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We certify that the thesis entitled “Applying Jakob Nielsen’s Rules on Kor SUKSIS UMP Portal (KSUP)” is written by Noor Shafika Syuhada Bt Rosli. We have examined the final copy of this thesis and in our opinion; it is fully adequate in terms of scope and quality for the award of the degree of Bachelor of Computer Science (Software Engineering). We herewith recommend that it be accepted in fulfillment of the requirement for the degree of Bachelor of Computer Science specializing in Software Engineering.

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**APPLYING JAKOB NIELSEN'S RULES ON KOR SUKSIS UMP PORTAL
(KSUP)**

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**Report submitted in fulfillment of the requirements for the award of the degree of
Bachelor of Computer Science (Software Engineering)**

**Faculty of Computer System & Software Engineering
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SUPERVISOR DECLARATION

I hereby declare that I have checked this thesis and in my opinion this thesis is adequate in terms of scope and quality for the award of the degree of Bachelor of Computer Science (Software Engineering).

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I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged. The thesis has not been accepted for any degree and is not concurrently submitted for award of other degree.

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Dedicated to my beloved parents

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ABSTRACT

The objective of this thesis is to present a well-design website that offers services to Kor Sukarelawan Polis Siswa-Siswi of Universiti Malaysia Pahang or also known as Kor SUKSIS, UMP. Kor SUKSIS is the Police Undergraduate Voluntary Corp which is an undergraduate police volunteer organization in Malaysia. The website will be developed with criteria of a portal which provides a platform for communication between members and the instructors of the organization. Another objective is to make a research in Human Computer Interaction (HCI) area which is in the context of web portal. The issues and challenges arise during the research can help developer to design a usable and effective web portal. Besides, HCI also concerned with the understanding, designing and evaluating computer system for human use. In this research, an issue which related to the development of KSUP has been examined which is how to ensure the design of a web portal offer good HCI. In addition, 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. Therefore, in order to design a portal that is accessible by all users, developer should taking account on the client background. To achieve this objective, a research on client background which is the instructors and member of Kor SUKSIS UMP has been done. Besides, in order to ensure the website have a well-design and easier to use, heuristic evaluation will be performed using Jakob Nielsen's rules, which is the guidelines for making sites user friendly. However, using only Jakob Nielsen's rules during development process is not enough. Therefore, a usability testing will be implemented on the websites before deliver it to the end user. This step is important in order to ensure the website have met user requirement.

ABSTRAK

Objektif tesis ini ialah untuk menerangkan pembinaan sebuah laman web dengan reka bentuk yang baik dan menawarkan perkhidmatan kepada Kor Sukarelawan Polis Siswa-Siswi dari Universiti Malaysia Pahang atau lebih dikenali sebagai Kor SUKSIS, UMP. Laman web ini akan dibina dengan kriteria sebuah portal yang menyediakan satu platform untuk komunikasi antara ahli-ahli Kor SUKSIS dan para jurulatih. Satu lagi objektif ialah untuk membuat satu kajian mengenai 'Human Computer Interaction' (HCI) dalam konteks web portal. Isu-isu dan cabaran-cabaran yang timbul semasa penyelidikan boleh membantu pembina web mereka satu web yang efektif dan mudah digunakan. Selain itu, HCI juga mengambil berat dengan pemahaman pengguna, dan penilaian sistem komputer untuk kegunaan manusia. Dalam penyelidikan ini, satu isu yang mana berkaitan dengan pembangunan KSUP telah diperiksa iaitu bagaimana untuk memastikan web portal mempunyai reka bentuk yang baik. Selain itu, komputer selalunya digunakan oleh pelbagai jenis orang. Jadi, penting untuk menumpukan perhatian terhadap keperluan sokongan, pengetahuan dan kemahiran pengguna-pengguna. Oleh yang demikian, untuk memastikan portal dapat dicapai oleh semua pengguna, pembina web sepatutnya mempertimbangkan latar belakang pelanggan. Untuk mencapai objektif ini, satu kajian mengenai latar belakang pelanggan yang terdiri daripada pengajar-pengajar dan ahli Kor SUKSIS UMP telah dibuat. Akhir sekali, bagi memastikan laman web ini mempunyai reka bentuk yang baik dan mudah untuk digunakan, penilaian heuristik akan diterapkan dengan mengaplikasikan peraturan-peraturan Jakob Nielsen, yang merupakan garis-garis panduan bagi menghasilkan laman web yang mesra pengguna. Walaubagaimanapun, menggunakan hanya peraturan-peraturan Jakob Nielsen semasa proses pembangunan laman web adalah tidak mencukupi. Oleh itu, ujian kebolegunaan telah dilaksanakan pada laman web tersebut sebelum diserahkan terus kepada pengguna. Langkah ini penting dalam memastikan laman web tersebut memenuhi keperluan pengguna.

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LIST OF ABBREVIATIONS

ASP	Active Server Pages
ASCII	American Standard Code for Information Interchange
CMS	Content Management System
CSS	Cascading Style Sheet
FSKKP	Fakulti Sistem Komputer & Kejuruteraan Perisian
FTP	File Transfer Protocol
HCI	Human Computer Interaction
HTML	HyperText Markup Language
HTTP	Hypertext Transfer Protocol
IMS	Information Management System
Kor SUKSIS	Kor Sukarelawan Polis Siswa Siswi
KSUP	Kor SUKSIS UMP Portal
PHP	Hypertext Preprocessor
SQL	Structured Query Language
UI	User Interface
UMP	Universiti Malaysia pahang
UPSI	Universiti Pendidikan Sultan Idris
VB	Visual Basic
XHTML	eXtensible HyperText Markup Language
XML	eXtensible Markup Language

CHAPTER 1

INTRODUCTION

1.1 Introduction

Kor SUKSIS which stands for Kor Sukarelawan Polis Siswa Siswi or Police Undergraduate Voluntary Corp is an undergraduate police volunteer organization in Malaysia. Universiti Malaysia Pahang (UMP) is one of the higher education institutions (IPT) in Malaysia that have SUKSIS, known as Kor SUKSIS UMP. All members have to follow training arrangement that prescribed during weekly training and when semester break. Besides, every weekend the instructor of Kor SUKSIS UMP have to update the activity to all members. Therefore, they need to have a website or service that offers a broad array of resources and services, such as announcement board and forum which can be used as a communication platform

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 thorough and in-depth assessment. Table 1.1 shows the ten general principles of Nielsen for user interface design [1].

Table 1.1: Nielsen's Ten Heuristics

Heuristic	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.
Recognition rather than recall	Make 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.

Table 1.1: Nielsen's Ten Heuristics

Heuristic	Description
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.

Nevertheless, this heuristic evaluation is only for filtering and refining the design. There is no way that we can know how the end-user would actually interact with the system. We also cannot expect the system to work correctly at the first time. To overcome this problem, we can conduct the usability test on the prototype of the system. Consider what have Jakob Nielsen, the author of Usability Engineering said, 'It takes only five users to uncover 80 percent of high-level usability problems on your website' (Nielsen and Landauer, 1993). This shows that user participant is very important in order to ensure the customer needs and expectations are met.

Usability testing is a technique used to evaluate a product by testing it with representative users. In the test, these users will try to complete typical tasks while observers watch; listen and takes note [2]. The objectives of this test are to identify any usability problems, collect the quantitative data on participant's performance as well as

their satisfaction with the system. The performance is based on their time on task and also the rates of error. It is not necessary to have a formal lab to conduct the testing. It can be conducted either at a conference room, user's home or work space. But, there must be an evaluator to observe the user performance or taking notes. With this testing, we can find out whether the customer able to complete the tasks successfully, the time taken to complete the tasks and how satisfied participants are with the system. This information is required to improve user performance.

1.2 Problem Statement

Till date, Kor SUKSIS UMP has no computerized system to help manage their organization. All tasks are handled physically in a manual system. All information and details of the member is manually filled and it is kept in a file. Then, instructor stored all those information in a place such as rack. The risk of losing the data is very high and it cause a waste of time when they want to search any member information. For example when the instructor wants to search someone phone number, they need a long time to find the old record until they find it. The other problem is the way instructor informs to members if there are any activities. Currently, the instructor make announcement about any activity changes in Facebook Group. However, some members are always deactivating their account when having personal problems and this often result in miss out the information. Thus, these shortcomings have led to a decision to develop web portal for them.

1.3 Objectives

- i. To develop a prototype of Kor SUKSIS UMP Portal.
- ii. To implement Jakob Nielsen's heuristic in Kor SUKSIS UMP Portal.
- iii. To evaluate the prototype of Kor SUKSIS UMP Portal with usability testing by using evaluation form.

1.4 Scope

The system will be done according to the scope of Kor SUKSIS UMP Portal. (KSUP) which are state as below:

- i. This system can become a portal that can give benefits to the instructor to retrieve member's information or details quickly and efficiently as well as to the club members in order to getting up to date with their program.
- ii. This project also comes with administrator site management system. The administrator is responsible to register users. Meanwhile, for the external user they can only follow up SUKSIS bulletin or information about the organization.
- iii. Apply the heuristic evaluation which is based on Nielsen's set of usability heuristics. Heuristic evaluation is a technique that involves analyzing the usability of a website against a set of general usability precepts.
- iv. This system has several functions like registration page, profile page, announcement board, forum site, pictures gallery and updates activity (bulletin).
- v. Conduct a usability test on Kor SUKSIS UMP Portal which will involve the end users. The objective of this step is to ensure that the proposed system is adapted to user and their tasks have no negative outcome.

1.5 Thesis organization

This thesis consists of six (6) chapters. Chapter 1 will discuss on introduction of the system which included the problem statement, objective and also scope of the propose system. Chapter 2 is the literature review which will discuss the existing system, its comparison and the technique/method/equipment or the technology that will be used in the propose system. Chapter 3 will discuss on system methodology, Meanwhile, Chapter 4 will be the project implementation which may consist of interface design and the source code used. Chapter 5 will be the result and discussion and last but not least, Chapter 6 which is the conclusion.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter is about literature review which will discuss the existing system and the technique/method/equipment or the technology that is used on the existing system.

2.2 Studies on Web Portal

A web portal or links page is a web site that functions as a point of access to information in the World Wide Web. A portal presents information from diverse sources in a unified way and provide a way for enterprises to provide a consistent look and feel with access control and procedures for multiple applications and databases, which otherwise would have been different entities altogether [3]. A web portal is not just putting the word 'portal' on home page. There are two groups of portal, horizontal and vertical portals. A horizontal portal is a public Web site which provides services that users might need. Meanwhile, a vertical portal is a portal that delivers organization-specific information in a user-centric way [4]. One of the scopes of Kor SUKSIS UMP Portal is to give benefits to the instructor to retrieve any related data and also to the club members in order to getting up to date with their program.

However, horizontal portals have no way of offering this kind of organization-specific information since they are not connected to any organization's data sources except their own. Thus, it is not suitable for the system to be developed as horizontal

portal but vertical portal which also required login authentication. Horizontal portals are directories like Figure 2.1. It is called "horizontal" because their list of websites covers a broad range of topics.

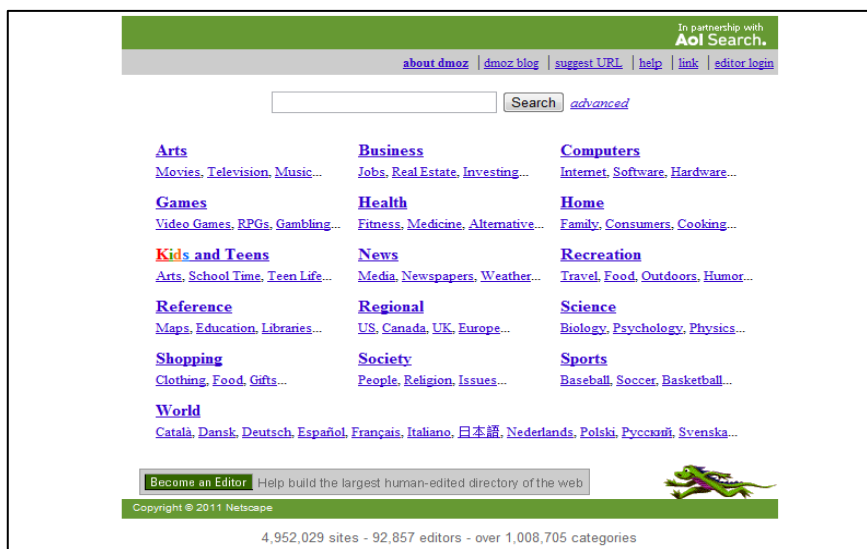


Figure 2.1: Horizontal portal

On the other hand, vertical portal only covering one topic or one type of topic. Figure 2.2 is an example of a vertical portal.

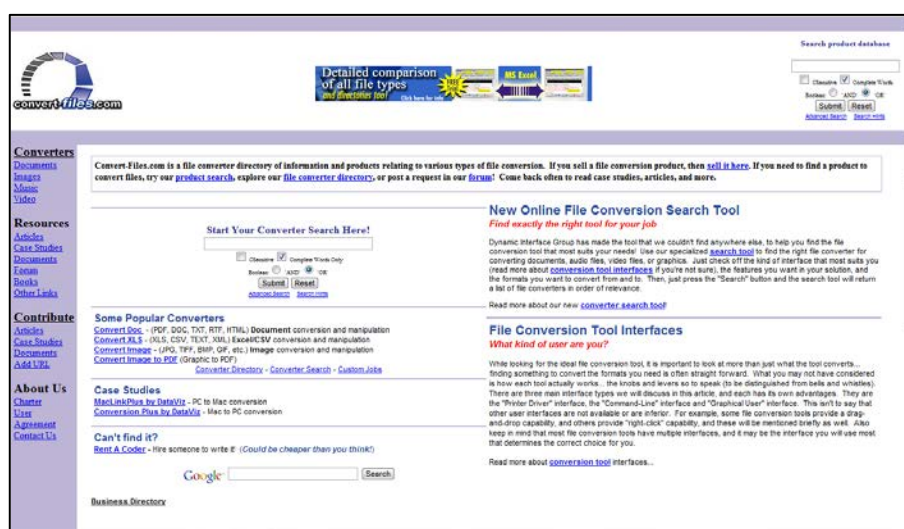


Figure 2.2: Vertical portal

Portal has a dual purpose. One of the purposes is to inform people within the community about current activities, groups and commerce. Meanwhile, the second purpose is to let others outside the community learn more about the community itself. In addition, portal is unique in its content and structure. It is necessary for developer to decide which criteria they should include in a specific portal [5]. The criteria are when the user entering a portal, its organization and structure, service, and community. However, it is no means complete, but it is a first step towards a better understanding of what ingredients are needed for well-designed. Table 2.1 is the summarization of overview of the portal pages.

Table 2.1: Overview of portal pages

Criteria	Page Type	Description
Entering a portal	Log on page/ log off page	Display a page for logging on or logging off.
	Home page	The central page of a portal. Users may return and then move to other sections, or where they find important information or functionality.
Organization/ Structure	Home page	The central page of a portal. Users may return and then move to other sections, or where they find important information or functionality.
	Overview pages	A page that provide info section.
	Hallway	A page that serves as a navigation "hallway" for a portal/website or a part of it (more or less structured link list).
	Sitemap	A page that provides access to the pages or sections shown in the map.

Table 2.1: Overview of portal pages

Criteria	Page Type	Description
Service	Introduction	A page that offers online help for first-time users.
	Search	A page that offers search facilities.
	Support page	A page that provides a knowledge management area where users can store important information permanently or just temporarily for later use or as reminders.
Community	Meeting Point	A role-specific home page that offers a community area for users having the same role.
	Team Place	A page that offers a community and collaboration area for team members .
	Company News	A page that supplies news relevant to the company as well as to all employees or specific groups or roles (e.g. sales or service).
	Services Page	A page that provides a personalized subset of the company Intranet & ESS (employee self-service); the Intranet pages may serve to establish a community of people sharing the same or related roles.
	Message Board	A message board for internal discussions, either company-wide or for special interest groups or roles.
	Chat Room	A chat area for internal discussions, either company-wide or for special interest groups or roles.

In the propose system, the user's first contact with a portal is when he or she enter it (the users are the member and instructors of Kor SUKSIS). There are several choices for the entering page as shown in Table 2.1 which are the log on/log off page and home page. This page can be included in the propose system, KSUP. In addition, for the organization and structure, the propose system will collect information in one place and provide access to information as well as services that are relevant to their works. User can also make change on data and allowing feedback into the portal as well. Next, will be the services pages that provide help for using the portal and also the information services such as manuals for application used in the propose system. Last but not least, will be the community pages that can support the direct communication between people (discussion forums, announcement board, calendar, blogs, etc.).

2.3 Studies on Existing System

IMS e-community, SUKSIS UPSI Portal and FSKKP Portal are the example of web portal that present about it organization, activities, people and etc.

2.3.1 IMS e-community

IMS E-community as shown in Figure 2.3 is a community portal system that act as a gateway to all e-management application system. It also implement the single-sign on system, so that user only needs to be authenticated once.



Figure 2.3: IMS e-community

Moreover, the system also has facilities that give benefits to both staff and student UMP. Such as announcement board, library, memo, email, forum, announcement board, news and so on. With this portal, student can view their detail, exam schedule, and get up to date with their course information. Instead of its function, e-community also has a quite good user interface. One of the elements that can be highlighted is this system offer personalization options. As shown in Figure 2.4, user can choose a color theme, font of size and the language. This is the simplest and most effective methods of binding the users to the system.

