is a simple way to let users feel in control of your site.

Be careful when forcing users into certain fonts, colours, screen widths or browser versions. And watch out for some of those "advanced technologies": usually user control is not added until the technology has matured. One example is animated GIFs. Until browsers let users stop and restart the animations, they can do more harm than good.

Next is consistency and standards heuristics. Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions. Within your site, use wording in your content and buttons consistently. One of the most common cases of inconsistent wording I see deals with links, page titles and page headers. Check the titles and headers for your pages against the links that point to them. Inconsistent wording here can confuse users who think they ended up in the wrong spot because the destination page had a title that differed vastly from the link that took them there. "Platform conventions" on the Web means realizing your site is not an island. Users will be jumping onto (and off of) your site from others, so you need

to fit in with the rest of the Web to some degree. Custom link colours are just one example where it may work well for your site but since it could conflict with the rest of the Web, it may make your site hard to use. Besides that, "standards" on the Web means following HTML and other specifications. Deviations from the standards will be opportunities for unusable features to creep into your site.

Heuristics are useful in design stage. Then, the next rules which is 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. Extraneous information on a page is a distraction and a slow-down. Make rarely needed information accessible via a link so that the details are there when needed but do not interfere much with the more relevant content. The best way to help make sure you are not providing too much (or too little) information at once is to use progressive levels of detail. Put the more general information higher up in your hierarchy and let user's drill down deeper if they want the details. Likewise, make sure there is a way to go "up" to get the bigger picture, in case users jump into the middle of your site. Make sure your content is written for the Web and not just a repackaged brochure. Break information into chunks and use links to connect the relevant chunks so that you can support different uses of your content.

The next principles that will applied in this research is Visibility of system status that describe the system should always keep users informed about what is going on, through appropriate feedback within reasonable time. Error prevention is also will be implemented to the common prototype. 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.

Minimize the user's memory load by making objects, actions, and options visible are important in designing website. 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. These elements is present in the next Jakob Nielsen's heuristics which is Recognition rather than recall rules.

Another rules that will be applied is flexibility and efficiency of use, help users recognize, diagnose, and recover from errors and help and documentation

2.8 Web Usability Research on UMP Website

Human–computer Interaction (HCI) mentions the study, planning, and design of the interaction between people and computers. Computers are used by different kinds of people. So, it is important to design HCI that supports needs, knowledge and skills of the intended users. A basic goal of HCI is to improve the interactions between users and computers by making computers more usable and receptive to the user's needs. Therefore, in order to design a website that is accessible by all users, developer should taking account on the diversity of user background.

To achieve this objective, a research has been done to administrators, lecturers and students in UMP Gambang which is from different faculty. Research has been done by distribute questionnaire to 20 participants. Questionnaire for this analysis is show in Appendix A. Findings gathered in this analysis will be group into two sections which are respondent background and web usability questionnaire.

CHAPTER 3

METHODOLOGY

This chapter will discuss about the methodology and procedure that are used for the study of ergonomic applications on eye discomfort of a website. The information about the background of case study, the technique use to get the feedback of using the website, the procedure to identify the awareness among users about the ergonomic applications, the analysis process on the existing website and the hardware and software that use in this study will be discuss more further in this chapter. The technique and methods that use will help in designing and improve the new UMP website based on ergonomic principles application.

3.1 Introduction

Effective web development from design, organizing information, the use of colour and type of writing is a key aspect to getting the number of visitors. The following aspects are important for eye comfort when browsing a web page. It determines the rate of time how long a person can survive to continue to access the website. In addition, the development of a good website plays an important role to ensure that consumers benefit and comfort when accessing the website. In this case, eye

comfort when surfing the web is closely related between users, web design, ergonomic techniques used and applied when developing a website.

UMP website is the main field of UMP citizens to obtain information, the latest info and so on. As major websites, website development shall be in accordance with

specifications and proper guidelines to ensure that websites produced the best quality and is one of the sites that will always visited by UMP members. The feedback obtained based questionnaire conducted to show the public that UMP members are not satisfied with the existing UMP website. It covers in colour background, font type, font size, font colour and design development. In addition, the combination of these aspects is also considered. That's why the people can't stay in a long time because their eyes not comfortable when browsing websites.

3.2 Research Methodology

Methodology is generally a guide line for solving a problem with specific components such as phases, tasks, methods, technique and tools. With methodology developer can easily highlight the choices about what are the information and data to gather. Data to gather is the answer resides in the research questions. Therefore, to know what data to be gathered, a clear research question is very crucial. The research will start by identify the problem that related with the objective of the research. There are the approaches that will conduct for this purpose such as questionnaire. The collected information and data then were going to be analysed for further suggestion of improvement according to the objective of the study. Besides that, the qualitative and quantitative of data collective need to make the consideration. The improvement will not be covering for all the works done on the website, but it only will be apply on the work that suit with the objective of the research. Figure 3.1 shows how the flowchart that consists of the process and method should implement in the project.

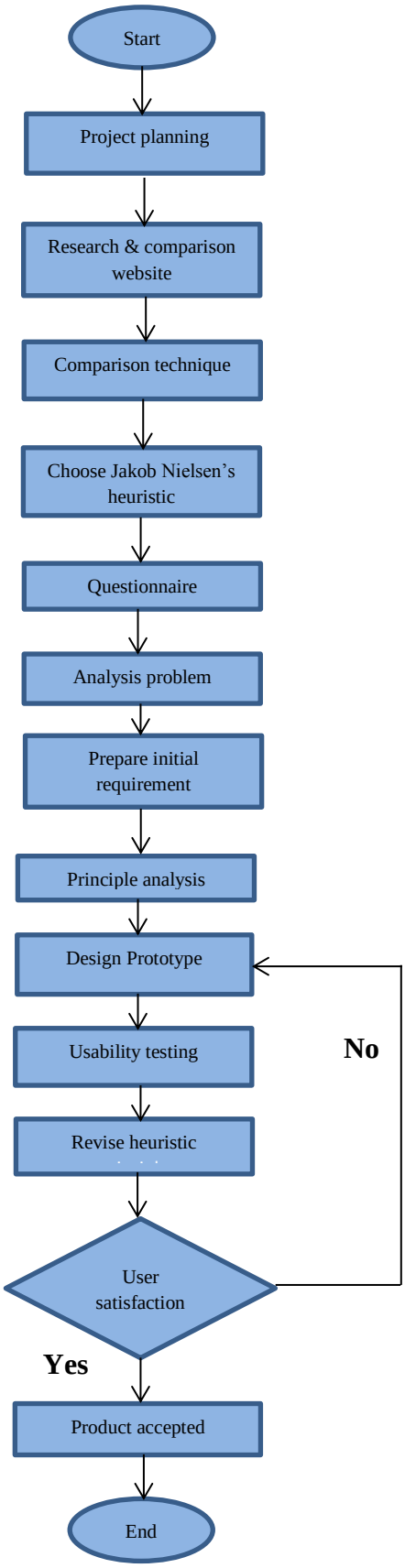

Figure 3.1: Flowchart Process

3.3 Identifying the Problem

Problem identification stage is the most important section for this study because it is the preliminary (priority) stage in designing or developing new design or methods. At this stage, all the point that related to the case study is going to be through in order to identify the problems that occur.

Identification process will be conducted on the whole case study related to the major problem based on the identified objective. Focus of this process is on the underlying causes of problems, not just the symptom and it will be link together to both theory and evidence from the case study. At this stage, questionnaire are going to be use in order to get the precise and clear result.

3.4 Preparing Survey Questionnaire

The questionnaire is one of the popular methods commonly being used to process identification as the root of the problem from random selected peoples. The aim of this questionnaire is to know the responses from the participants about the activities being studies. The respondent for this questionnaire has been randomly distributed to 20 members which is involved admin, lecturer and student of UMP Gambang from different faculties. The questionnaire consists the questions related to the objectives of the studies. There are eight questions in this questionnaire which ask on different aspects based on Jakob Nielsen's rules and are related to how respondents used the existing UMP website and the newly build of UMP website and then know their opinion on the website. It will be arranged in standardized answer to make it simple for compiling and analysis process.

This questionnaire will conducted for two session in order to obtain the pre-test and post-test result. The pre-test result is done before implementation of newly website to collect data on the current version of UMP website. While the post-test result are collected from the newly development of UMP website.

3.5 Project Planning

Project planning is a discipline for stating how to complete a project within a certain timeframe, usually with defined stages, and with designated resources. Project planning allows developer to make and start preparing design to develop the prototype. Planning include determining the instructional needs and concepts, determining management and evaluation strategies, and estimating resources requirement and constraints. Planning activities are defines before developing new or revising existing instruction. Besides that, one view of project planning divides the activity in term of setting objectives, identifying deliverables, planning the schedule and making supporting plans. Supporting plans may include those related to human resources, communication methods, and risk management. Computer hardware and software project planning within an enterprise is often done using a project planning guide that describes the process that the enterprise feels has been successful in the past. Tools popularly used for the scheduling part of a plan include the Gantt chart and the PERT chart.

However, in the research of ergonomic study of eye discomfort for using UMP website using Jakob Nielsen's principles, there are several steps in planning process that should be conducted before start the development process. First, is to develop the project objectives and the objective must be developed based on problem statement. Second, is to identify the deliverables of the project. Deliverables also defines as expected outcomes over the lifecycle of the project. Table 3.1 shows the deliverables of the UMP website.

Task	**Deliverables**
Prototype of system for UMP website	UMP prototype system
Heuristic evaluation of system for UMP website	Implement Jakob Nielsen's heuristics to analyse the usability of the website
End-user usability testing for UMP website	Conduct usability test on prototype of UMP website

Table 3.1: Deliverables of UMP website

As mention in Literature Review, web portal is a web site that functions as a point of access to information in the World Wide Web. Thus, to achieve the objectives of web portal, UMP website should be built as a system that managing the knowledge such as creating, using an so on. Meanwhile, the target audiences are the UMP members.

Next is to determine the schedule. Scheduling is the process of deciding how to commit resources between a variety of possible tasks. Besides that, schedule is important in order to make sure the project's requirement is met and can be delivered on time. Activities that will be included will shows in table 3.2.

Task	**Activities**
Design Development	○ Identify Module ○ Draft UI Design
Design Prototype	○ Develop System Prototype ○ Activities Documentation ○ System Design Complete
Heuristic Evaluation	○ Rebuilt Prototype ○ Activities Documentation ○ Heuristic Evaluation Complete
Usability Testing	○ Create Test Plan ○ Making Appointment With User ○ Usability Testing ○ Result Testing ○ Activities Documentation ○ System Touch up
Presentation	○ Present the project

Table 3.2: Scheduling and Activities

3.6 Requirement Development

Requirements are important in the prototype development of UMP website. Requirement can highlight the limitations and set the boundaries for system development. In addition, requirement also assists in the development of clear needs and capabilities of a web portal. Furthermore, it provides guidance through the development process, which wills helps to maintain focus in the prototype development of UMP website. Requirement can be obtained from user inputs by doing the questionnaire and interviews. All the inputs were grouped and categorized according to similarities. There should be considered in the developing possible changes to system goal. There several factors that should be considered before doing the questionnaire. First, determine the questions that related to the heuristic that should be implementing. Second, determine if the respondent is telling the truth and lastly consideration for source of bias. This is important in order to have an accurate requirement.

3.7 Prototyping the Design

A prototype is an early sample or model built to test a concept or process or to act as a thing to be replicated or learned from. It is a term used in a variety of contexts, including semantics, design, electronics, and software programming. A prototype is designed to test and trial a new design to enhance precision by system analysts and users. Prototyping serves to provide specifications for a real, working system rather than a theoretical one. It is step that helps direct the development process. Sometimes, development effort comes out with mistake. However, it can be minimized through the use and analysis of prototype. Then, need to decide what will be prototyped and identify a part whose performance is measurable, has a high probability for success and has a high project impact. In addition, prototypes design ability to reduce development cost and time when requirement change frequently. In this stage, the prototype will be built based on modules that have been discussed before. Meanwhile, prototype methodology is a good practice to choose heuristic principle in order to implement during designing phase because customer evaluation is use to improve suitable heuristic principle regarding user requirement.