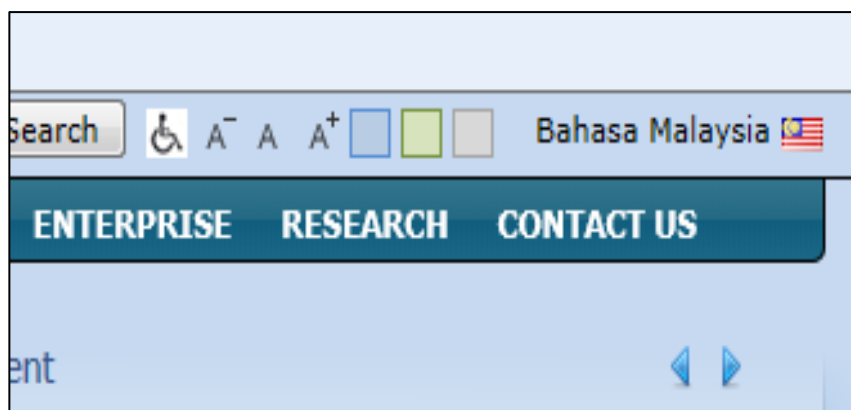


Figure 2.4: Personalization option in e-community

On top of that, this system also considers the principal of universal design. It is accessible by all users in all circumstances by taking account of human diversity in disabilities and age. Besides, the user interface is also works consistently. The button or menu tab is consistent places in all windows, use the same wording in labels and messages and use a consistent color schema throughout. However, this system provides too much pop up messages. Too much pop up messages can make user stress and it is really intrusive. Rather than that, the feedback message is also not design carefully. Especially for the user login, when user enters the wrong password or username or both, a message will be pop out suddenly. This phenomenon will startle the user. Besides, after close the pop up message it will attempt to load the home page again.

2.3.2 SUKSIS UPSI Portal

SUKSIS UPSI Portal, as shown in Figure 2.5 is developed in order to provide news or up-to-date information about their organization which change daily. This portal is simply build and only offer news, activity and some information about their organization. All the content in this portal can be access without providing any form of authentication because it is sets up as an external portal that is accessible through the Internet. Therefore, all contents are available to anyone who wants to visit the portal. Besides, it also has no application or service like forum site or announcement board. A simple plugin chat box is used for live chat capability.

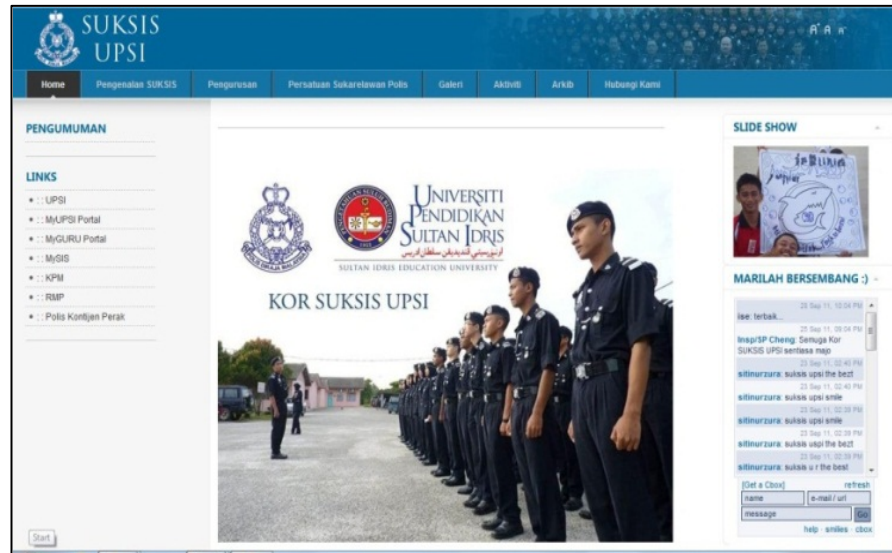


Figure 2.5: SUKSIS UPSI Portal

Meanwhile, in term of the user interface design this portal has a very simple design and it takes a short time for all the graphics to loading. It also contains no unnecessary elements. In fact, this portal works consistently where the button or menu tab is consistent places in all windows and use the same wording in labels. With this consistent interface, users are able to have a better understanding of how things will work and hence increasing their efficiency. However, there is a problem in choosing font and the background color. The wrong combination of text and background color as well as the size of text which is too small makes the text hard to read. This problem goes for the menu tab as well. It is lack of contrast, thus make it uneasy to spot by user. Rather than that, this portal also has a problem with the personalization option as shown in Figure 2.6 which cannot be function.



Figure 2.6: Personalization option in SUKSIS UPSI Portal

It is a good decision to put a function that can make change on the font size. However, it is useless if nothing will response when user clicks the icon. In fact, this will make user feel frustrated.

2.3.3 FSKKP Portal

Fakulti Sistem Komputer & Kejuruteraan Perisian, FSKKP Portal as shown in Figure 2.7 is the official portal for the Faculty of Computer System & Software Engineering, UMP for creating & maintaining their own web pages which anyone can view online by visiting the website. The advantages of using this web-based are it contain lot of features for staff, student and admin itself. This portal provides the information about the faculty in general such as the overview, academic program, and gallery as well as offers downloadable material and forum site.



Figure 2.7: FSKKP Portal

FSKKP Portal has quite a good and effective user interface. One of the elements that can be highlighted is the clarity of the design. So far users are able to interact with the system by communication meaning and function. For example, as shown in Figure 2.8 user can decrease, increase or change the font back to default by click the 'A' icon.

With the correct match of icon and its function, user can easily figure out how the application works and will prevent them from get confused and frustrated.

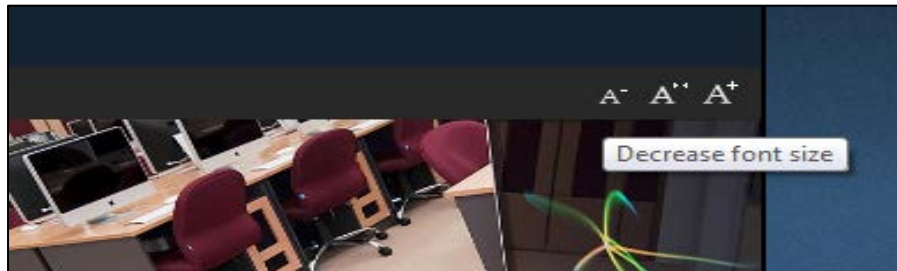


Figure 2.8: Decrease and increase the font size

Next element is the user interface responsiveness, also means the interface provides some form of feedback. For example, as shown in Figure 2.9 a message 'Thank you for voting!' is appear once the user vote on the FSKKP poll. This feedback informs the user that the voting is success.

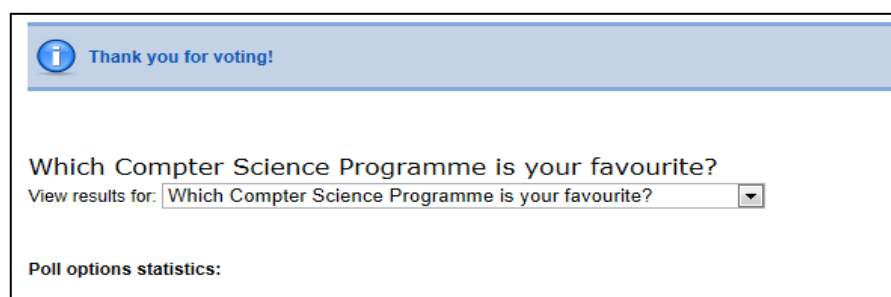


Figure 2.9: FSKKP poll's feedback

In addition, FSKKP portal also works consistently. The menu tab is consistent places in all windows, use the same wording in labels and messages and use a consistent color schema throughout.

2.3.4 Review usability in existing system

In the main, IMS e-community, SUKSIS UPSI Portal and FSKKP Portal are well presented and has a professional appearance. However, there are several usability issues which we need to discuss such as navigation, functionality, control, language, feedback, consistency and error prevention and correction.

Table 2.2: Review Usability in Existing System

Usability Issue	IMS E-community	SUKSIS UPSI Portal	FSKKP Portal
Navigation	<ul style="list-style-type: none"> - All major parts of the site are not accessible from the Home page. User have to login. - There is a clearly-identified link to the Home page 	<ul style="list-style-type: none"> - All major parts of the site are accessible from the Home page - It is not clear how to return to the home page. 	<ul style="list-style-type: none"> - All major parts of the site are accessible from the Home page - Link is clearly-identified to the Home page - The current location is not always clear.
Control	<ul style="list-style-type: none"> - Best viewed with Internet Explorer 7 and above. 	<ul style="list-style-type: none"> - All appropriate browsers are supported 	<ul style="list-style-type: none"> - All appropriate browsers are supported
Language	<ul style="list-style-type: none"> - No issues identified 	<ul style="list-style-type: none"> - No issues identified 	<ul style="list-style-type: none"> - No issues identified
Feedback	<ul style="list-style-type: none"> - Users are informed if a plug-in or browser version is required. 	<ul style="list-style-type: none"> - There is no facility for customers to receive email feedback 	<ul style="list-style-type: none"> - Users can give feedback via email.

Table 2.2: Review Usability in Existing System

Usability Issue	IMS E-community	SUKSIS UPSI Portal	FSKKP Portal
Consistency	<ul style="list-style-type: none"> - Standard colours are used for links and visited links - Links match titles of the pages to which they refer 	<ul style="list-style-type: none"> - Standard colours are used for links and visited links - Links match titles of the pages to which they refer 	<ul style="list-style-type: none"> - Standard colours are used for links and visited links - Links match titles of the pages to which they refer
Error prevention and correction	<ul style="list-style-type: none"> - Error messages do not always provide a clear exit point (the customer must use 'Back' on the browser to back out). 	<ul style="list-style-type: none"> - No issues identified 	<ul style="list-style-type: none"> - No issues identified

2.4 Studies on 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 [6]. The main goal of heuristic evaluations is to identify any problems associated with the design of user interfaces. The simplicity of heuristic evaluation is beneficial at the early stages of design and this usability inspection method does not require user testing which can be burdensome due to the need for users, a place to test them and a payment for their time. Besides, using heuristic evaluation prior to user testing will reduce the number of design errors discovered by users. This is because, developer can uncover many major usability issues such as the navigation, functionality, control, language, feedback, consistency and error prevention as well as correction in a short

period of time. However, there are three collections of heuristic evaluation. Shneiderman's Eight Golden Rules, Norman's Seven Principles and Nielsen's Ten Heuristics.

2.4.1 Shneiderman's Eight Golden Rules

Shneiderman's Eight Golden Rules are user interface design rules described in *Designing the User Interface: Strategies for Effective Human-Computer Interaction*. Shneiderman proposed this collection of principles that are derived heuristically from experience and can be apply in most interactive systems after being properly refined, extended, and interpreted [7]. To improve the usability of an application it is important to have a well-designed interface and these Shneiderman's Eight Golden Rules are claimed to be a guide to good interaction design. Table 2.3 shows the eight golden rules by Shneiderman.

Table 2.3: Shneiderman's Eight Golden Rules

Heuristic	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.
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.

Table 2.3: Shneiderman's Eight Golden Rules

Heuristic	Description
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.

2.4.2 Norman's Seven Principles

Next, is the Norman's Seven Principles; Donald Norman, 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. Why simple devices like computers, motorcycles, showers, cars, etc. are designed in such a way as to cause confusion and frustration. These are the kind of things that Norman examines in his books *The Design of Everyday Things* and *Information Appliances*, and in his other articles [8]. Besides, the design principles that he has developed aim to facilitate the user's interaction with the system. They help in designing systems that facilitate the user in forming the correct actions and give the correct and expected feedback. Table 2.4 shows the seven principles of Norman.

Table 2.4: Norman's Seven Principles

Heuristic	Description
Use both knowledge in the world and knowledge in the head	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. Second, 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.

Table 2.4: Norman's Seven Principles

Heuristic	Description
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 user to evaluate the his 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 system state; and between the perceived state of the system and the needs and intentions of the user.
Exploit the power of constraints and affordances	In formulating the right action, it would be helpful if the number of choices made available to the user was constrained in some way. The use of natural and artificial constraints is a very effective design technique. This also helps in 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 help the user as he has to undergo the learning process only once.

2.4.3 Nielsen's Ten Heuristics

Lastly is the Nielsen's Ten Heuristics. Jakob Nielsen's heuristics are probably the most-used usability heuristics for user interface design. Nielsen developed the heuristics based on work together with Rolf Molich in 1990. The final sets of heuristics that are still used today were released by Nielsen in 1994 [1]. The heuristics as published in Nielsen's book Usability Engineering are as follows:

Table 2.5: Nielsen's Ten Heuristics

Heuristic	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.

Table 2.5: Nielsen's Ten Heuristics

Heuristic	Description
Recognition rather than Recall	Make 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.

Based on discussion above, different collection of heuristic evaluation was presented. One particular heuristic rule will be used for the assessment of KSUP which is Nielsen's Ten Heuristics. This is due to the five basic parameters that are highlighted

by Nielsen which are easiness and speed of learning of system use, efficiency to use, easiness to remember system use after certain period of time, reduced numbers of user errors and easy recovery from them and subjective satisfaction of users. Besides, heuristic evaluation based on Nielsen's Ten Heuristics also is a method that is fast (about a day for most evaluations) and it is relatively cheap.

Heuristics are useful in design stage. Therefore, in design, Nielsen's rules will be used to guide developer in choosing between design alternatives and avoid them from making any silly mistakes. But how these rules will help them in design process? The first rule is matching the real world. The system should match the real world of the user's experience as much as possible. For example, use a language that can be understood by users. If the user speaks English, then the interface should be in English language. Use commons words instead of technical jargon. The second rule is consistency. Do not surprise the user with the interface object works. Similar things should look and act in a similar ways and vice versa. For example, the button or menu tab is consistent places in all windows, use the same wording in labels and messages and use a consistent color schema throughout. Figure 2.10 shows an interface which is not consistent in it design. First, not use the same alignment for header in each page ('Home' and 'Profile'). Second, color use for selected object is not same ('Home' button and 'Profile' button).

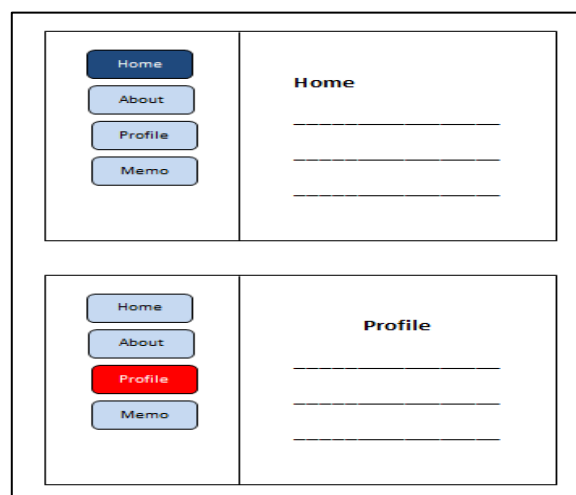


Figure 2.10: Inconsistent design

The next rule is help and documentation. It is a fact that most users do not read the documentation before try the interface. They only will refer to the user manual when they have gotten stuck. For that reason, the help and documentation should be searchable, context-sensitive, task-oriented, concrete and short. This will help them to solve their problems and avoid them from being stress and frustrated. The fourth rule is the user control and freedom. Developer should provide undo function in the system design which is a great way to support exploration. For example, allow user to get back the file that they have deleted. Besides, a system also should be provided with a cancel button for all dialogs as shown in Figure 2.11.

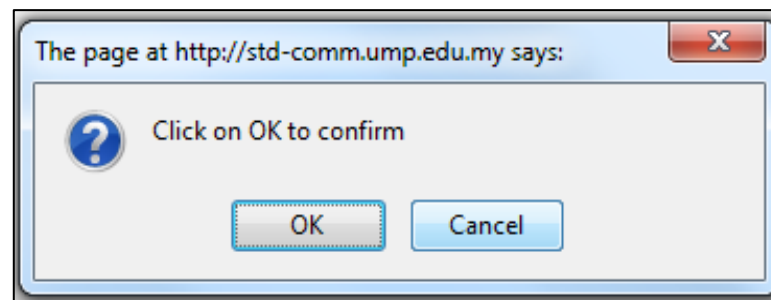


Figure 2.11: Dialog box

The fifth rule is the visibility of system status or simply called feedback. In the design, developer should keep the user informed about what is going on. For example, apply change for the cursor when user hands over a hyperlink to indicate possible action. Besides, developer also can use highlights to show selected object or use the status bar for messages and progress indicators. The sixth rule is the flexibility and efficiency or in the other word is shortcut. Examples of shortcuts that can be implemented in the design of the interface are the keyboard accelerators, command abbreviations, bookmarks and history. The seventh rule is the error prevention. People always make mistake, and they should forgive. However, the best solution is to prevent them from making any errors. One way to prevent errors is to allow users to select in place of typing it and hence can avoid from misspelling. Another reason why selection is better than typing is it reduces the user's memory load which is the eighth rule of Nielsen known as recognition rather than recall. To implement this rule to the interface design, developer should use menus instead of command languages, combo box rather than textboxes as well as use generic

command such as open, save, copy and paste. The next rule is help users recognize, diagnose and recover from errors. A good error message is crucial if cannot prevent error. There are several characteristic of a good error message which are be precise, speak the user's language, avoiding technical terms and details unless it is requested, give constructive help such as why error occurred and how to fix it and be polite. Last but not least, aesthetic and minimalist design which consider the word 'simplicity'. To implement this rule in the system design, developer should leave things out if do not have a good reason to include it. For example, do not put too much help text on main window rather than what is really necessary. In other words, leave out unnecessary features. No need to complicate the interface by put features that will never use. In addition, this rule also considers the color scheme. Make sure to use only few and well-chosen colors. Too many saturated colors can be distracting and will uneasy to spot by user.