Figure 3.12 shows the phase of prototype process in order to provide guidance on development phases. Prototype methodology involve several phase which are identify the user basic requirements, analysis heuristic principle, design using heuristic, customer evaluation, revise heuristic principle, usability testing.

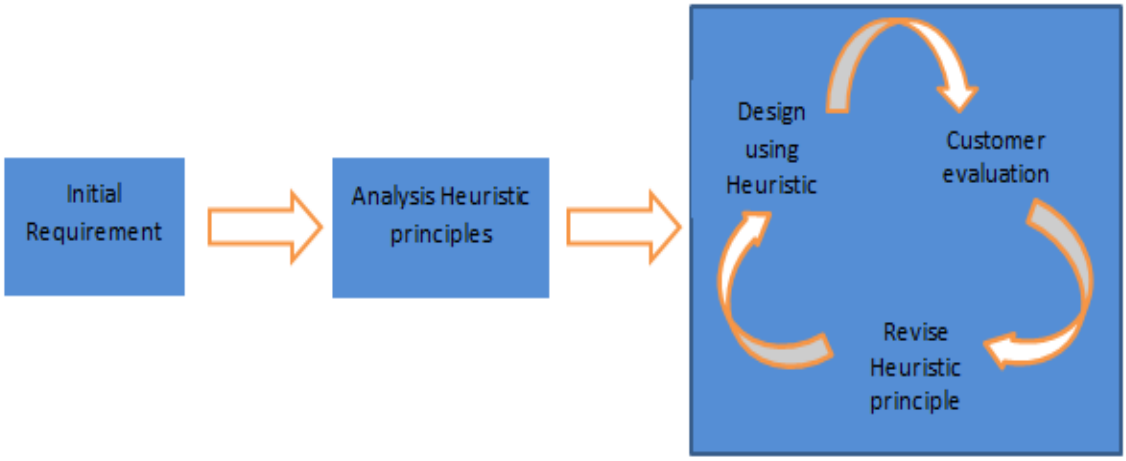

Figure 3.2: Prototype Design Life Cycle

3.8 Heuristic Evaluation

Evaluation is a process by which the interface is tested based on the needs and practices of the user. Meanwhile, heuristic evaluation is a guideline or general principle that can guide a design decision or be used to critique a decision that has already been made. The method of heuristic evaluation will be used to evaluate the prototype system of UMP website in order to find any usability issues in the user interface design. In this evaluation process, chosen rules from Nielsen's Ten Heuristics will be used as a guide by implement the rules into evaluation form. Any comment about the usability problems found in the prototype also will be made base on the rules. From the analysis that made in the literature review, those Nielsen's heuristics that will be used in the project are presented in summary below:

i. Match between system and the real world: It is important to speak language that user can understand and use commons words instead of technical jargon. The concepts use in design should be familiar so that users will easy to navigate.

ii. Consistency and standards: Consistency should be used during evaluation because it can make sites easier to use. So those users do not have to learn any new techniques in order to use the sites successfully.

iii. User control and freedom: It is possibilities that user choose system by mistake. Therefore, navigation is one of the most critical aspects of website design. Navigation refers to the ability to find one's way within the website. Colours that use should be careful when forcing users into certain fonts, colours, screen widths or browser versions.

iv. Aesthetic and minimalist design: This rule is important in order to ensure that the system have a good design especially in the colour scheme, appropriate margins and left alignments in the left and right. It is to make sure that rarely needed information accessible via a link so that the details are there when needed but do not interfere much with the more relevant content.

v. Visibility of system status: The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

vi. Error prevention: 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.

vii. Recognition rather than recall: 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.

viii. Flexibility and efficiency of use: Accelerators which 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.

ix. 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.

x. 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.

3.9 Usability Testing

Usability testing is a technique used in user-centered interaction design to evaluate a product by testing it on users. This can be seen as an irreplaceable usability practice, since it gives direct input on how real users use the system. It is also a way of ensuring that interactive systems such as websites are adapted to user and their tasks has no negative outcomes. Usability testing involves measuring the performance of end-users doing typical tasks in controlled laboratory-like conditions. Besides, usability testing is also necessary to ensure that the system meet the user requirement. It is a true test of how people actually use the system. In the development of UMP website, usability test will be conducted before it is delivered to the end user. Participants which are the instructor and member of UMP from different faculty will test the prototype of UMP website in order to test the system. Questionnaire also will be distributed to the participants during the usability test. Questionnaire used to evaluate the products and use the rating style to evaluate during usability test. Then, the result will be analysed by grouping each question by its usability characteristics which use in the prototype development. Next, data will be illustrated using pie chart and a conclusion will be made based on the result.

3.10 Project Requirement

To develop the system, it is crucial to choose appropriate software as well as the hardware. Following are the software and hardware requirement that use for the

research of ergonomic study of eye discomfort for using UMP website by applying Jakob Nielsen's Heuristics. The specifications of the requirement for development are shown in Table 3.3 that shows the software requirement that will use including all tools to develop prototype, documentation and operating system that use. Table 3.4 shows the hardware requirement that use in the project. It is also contain the hardware that use to burn, backup the data, and to print the report.

Software	**Propose**
Macromedia Dreamweaver MX2004	To create interface design and development system
Adobe Photoshop CS4	To edit picture
Microsoft Project 2007	To develop Gantt Chart
Microsoft Word 2010	Documentation and report writing
Microsoft Power Point 2010	To do final presentation
Microsoft Windows 7 Professionals	Operating System

Table 3.4: Software Requirements

Item	**Quantity**	**Purpose**
HP Pavilion G Series	1	For proposal, documentation and prototype development
Pen drive	1	Data transfer and backup data
Printer/Scanner	1	Print documentation
CD/DVD	1	Backup data and storage

Table 3.5: Hardware Requirements

CHAPTER 4

DESIGN

This chapter briefly discusses on how the prototype had been design. The prototype is based on technique that should be applied in order to achieve the objectives of the project. In this chapter will consist of the base line design of the prototype such as framework of the website and context diagram that shown how the website interacts with the user. Besides that, the current website and prototype of newly design will show in this chapter.

4.1 Context Diagram

Figure 4.1 shows the relationship between user and UMP website. The context diagram of the system represents the overview of the system by showing the system boundaries, external entities which interact to the system and the major flow of information between the entities of the system. From the diagram, user will search the information from and should be achieve the information from UMP website.

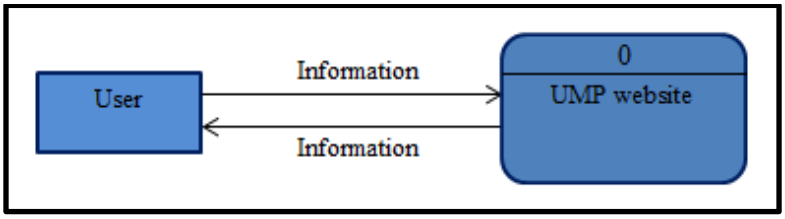

Figure 4.1: Context Diagram of the website

4.2 Framework and Design Model

Figure 4.2 shows the framework and design model of the project. The client side is the presentation layer. This layer is not only provided a graphical user interface (GUI) so that the users can interact with the application, input data and view the results of the request. In web application, a web browser performs the task of this layer. For developed prototype of UMP website, the client-side is a Mozilla Firefox.

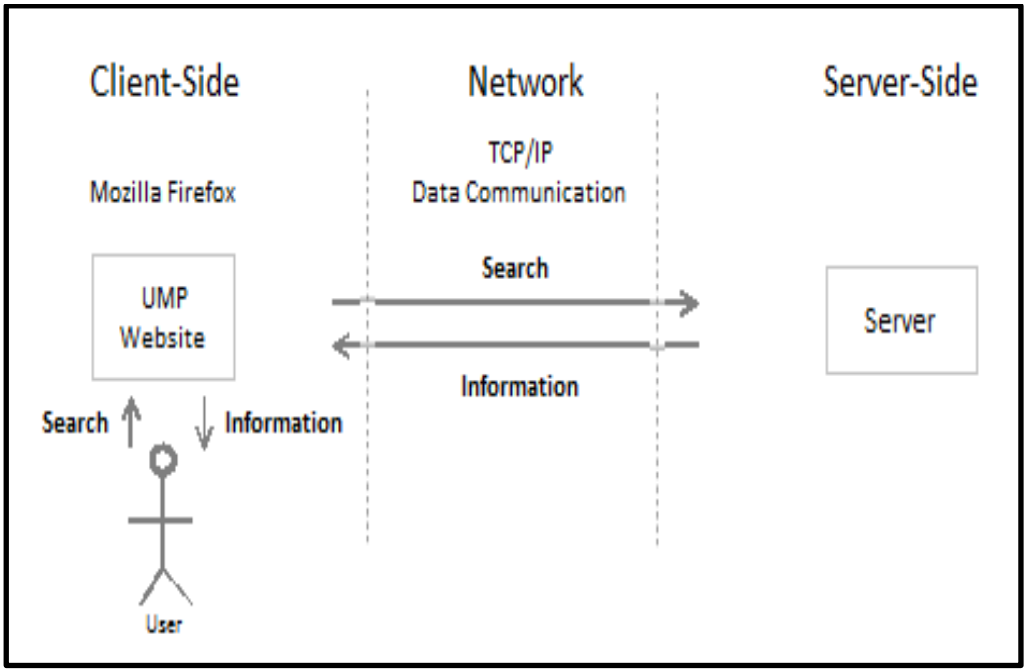

Figure 4.2: Framework Model

The framework is the flow of information from research in the internet to the research material until the applied location of the information and the output of the research done.

4.3 Current Design of UMP Website

Figure 4.3: Homepage of the current UMP website

Figure 4.3 shows the homepage of the current UMP website. Based on research and study that is conducted based on rules and guideline of Jakob Nielsen's for designing website, there are some offense on the current system that do not comply the principles correctly.

Based on Jakob Nielsen's principles, the first rules are visibility of system status. In the website all pages is done fairly well where the system always keep users informed about what is going on, through appropriate feedback within reasonable time. Next is the match between system and the real world. The language use is matching and the user can understand it with use commons words instead of technical jargon. But the design concepts use is more scattered where the content and information is not placed on a proper position. It is become to eye discomfort when user need to read the full text.

Then is the user control and freedom. From the current website, user control is done fairly good where the user can leave the unwanted state without having to go through an extended dialogue which is support undo and redo. But the website design is not consistency and standards where the size font use is not consistent in each page. The pairing color of background, text and other is not consistent and will make the user eyes feel uncomfortable when focus on the page at the long period.

Error prevention rules are done very well in the website. When the users input the invalid username, password or choose the wrong category, the error message will be appear to present the confirmation before they commit to the action. Next is recognition rather than recall where the current website uses the appropriate label and organize everything in order to make customer easily to find and carry information across pages on the website. But the instruction is not visible for the new user retrieved whenever appropriate.

Coming up is the flexibility and efficiency of use rules is also implemented in the current website. For example shortcuts options allow in order to increasing performance, user can press "CTRL" "S" on keyboard to save the information. Next is the aesthetic and minimalist design rule that it not fully implement in the website design. The content in the website contain information which is irrelevant or rarely needed and need to scroll down to see further information. It is full of word and every

extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

Then is help users recognize, diagnose, and recover from errors rules. The rule is done well in the website which precisely indicate the problem, and constructively suggest a solution when user login E-comm with the invalid input. The last rules are help and documentation that is not implemented in the current website. 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.

All the weakness and strength found based on research in current UMP website where all the detail will be taken down as the base line design for the new website prototype.

4.4 Prototype Design of UMP Website

During the designing prototype will be develop according the principles taken off from Jacob Nielsen Ten Heuristic. The designing is consider on background and font colour, type and size of font, content, design and the effectively on the website.

Figure 4.4: Prototype Design of UMP Website

Figure 4.4 shows the design of the UMP website interface for the prototype. The prototype design will consider on the previous system which is the current UMP website weakness and strength so that the similar weakness would not appear again in the implemented design by follow the proper rules.