However, it is impossible to implement all ten Nielsen's rules into the propose system. Thus, only seven out of ten rules are chosen. These seven rules are chosen based on its priority. In order to choose the rules, the Nielsen's rules will be chunked by its objectives as shown in Figure 2.12. Then, one or two rules from each objective will be chosen. This process will ensure that the chosen rules will cover all objectives of Nielsen's rules into the propose system.

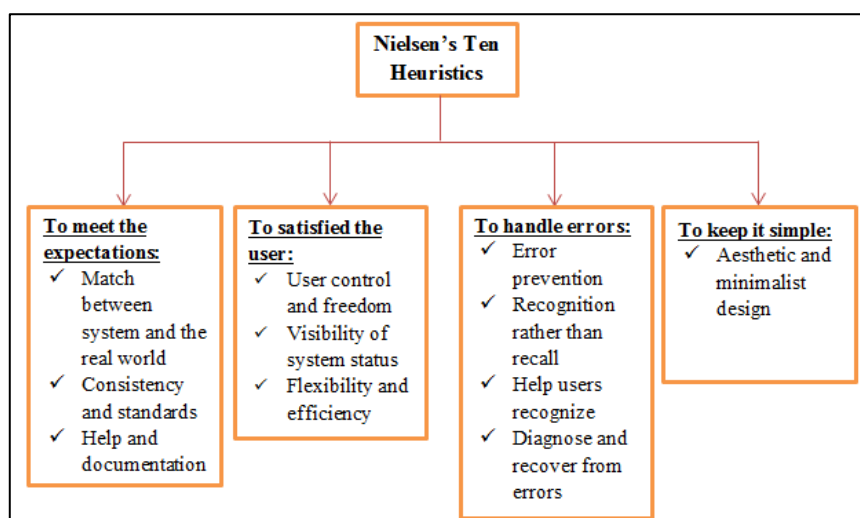


Figure 2.12: Objectives of Nielsen's Ten Heuristics

Rules that will be implemented in this project are presented in a summary below:

- i. To meet the expectations
 - **Match between system and the real world:** It is important to speak the language that user can understand, in order to prevent confusion and frustration.
 - **Consistency and standards:** Consistency should be used during evaluation because it can makes sites easier to use. So that user do not have to learn any new techniques in order to use the sites successfully.
- ii. To satisfied the user
 - **User control and freedom:** There is possibilities that user choose system by mistake. Therefore, navigation is one of the most critical aspects of Web site design. Navigation refers to the ability to find one's way within the web site.
 - **Visibility of system status:** The ideal system must have a good feedback. Feedback refers to the provision of information about what is happening at any time.
- iii. To handle errors
 - **Error prevention:** Errors should be prevented from occuring in the first place wherever possible.
 - **Help users recognize, diagnose, and recover from errors:** When errors occur, it is important to provide clear explanation of what has happened. Provide a clear instructions for how to recover.
- iv. To keep it simple
 - **Aesthetic and Minimalist Design:** This rule is important in order to ensure that the system have a good design especially in the color scheme, appropriate margins and left alignments in the left and right.

2.5 Web Usability Research on IMS e-community

In the context of Human Computer Interaction (HCI), 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. Therefore, in order to design a portal that is accessible by all users, developer should taking account on his client background.

To achieve this objective, a research on client background which is the instructors and member of Kor SUKSIS UMP has been done. Research has been done by distribute questionnaire to 30 Kor SUKSIS UMP's member which are from different faculty. 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.

2.5.1 Respondent background

As mentioned previously, a web usability questionnaire has been randomly distributed to 30 Kor SUKSIS UMP's member. All 30 members are from four different faculties. 54% of respondents are from Faculty of Civil Engineering & Earth Resources (FKASA), 20% are from Faculty of Industrial Science & Technology (FIST), 17% are from Faculty of Computer System & Software Engineering (FSKKP) and the rest 10% of respondents are from Faculty of Mechanical Engineering (FKM). 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.

2.5.2 Web Usability Questionnaire

There are five questions in this section. All five questions are related to how the respondents used the IMS e-community and their opinion on the website. IMS e-community has been chosen for the research because e-community and KSUP got quite similar characteristic in the context of community portal. Besides, all Kor SUKSIS

UMP members are the student of UMP. Therefore, all of the member have the authority to access the system. Pie chart in Figure 2.14 shows the result of the analysis of this section.

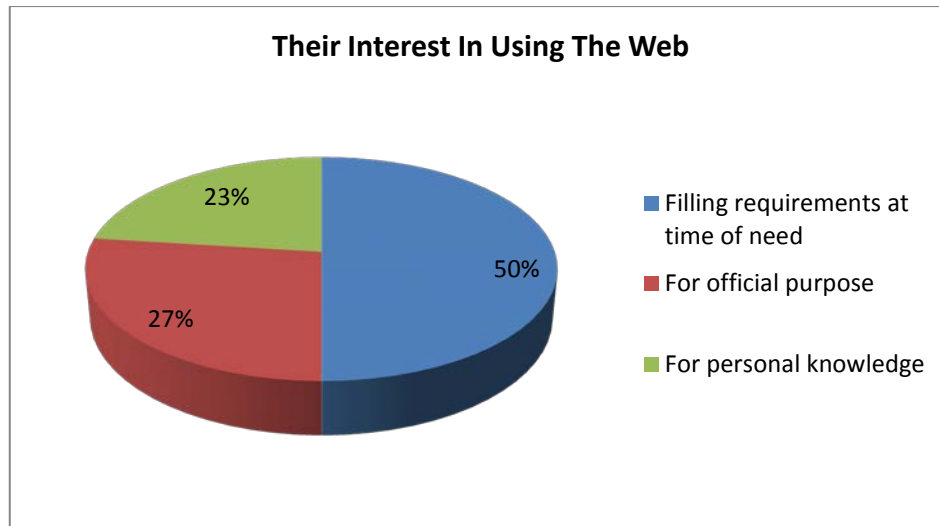


Figure 2.13: Interest in using the web

Figure 2.13 is a pie chart of the question ‘What interest you in using the web?’. According to the pie chart, 50% of the respondents answered that they use the e-community for filling requirements at time of need, 27% say that for official purpose and the 23% of the respondents say that it is for personal knowledge. From this result, it shows that most of the respondents use the e-community only to fill their requirements at time of need. For example, to check course result, learning time table, exam schedule and register subject. Meanwhile, only few of respondents using e-community for their personal knowledge and the personal knowledge might include using the user directory and memo system. In conclusion, in order to make user keep loyalty to a website, developer should now what are the user needs and requirement. The more user needs or requirement met, the better the system is. In the development of KSUP, several requirements have been identified. The requirements are as follows:

- a) Staff can use KSUP as medium to quickly retrieved Kor SUKISIS UMP member’s details.
- b) Staff can use KSUP as a platform for communication.

- c) Staff can use KSUP as a medium to spread information.

Meanwhile, Figure 2.14 is a pie chart for the question ‘Up to what level are you familiar with working over the net?’. According to the pie chart, 63% of the respondents answered that they have web knowledge till school level, 30% were very much accustomed with it. Meanwhile, only 7% answered they have no knowledge in web using. Form this result; we can see that only few of respondents are familiar with working over the net. However, a well-designed web can help them to use a system efficiently. That’s the reason why Jakob Nielsen’s rules should be implementing in the development of KSUP.

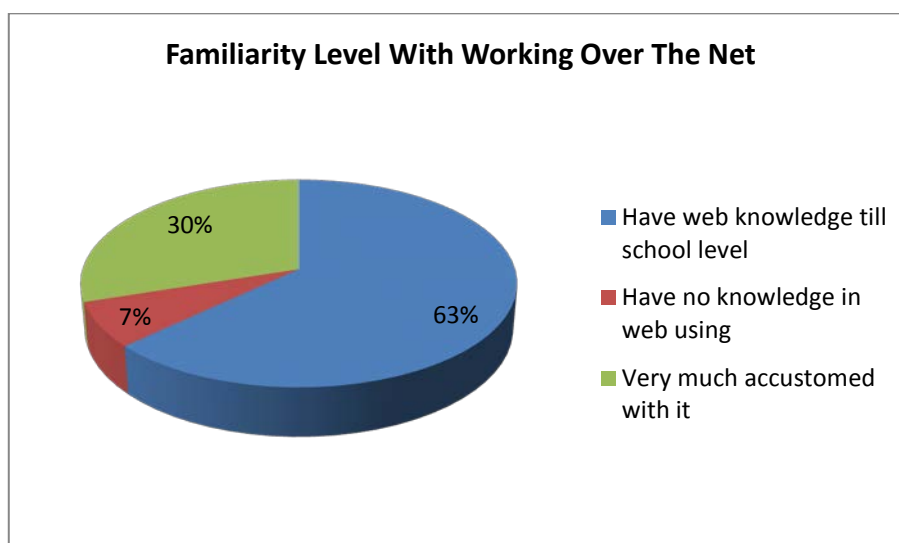


Figure 2.14: Familiarity level with working over the net

Next, Figure 2.15 is a pie chart for the question ‘Does the web satisfy your purpose?’. According to the pie chart, 83% of the respondents answered that e-community was not always satisfied them meanwhile the rest answered it always does. This result shows the quality of the system service not so consistent. Sometimes, the system does not met user needs. Before delivered system to the end user, a testing together with user should be made. To prevent KSUP from having the same problem, usability test is conducted before system is delivered. This kind of testing can help developer to measure does the KSUP met user needs or not.

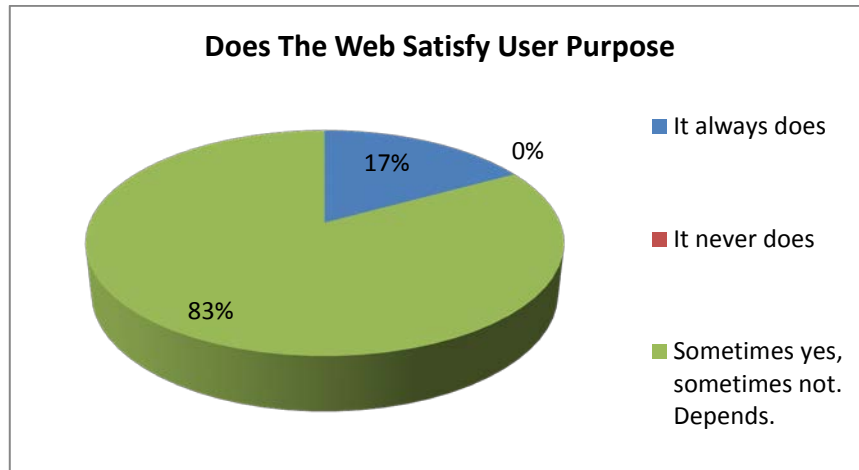


Figure 2.15: Does the web satisfy user purpose

Lastly, Figure 2.16 is a pie chart for the question ‘Are you happy by the way the web is presented to you?’. According to the pie chart, 47% of the respondents answered that there are rooms for improvement, 33% not at all satisfied with the style and 20% satisfied with the style. What can be concluded from this result is, the way e-community presented is not fully satisfied the respondents. However, it still can be improved. In the development of KSUP, usability testing also will be used as a technique to measure user design’s satisfaction since the evaluation form use during the testing is constructed based on chosen Jakob Nielsen’s rules.

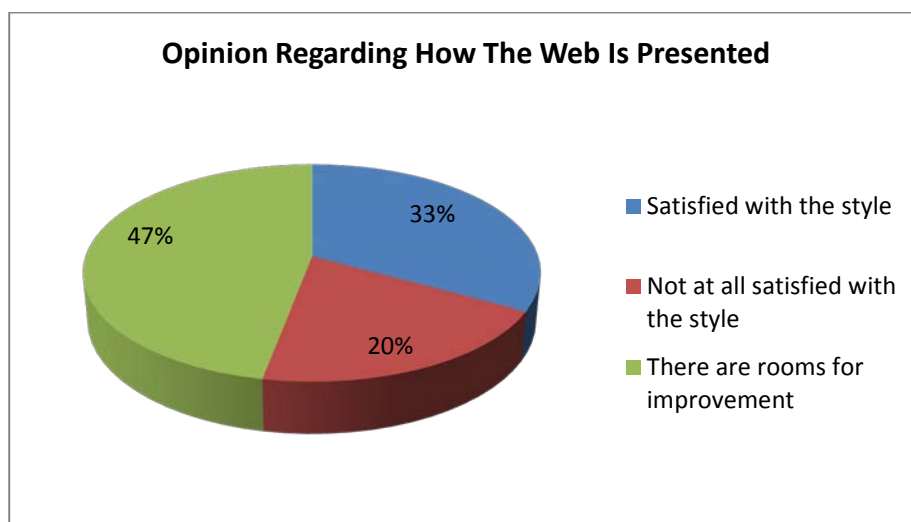


Figure 2.16: Opinion regarding how the web is presented

2.6 Studies on Usability Testing

Usability testing is a way of ensuring that interactive systems such as web sites are adapted to users and their tasks has no negative outcomes. Usability testing involves measuring the performance of end-users doing typical tasks in controlled laboratory-like conditions [9]. Besides, usability testing can be used to evaluate the product against customer reactions. Through this kind of testing, developer can find out whether customers know how to use and are they enjoyed using the system.

Yet, there are two things to consider when conducting usability testing. First, is to ensure that the best possible method for testing is used and the best method is to conduct a test where representative participants interact with representative scenarios. The tester has to collect data on the participant's success, speed of performance, and satisfaction. All findings, including both quantitative data and qualitative observations information, are provided to designers in a test report. Second consideration is to ensure that an iterative approach is used. After the first test results are provided to designers, they should make changes on the system and then it will be tested again. The more iterations, the better the system is because the developer will find out different problems in different iterations.

Besides, it is very important to avoid from making administrator feels uncomfortable and poorly prepared when conducting usability testing. As a consequence, participants may also feel ill-at-ease [10]. Table 2.6 is a list of materials that can be used when running a test.

Table 2.6: Usability testing materials

Materials	Description
Test Schedule	The test schedule describes the location and time of each session, and who will attend.
Observer Guidelines	It is important that observers are informed about appropriate behaviour. You must communicate some basic ground rules, and a written document is the most effective way to do this without giving offence.
Script	Read a formal script to each participant in order to ensure that all participants receive the same information. Avoid the temptation to run usability testing without a script - it is very easy to give too much or too little information without one.
Consent Form	If taping, obtain written consent from the participant. The consent form should state exactly what you are taping and what the tape will be used for.
Task Cards	It is good practice to hand a written description of the task to the participant, as well as reading it to them. This allows the participant to refer back to the card as they attempt the task. If randomising the order of task presentation, you put the cards in the appropriate sequence before the participant arrives.
Logging sheets	Logging sheets is needed to make notes about what the participant does during the test. Some practitioners use detailed logging sheets in an attempt to pre-classify the information gathered; others use free-form logging sheets.
Questionnaire	A single questionnaire to gather demographic information and to obtain subjective feedback and comments.

For KSUP usability testing will be conduct in the later stages of development when at least a working prototype of the system is in place. This is far more valuable and cost effective. Besides, the test will be run in the user's work place or home. There are several benefits when conducting this test in user's home or work place. Firstly, the user will feels more relaxed since they already get used to the environment. Next, developer will get to see how the web site works on different computers, browsers and modems. Material like questionnaire is going to be distributing after the test is over. When conducting the test, observer should follow guidelines as list below:

- i. Be quiet. Keep noise levels to a minimum to avoid disrupting the test.
- ii. Do not discuss participants' personal attributes. It is inappropriate to discuss participants in any way that is not directly related to the work that are carrying out.
- iii. Do not include participant names in any notes.
- iv. Refrain from joking and laughing, as this may be misinterpreted as being directed at the test participant.

These guidelines are very important in order to have accurate information from user.

2.7 Summary on Programming Tools

This section will discuss the programming tools that will be used during the development of KSUP including the advantages and disadvantages.

2.7.1 Adobe Dreamweaver CS5

Adobe Dreamweaver CS5 will be chosen as the tools to develop KSUP since it is easy to use and allows us to create professional web pages. It also give advantage to people that have lack knowledge in HTML because from the design features of Adobe Dreamweaver CS5, they can quickly adding objects and functionality to the page

without having to write the HTML code manually. With Adobe Dreamweaver CS5, designers and developers as well as novice and professional will have the ability to create standards-based websites with an air of self-assurance. Table 2.7 shows some of the features that the Dreamweaver CS5 has [11].