4.5 Database Design

Database design for the UMP website prototype is created for login, staff and student table in order to prepared several functions and access for the user when the website is implemented.

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
	id	int(11)			No	None	auto_increment	
	login	varchar(30)	latin1_swedish_ci		No	None		
	password	varchar(40)	latin1_swedish_ci		No	None		
	level	varchar(40)	latin1_swedish_ci		No	None		

Figure 4.5: Database Login Table

Figure 4.5 show the login table database design for the prototype that consists of three fields such as id, username and password. The table serves the property of login information and each attributes of the table is important to serve different purpose.

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
	id	int(10)			No	None	auto_increment	
	position	varchar(50)	latin1_swedish_ci		No	None		
	fullname	varchar(50)	latin1_swedish_ci		No	None		
	email	varchar(20)	latin1_swedish_ci		No	None		
	phone	varchar(20)	latin1_swedish_ci		No	None		
	photo	varchar(40)	latin1_swedish_ci		No	None		
	category	varchar(20)	latin1_swedish_ci		No	None		

Figure 4.6: Database Staff Table

Figure 4.6 show the database structure of the staff table. The table include id, position, full name, email, phone, photo and category field, and then it is used to display the information in staff field for the prototype.

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
	id	int(10)			No	None	auto_increment	
	fullname	varchar(50)	latin1_swedish_ci		No	None		
	fakulti	varchar(50)	latin1_swedish_ci		No	None		
	kolej	varchar(50)	latin1_swedish_ci		No	None		
	email	varchar(50)	latin1_swedish_ci		No	None		
	phone	varchar(20)	latin1_swedish_ci		No	None		
	photo	varchar(100)	latin1_swedish_ci		No	None		
	category	varchar(30)	latin1_swedish_ci		No	None		

Figure 4.7: Database Student Table

Figure 4.7 shows the database of student table in the project prototype. The main purpose of this table is to keeps and stores all the information of the students. This table consists of id, full name, faculty, kolej, email, phone, photo and category then need to make sure the database is up to date all the time.

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
	id	int(10)			No	None	auto_increment	
	username	varchar(10)	latin1_swedish_ci		No	None		
	password	varchar(20)	latin1_swedish_ci		No	None		

Figure 4.8: Database External Table

Figure 4.8 shows the database of external table in the project prototype. The main purpose of this table is to keeps and stores all the information of the external. This table consists of id, username and password then need to make sure the database is up to date all the time.

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
	id	int(30)			No	None	auto_increment	
	name	varchar(40)	latin1_swedish_ci		No	None		
	email	varchar(40)	latin1_swedish_ci		No	None		
	website	varchar(40)	latin1_swedish_ci		No	None		
	comment	varchar(100)	latin1_swedish_ci		No	None		

Figure 4.9: Database Comment Table

Figure 4.8 shows the database of comment table in the project prototype. The main purpose of this table is to keeps and stores all the information of the comment from the feedback pages. This table consists of id, name, email, website, and comment then need to make sure the will keep in the database.

CHAPTER 5

IMPLEMENTATION

This chapter briefly discuss on the implementation of this project. The implementations show the complete prototype homepage design and will be described in details which part of the design are change and transform to the new one based on the Jakob Nielsen's heuristics.

5.1 Introduction

Implementation of the UMP website is develop by applying Jakob Nielsen's ten principles by changes the certain part that are not followed the rules to the new design in order to achieve the objectives of the project.

This chapter will describe how the design will shows the result from applying each principle in the different part on UMP homepage design based on Jakob Nielsen's heuristics. Parts that already apply the rules are properly maintained and the trouble and specific part is changed by insert the principles elements.

5.2 Implementation of Design Principles

This section will discuss on the outcome after applying Jakob Nielsen's heuristics into the prototype design. The specific parts that are problems in the current

design is mark and then the change into the prototype design will be described and shows the detail explanation to prove the research based on prototype screenshots.

5.2.1 Aesthetic and Minimalist Design

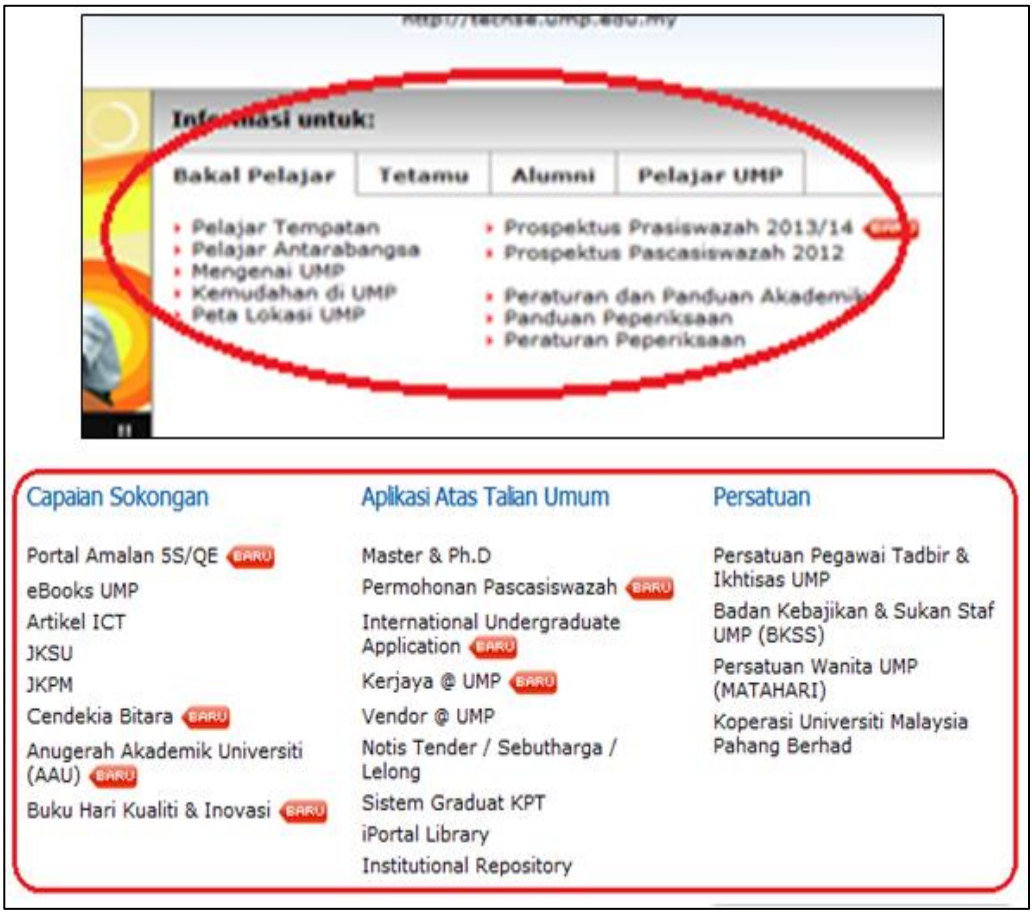

Figure 5.1: Problem Part I

This part carries the purpose to design the interface which not contained 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. The current design show the interface display too much link and irrelevant contents that actually can be hidden to save the space and do not interfere the eyes vision that need to see too much text at a specific time.

5.2.1.1 Applying Rules on the Problem Part I

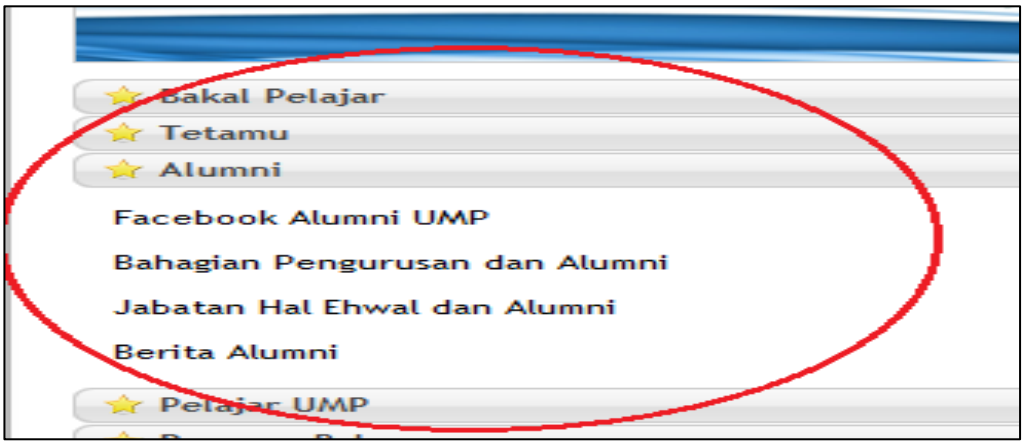

Figure 5.2: Applying Rules on the Problem Part I

Figure 5.2 show the prototype design that is developed by implement the aesthetic and minimalist design principles. This rule is important in order to ensure that the system have a good design and to make sure that rarely needed information accessible via a link so that the details are there when needed but do not interfere much with the more relevant content. The prototype design show the contents and link are hidden behind the menu bar, so that the users need to click the chosen menu bar to display the link and go to the next pages. The design will reduce the eye discomfort because an eye is react to view, observe and relevant content.

5.2.2 User Control and Freedom

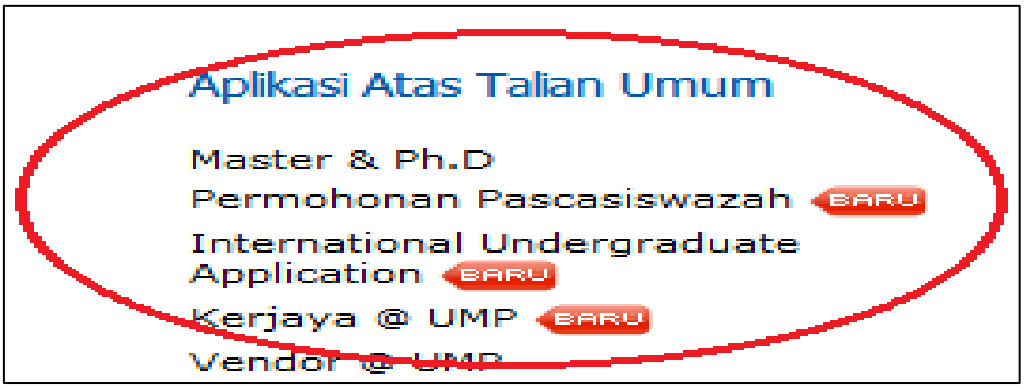

Figure 5.3: Problem Part II

Figure 5.3 shows the problem part on the current design that extremely exposed to the eye discomfort. Colour combination that applied is not suitable to use in design because human limitation is react to light and eye allows is to seer and interprets colours. It is possibilities that user choose system by mistake. Therefore, navigation is one of the most critical aspects of website design. Navigation refers to the ability to find one's way within the website. Colours that use should be careful when forcing users into certain fonts, colours, screen widths or browser versions. The blink icon and red colours use in the current website is to show the signal of the latest info but it is not the appropriate colours and design to apply on the website development.

5.2.2.1 Applying Rules on the Problem Part II

Figure 5.4: Applying Rules on the Problem Part II

Figure 5.4 shows the problem part on the current design of UMP website is implemented to the new design by applying of user control and freedom principles. The colour combination will give the good effect to the users vision because use the appropriate and standard colour. The vision will not become blurry and foggy during

navigation because the users will not disturbed by the words or the colour use that exposed to the eye discomfort. The latest info and other information is separated to the respective parts and will display to the website. The information is constantly updated and the earlier info will be deleted or hidden on the website without use the blink icon or bright colour to show the signal.

5.2.3 Consistency and Standard

Figure 5.5: Problem Part III

From the figure 5.3 show the displaying content and interface on the current website not use the consistent aspects such as font size, font type, background colour and so on. Consistency should be used during evaluation because it can make sites easier to use. So those users do not have to learn any new techniques in order to use the sites successfully. The current design homepage use the variety of font size and apply the variety of capitalizations. Besides that, the contents are on the different background colour. The design concepts will become uncomfortable to the eye vision with the font type and design concept that is applied.

5.2.3.1 Applying Rules on the Problem Part III

Figure 5.6: Applying Rules on the Problem Part III

This principle of consistency and standard carries the purpose to design the interface or the display of the prototype to be consistent. Other aspects of this rule are the font type and size used in the prototype, colour of the word or background, terminology of the word used, information layout of the prototype and so on. The applying rules on the website development is to ensure that all aspect mention to be

consistent throughout the prototype in other to attain the objective of the principles by Jakob Nielsen's.

Figure 5.6 shows the prototype design of UMP website is develop based on the consistency and standard principles in order to reduce the problem design that occur on the current design. The problem will cause the vision not clear enough during website navigation. The good design will applied the standard style, font and language in design user interface such as for content using times new roman or arial style with standard font size which is 12px or 14px and in minimal use of capitalizations. The prototype design that was implemented applied the minimal use of font size, capitalization and minimal background colour to display the specific content on the different space.

5.2.4 Match between System and the Real World and Flexibility and Efficiency of Use

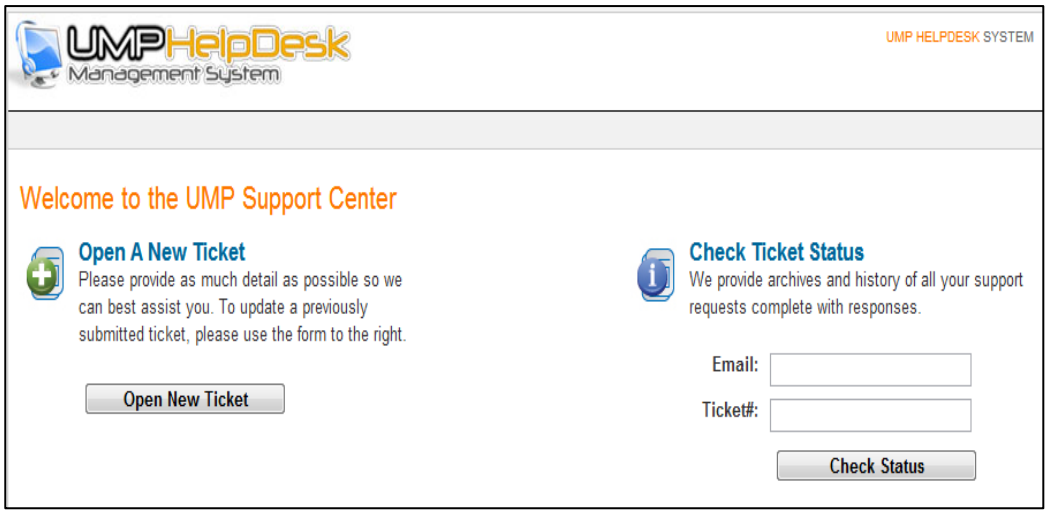

Figure 5.7: Problem Part IV

This part carries the purpose to design the interface which is match between system and the real world, flexibility and efficiency of use. The current design shows concepts use in feedback page design are not familiar and difficult to navigate. The problem occurs will cause the vision feel uncomfortable with what is going on through appropriate feedback, actions and information that stated. The current interface is

difficult to understand by novice user and cannot cater to inexperienced users. It is important to speak language that user can understand and use commons words instead of technical jargon. The concepts use in design should be familiar so that users will easy to navigate.

5.2.4.1 Applying Rules on the Problem Part IV

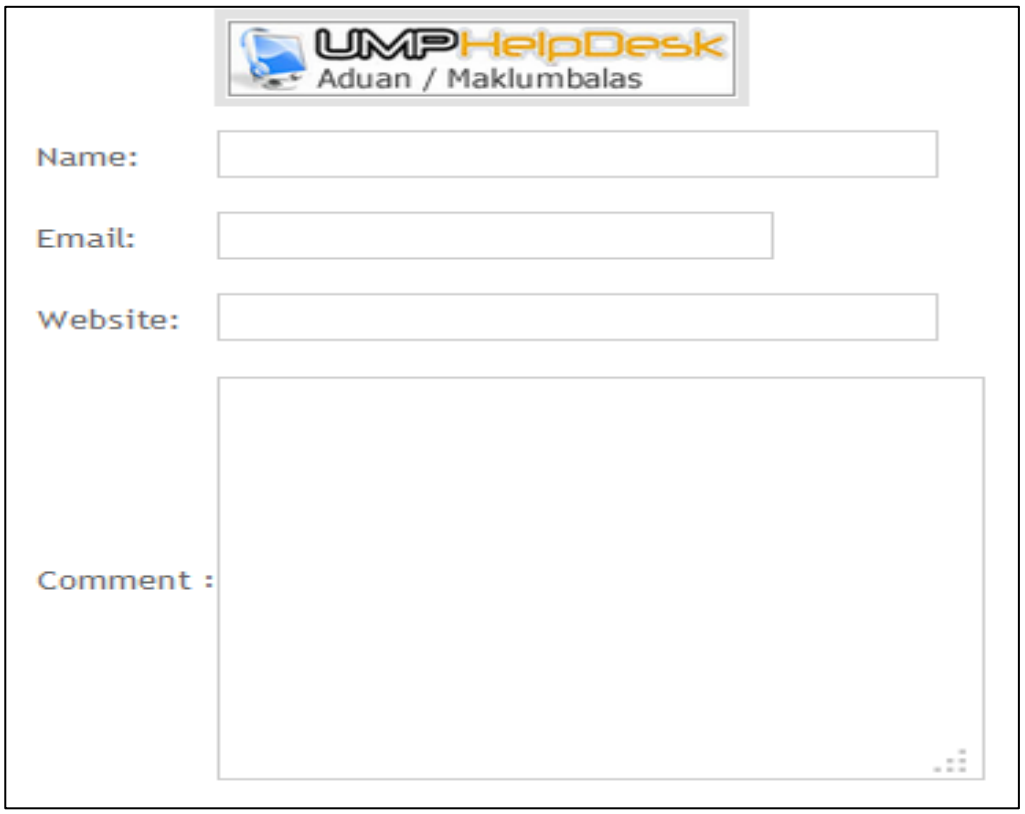

Figure 5.8: Applying Rules on the Problem Part IV

Figure 5.8 show the prototype design that is developed by implement both match between system and the real world and flexibility and efficiency of use principles. This principle is important in order to ensure that the implemented design should be simple and clear for experience and novice users. Apply real world conversation in order to make users familiar to the word. Users clearly understand about the content and how to conduct the website pages. From the prototype design above, the interface are familiar

and easy to navigate because it contains the simple word and clearly understand what is going to do on the feedback page.

5.2.5 Visibility of System Status

Figure 5.9: Current Website

Figure 5.10: Prototype Website

Figure 5.9 and 5.10 show the current and prototype design of UMP website is already applied the visibility of system status principles. The system should always keep customers informed about what is going on, through appropriate feedback within reasonable time. Figures above shows the picture that use as a heading of the website. The header is simple, meaningful and designs depend on the service and the purpose of

the website, so users exactly knows about the service provided. Besides, designing header on the website is the important part because header will give first impression for every user. The eye not bothers user with the header because the design is match with the service provided.

5.2.6 Recognition Rather Than Recall

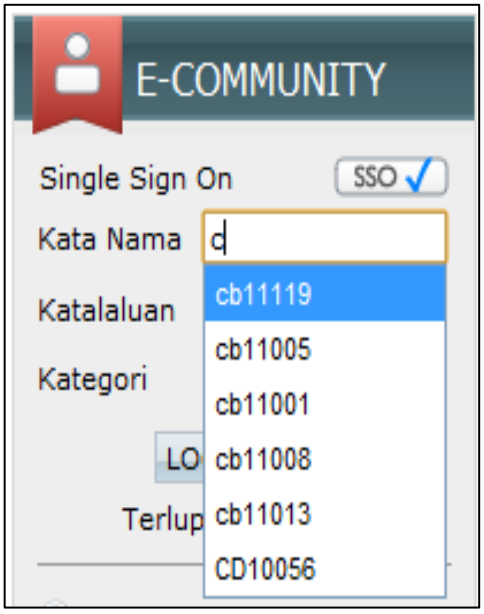

Figure 5.11: Current Website

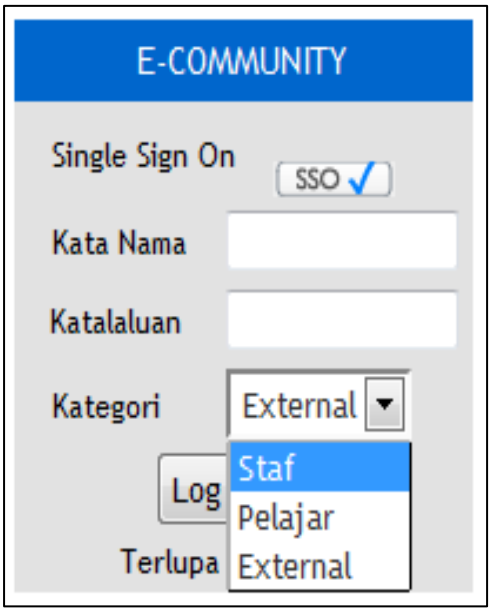

Figure 5.12: Prototype Website

From the figure 5.11 and 5.12, the recognition rather than recall principle is applied in website development. Minimize the customer's memory load by making objects, actions, and options visible. The customer 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. The figures above show the design use the drop down list in order to divide users to the certain categories and will display the username that have use before when they want to login on the next time. By applying the rules, the users feel comfortable and clearly enough with what is going on through appropriate actions.

5.2.7 Help Users Recognize, Diagnose, and Recover From Errors

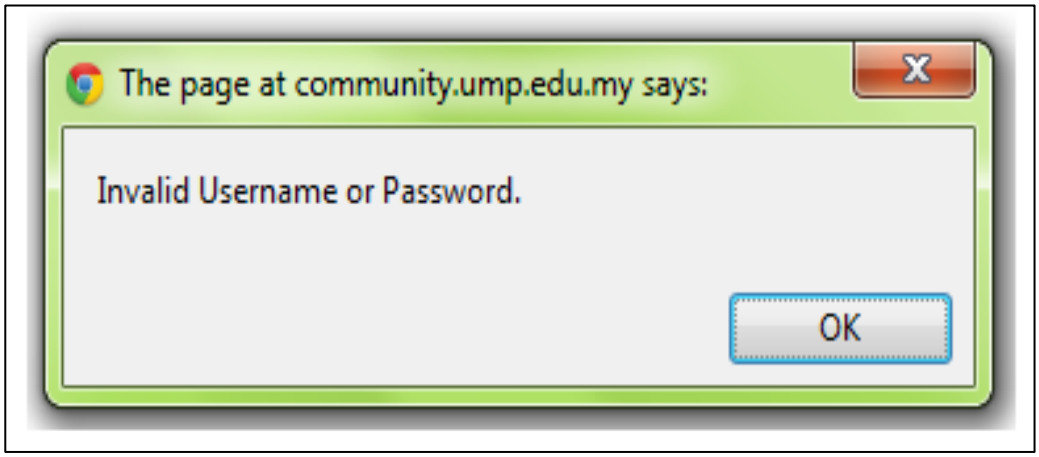

Figure 5.13: Current Website

Figure 5.14: Prototype Website

Figures above show the design that is extremely applied the help users recognize, diagnose, and recover from errors principles by Jakob Nielsen's. The feedback is example to handle error, with organize everything. When errors occur is important to provide clear explanation of what has happened. Provide clear instructions to customer a way to recover error. This rules is important in other to ensure that the vision feel comfortable with what is going through appropriate feedback and actions.