Table 2.7: Features of Adobe Dreamweaver CS5

Features	Description
Enhanced Integration	Website designer can decrease the number of steps that are needed to finish projects with intelligent integration across Photoshop Extended, Adobe Flash Professional, Fireworks and Adobe CS Live online services.
Intelligent Coding Assistance	Able to write cleaner code more faster since it provide the code hinting with Javascript, HTML and AJAX frameworks and to glean direct insight into the bottom line objects, functions and methods with compelling PHP code hinting.
Integrate FLV Content Enhanced	Allow to add FLV files to whatever web page that have been created with just a click of mouse and standards-compliant coding. It also provide FLV playback that enable us to see in Live View.
New Site-specific Code Hinting	Allow us to get enhanced hinting support for other CMS frameworks such as Joomla, WordPress and Drupal.
Enhanced Dreamweaver Extended Community	For novice user, who is relatively new to all of computer jargon will be able to learn as well as share from an extended Dreamweaver community.
New Integrated CMS Support	Can enjoy the testing and authoring support for different system frameworks such as Drupal, WordPress and Joomla!

Table 2.7: Features of Adobe Dreamweaver CS5

Features	Description
Enhanced Comprehensive CSS Support	Enable us to visually show the CSS box model and not need any separate utilities. Besides, there will be no need to manually edit any CSS code.
Support for Leading Technologies	We will have the certainty that we will be able to design and develop the website in an environment that is supportive to all leading web technologies. These include HTML, CSS, Ajax, Adobe ColdFusion software, XHTML, XML, JavaScript, PHP and ASP.
New Adobe BrowserLab Integration	Able to preview local content and web pages with tools that are comparing, multiple viewing and diagnostic. The new CS Live online service or also called as BrowserLab will allow us to swiftly and accurately test the web content across different operating systems and web browsers.

Apart from that, the reason why Adobe Dreamweaver CS5 is chosen as a tool to develop KSUP is because it is widespread use in the industry as of June 2011, there were nearly 4 million active sites known to have been developed using Dreamweaver [12]. Since it is widely used, there is a large community of users who can give support to the beginners as well as a large market for third-party resources, for example extensions and templates. In addition, this software also has powerful site management abilities. With this software, we can develop entire websites easily instead of create only a single page. In fact, with its interface also we can easily manage all files and directories.

However, although Adobe Dreamweaver CS5 may be the best software of its type, it still has several disadvantages that can be highlighted. The disadvantages include a hefty price tag and confusing interface that is difficult to master. Plus, it takes

up a lot of computer space [13]. Adobe Dreamweaver has a confusing interface and this problem may intimidate new users. To become an expert at this software tool, one needs to purchase Dreamweaver guide and have to read it from start. This is time consuming. Meanwhile, for the computer space Dreamweaver require lot of hard drive space. In comparison with write code in Notepad, it would take up almost no space at all.

2.7.2 XAMPP

More than 50 percent of web server programs being use today are Apache Web Server [14]. One of the main reasons is because it is free. XAMPP is a free and open source cross-platform web server package. It consist the Apache HTTP Server, MySQL database and interpreters for scripts written in the PHP and Perl programming languages [15]. XAMPP is a compilation of free software, it's free of charge and it's free to copy under the terms of the GNU General Public License. But it is only the compilation of XAMPP that is published under GPL. XAMPP's name is an acronym for X (meaning cross-platform), Apache HTTP Server, MySQL, PHP and Perl.

Many people know from their own experience that it's not easy to install an Apache web server. It is getting harder if we want to add MySQL, PHP and Perl. Nevertheless, XAMPP is an easy to install Apache distribution containing MySQL, PHP and Perl [16]. Besides, XAMPP requires only one zip, tar, 7z, or exe file to be downloaded and run, and little or no configuration of the various components that make up the web server is required. XAMPP is regularly updated to incorporate the latest releases of Apache/MySQL/PHP and Perl. It also comes with a number of other modules including OpenSSL and phpMyAdmin. Installing XAMPP takes less time than installing each of its components separately. Self-contained, multiple instances of XAMPP can exist on a single computer, and any given instance can be copied from one computer to another.

Moreover, XAMPP is also easy to install. To install XAMPP we only need to download and extract XAMPP, that's all. There are no changes to the Windows registry except if use the Windows installer version of XAMPP. In fact, it's not necessary to edit any configuration files. It couldn't be easier! Besides, if you decide that XAMPP isn't needed any more just delete the XAMPP directory and it's completely removed from your system. However for Windows installer version of XAMPP it's recommended to use the uninstall feature. As every installer the installer will make registry entries to remember the install.

XAMPP is used as a development tool, which allows website designers and programmers to test programmer's work on their own computers without any access to the Internet. To make this as easy as possible, many important security features are disabled by default. In practice, however, XAMPP is sometimes used to actually serve web pages on the World Wide Web. A special tool is provided to password-protect the most important parts of the package. XAMPP also provides support for creating and manipulating databases in MySQL and SQLite among others. Once XAMPP is installed localhost can be treated like a remote host by connecting using an FTP client. Using a program like FileZilla has many advantages when installing a content management system (CMS) like Joomla. You can also connect to localhost via FTP with your HTML editor. However, the philosophy behind XAMPP is to build an easy to install distribution for developers to get into the world of Apache. To make it convenient for developers XAMPP is configured with all features turned on. The default configuration is not good from a security point of view and it's not secure enough for a production environment.

2.8 Studies on Database

There are two type of database that will be discussed in this section which is Microsoft Access and MySQL. Besides, this section also will discuss about the Apache Web Server.

2.8.1 Microsoft Access

Microsoft Office Access, also known as Microsoft Access, is a relational database management system from Microsoft that combines the relational Microsoft Jet Database Engine with a graphical user interface and software-development tools [17]. It is a member of the Microsoft Office suite of applications, included in the Professional and higher editions or sold separately. MS Access stores data in its own format based on the Access Jet Database Engine. It can also import or link directly to data stored in other applications and databases.

2.8.2 MySQL

MySQL is a relational database management system (RDBMS) that runs as a server providing multi-user access to a number of databases. It is named after developer Michael Widenius' daughter, My. The SQL phrase stands for Structured Query Language [18]. The MySQL development project has made its source code available under the terms of the GNU General Public License, as well as under a variety of proprietary agreements. MySQL was owned and sponsored by a single for-profit firm, the Swedish company MySQL AB, now owned by Oracle Corporation.

2.8.3 Comparison Between Microsoft Access and MySQL

Table 2.8 shows the comparison between Microsoft Access and MySQL [19]. From the comparison, it shows that MySQL have lot of benefits compare to Microsoft Access. Microsoft Access can only hold up with a few users. If the database gets too large, it will be dealing with crashes a lot.

Table 2.8: Comparison Between Microsoft Access and MySQL

Use	MySQL	Microsoft Access
Validate basic user input (e.g., for a single field/cell)	Yes	Yes
Complex user input validation or events (if field X = Y, and field Z is empty, perform some action)	Yes	Yes
Data arranged in a few columns without much repetition	Yes	Yes
Rows/records supported	Unlimited	Unlimited (up to 2GB/table)
Simple cross-references	Yes	Yes
Complex data analysis/queries	Yes	Yes
Events based on user actions (when user exits a field/cell do X, when they mouse over a field/cell do Y)	Yes	Yes
Multiple users, but generally accessing data at different times	Yes	Yes
Multiple users, accessing data at the same time	Yes	Yes (but can be slow depending on network speed)

Table 2.8: Comparison Between Microsoft Access and MySQL

Use	MySQL	Microsoft Access
Frequent mass-update operations	Yes	Yes
Multiple data entry forms	Yes	Yes
Mail Merge with Word	Yes	Yes
Reporting	Yes	Yes
Automated backups	Yes	Possible with VB coding, backup software, or UI Builder for Microsoft Access
Record-level auditing	Yes	Possible with VB coding or UI Builder for Microsoft Access
Ability to hide the inner workings of your project from the user	Yes	Yes (MDE files and ACCDE files)
Expertise Required	High	For simple databases: Low/Moderate For complex requirements: Moderate-to-High
Attaching files/links to fields	Yes	Yes (MS Access 2007 and Access 2010)
Sharing information on the Web	Yes (with a web front-end like PHP or ASP.NET)	Yes (Microsoft Access 2010)

2.8.4 Apache Web Server

The Apache HTTP Server, commonly referred to as Apache is web server software notable for playing a key role in the initial growth of the World Wide Web. In 2009 it became the first web server software to surpass the 100 million website milestone [20]. Core development of the Apache Web server is performed by a group of about 20 volunteer programmers, called the Apache Group. However, because the source code is freely available, anyone can adapt the server for specific needs, and there is a large public library of Apache add-ons. In many respects, development of Apache is similar to development of the Linux operating system [21].

There are many advantages of Apache to users, developers and also web administrators. First of foremost, Apache has various useful features, including implementation of the latest protocols. It is also customizable. With Apache's modular architecture, user can build a server that is made to measure. Meanwhile, for administration, Apache configuration files are in ASCII. It has a simple format and can be edited using any text editor. It can be transferable so that one can effectively clone a server. In addition, the server can be controlled from command line, which will make remote administration very convenient. Other advantage is it is extensible; Apache server and API source code are open to public. If there is any feature that want to be included but does not exist in Apache, own server module can be written to implement it. On top of that, Apache Web Server is also efficient and portable. Apache can runs on a wide variety of operating systems. Meanwhile, in term of its stability and reliability, Apache's source code is open to public. When any bugs are found, it will quickly been fixed and updates are made. This makes Apache becoming more stable, and hence reliable, server over the time.

2.9 Propose system

Currently, organization of KSUP is managed manually with no computerized system. Figure 2.17 shows the manual process of how the instructors manage the organization. To begin the process, Kor SUKISIS's members fill their profile form and submit to instructor. All information and details of the member is manually filled and it is kept in a file.

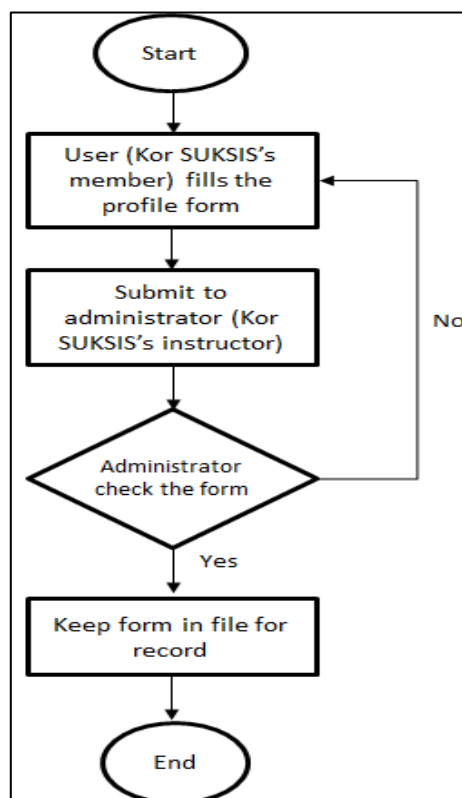


Figure 2.17: Manual flow of Kor SUKISIS System

From the problem statement highlighted in Chapter 1: Introduction, it shows that Kor SUKISIS UMP is in need of a system that can manage their organization and at the same to promote information sharing and discussion among members over the Internet. From the beginning, this chapter has discussed the technique, equipment and technology that are used on the existing system. After that, a comparison of usability between existing systems is made. This discussion will be taken as a reference for the

development of the proposed system. As well as to help us to choose the tools that will be used during the development process based on their benefits and disadvantages.

From the studies on existing system, there are several points were highlighted which are type of portal and its characteristics and also usability issues that can be found in existing system. The study shows that KSUP is more likely suitable to be developed as a vertical web portal rather than horizontal as it fulfill the organizational needs where user of the web portal can access information in the World Wide Web. Besides, by considering the overview of the web portal, several features will be added into KSUP. The features are forum site that allow discussion between users of the system, memo system that allow the interaction between users, announcement board which allowing user to make announcement about upcoming event or activities directly at the portal and bulletin that allow the admin to provides information or latest news of the organization. Meanwhile, other features in KSUP are based on what the organization need. The following are the features:

- a. Registration page: Allows the new user registration where the function is for the first time user to register into database of KSUOS before the users can login into the system. The targets are for the members and instructors.
- b. Login: Allows users (instructors and members) to log in to the system. User access to system when username and password is correct.
- c. Profile Page: Instructors and members allow viewing other users profile and updating certain data in their own profile.

From the features, overall flowchart for the propose system is design as shown in Figure 2.18. This system requires login. After login user (instructor and member) will directed to their homepage.

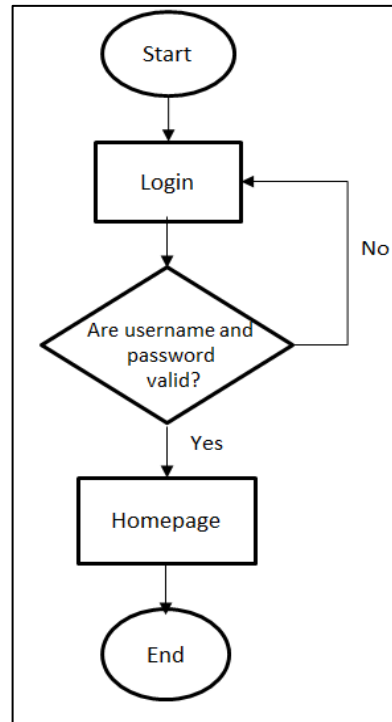


Figure 2.18: Flowchart for the propose system

Different roles (instructor and member) will have different function on their homepage. Admin (instructor/staff) functions are home, bulletin, galleries, profile, forum and announcement. For member, there is no function for registration since only administrator can register new user to the system. Member functions are home, bulletin, galleries, profile, forum, memo and announcement. Only these eight functions can be accessed by member of KSUP. Meanwhile, functions for external user are home, bulletin, galleries and contact us.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter will discuss on the methodology and the framework of Kor SUKSIS UMP Portal (KSUP).

3.2 Project Methodology

Methodology is generally a guideline for solving a problem with specific components such as phases, tasks, methods, techniques and tools [22]. 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 question. Therefore, to know what data to be gathered, a clear research question is very crucial. Next are the choices about how to analyze the analysis. For example, analysis of cost's benefit is for to find a method to conduct a cost's benefit analysis. Nevertheless, developer also should think about practical and intellectual considerations when deciding which methodologies to employ such as cost, time, resources and accessibility. Besides, also make the consideration on type of data collective which are qualitative and quantitative. Need to remember that, even if description is qualitative, it still needs to be precise. Figure 3.1 shows how the development of KSUP is conducted. This software development process is created based on the technique that will be used in the development of KSUP, which are the heuristic evaluation and usability testing. If the software development process use is match with the technique involve in the

development of the project, it can avoid developer from having problems during the development.

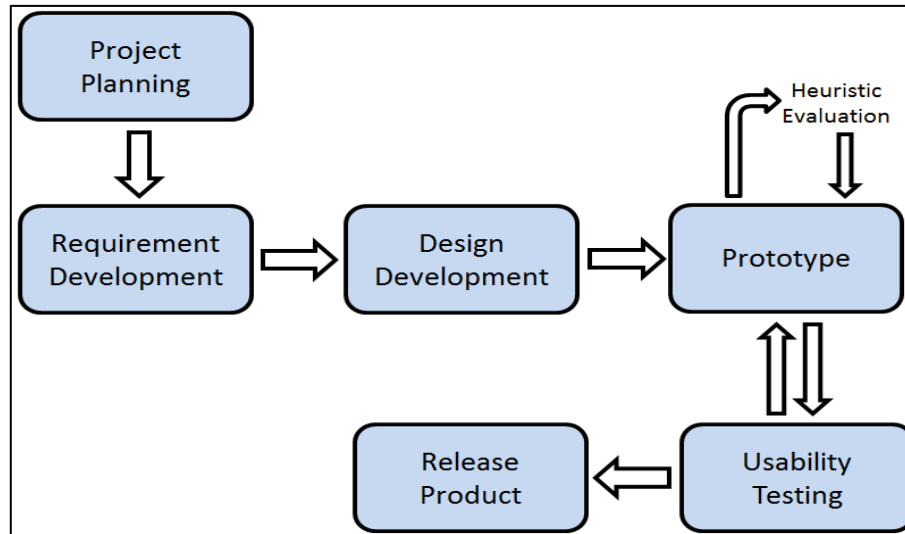


Figure 3.1: Software development process

3.3 Analysis from Literature Review

As mention in the Literature Review, KSUP will be developed as a vertical web portal. Vertical web portal concept development is the first step toward development of vertical web portal. In the analysis of the Literature Review, vertical web portal is a portal that delivers organization-specific information in a user-centric way. Further, it provides information and services while affording the user to access over a network, such as internet. In this chapter, we will present a methodology for architecting KSUP. The methodology will come along with some guidelines at the beginning which intended to serve as framework for the development of KSUP as a vertical web portal.

3.4 Project Planning

Project planning allows developer to begin preparing design and develop a course. Planning includes determining the instructional needs and concepts, determining management and evaluation strategies, and estimating resource requirement and constraints. Planning activities are defined before developing new or revising existing instruction.

However, in the development of KSUP there are several steps in planning process that should be conducted before start the development process. First of for most, is to develop the project objectives. The objective must be developed based on problem statement or from the reason why KSUP should be built as mentioned in chapter 1. Second, is to identify the deliverables of the project. Deliverables also defined as expected outcomes over the lifecycle of the project. Table 3.1 shows the deliverables of KSUP.