5.2.8 Help and documentation

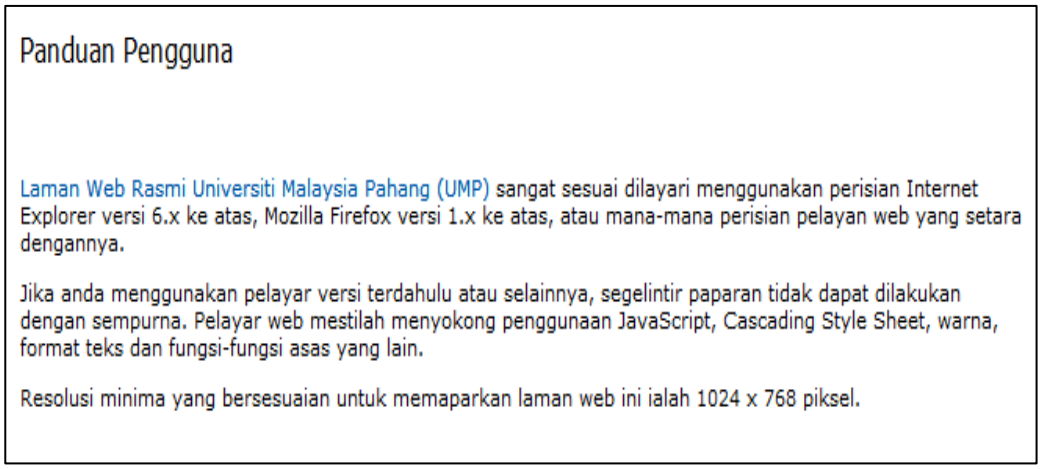

Figure 5.15: Current Website

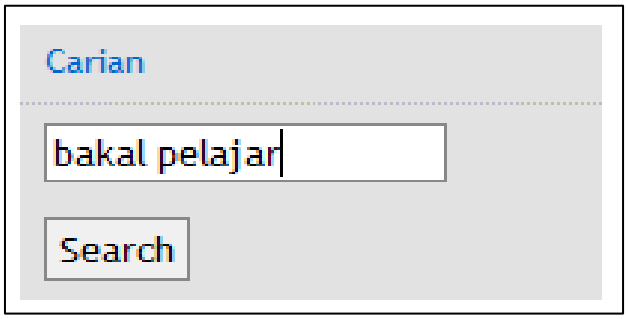

Figure 5.16: Prototype Website

From the screenshots of the current and prototype website design above, help and documentation principles is applied during implementation. 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. The website must provide some sort support include a help section in order to give instruction to user how to perform the function on the website. By applying the rules, the vision was clear with the design and link use to help user more understand about action required.

5.2.9 Error Prevention

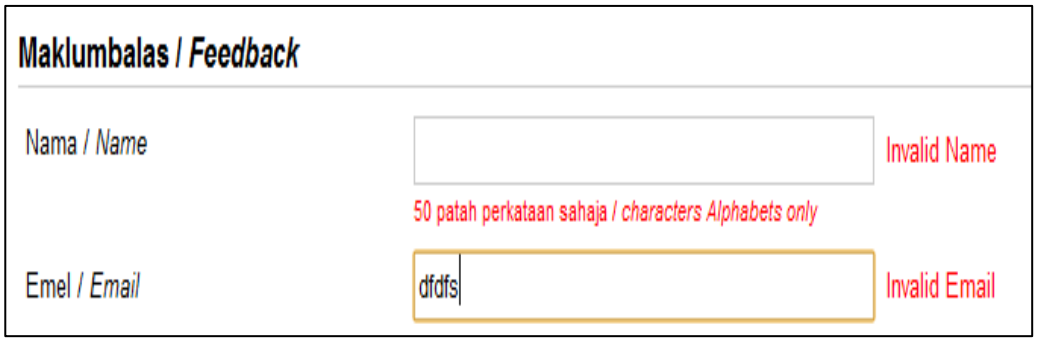

Figure 5.17: Current Website

Figure 5.18: Prototype Website

Figure 5.17 and 5.18 shows the error a prevention principle by Jakob Nielsen's is implemented in the design. 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. From the current design on the feedback pages, the the error message will display when the user not input the name and emel to login and go into the next page. While prototype design show the message and information when the user search something that related to the UMP website content by using search functions that is provided on the prototype design.

5.3 Summarize on Implemented of Jakob Nielsen's Heuristics

Principles	Current Design	Prototype Design
Visibility of system status	✓	✓
Match between system and the real world		✓
User control and freedom		✓
Consistency and standards		✓
Error prevention	✓	✓
Recognition rather than recall	✓	✓
Flexibility and efficiency of use	✓	✓
Aesthetic and minimalist design		✓
Help users recognize, diagnose, and recover from errors	✓	✓
Help and documentation	✓	✓

Table 5.1: Summarize on Implemented of Jakob Nielsen's Heuristics

CHAPTER 6

RESULT AND DISCUSSION

This chapter briefly discuss on the result of this project. It will focus on the survey carry out to the users of the UMP website homepage, the analysed result based on survey and discussion on each question in the survey.

6.1 Introduction

The questionnaire is one of the popular methods commonly being used to process identification as the root of the problem from random selected peoples. The questionnaire consists the questions related to the objectives of the studies. There are eight questions in this questionnaire and are related to how respondents used the existing UMP website and their opinion on the website. It will be arranged in standardized answer to make it simple for compiling and analysis process

After the completion implementation of Jakob Nielsen's ten principles into the prototype of UMP website homepage, a survey will be carry out among the respondents which is consists of students, lecturers and staff. Feedback from the respondents will be group and analysed into chart to display the percentage result for overall rate of prototype design and each questions based on the principles. From the findings, several discussions will made based on chart.

6.2 Feedback Questionnaire

Questionnaire is conducted among the respondents when the prototype of UMP website is done completely. The purpose of the questionnaire is to get the feedback from the respondents on how the prototype design that have implemented based on Jakob Nielsen's rules achieve the objectives then get the satisfaction and will be attract users to use the website without causing discomfort on their eyes. From the findings, some general description is written to elaborate the result.

The questionnaire has been randomly distributed to 20 members of UMP Gambang from five different faculties. The questionnaire is carry out face to face to each individual in order to get the precisely feedback. Respondents need to give the feedback for both current website and prototype design to know that either the website have fulfill the rules and will implement the comparison based on the feedback.

6.3 Respondent Background

A web usability questionnaire has been randomly distributed to 20 members of UMP Gambang. All 20 members are from five different faculties. The two persons of respondents are from Faculty of Civil Engineering & Earth Resources (FKASA), four are from Faculty of Computer System & Software Engineering (FSKKP), four of respondents are from Faculty Technology (FTECH), five randomly of respondents are from Faculty of Industrial Science & Technology (FIST) and the rest of five respondents are from Faculty of chemical engineering & resources (FKKSA). Respondent's categories will shows that only four person of admin are participated. Randomly selected of seven respondents are from lecturer and the rest which is students of UMP Gambang. This statistic shows that major of the respondent are not from computer field. However, next section will tell in details about their computer level and their opinion regarding website usability. Bar chart in figure 6.1 and 6.2 shows the rate of respondent background and respondents categories.

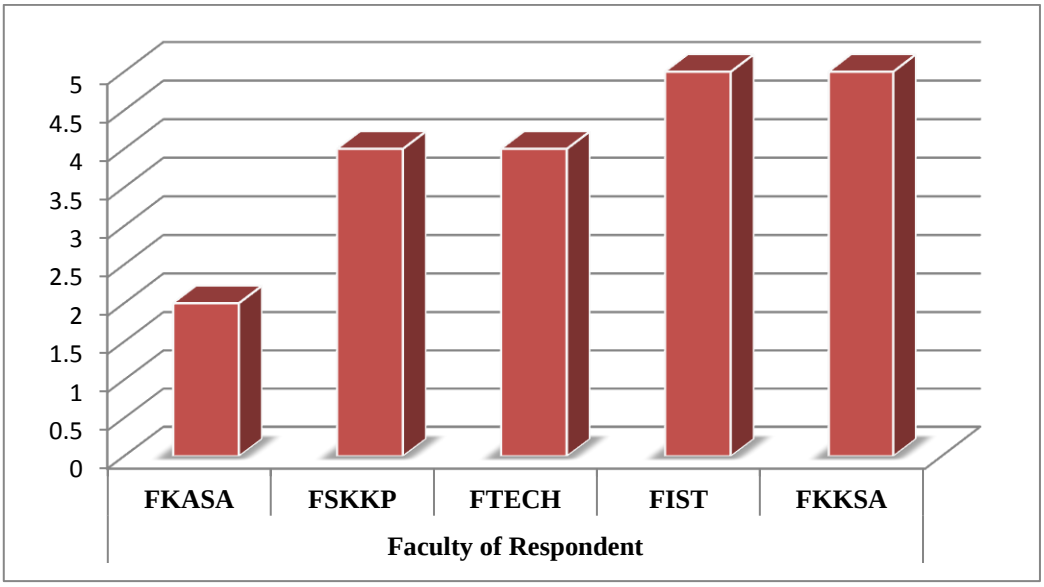

Figure 6.1: Faculty of Respondents

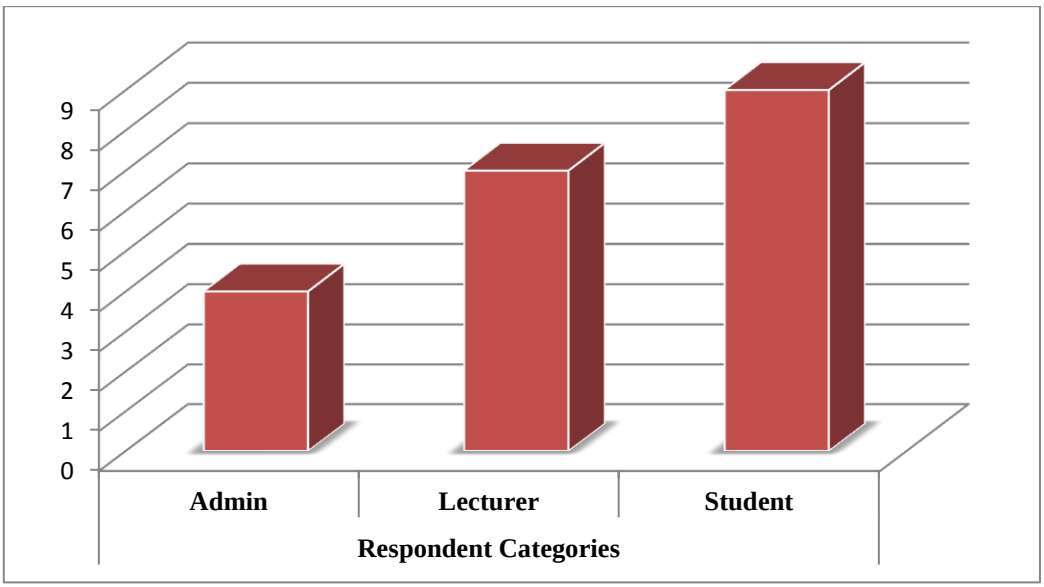

Figure 6.2: Respondents Categories

6.4 Discussion of Web Usability Questionnaire

There are eight questions in this questionnaire. All the questions are related to the participant's level of satisfaction and comfortable when using UMP website homepage. When the overall results are successfully acquired from the respondents, the data will be extracted using Microsoft Excel to produce the results. Data have been

input to the table and the rate is calculated then produces the bar chart from the set of data. Based on the chart, discussion on the result will be generating for the entire question in the questionnaire form. Analysis of the questionnaire will describe and evaluate to the following pages.

Question 1: Overall rate of this website

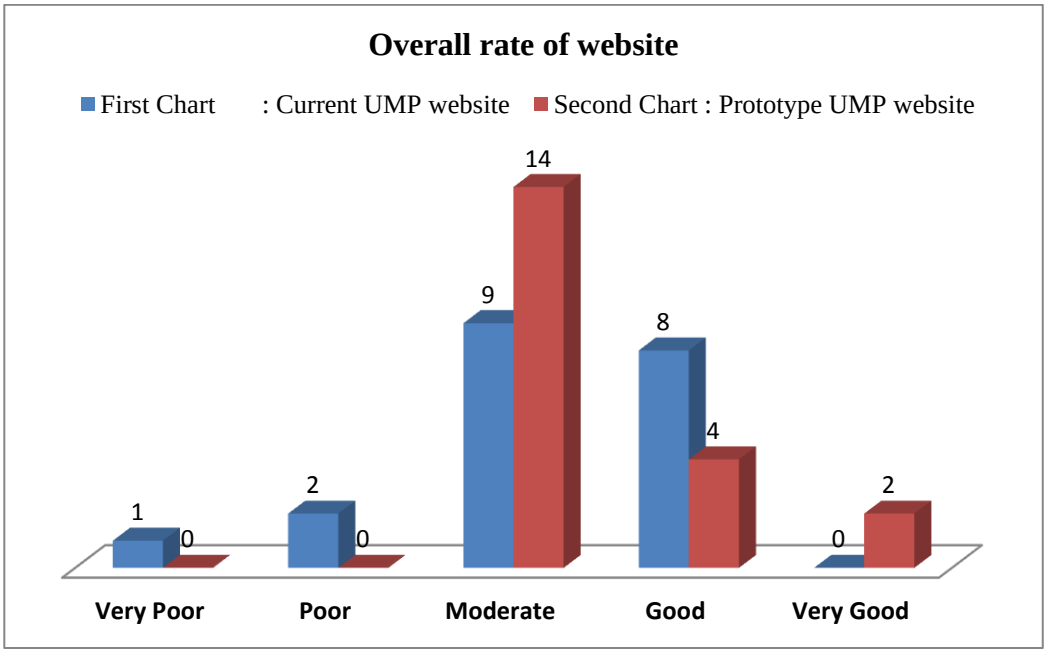

Figure 6.3: Overall rate of website

Figure 6.3 show the result of the overall rate of current and prototype of UMP website. From the evaluation on the current website shows that only one respondent which is think that that the current website is very poor due to the contents, design and colour use that extremely expose to the eye discomfort. Two of respondent answered poor due the rate of current website, nine respondents are choose moderate and the rest feeling that the website is good. From the result, it show that have no respondent think that the current UMP website is very good.

The prototype UMP website shows that no respondent was feeling very poor and poor about overall rate of the newly website. It is possible to the website that is developed by applying ten principles of Jakob Nielsen's. While 14 of 20 respondents

was selected moderate as their answer, the four respondent is feeling good two of respondents think the overall rate of the website is very good and they are comfortable during navigation.

Question 2: During website navigation, how much did the eye discomfort bother you?

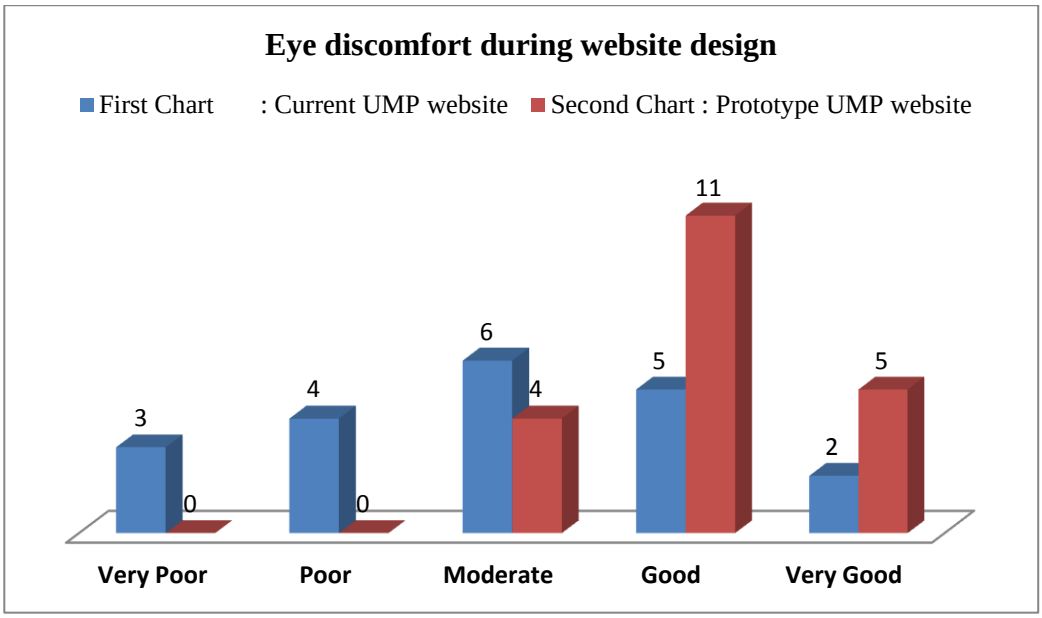

Figure 6.4: Eye discomfort during website design

Figure 6.4 show the result of the how much did the eye discomfort bother the users during website navigation. Evaluate on the current website shows that three of 20 respondents which are feeling very poor on the rate of eye discomfort during website navigation. While four of respondents is answered poor, moderate is answered by six respondents, five of them which is feeling good during navigation and only two respondents are feeling comfortable to their eye when browsing the current UMP website.

The evaluation on the prototype UMP website shows that no respondent was feeling very poor and poor during navigation. The result is because they feel the displaying contents and interface design on the prototype not bother their eye. While four of 20 respondents was selected moderate as their answer, the most respondent is

feeling good with 11 of them selected good as their answer and five respondents think that the prototype design of UMP website not bothers their eye during website navigation.

Question 3: Within the first one hours of viewing website, how often did your vision change between clear and blurry or foggy?

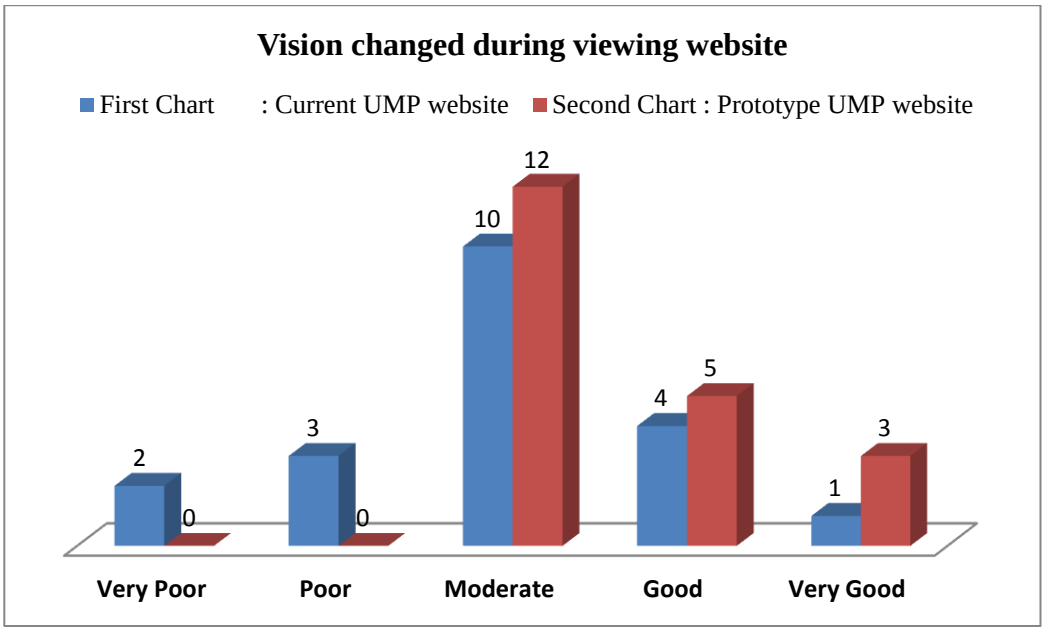

Figure 6.5: Vision changed during viewing website

Figure 6.5 show the rate of how the visions change between clear and blurry or foggy within the first one hours of viewing website. For the current website evaluation, it shows the two respondents are answered very poor and three respondents are feeling poor due the vision change during navigation. The most of them are selected moderate as their feeling with 10 respondents, while four respondents are feeling good and only one of 20 respondent feel that the current UMP website is very good and not bother their visions within the first one hours navigation.

The evaluation on the prototype UMP website shows that no respondent was feeling very poor and poor during navigation. The result is because they feel that not have change between clear and blurry or foggy on their eye. While four of 12

respondents was selected moderate as their answer, the most respondent is feeling good with five of them selected good as their answer and three respondents think very good that the prototype design of UMP website not bothers their eye during website navigation and seen clearly.

Question 4: Did your eyes feel comfortable with the font type and design concept?

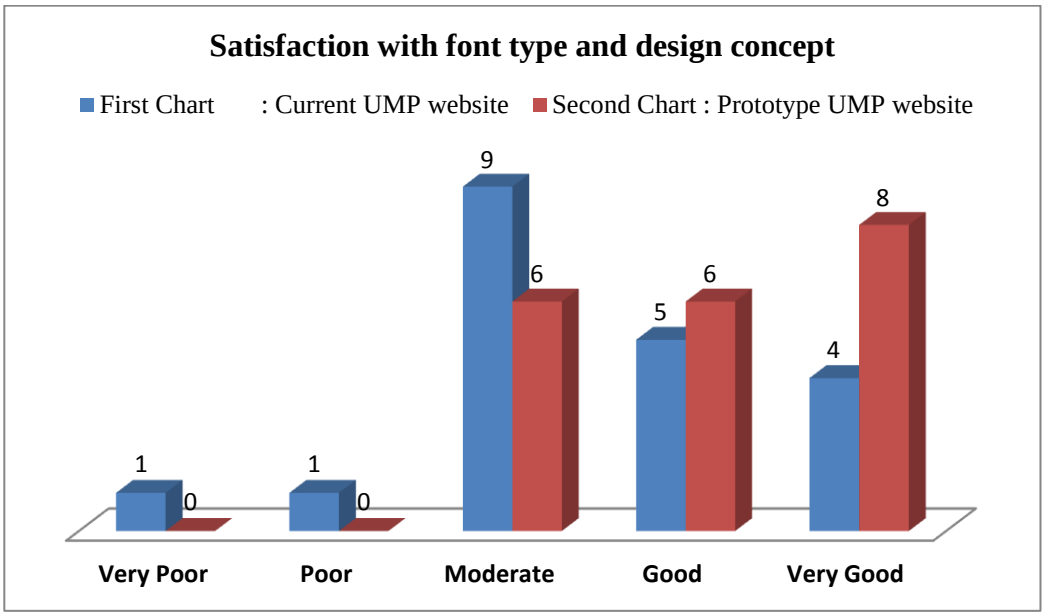

Figure 6.6: Satisfaction with font type and design concept

Figure 6.6 show the rate of satisfaction comfortable with the font type and design concept of viewing website. For the current website evaluation, it shows one respondents are answered very poor and one respondents are feeling poor. The most of satisfaction comfortable with the font type and design concept , they are selected moderate as their feeling with nine respondents, while five respondents are feeling good and four respondent feel that the current UMP website is very good for satisfaction comfortable with the font type and design concept .

The evaluation on the prototype UMP website shows that no respondent was feeling very poor and poor during of satisfaction. The result is because they feel satisfaction comfortable with the font type and design concept on the prototype not

bothers their eye. For the feeling moderate and feeling good with six respondents, the most respondent is feeling very good with 8 of them selected very good as their answer. and five respondents think that the prototype design of UMP website satisfaction comfortable with the font type and design concept.

Question 5: Did your vision was clear enough and familiar with the website design?