Table 3.1: Deliverables of KSUP

Task	Deliverables
Prototype of system for KSUP	KSUP prototype system
Heuristic evaluation of system for KSUP	Implement heuristics by Jakob Nielsen to analyze the usability of the website.
End-user usability testing for KSUP	Conduct usability test on prototype of KSUP

After found out the project objectives and deliverables, the structure of the system will be constructed in details. From the analysis of problem statement in Chapter1: Introduction and Chapter 2: Literature Review, several characteristic of web portal will be implemented in the structure of KSUP. Portal mainly concern on constraint in handling, managing and providing accessibility to its content such as the data,

information and services that are identified within the portal goal. Figure 3.2 shows the component of portal goal.

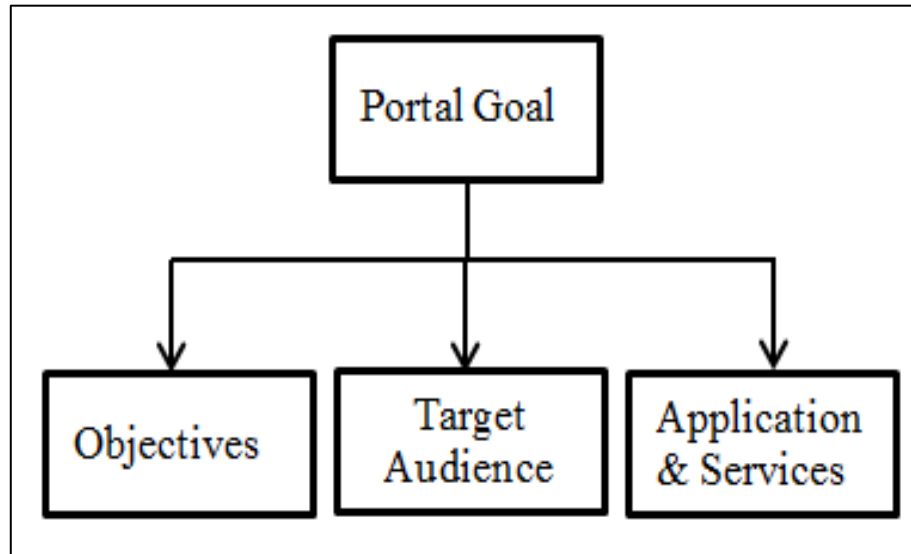


Figure 3.2: Portal Goal

As mention previously in the 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 objective of web portal, KSUP should be built as a system that managing knowledge such as creating, storing, sharing and using. Meanwhile, the target audiences are the community (members of Kor SUKISIS UMP). Further, it will be two ways communication between contributors and users. Table 3.2 shows the correlation table for combined application and service and target audience to requirement.

Table 3.2: Correlation table

Application/Service	Requirement	Audience
Registration	Functionality to register user into the system	The system's admin
Profile	Retrieve user information	The system's admin, instructor, member (Certain information is restricted. Only admin can retrieve all.)
Announcement board	Provide up to date information	The system's admin, instructor, member
Forum site	A place to discuss and share information	The system's admin, instructor, member
Gallery	A pictures gallery	The system's admin, instructor, member, external user
Bulletin	Provide up to date news	The system's admin, instructor, member, external user

Third, is to determine the schedule. Refer to Appendix A to view the project planning. Schedule is important in order to make sure the project's requirement is met and can be delivered on time. The activities that will be included are referring as follow:

- a. Design Development
 - i. Identify Module
 - ii. Draft UI Design

- b. Prototyping the design
 - i. Develop System Prototype
 - ii. Activities Documentation
 - iii. System Design Complete

- c. Heuristic Evaluation
 - i. Design Decision Using
 - ii. Rebuilt the Prototype
 - iii. Activities Documentation
 - iv. Heuristic Evaluation Complete

- d. Usability Testing
 - i. Create Test Plan
 - ii. Making Appointment With User
 - iii. Usability Testing
 - iv. Result Analysis
 - v. Activities Documentation
 - vi. System Touchup

- e. Presentation
 - i. Present the project

3.5 Requirement Development

Requirements are important in the development of KSUP. 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 will help to maintain focus in the development of KSUP. Requirement can be obtained from user inputs by doing the surveys and interviews. All the inputs were grouped and categorized according to similarities. User inputs will provide specific contribution that is needed for the development of the overall vertical web portal concept. Inputs outside of

the organization (inputs from people who not related to the stakeholder) may have worth and should be considered in developing possible changes to system goal. There several factors should be considered before doing the interview. First, determine when to interview. Second, determine if the respondent is telling the truth and lastly, consideration for source of bias. Always remember that client is not always conscious of all the needs. This is important in order to have an accurate requirement. Most of the projects failure was because of the wrong requirement captured in the first place. There are several questions that can be asking to the stakeholder during the interview. Examples of questions are as follow:

- Q1:** What is the kind of website you want to develop? What field is it expected to address?
- Q2:** What is the kind of target audience you seek to communicate with?
- Q3:** What other visitors (secondary audience) is your site going to get?
- Q4:** What is the purpose of your site?
- Q6:** What features do you think your website should include? (Calendar, forum, login, price comparison chart, contact form, anything?).
- Q7:** Will web visitors have any special needs? (eyesight, language, mobility, reading level?).
- Q9:** Anything else I should know?

Meanwhile to have a web portal that can satisfied other users (target audience and secondary audience); a survey can be donned by distributing questionnaires and distributed it to people which not related to the stakeholder. Further, create a survey form and distributing it. Figure 3.3 shows the example of survey form.

Sample Web Usability Questionnaire

Name of Web User: _____
 Web Generally Used: _____
 Age: _____
 Contact Number: _____
 Mail I.D: _____

Please Mark the Right Option:

Q1. What interests you in using the web?
 a. for personal knowledge
 b. for official purpose
 c. filling requirements at times of need

Q3. Up to what level are you familiar with working over the net?
 a. I have the web knowledge till school level
 b. I have no knowledge in web using
 c. I am very much accustomed with it

Q4. Does the web satisfy your purpose?
 a. It always does
 b. It never does
 c. sometimes yes sometimes no, depends!

Q5. While browsing web on which part do you usually face usability problems?
 a. At the very first part
 b. at the middle
 c. I do not now how to finally end it up

Figure 3.3: Example of survey form

3.6 Design development

This section will explain the development stages for KSUP and clarified the system outline. Further, the flow of how the users interact with the system and the sample screens and procedures is designed as well. At the end of this step, the general idea behind the new system is start to transform into a specific plan.

3.6.1 Module Development

After making analysis on user requirement, twelve modules for KSUP are found out. Refer the following as below:

- a. Registration page: Allows the new user registration where the function is for the first time user to register into database of KSUP before the users can login into the system. The targets are for the members and instructors.
- b. Login: Allows users (instructors and members) to log in to the system. User access to system when username and password is correct.
- c. Profile Page: Instructors and members allow viewing other users profile and updating certain data in their own profile.
- d. Announcement board: This module allowing user to make announcement about upcoming event or activities directly at the portal.
- e. Forum site: This module is a medium that allow discussion between instructors and members.
- f. Gallery: This module allowed instructor and member to upload pictures for events.
- g. Bulletin: This module is a medium that allow instructors and member upload the latest news related to the organization.

3.6.2 Workflow diagram

Following are the flowchart of KSUP which presented by modules:

- a. Registration

There will be a registration function for the first time users. Administrator will initiate this module and register user of KSUP. After registration, they are able to login to the system. Figure 3.4 shows the flowchart of registration module.

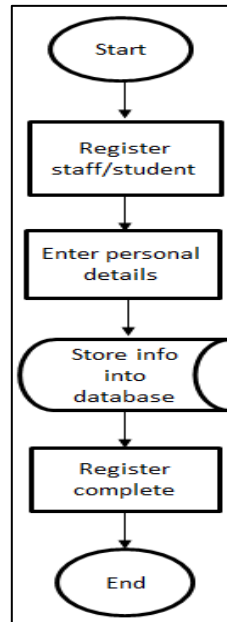


Figure 3.4: Registration

b. Login

There will be a login function for users. They need to choose either to login as a staff or student and they can only access to system when username and password is correct as shown in Figure 3.5.

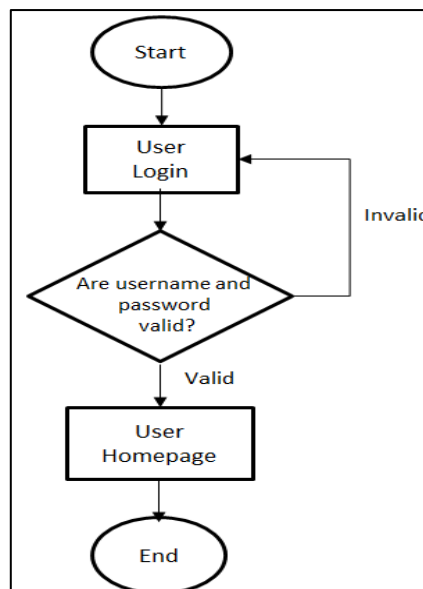


Figure 3.5: User login

c. Profile

This flowchart explains the task that will be initiated by staff. Staff can view all user profiles (staff and student), add and delete. Figure 3.6 shows the flowchart of the profile modules initiated by admin.

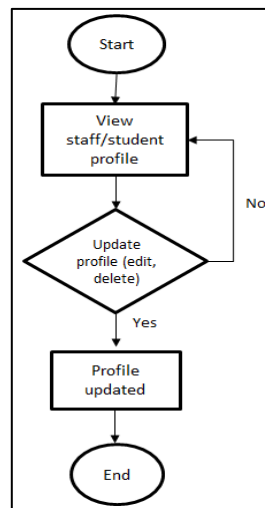


Figure 3.6: Profile page for staff

Meanwhile, this flowchart will be initiated by student. They can view other users profile and updating certain data in their own profile. Figure 3.7 shows the flowchart of the profile modules initiated by staff and student.

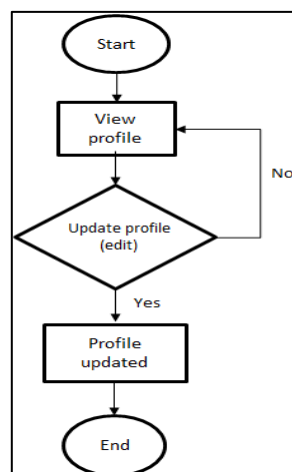


Figure 3.7: Profile page for student

d. Announcement board

There are two tasks involve in announcement module. First, is to view the announcement as shown in Figure 3.8. This module is initiated by all users.

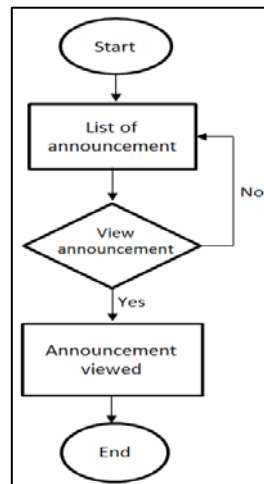


Figure 3.8: View announcement

Meanwhile, the second task is to make announcement about upcoming event or activities directly at the portal as shown in Figure 3.9. This task is also initiated all users.

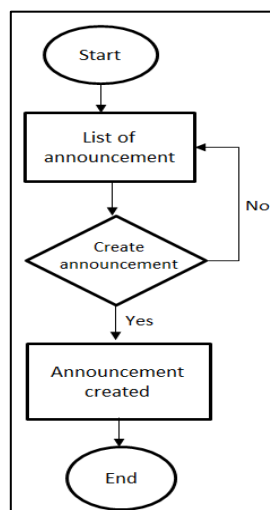


Figure 3.9: Create announcement

e. Gallery

This module is initiated by all users and they can update the gallery as shown on Figure 3.10.

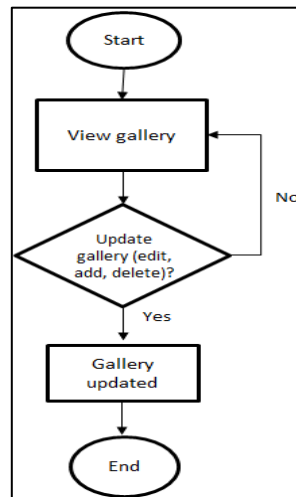


Figure 3.10: Update gallery

f. Bulletin

This module will be initiated by all users. They can update news about the organization as shown in Figure 3.11.

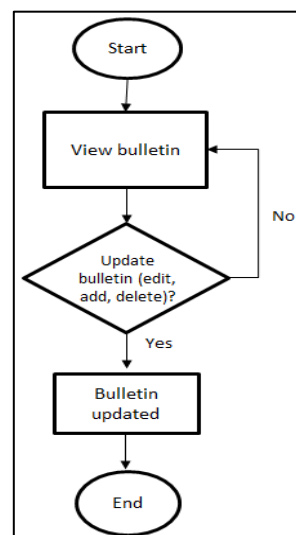


Figure 3.11: Update bulletin

3.6.3 User interface design for KSUP

In this phase, a storyboard or sketch of user interface design of KSUP will be created. It is necessary in order to measure the relationships between major user interface elements. Further, the design must consider all modules. After finish with the storyboard, Adobe Dreamweaver CS5 will be used to design for real interface. In the proposed system, KSUP will have three main parts which are instructor/staff (also act as admin), member and external user. In comparison with member, the instructor/staff is responsible to register users and can access all modules. In order to access all functions, they have to login first. Meanwhile, for the external user they need no login but can only follow up SUKSIS bulletin and some information about the organization. Following are the sketch of user interface design for instructor, member and external user:

i. Instructor

As shown in Figure 3.12, there are seven functions for instructor (admin). The functions are home, bulletin, gallery, profile, announcement, registration, and forum. These functions have been discussed in module development.

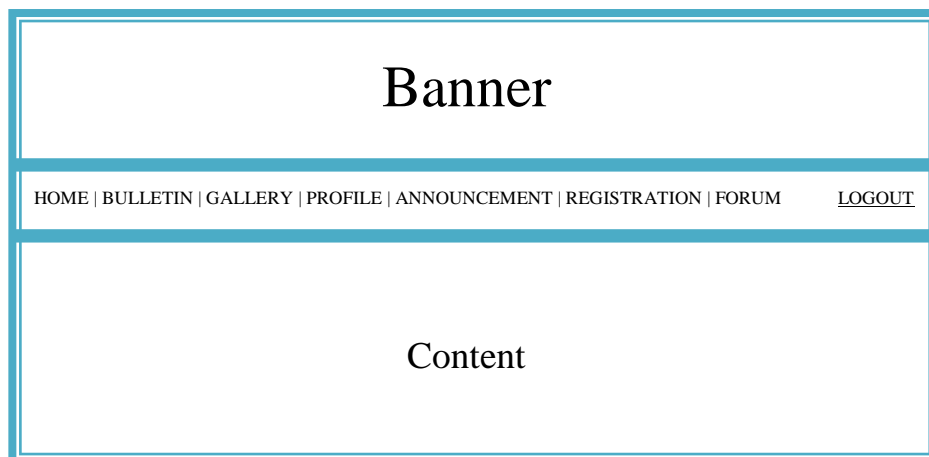


Figure 3.12: Sketch for Instructor Interface

ii. Member

As shown in Figure 3.13, there are only six functions for member. The functions are home, bulletin, gallery, profile, announcement, and forum. Only these eight functions can be accessed by member of Kor SUKSIS UMP.

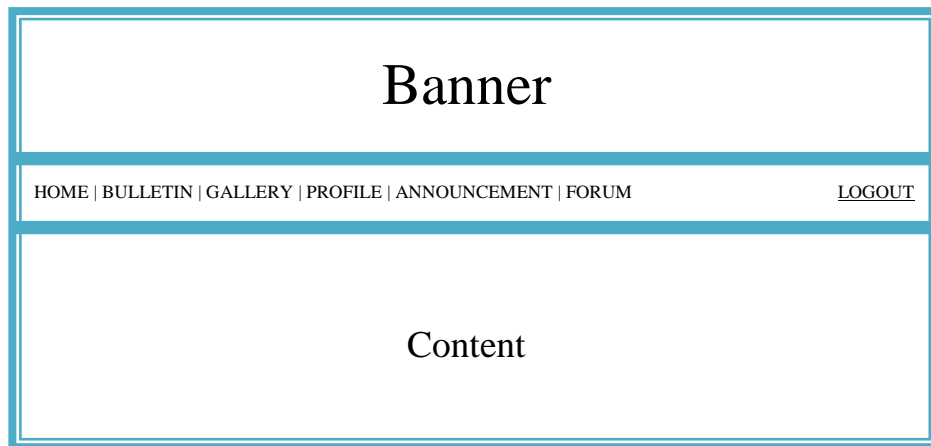


Figure 3.13: Sketch for Member Interface

i. External user

As shown in Figure 3.14, there are only four functions for member. The functions are home, bulletin, and gallery and contact us.

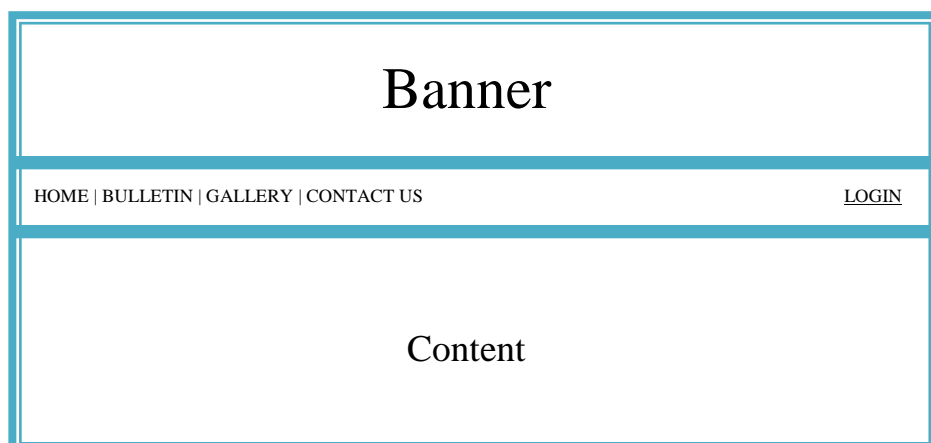


Figure 3.14: Sketch for External user Interface

3.7 Prototyping the design

Prototype is the starting system implementation process and a tool for improving the quality of the delivered system. It is a step that helps direct the development process. Sometimes, development effort comes out with mistakes. However, it can be minimized through the use and analysis of prototype. The development team has 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 this stage, the prototype will be built based on modules that have been discussed before. Flowcharts and user interface design will be used as a guideline in the development of prototype and will be implemented. Further, determines whether it is working properly without error or not. If errors occur, it will be fixed until the interface can run smoothly and correctly. Adobe Dreamweaver CS5 will be used in other to develop the prototype and XAMPP as the database platform. A web design template also will be used to develop the prototype.

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 [6]. The method of heuristic evaluation will be used to evaluate the prototype system of KSUP in other to find any usability issues in the user interface design. In this evaluation process, chosen rules from Nielsen's Ten Heuristic 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 made on the Literature Review, those Nielsen's heuristic that will be used in the project are presented in summary below:

- Match between system and the real world: It is important to speak the language that user can understand, in order to prevent confusion and frustration.
- Consistency and standards: Consistency should be used during evaluation because it can makes sites easier to use. So that user do not have to learn any new techniques in order to use the sites successfully.
- User control and freedom: There is possibilities that user choose system by mistake. Therefore, navigation is one of the most critical aspects of Web site design. Navigation refers to the ability to find one's way within the web site.
- Visibility of system status: The ideal system must have a good feedback. Feedback refers to the provision of information about what is happening at any time.
- Error prevention: Errors should be prevented from occurring in the first place wherever possible.
- Help users recognize, diagnose, and recover from errors: When errors occur, it is important to provide clear explanation of what has happened. Provide a clear instructions for how to recover.
- Aesthetic and Minimalist Design: This rule is important in order to ensure that the system have a good design especially in the color scheme, appropriate margins and left alignments in the left and right.

In this phase, evaluation process should be iterative. Thats mean the inspection and comparison of interface elements should be done several times to pick up missed details and it will be improved until no more problems are found [23].

3.9 Usability testing

Usability testing is a way of ensuring that interactive systems such as web sites are adapted to users and their tasks has no negative outcomes. Usability testing involves measuring the performance of end-users doing typical tasks in controlled laboratory-like conditions [10]. Besides, usability testing is also necessary to ensure that the system met the user requirement. It is a true test of how people actually use the system. In the development of KSUP, usability test will be conducted before it is delivered to the end

user. Participants which are the instructor and member of KSUP will test the prototype of KSUP in order to discover whether they can get the point of the page(s), understand the navigation system and can guess where to find things. Usability testing is conducted in the user's work place or home. So that, the users can feel more relaxed. Meanwhile, for the test that will run at user's home, all the modules will be uploaded in a web hosting service and the link will be given to user to test it. Questionnaire also will be distributed to the participants during the usability test. They can use the questionnaire to help them evaluate the product. Refer Appendix B for the sample of the questionnaire used during the usability test. Following are the ratings style that going to be used during usability test.

- 4: Strongly agree
- 3: Agree
- 2: Disagree
- 1: Strongly disagree

The result then will be analyzed by grouping each question by its usability characteristics which are visibility of system status, match between system and the real world, user control and freedom, help user recognize, diagnose and recover from errors, error prevention, consistency and standard, and aesthetic and minimalist design. Data is then will be illustrated using pie chart and a conclusion will be made based on the result.

3.10 Project Requirement

Table 3.3 shows the software requirement that will use in this system. It is including all tools to develop interface, run database, documentation and operating system that use.

Table 3.3: Software requirement

Software	Propose
Adobe Dreamweaver CS5	To create interface design and development system
MySQL 5.5	Database for store data
Adobe Photoshop CS4	To edit picture
Microsoft Project 2003	To develop Gantt chart
Microsoft Word 2010	Documentation and report writing
Microsoft Power Point 2010	To make story board planning
Ms Windows 7 Professionals	Operating system

Table 3.4 shows the hardware requirement that use when developing the system. It is also contain the hardware that use to burn, backup the data, and to print the report.

Table 3.4: Hardware requirement

Item	Quantity	Purpose
Laptop Compaq Presario CQ40	1	For documentation and system development
Pen drive	1	For backup data
External hard disk	1	For backup data
Printer/Scanner	1	Print documentation
CD/DVD	3	For backup data

CHAPTER 4

IMPLEMENTATION

4.1 Introduction

Human-computer interaction or HCI in portal is an important research area. This is because; the issues and challenges arise during the research can help developer to design a usable and effective web portal. Besides, HCI also concerned with the understanding, designing and evaluating computer system for human use. In this research, an issue which related to the development of KSUP has been examined which is how to ensure that the design of a web portal offer good HCI. From the literature review made on several existing systems in Chapter 2, it shows that all of the existing systems still have some weaknesses in the design of user interface, especially in the site design, navigation and page layout. Therefore, to ensure that KSUP offer good HCI; heuristic evaluation and usability test have been introduced. Meanwhile, this chapter will discuss how chosen Jakob Nielsen's rules help to justify the system design and how the usability testing will be conducted. Besides, this chapter also will discuss about the project implementation of KSUP base on methodology discuss previously in chapter 3 which may consist of the interface design and the source code used.

4.2 Design

The interface design of KSUP is developed by using Adobe Dreamweaver CS5 based on previous sketch user interface design. KSUP have three main parts which are instructor/staff, member and external user. Following subparagraph will discuss about the interface design for each part.

4.2.1 Instructor/staff

As shown in Figure 4.1, there are eight menus for Instructor/staff. The menus are Home, Bulletin, Gallery, Profile, Announcement, SUKSYS System, SUKSYS Forum and user logout button.

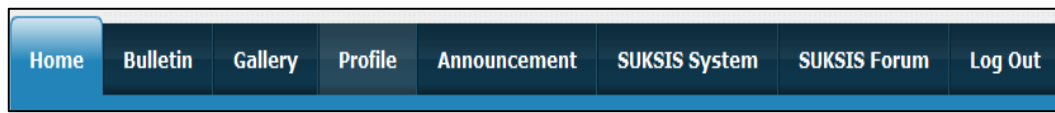


Figure 4.1: General view of interface design for instructor/staff

Meanwhile, Table 4.1 will show the menu's detail.

Table 4.1: Menu available for instructor/staff

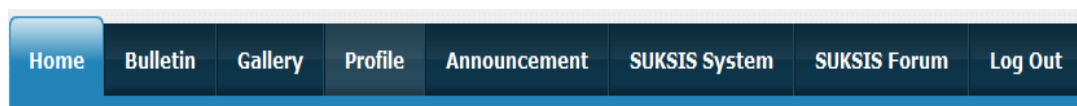
Function	Description
Home	First page after user login (starting point for user).
Bulletin	Allow instructors upload the latest news related to the organization.
Gallery	Allow instructor to upload pictures for any events.

Table 4.1: Menu available for instructor/staff

Function	Description
Profile	View and update certain data in their own profile.
Announcement	Create announcement about upcoming event or activities directly at the portal.
SUKSIS System	Register new member and view user directory.
SUKSIS Forum	Allow discussion between all users.
Logout	Log out from the application.

4.2.2 Student

As shown in Figure 4.2, there are also eight menus for member same like staff's modules. The modules are Home, Bulletin, Gallery, Profile, Announcement, SUKSIS System, SUKSIS Forum and user logout button.

**Figure 4.2:** General view of interface design for member

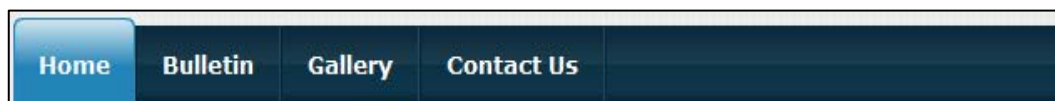
Meanwhile, Table 4.2 will show the menu's detail.

Table 4.2: Module available for student

Function	Description
Home	First page after user login (starting point for user).
Bulletin	Allow member to upload the latest news related to the organization.
Gallery	Allow member to upload pictures for any events.
Profile	View and update certain data in their own profile.
Announcement	Create announcement about upcoming event or activities directly at the portal.
SUKSIS System	View user directory.
SUKSIS Forum	Allow discussion between all users (member and instructor).
Logout	Log out from the application.

4.2.3 External user

As shown in Figure 4.3, there are only four menus for external user. The general functions are Home, Bulletin, Gallery and Contact Us.

**Figure 4.3:** General view of interface design for external user

Meanwhile, Table 4.3 will show the menu's detail.

Table 4.3: Menu available for external user

Function	Description
Home	Main page of the portal.
Bulletin	Read SUKSIS's latest news.
Gallery	View picture available in gallery page.
Contact Us	Contact the organization for any enquiries.
Login	Log in into the application (for registered member only).

4.3 Interface Design And Source Code

There are several types of source codes used in order to develop KSUP which are PHP, HTML, JavaScript and CSS. These source codes are required for system engine and also for user experience while using the system.

4.3.1 PHP code

PHP will acts as a system engine for logic and decision and working with server. For example log in and log out function for add, update and delete. Following shows the source code used in KSUP.

i. Log in

This section will explain about source codes in log in system which is used to prevent SQL injection, validation, post form values and store the session value.

- a) Clean function - As shown in Figure 4.4, a clean function is put inside the log in code. It will be used to prevent SQL injection. This function will sanitize each value received from the form.

```

function clean($str) {
    $str = @trim($str);
    if(get_magic_quotes_gpc()) {
        $str = stripslashes($str);
    }
    return mysql_real_escape_string($str);
}

//Sanitize the POST values
$username = clean($_POST['username']);
$password = clean($_POST['password']);
$category = clean($_POST['category']);

```

Figure 4.4: Clean function

- b) Log in Validation - Meanwhile, Figure 4.5 shows code for validation. User has to enter both username and password. If not, there will be a JavaScript message box to notify the user.

```

if($username == '') {
    $errmsg_arr[] = 'Login ID missing';
    $errflag = true;
}
if($password == '') {
    $errmsg_arr[] = 'Password missing';
    $errflag = true;
}

//If there are input validations, redirect
back to the login form
if($errflag) {
    $_SESSION['ERRMSG_ARR'] = $errmsg_arr;
    session_write_close();
    header("location: Home.php");
    exit();
}

```

Figure 4.5: Log in validation

- c) Privileges - After user login, they will be redirect to different page base on their category. Source code in Figure 4.6 and Figure 4.7 shows how privileges is set for member and admin respectively in MySQL database and then uses them in PHP code.

```

else if ($_POST["category"] == "member") {
    $sql = "SELECT * FROM member WHERE username
= '" . $username. "' AND password = '" .
$password. "'";

    $result = mysql_query($sql) or die('error
making query');
    if($result) {
        if(mysql_num_rows($result) == 1) {
            session_regenerate_id();
            $members = mysql_fetch_assoc($result);
            $_SESSION['SESS_MEMBER_ID'] =
            $members ['username'];
            $_SESSION['SESS_MEMBER_NAME'] =
            $members['member_name'];

            session_write_close(); //end the
session.
            header("location: add.php");
            exit();
        }else {
            header("location: login-
failed.php");
            exit();
        }
    }else {
        die("Query failed");
    }
}
}

```

Figure 4.6: User privilege (member)

```

else if ($_POST["category"] == "admin") {
    //set up the query admin
    $sql = "SELECT * FROM admin WHERE username
= '" . $username. "' AND password = '" .
$password. "'";

    $result = mysql_query($sql) or die('error
making query');

    if($result) {
        if(mysql_num_rows($result) == 1) {
            session_regenerate_id();
            $members =
mysql_fetch_assoc($result);
            $_SESSION['SESS_MEMBER_ID'] =
$members ['username'];
            $_SESSION['SESS_MEMBER_NAME'] =
$members['admin_name'];

            session_write_close(); //end
session
            header("location: add2.php");
            exit();
        }else {
            header("location: login-
failed.php");
            exit();
        }
    }else {
        die("Query failed");
    }
}
}

```

Figure 4.7: User privilege (admin)

- d) Session Verification – Figure 4.8 below shows session verification code for login. It will be safe as lock.php and attached in every page. If no session value, it will redirect user to login page.

```

<?php

    session_start();

    if(!isset($_SESSION['SESS_MEMBER_ID']) ||
(trim($_SESSION['SESS_MEMBER_ID']) == '')) {

        header ("location:
home.php");

        exit();

    }

?>

```

Figure 4.8: Session Verification

- ii. Log out - In order to ensure that users can log out successfully, source code as shown in Figure 4.9 will be used to destroy the session. When this function is executed, all the session variables that have been set up for the user will be destroyed.

```

<?php

    session_start();
    if(session_destroy())
    {
        header("Location: home.php");
    }

```

Figure 4.9: Log out

- iii. Insert - As shown in Figure 4.10 the INSERT INTO statement is used to add new data to a database table. Meanwhile, the mysql_query() function is used to execute the INSERT INTO statement . This function is used to send a query to a MySQL connection.

```

if (isset($_GET['add']))
{
    $title = mysql_real_escape_string ($_POST ['title']);
    $author = mysql_real_escape_string ($_POST ['author']);
    $entry = mysql_real_escape_string($_POST ['entry']);
    $date_time = mysql_real_escape_string($_POST
    ['date_time']);

    $result = mysql_query("INSERT INTO bulletin (title, author,
    entry,date_time) VALUES ('$title', '$author',
    '$entry', '$date_time')");

    if
    (!$result) {

        $errormessage = mysql_error ();
        echo "Error with query: " . $errormessage;
        exit();
    }
    header ('Location: newpost.php?msg=done');
}

```

Figure 4.10: Insert data into database table

- iv. Update - To update data in a database, code as shown in Figure 4.11 is used. WHERE clause is used to specifies which data should be updated. Meanwhile, the mysql_query() function is used to execute the statement . This function is used to send a query to a MySQL connection.

```

extract($_POST);

$query = "UPDATE bulletin SET title = '$title', author = '$author',
    entry = '$entry', date_time = '$date_time' WHERE id = '$id'";

$result = mysql_query($query, $conn) or die("Could not execute query in
    update.php");
if($result) {
    echo "<script type='text/javascript'>
    window.location='dashboard.php?msg=done' </script>";
}

```

Figure 4.11: Update data in a database

- v. Delete - Statement DELETE FROM as shown in Figure 4.12 is used to delete data in a database. WHERE clause specifies which data should be deleted. Meanwhile, the mysql_query() function is used to execute the statement . This function is used to send a query to a MySQL connection.

```

$idURL = $_GET['id'];

$query = "DELETE FROM bulletin WHERE id = '$idURL'";
$result = mysql_query($query, $conn);

if($result) {
    echo "<script type = 'text/javascript'>
        window.location='dashboard.php' </script>";
}

```

Figure 4.12: Delete in a database

4.3.2 JavaScript

JavaScript is a browser-interpreted language that can access all elements of HTML and the browser. In the development of KSUP, JavaScript is used to validate input forms on the client side. For example, if a user forgets to enter his name in a form, a JavaScript validation function will pop up a message to let user know about the omission and display error message if a user enter incorrect format of data.

- i. JavaScript confirm box

Figure 4.13 shows a source code of JavaScript confirm box that used to verify or accept something. The JavaScript confirmation box will pops up when user want to delete a data. Then, user has to click either "OK" to delete it or "Cancel" to cancel the operation. This kind of popup message can prevent accidental deletion of data made by user.

```
<script language="JavaScript" type="text/javascript">  
    function delpage(id, title, author, entry,  
date_time)  
    {  
        if (confirm("Are you sure you want to delete  
'" + title + "'"))  
        {  
            window.location.href =  
'dashboard.php?delpage=' + id;  
        }  
    }  
</script>
```

Figure 4.13: JavaScript confirm box

ii. JavaScript alert box

As shown in Figure 4.14, the JavaScript is used to inform or give feedback to user, after successfully finishing certain task. When an alert box pops up, user has to click 'OK' to close the box.

```
<script language="javascript">  
    function show_alert()  
    {  
        alert("post updated!");  
    }  
</script>
```

Figure 4.14: JavaScript alert box

iii. JavaScript form validation

Javascript validation form can be used to check whether user left required fields empty, entered a valid email or valid date before send to a server. Figure 4.15, shows a JavaScript that used to validate data in a form.

```
<script type="text/javascript">

    $('document').ready(function(){

        $('#form').validate({
            rules:{
                "password":{
                    required:true,
                    maxlength:12
                },

                "staff_ic":{
                    required:true,
                    digits:true,
                    maxlength:12
                },

                ...
            },

            messages:{
                "password":{
                    required:"*This field is
required"
                },

                "staff_ic":{
                    required:"*This field is
required",
                    digits: "*Please enter
only digits."
                },
                ...
            }
        });
    });
</script>
```

Figure 4.15: Validation for form using JavaScript

4.3.3 CSS

CSS which stand for Cascading Style Sheet is a style sheet language that used to describe the look and formatting of a document written in a markup language. With CSS, the development of KSUP will be easier as CSS can allow developer to change the style of a document. Figure 4.16 shows the example of CSS used to change how a picture should be display. Besides, the picture's size and position can also easily set by developer.

```
<style>
  .image {
    position:relative;
    float:left;
  }
  .image .text {
    position:absolute;
    top:6px;
    left:14px;
    width:177px;
    height: 105px;
  }
  .login_img{
    position:relative;
    top:10px;
    float:right;
  }
</style>
```

Figure 4.16: Example of CSS used

4.4 Implementation of Jakob Nielsen's Rules

There were seven rules of Jakob Nielsen have been implement in KSUP. Following subparagraphs will discuss about the design of KSUP that match with the chosen rules.