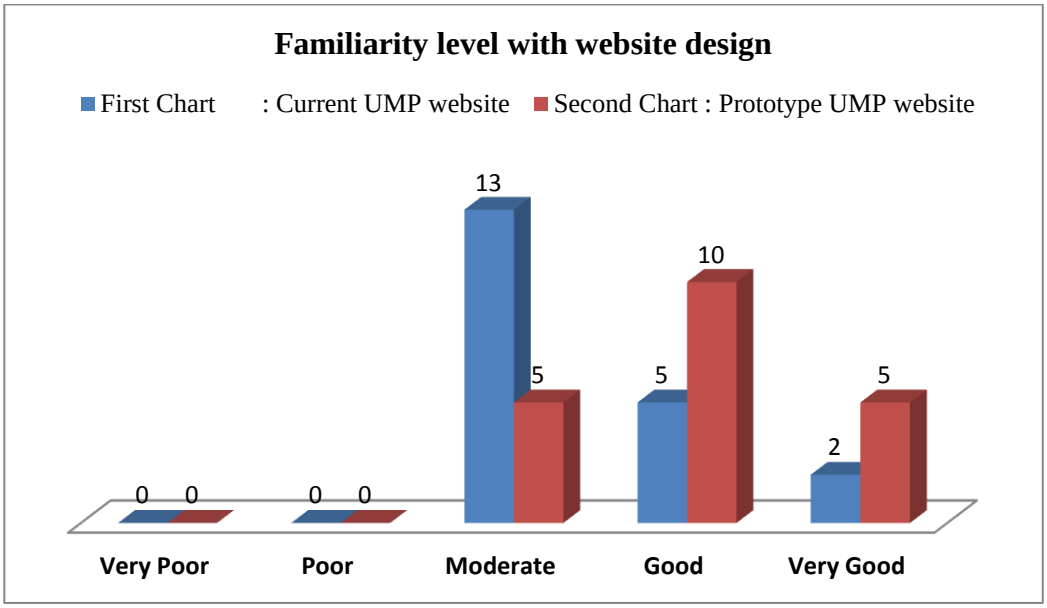

Figure 6.7: Familiarity level with website design

Figure 6.7 show the rate of vision was clear enough and familiar with the website design of viewing website. For the current website evaluation, it shows no respondents are answered very poor and poor. The most of respondents are feeling moderate due the vision was clear enough and familiar with the website design with 13 respondents. While five respondents are feeling good and only two respondent feel that the current UMP website is very good and not bother their eyes because was clear enough and familiar with the website design

The evaluation on the prototype UMP website shows that no respondent was feeling very poor and poor. The result is because they feel the displaying contents and

interface design on the prototype very clear and familiarity. While five of 20 respondents was selected moderate as their answer, the respondent is feeling good with ten of them selected good as their answer and five respondents think that the prototype design of UMP website are familiar.

Question 6: During viewing website, did your vision feel comfortable with what is going on thought appropriate feedback, actions, information and services that stated?

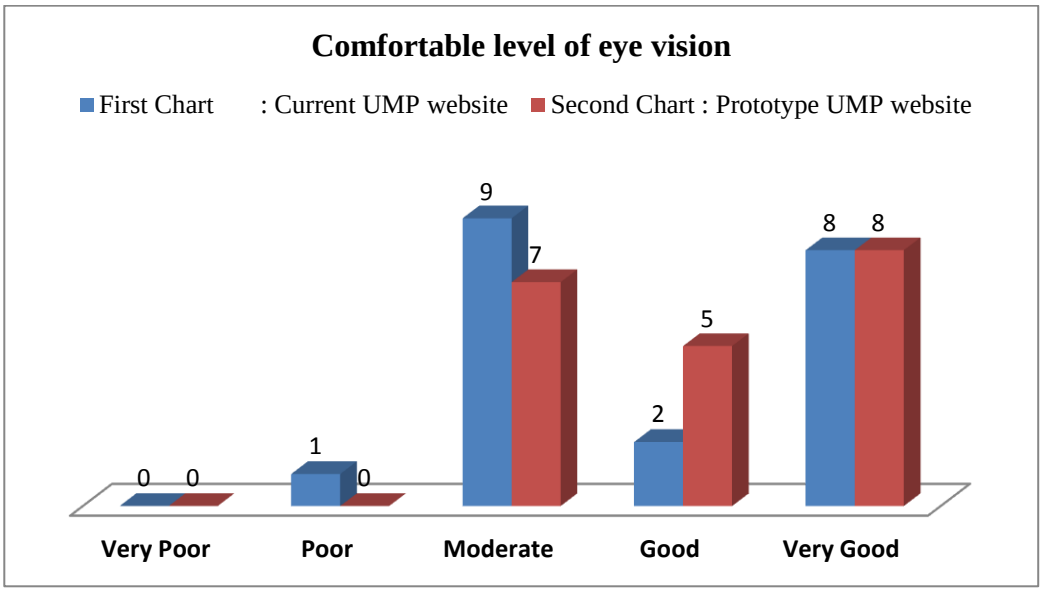

Figure 6.8: Comfortable level of eye vision

Figure 6.8 show the rate of feel comfortable with what is going on thought appropriate feedback, actions, information and services that stated. For the current website evaluation, it shows the no respondents are answered very poor and one respondents are feeling. The most of them are selected moderate as their feeling with nine respondents, while two respondents are feeling good and eight of 20 respondents feel that the current UMP website is feel comfortable level of eyes vision.

The evaluation on the prototype UMP website shows that no respondent was feeling very poor and poor during comfortable level of eyes vision. While seven of 20

respondents was selected moderate as their answer, two respondents are feeling good. Eight respondents are selected very goof through the comfortable level of eyes vision.

Question 7: How much your vision was clear with images use to help user more understand about action required

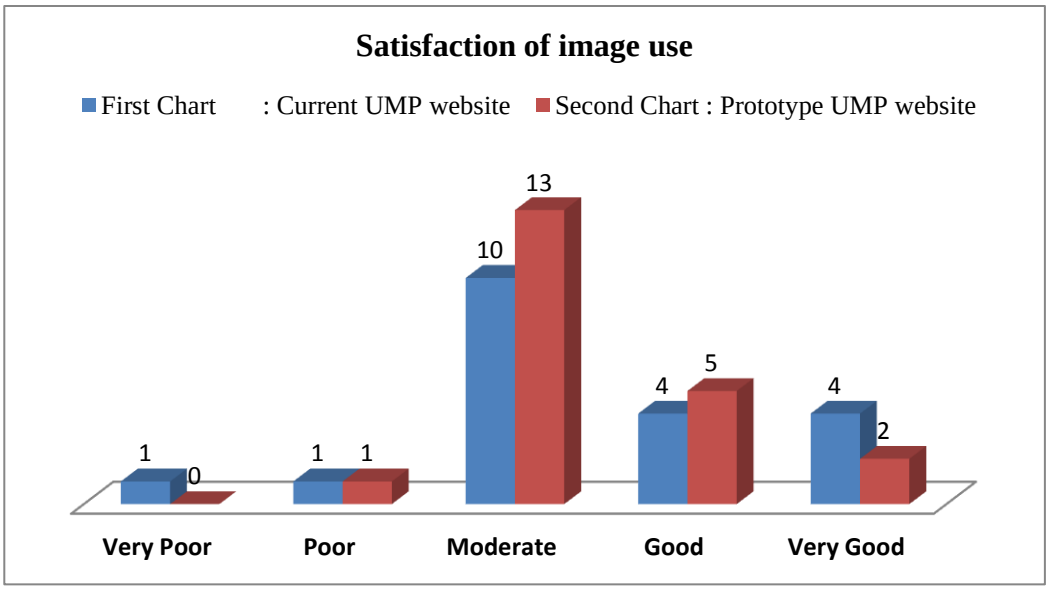

Figure 6.9: Satisfaction of image use

Figure 6.9 show the rate of clear with images use to help user more understand about action required of viewing website. For the current website evaluation, it shows the one respondent is answered very poor and poor. The most respondent are feeling moderate with ten. While four respondents are feeling good and very good of satisfaction of image use

The evaluation on the prototype UMP website shows that no respondent was feeling very poor and one respondent poor during satisfaction of image use. The most of respondents are feeling moderate clear with images use to help user more understand about action required of viewing website with 13 respondents. While five of 20 respondents was selected good as their answer and two respondents satisfaction of image use with prototype UMP website.

Question 8: Does the colour combination give the good effect to your eyes?

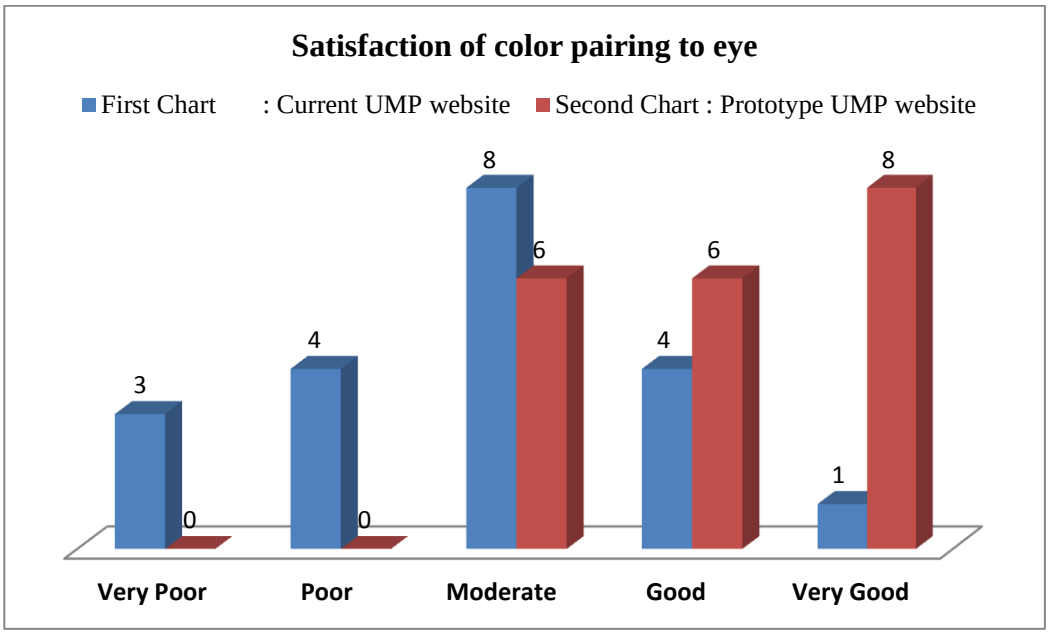

Figure 6.10: Satisfaction of colour pairing to eye

Figure 6.10 show the rate of the colour combination give the good effect to their eyes of viewing website. For the current website evaluation, it shows the three respondents are answered very poor and four respondents are feeling poor for the colour combination give the good effect to their eyes. The most of them are selected moderate as their feeling with eight respondents, while four respondents are feeling good and only one of 20 respondent feel that the current UMP website is very good for satisfaction of colour pairing to eye.

The evaluation on the prototype UMP website shows that no respondent was feeling very poor and poor during satisfaction of colour pairing to eye. The result is because they feel satisfaction of colour pairing to eye on the prototype not bother their eye. The respondent selected moderate and good with 6 respondents. The most of them are selected very good as their feeling with 8 respondents for satisfaction of colour pairing to eye.

6.5 Analysis of the Feedback

Analysis of the overall discussion shows that the implementation of the Jakob Nielsen's Ten Principles on the current website is insufficient. From the overall rate of the website design result shows the users not comfortable during navigation because the colour combination and colour scheme use is so poor and the bright colours use on the blink icon will cause the eye discomfort to the users when browse the website. From the research that was done, the good website design will not applied more than three colours to the implementation of website design because it show the design look unprofessional and bother the user eye that is extremely changes between clear, foggy and blurry. Eye is react to the light, font and colour that relevant to the design. Besides that, the irrelevant contents and too much text display are bother the vision during navigation. The contents needs to separate to certain parts and hidden into the specific link or menu in order to produce the minimal text display and only contains the relevant contents.

The current website is also contains the menu that the users have the problems to understand what it want to exposed. For example, feedback pages are unfamiliar and difficult to navigate by the novice user. With the weakness on the current website, the vision feels uncomfortable with what is going on through appropriate feedback, actions, information and services that stated. The font type and font size that use on the current website is not consistent with apply the variety of capitalizations. Besides that, the contents are on the different background colour. The design concepts will become uncomfortable to the eye vision with the font type and design concept that is applied.

Based on result of the questionnaire, the implementation of the Jakob Nielsen's Ten Principles in the prototype design is quite successful. The purpose of the prototype that wants to minimalist design and reduces too much text display is accepted by user because the irrelevant content and displaying too much word on the website will make the vision uncomfortable when users need to read and find such of word. The colour use for background and word is appropriate than the current design that apply the bright colour on the design. The consistency is very important in order to develop website because human limitation is react to the font and eye are allowed to interpret the colours and dimension.