4.4.1 Match between system and the real world

In the quick directory as shown in Figure 4.17, there are icons that are used to link main page to another page. The icon is representing using appropriate picture. For example, human icon will link to user profile. Besides, the language used is also simple. Profile, inbox, forum and dashboard is a very simple name but meaningful. User can understand that 'profile' term is used for viewing user profile, 'inbox' for checking any message and so forth. This characteristic shows that the words, phrases and concepts are familiar to the user in daily life.

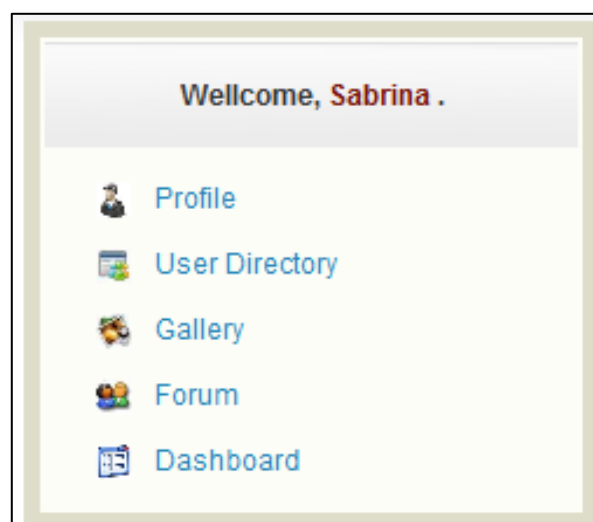


Figure 4.17: Quick directory

4.4.2 Consistency and standards

Consistency and standards in a web design is the idea of same objects will look and act in a similar ways even in different pages. In fact, it also will be not harder for user to see the pattern or how the website work. To help user easily use KSUP especially for the first time user, consistency and standards should be applied in layout and design. Layout is the structure of the website. Therefore, consistency in layout and design of KSUP will include where the text content, navigation, images and so forth. Besides, it also involves the usage of fonts and colors. Figure 4.18 and Figure 4.19 will show how the consistency and standard in layout and design are applied.

Let's make a comparison between these two figures. Figure 4.18 will represent the Home page. Meanwhile Figure 4.19 will represent the Bulletin page. Both figures have left side menu which contain menu boxes. Here the consistency was applied. Assume user now at Home page and user will clicks a link that connecting to another page which is Bulletin page. The element positions, colors and texts inside each menu box would not change. Hence, make user recognized that the connecting page is similar to the previous one. If failing to do so, user will get confused and hard to find information inside the page. The same thing also applied in how the developer defined the content in the portal. Content in each page in KSUP is placed exactly at the right side which is next to left side menu. Besides, the content's font type, font size, color and spacing are also consistent. As shown in Figure 4.18 and Figure 4.19, the font type used is Arial and the size is 12px. The consistency will help to prevent user getting tiring to read the content.

Welcome To Kor SUKISIS UMP Portal

Username

Password

Category

Announcement

- [LATHAN RENANG](#)
- [PERHATIAN !!!](#)
- [PHOTOSTATE AKAUN BANK](#)
- [LATHAN MINGGU INI \(30/5/2012\)](#)

Recent Post

- [TESTING ARTICLE](#)

Kor SUKISIS Universiti Malaysia Pahang

SUKISIS ialah singkatan kepada nama Sukarelawan Polis Siswa dan Siswi. Kor ini ditubuhkan sebagai pilihan kepada aktiviti kokurikulum universiti. Penubuhannya adalah merupakan salah satu daripada program negara melalui Polis Diraja Malaysia yang berperanan untuk melatih bakal-bakal pegawai dari Institusi Pengajian Tinggi (IPT) tentang ilmu kepolisan. Dari segi perundangan, penubuhan Kor SUKISIS adalah mengikut Akta Polis 1967, kuasa-kuasa penubuhan Kor Kadet Polis (Bhg. XI) dan Pasukan Sukarelawan Polis, PVR (Bhg. VIII). Kor SUKISIS adalah di bawah kelolaan Pusat Kokurikulum universiti. Dengan adanya Kor SUKISIS, ianya menjadi satu landasan bagi mewujudkan satu barisan sukarelawan polis simpanan yang sentiasa bersedia untuk digembelngkan bagi menyahut sebarang negara apabila diperlukan. Penubuhan Kor SUKISIS adalah berlandaskan kesedaran dan kepercayaan bahawa IPT-IPT dalam negara ini mempunyai potensi besar bagi sumber tenaga manusia yang berkelulusan tinggi dan boleh memberi sumbangan yang dinamik, patriotik dan "multi-skilled" terhadap keperluan negara. Kepercayaan bahawa dengan kelulusan akademik yang ada, mahasiswa & mahasiswi ini boleh dijadikan sukarelawan polis yang dinamik dan berdedikasi. Berdasarkan kepada kesanggupan mahasiswa & mahasiswi untuk menceburkan diri dalam aktiviti kepolisan selepas tamat pengajian. Program latihan kepada mahasiswa & mahasiswi selain daripada melengkapkan diri sebagai sukarelawan polis, ianya juga dapat membantu IPT dan negara dalam membentuk warganegara yang mempunyai sahsiah yang sempurna, berdisiplin dan mempunyai ketahanan diri yang unggul.

Misi:
Kokurikulum SUKISIS UMP adalah bertujuan untuk melatih para mahasiswa & mahasiswi di dalam ilmu kepolisan dan seterusnya dapat menyumbang tenaga dan bakti kepada negara melalui Pasukan Sukarelawan Polis.

Produk:

- Mahasiswa & mahasiswi yang menyertai KOR Suksis akan ditauliahkan sebagai seorang Inspektor Sukarelawan Polis setelah berjaya menamatkan kursus selama 6 semester.
- Program ini menyumbang kepada 6 jam kredit yang diperlukan untuk berijazah.
- Akan diberi keutamaan jika ingin menyertai PDRM setelah memperolehi ijazah. (menjalani latihan sebagai pegawai polis berpangkat Inpektor)

Figure 4.18: Home page

Left Side Menu

Content

Welcome To Kor SUKISIS UMP Portal

Username

Password

Category

Announcement

- [LATHAN RENANG](#)
- [PERHATIAN !!!](#)
- [PHOTOSTATE AKAUN BANK](#)
- [LATHAN MINGGU INI \(30/5/2012\)](#)

Recent Post

- [TESTING ARTICLE](#)

Kor SUKISIS Bulletin

Testing Article
by Mira

Hati manusia adalah sesuatu yang sangat misteri. Oh saya tidak bercakap tentang seketul hati yang anda boleh lihat menerusi imbasan X-Ray atau skan CT itu, bukan. Tapi seketul hati ghaib yang hanya Allah sahaja tahu rupa dan kedudukannya yang sebenar. Mengapa misteri? Kerana hanya diri sendiri dan Allah sahaja yang tahu apa isi hati kita; bilamana kita berbicara, ketika hati kita menangis hiba, tatkala hati kita tertawa gembira.. Ia adalah suatu misteri yang hanya kita dan Allah sahaja [\[readmore\]](#)

Date/Time: 2012-05-24 16:00:33

Ayat Dalam Hati Ada Taman
by Mimi

Hati manusia adalah sesuatu yang sangat misteri. Oh saya tidak bercakap tentang seketul hati yang anda boleh lihat menerusi imbasan X-Ray atau skan CT itu, bukan. Tapi seketul hati ghaib yang hanya Allah sahaja tahu rupa dan kedudukannya yang sebenar. Mengapa misteri? Kerana hanya diri sendiri dan Allah sahaja yang tahu apa isi hati kita; bilamana kita berbicara, ketika hati kita menangis hiba, tatkala hati kita tertawa gembira.. Ia adalah suatu misteri yang hanya kita dan Allah sahaja yang [\[readmore\]](#)

Date/Time: 2012-05-23 14:00:00

Sebuah Senjan

Figure 4.19: Bulletin page

On top of that, as shown in Figure 4.20, post summary with ‘readmore’ function (a link that will link user from summary to the whole article) and pagination are used in order to have a consistent look in bulletin page. With ‘readmore’ function, only the summary of the article would be displayed on the bulletin page and user have to click ‘readmore’ to read the whole article. Meanwhile, pagination is used to prevent user from keep scrolling down the page since it can limit how many articles should be display at the bulletin page.

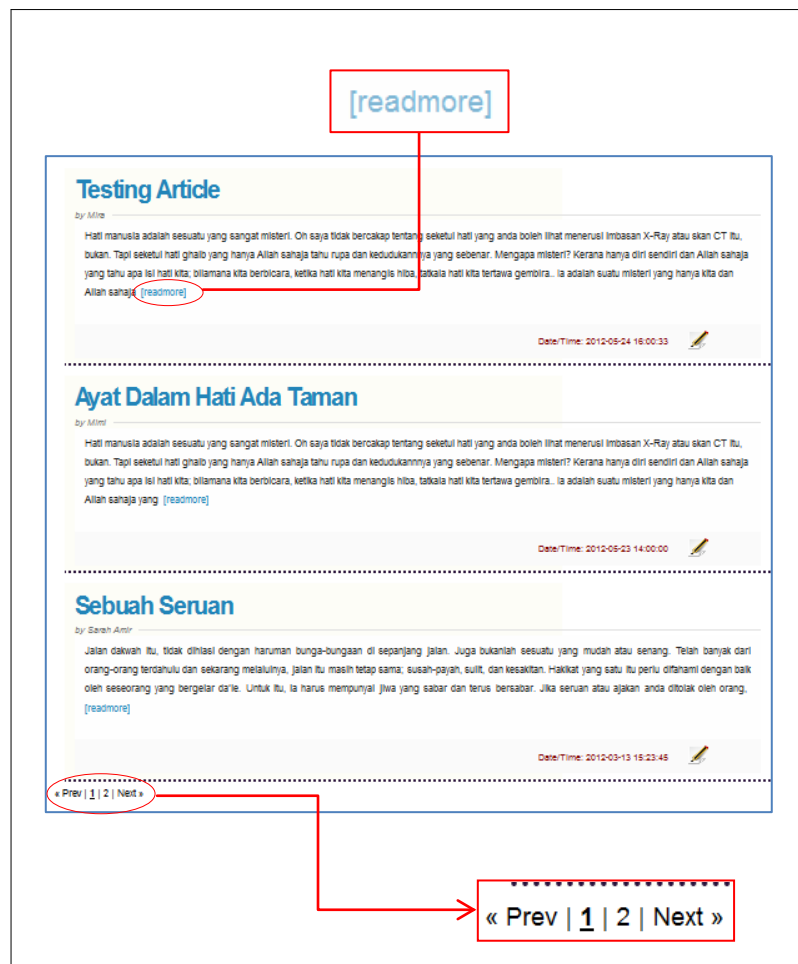


Figure 4.20: ‘Readmore’ function in Bulletin page

In addition, it is important to standardize style in every page, the style including for a table as shown in Figure 4.21 and Figure 4.22. Color used for the table header in Figure 4.21 is blue meanwhile font color is white same like table in Figure 4.22. The

same icon ('x' button) also is used for delete function. With consistent look and feel, users will easy to get used with the environment.

Edit	View	Title	Author	Date/Time	Delete
Edit	View	When Dirty Become Disgusting	Nurul Lisa Surihani Bt Aiman	2012-06-01 16:03:04	
Edit	View	Kenapa Tak Ramai Ikhwah Yang Hensem?	Sabrina Mira Bt Ali	2012-05-31 17:57:00	
Edit	View	Ada Apa Dengan Angka 200?	Sabrina Mira Bt Ali	2012-05-30 15:52:10	
Edit	View	Testing Article	Mira	2012-05-24 16:00:33	
Edit	View	Ayat Dalam Hati Ada Taman	Mimi	2012-05-23 14:00:00	
Edit	View	Sebuah Seruan	Sarah Amir	2012-03-13 15:23:45	

Figure 4.21: Table in bulletin page

Thread	Views	Replies	Date/Time	Delete
Penjual Rabbt dikehendaki segera!!!	25	1	03/05/12 07:19:10	
Hari Pentauliahan	81	3	01/05/12 09:05:12	
Create New Topic				

Figure 4.22: Table in forum page

4.4.3 User control and freedom

As we discuss in previous chapter which is in Literature Review, navigation is one of the most critical aspects of Web site design. Well design navigation will make the user easy to find the home page again after go to another page. It will also help user to easily and quickly do their task. Figure 4.23 show main menu for gallery page. As we can see, the color for gallery tab is lighter than other tab and this will help user to indicate their current location.

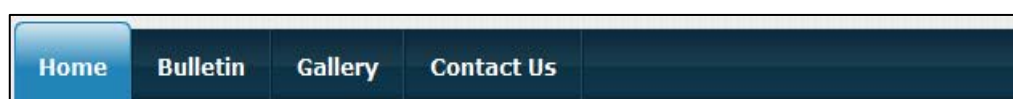


Figure 4.23: Main menu in Home page

On top of that, no lower navigation bar means no freedom for user. Therefore, KSUP is provided with lower navigation bar as shown in Figure 4.24 which is near the footer. When user reaches the footer, they can use the navigation to go to another page without scrolling up.



Figure 4.24: Lower navigation bar

4.4.4 Visibility of system status

Visibility of system status means KSUP will always keep users informed about what is going on, through appropriate feedback within reasonable time. For example, as shown in Figure 4.25 when user click button 'publish' (when update an article in bulletin) there will be a popup message to inform user that the task was complete. This action will keep user know about the current situation and always clear on what is happening on the site.

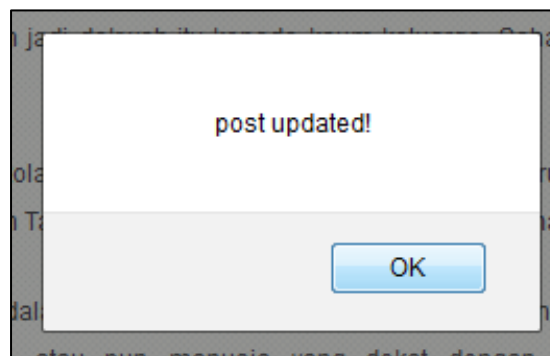


Figure 4.25: Popup message

Another example of visibility of system status in KSUP is as shown in Figure 4.26. A notification "picture successfully added!" will appear after user upload photo. The objective of this notification is the same as in the popup message as shown in Figure

4.25. If KSUP is not provided with this kind of notification, user will not feel confident when using the application. Are the picture is successfully uploaded or not and do they need to upload once again? But, with notification user have not to worry about the process has been success or not. This shows that how important the visibility of system status in KSUP design.



Figure 4.26: Upload Picture

4.4.5 Error prevention

A good error messages can help user to prevent problem from occurring in the first place. What will happen if there is no error message in a system? Especially in a process that cannot restore previous action especially when user to delete data. To prevent this problem occurring in KSUP, a popup message that acts as a confirmation option before user commit to the action is provided. This task is shown in Figure 4.27 below. User have to click 'OK' if want to proceed, and 'Cancel' to cancel the operation.

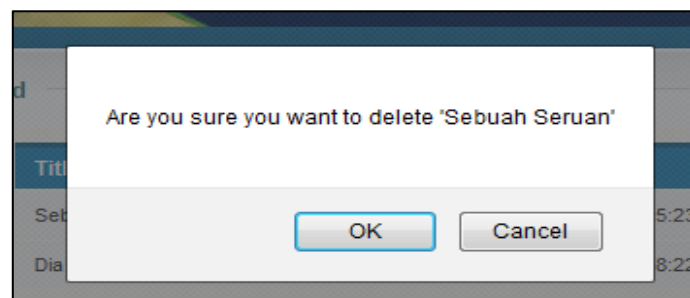


Figure 4.27: Popup message for delete function

Another application that can help user from making any error is the date input calendar. The date we try to insert will be not saved in database if we inserting the wrong date's format. To prevent this problem from occurring, a date input calendar as shown in Figure 4.28 is attached next to the text field in KSUP design.