Whole analysis and findings on the questionnaire result are clearly prove that the prototype design have achieve the project objectives and respondents give the positive comment to the minimal design that applied. However, there are certain parts that show the current design rate is higher than prototype design. There might be considered because some of respondent which did not comes from computer background and not too expose on the designing website. The background such as faculty is related to the computer literacy and eye discomfort factor. For example, for FKKSA student think the colour use on the current design is very good while the student from FSKKP background the colour use give the uncomfortable impact to the eye.

6.6 Research Constraints

During project implementation, several constrains had been encounter throughout every phase in the project. It contains such as to make a complete research and understood the concepts of Jakob Nielsen's Ten Principles in order to apply to the prototype. There need to study on the previous research and how the principles is successful implement to the system design. Besides that, studying from the existing website is also difficult because need to define each part on the website that is extremely apply the correct rules and will elaborate about the strength to apply on the prototype design. The strength is evaluated from the colour, font types, design concepts and so on in order to develop the best website.

The other constraints are about developing the questionnaire. The questionnaires need to base on the purpose of the project and need to consider all aspect. Then, the decisions have been made to create the questionnaire with statement as question instead of asking question in the survey form. This approach is used because the rules contain a lot aspect to be revised and it difficult to create single question to comply all aspect based on rules.

Besides that, it also quite difficult to related the design with eye discomfort in order to prove the research objectives. There need to make some study on the previous research and read more article in order to related the two word. Nevertheless, the project still able to carry on successfully and is to be completed as scheduled.

CHAPTER 7

CONCLUSIONS

7.1 Conclusions

This thesis is mainly discussed on applying the Jakob Nielsen's ten heuristics in the website development. Jakob Nielsen's principles are very useful and best practice in order to develop the best website because it is one of the most-used usability heuristics for user interface design. The principles that will apply are related to eye discomfort that is the major problem in the project. By applying Jakob Nielsen's Heuristics, the project will be achieve the objective to propose improvement on the website hence reduces discomfort of the eye. Nielson's method uses a small set of principles, guidelines, or heuristics that are systematically assessed against a target system in order to identify problems and their severity, as well consequences for the user. The guideline is suitable for any web application or websites.

In this project, a prototype of UMP website homepage was developed based on Nielsen's principles. After completion of the system, testing session was carried out to determine the interface build in the system. Then, with the complete prototype of the system and questionnaire, a survey was done in the all faculties of UMP Gambang among student, lecturer and admin. With the result from the feedback for both current version and prototype design of UMP website, the collected result will be analyse and transform to the chart.

The graphical views on chart show it clearly sees the different rate by fully apply the principles and not fully applied to the website design. Based on the respond, result and discussion that have made, it can be conclude that UMP website have a chance to build into the newly website in order to increase the eye comfort during navigation among UMP citizens. In order to develop the newly website, more preparation and research need to do due how the principles will implement in the website in order to produce the good design and will achieve the main objective of the research.

7.2 Future Works

The results presented here could be further developed in a number of ways. When the finding is positive and the respondents agree with the prototype, this project can be developed into a complete working system that extremely same to the function of current UMP website. More implementation of function by applying Jakob Nielsen's principles on the whole website will further increase the eye comfort on the all pages of website. It is also will increase the good design, functionality, performance, and will implement the ten principles to produce the good one of UMP website that can be used for all UMP citizens.

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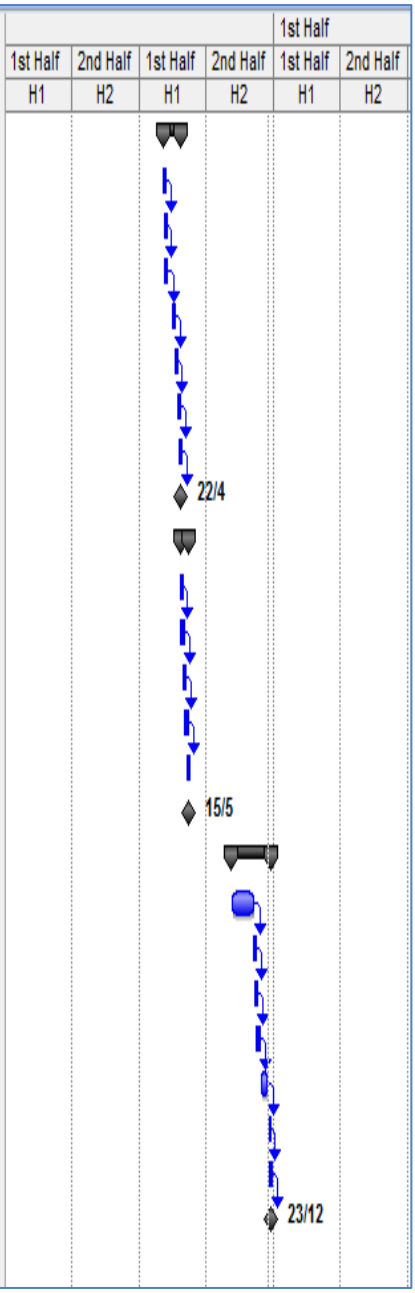
	Task Name	Duration	Start	Finish	Predecessors
8	**Research**	**37 days**	**Wed 6/3/13**	**Mon 22/4/13**	
9	Introduction of Research	4 days	Wed 6/3/13	Sun 10/3/13	
10	Meeting with Supervisor	1 day	Mon 11/3/13	Mon 11/3/13	9
11	Project Planning Document	2 days	Tue 12/3/13	Wed 13/3/13	10
12	Literature Review	5 days	Mon 1/4/13	Fri 5/4/13	11
13	Decide Technique	2 days	Mon 8/4/13	Tue 9/4/13	12
14	Distribute Questionnaire	5 days	Mon 15/4/13	Fri 19/4/13	13
15	Analysis Problem	2 days	Sat 20/4/13	Mon 22/4/13	14
16	Submit Proposal	0 days	Mon 22/4/13	Mon 22/4/13	15
17	**Design Prototype**	**16 days**	**Tue 23/4/13**	**Wed 15/5/13**	
18	Prepare initial requirement	2 days	Tue 23/4/13	Wed 24/4/13	
19	Principle Analysis	3 days	Thu 25/4/13	Mon 29/4/13	18
20	Draft User Interface Design	4 days	Tue 30/4/13	Fri 3/5/13	19
21	Develop System Prototype	5 days	Mon 6/5/13	Fri 10/5/13	20
22	Review	1 day	Mon 13/5/13	Mon 13/5/13	21
23	Submit Proposal	0 days	Wed 15/5/13	Wed 15/5/13	
24	**Usability Testing**	**76 days**	**Mon 9/9/13**	**Mon 23/12/13**	
25	Revise Heuristic	44 days	Mon 9/9/13	Thu 7/11/13	
26	User Satisfaction	2 days	Fri 8/11/13	Mon 11/11/13	25
27	Product Accepted	2 days	Tue 12/11/13	Wed 13/11/13	26
28	Result Analysis	7 days	Thu 14/11/13	Fri 22/11/13	27
29	Activities Documentation	15 days	Mon 25/11/13	Fri 13/12/13	28
30	Presentation PSM 2	1 day	Mon 16/12/13	Mon 16/12/13	29
31	Documentation Review	5 days	Tue 17/12/13	Mon 23/12/13	30
32	Final Submission	0 days	Mon 23/12/13	Mon 23/12/13	31



This questionnaire is to evaluate UMP website. There are two sections; section A and B.

Please answer all sections.

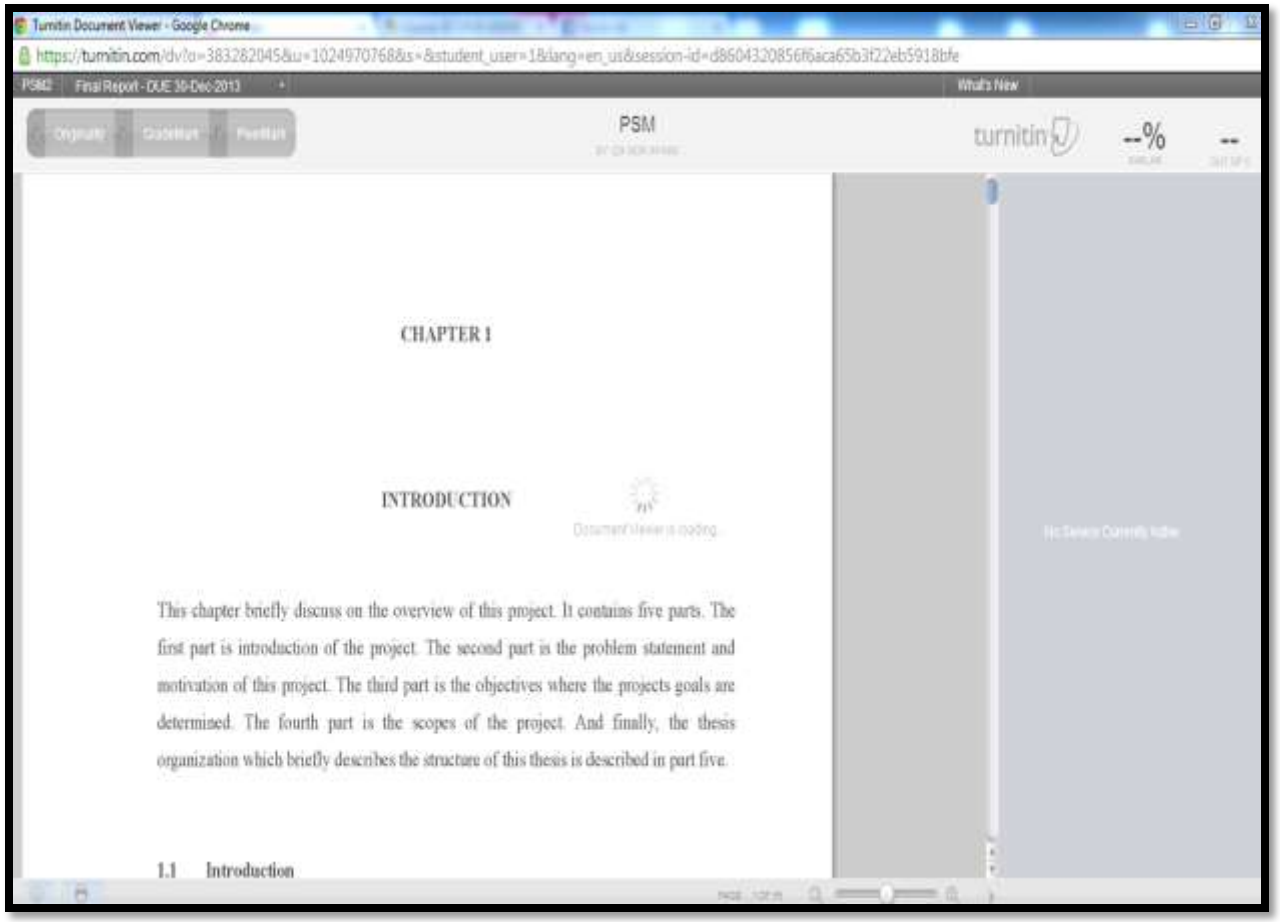
A. Personal Background

1. Faculty : …….....
2. Categories : o Admin
   o Lecturer
   o Student

B. Questionnaire

1 – Very Poor ***2 – Poor*** ***3 – Moderate*** ***4 – Good*** ***5 – Very Good***

Question	1	2	3	4	5
The overall rate of this website					
During website navigation, how much did the eye discomfort bother you?					
Within the first one hours of viewing website, how often did your vision change between clear and blurry or foggy?					
Did your eyes feel comfortable with the font type and design concept?					
Did your vision was clear enough and familiar with the website design?					
During viewing website, did your vision feel comfortable with what is going on throught appropriate feedback, actions, information and services that stated?					
How much your vision was clear with images use to help user more understand about action required					
Does the colour combination give the good effect to your eyes?					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CHAPTER 1
INTRODUCTION
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This chapter briefly discuss on the overview of this project. It contains five parts. The first part is introduction of the project. The second part is the problem statement and motivation of this project. The third part is the objectives where the projects goals are determined. The fourth part is the scopes of the project. And finally, the thesis organization which briefly describes the structure of this thesis is described in part five.
1.1 Introduction