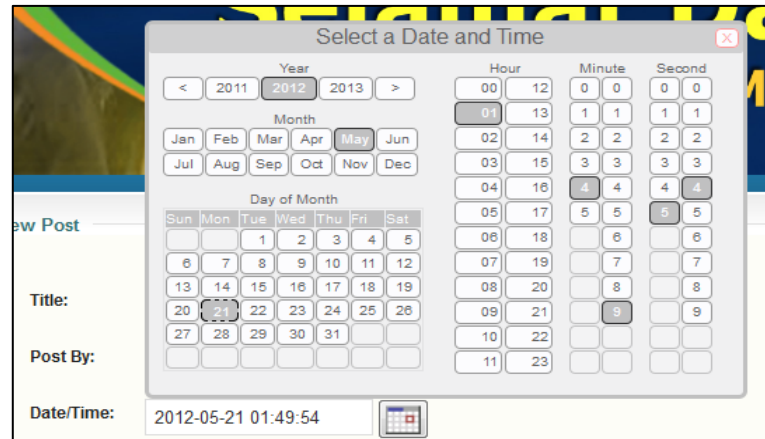


Figure 4.28: Date input calendar

4.4.6 Help users recognize, diagnose, and recover from errors

Even rule of error prevention is applied in the design of KSUP. It does not mean that user is always free from error. For example when user try to submit an incomplete form, do not just say they missed a field, but notify them which field they are missed. Figure 4.29 shows that when user not entering his or her first name, an error message highlighted with red color is appear next to the first name text field. This will help user to quickly solve the problem.

IC No	:	<input type="text" value="900011999283"/>	
			<i>e.g 987654321234</i>
First Name	:	<input type="text"/>	*This field is required
Middle Name	:	<input type="text" value="Mira"/>	

Figure 4.29: Validation for required field

Another example is form fields that have a maximum character length. As we can see in Figure 4.30 and Figure 4.31, a message “Please enter no more than 12 characters” is appear when user enters incorrect number of characters in the IC field and a message “Please enter only digits” when user enters incorrect type of character.

Password	:	<input type="text" value="deds"/>	
IC No	:	<input type="text" value="90001199928323123213"/>	Please enter no more than 12 characters. e.g 987654321234
First Name	:	<input type="text" value="Farah"/>	

Figure 4.30: Validation for character length

Password	:	<input type="text" value="deds"/>	
IC No	:	<input type="text" value="900011999cd"/>	Please enter only digits. e.g 987654321234
First Name	:	<input type="text" value="Farah"/>	

Figure 4.31: Validation for type of character

There is also validation for a select statement. For a select statement validation, the box is highlighted with red color and a message “Please select an item” is appeared as shown in Figure 4.32.

Postcode	:	<input type="text" value="27672"/>	
State	:	<input style="background-color: #f08080;" type="text" value="Please Select."/>	Please select an item.
Tel. No (H)	:	<input type="text" value="0199992837"/>	e.g 001234567

Figure 4.32: Validation for select statement

4.4.7 Aesthetic and Minimalist Design

In web design, aesthetic and minimalist design means visual layout should respect the principles of contrast, repetition, alignment, and proximity. For example, as we can see in Figure 4.33, the color of the portal's banner is dark blue meanwhile font color is yellow. Different contrast of color is applied in this banner. In addition, lighter color is used as the banner text is a good decision to be made since it can prevent the text banner look dim. On top of that, there are only four colors uses in KSUP. The colors are dark blue, light blue, grey and light brown. Too much color in a portal will make it harder for users to find the information they want. Besides, too much color using in web design also more tires to user's eyes.



Figure 4.33: Kor SUKISIS UMP Portal

Another principle is repetition in web design. Repetition can make the portal look more consistent and attractive. This principle is achieved by repeating the element of header and footer in KSUP, as shown in Figure 4.34.



Figure 4.34: Kor SUKSISS UMP Portal

Next is the principle of alignment. As we can see in Figure 4.35 the alignments of all texts, sufficient padding and spacing keep the table look consistent. Meanwhile, for header and column it uses different colors in order to indicate the header is distinct from the content. If failing to do so, user will get confuse with the content and hard for them to search information. Let’s imagine what will happen when color for header is the same as the content. User might think that word in the header is one of the data shows in the table. Besides, user also cannot identify what the column represents for.

Edit	View	Title	Author	Date/Time	Delete
Edit	View	When Dirty Become Disgusting	Nurul Lisa Surihani Bt Aiman	2012-06-01 16:03:04	✖
Edit	View	Kenapa Tak Ramai Ikhwah Yang Hensem?	Sabrina Mira Bt Ali	2012-05-31 17:57:00	✖
Edit	View	Ada Apa Dengan Angka 2007?	Sabrina Mira Bt Ali	2012-05-30 15:52:10	✖
Edit	View	Testing Article	Mira	2012-05-24 16:00:33	✖

Figure 4.35: Table in bulletin page

4.5 Implementation of usability test

As has been mentioned in Chapter 3 (Methodology), usability test will be conducted on KSUP prototype just after the heuristic evaluation. Usability test is used to ensure the system has met the user requirement. In the implementation of usability test, the prototype of KSUP is tested by 25 respondents which are the instructor and member of Kor SUKISIS UMP. After test the prototype of KSUP, respondents have been asked to answer a questionnaire. Each respondent have to answer twelve questions using the following rating style.

- 4: Strongly agree
- 3: Agree
- 2: Disagree
- 1: Strongly disagree

. These twelve questions are used to measure the usability of the portal since it is constructed based on chosen Jakob Nielsen's rules. Refer Appendix C for the sample of the questionnaire used during the usability test. Result from the usability test can help developer to identify whether the user can understand the navigation system or not.

The result of usability testing is then analyzed by grouping each question by its usability characteristics which are the chosen Jakob Nielsen's rules. Then, each question's result is represented using a pie chart. From the pie chart, developer can easily identified which question responders do not agree with. The higher the percentage of respondent disagrees with the question, and the higher the usability problem is. This is because, questionnaire used during the usability test is constructed based on heuristic rules which can be used by developer to measure which rules has been violated in KSUP. After identified the usability problem in KSUP, a solution is suggested.

CHAPTER 5

RESULT AND DISCUSSION

5.1 Introduction

This chapter will elaborate more on the findings gathered in this project which is about analysis that has been done during usability testing, the project constraint and future enhancement of the system.

5.2 Usability Testing On KSUP

As mention in previous chapter (Chapter 3: Methodology), a usability test must be conducted before KSUP being delivered to the end user. Usability test on prototype KSUP was participated by the instructor and member of Kor SUKISIS UMP as well as people which are not from the organization. Usability test on KSUP was done in two different situations. For the staff, the usability has been conducted at their office meanwhile the rest doing the usability test at home. After test the prototype, user has to evaluate KSUP using the evaluation form given (Appendix C). The rating style used is as following:

4: Strongly agree

3: Agree

2: Disagree

1: Strongly disagree

There are twelve questions that have been answered by user in order to evaluate KSUP. Table 5.1 shows all twelve questions categorized by Jakob Nielsen's rules:

Table 5.1: Web usability Questionnaires

Jakob Nielsen's Rules	No.	Question
Visibility of system status	1	The portal always kept me informed about what was going on through appropriate feedback. (e.g. validation form, alert box)
	2	Navigation buttons and bars are easy to understand and use.
Match between system and the real world	3	The language (word, phrase and concepts) used in the portal is easy to understand.
	4	Appropriate image used for icons help me process information more efficiently.
User control and freedom	5	Colors uses in all pages (e.g. font color, layout) are consistent and I can find any information in the portal easily.
Help user recognize, diagnose and recover from errors	6	Actions taken can be undoing or cancel and easily corrected.
	7	The error messaged describes what action is necessary to fix the problem.
Error prevention	8	Error messages occur only when necessary.
	9	The error messages were displayed in a plain and understandable language.
Consistency and standard	10	Navigation is consistent throughout web site.
	11	Content in the portal are readable and use standard font type and size.
Aesthetic and minimalist design	12	The portal banner looks attractive since it uses different contrast of color.

Following paragraphs are the analysis and result from the testing:

5.2.1 Visibility of system status

Figure 5.1 is one of the functions in KSUP that match with Question 1. Figure 5.1 shows an alert box that will keep user know about the current situation and always clear on what is happening on the site.

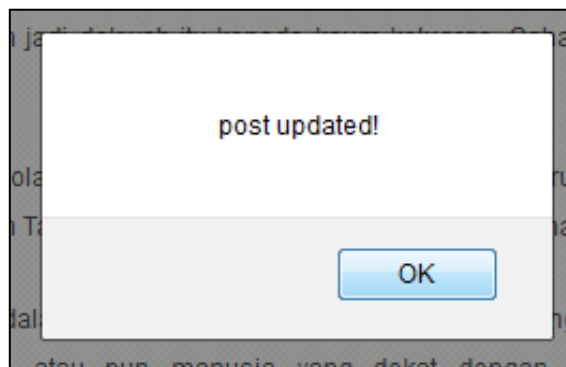


Figure 5.1: Popup message

Meanwhile, Figure 5.2 shows the design of menu tab used in KSUP that match with Question 2. Each button will direct user to its own page. Besides, the design and color used is simple. It makes user easy to use it even for the first time user.

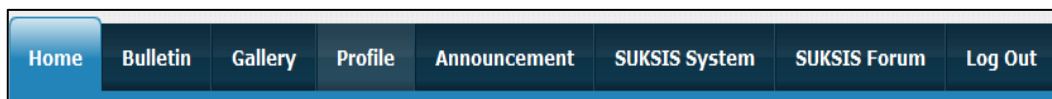


Figure 5.2: Menu tab in KSUP

- i. Question 1: The portal always kept me informed about what was going on through appropriate feedback. (e.g. validation form, alert box)

According to the pie chart shows in Figure 5.3, 52% of the respondents agree that KSUP always kept them informed about what was going on through appropriate feedback. Meanwhile, only 48% are strongly agreed.

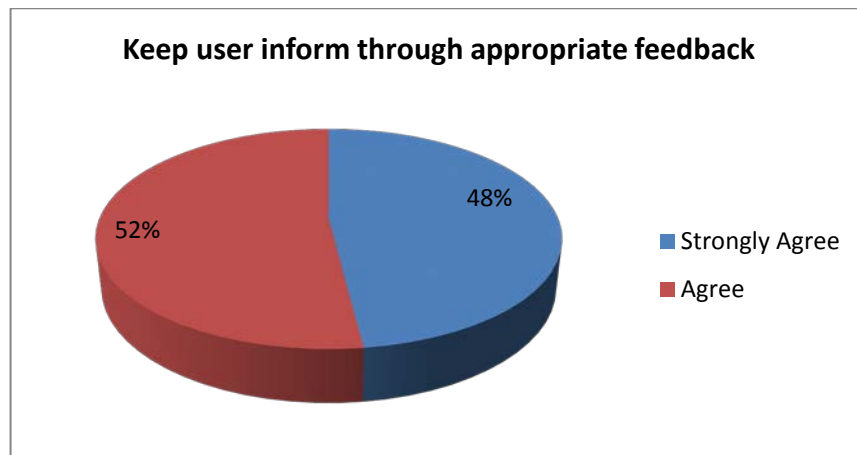


Figure 5.3: Keep user inform through appropriate feedback

- ii. Question 2: Navigation buttons and bars are easy to understand and use

According to the pie chart shows in Figure 5.4, 60% respondents strongly agree that navigation buttons and bars in KSUP are easy to understand and use. Meanwhile, only 32% respondents agreed and 8% disagree.

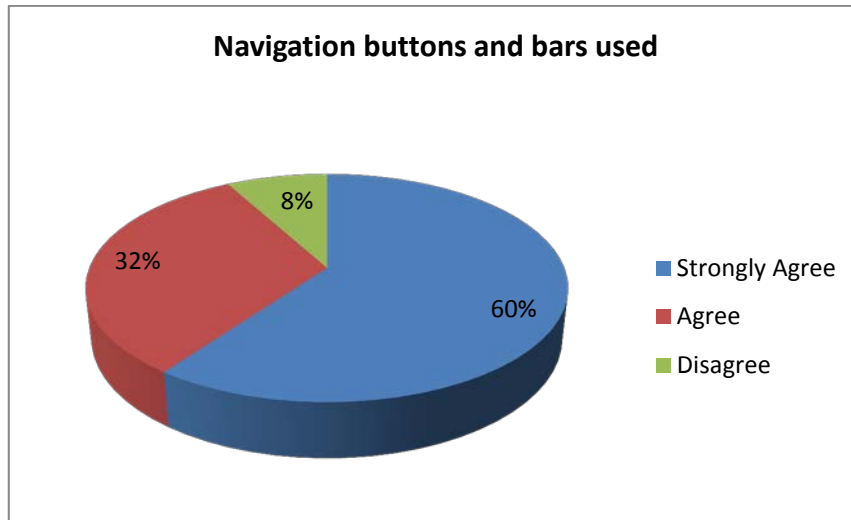


Figure 5.4: Navigation buttons and bars used

5.2.2 Match between system and the real world

Figure 5.5 shows icons that are used to link main page to another page that match both Question 3 and 4. The icon is representing using appropriate picture and with a simple language but meaningful.



Figure 5.5: Quick directory

- i. Question 3: The language (word, phrase and concepts) used in the portal is easy to understand.

According to the pie chart shows in Figure 5.6, 48% of respondents strongly agree that the language used in KSUP is easy to understand. Meanwhile, only 48% respondents agree. Majority agreed with the statement.

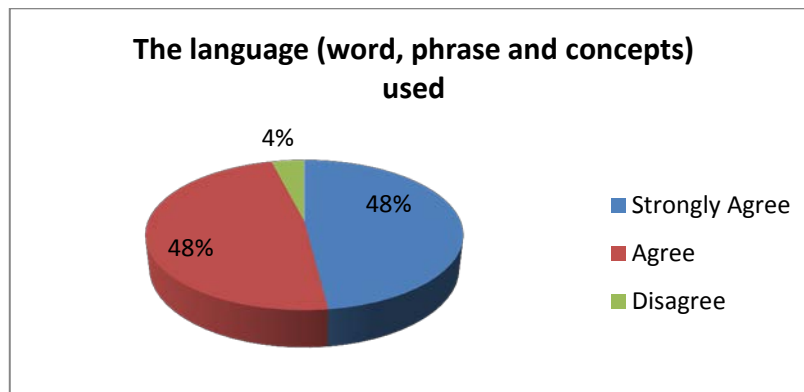


Figure 5.6: The language (word, phrase and concepts) used

- ii. Question 4: Appropriate image used for icons help me process information more efficiently.

According to the pie chart shows in Figure 5.7, 56% of respondents are strongly agree the image used for icons help process information more efficiently. Meanwhile, 44% respondents only agree. Majority agreed with the statement.

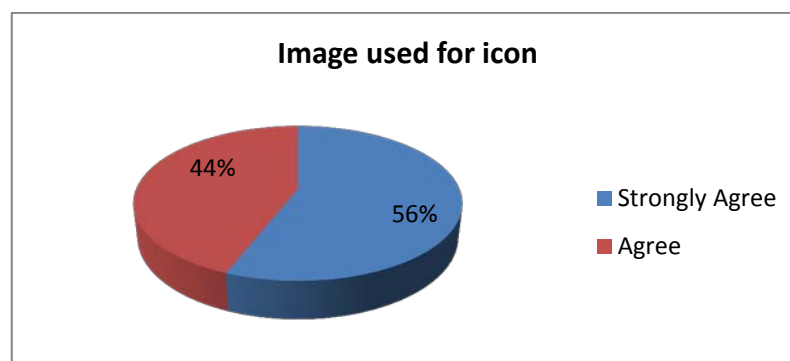


Figure 5.7: Image used for icon

5.2.3 User control and freedom

Navigation is one of the most critical aspects in KSUP design. As they navigate KSUP, it is crucial for them to feel in control. Well design navigation will make the user easy to find the home page again after go to another page. It will also help user to easily and quickly do their task. Figure 5.8 show main menu for gallery page. As we can see, the color for gallery tab is lighter than other tab and this will help user to indicate their current location. Besides, main part of the portal (Bulletin, Gallery and Contact Us) is placed along with the Home tab. As a consequence, user can easily reach to another page to find information in the portal.

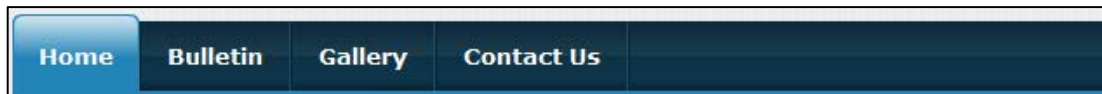


Figure 5.8: Home page

- i. Question 5: Colors use in all pages (e.g font color, layout) are consistent and I can find any information in the portal easily

According to the pie chart shows in Figure 5.22, 56% of the respondents agree that color use in all pages is consistent and they can find information in the portal easily. Meanwhile, 36% strongly agree and 8% disagree. This result shows that majority agreed with the statement.

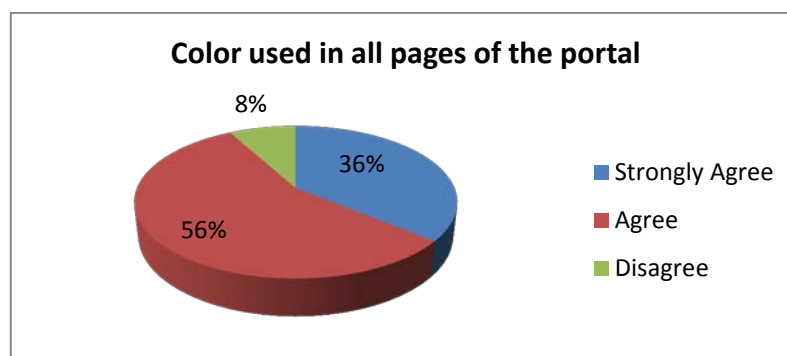


Figure 5.9: Color used in all pages of the portal

5.2.4 Help users recognize, diagnose and recover from errors

Example of function that matches with Question 6 is as shown in Figure 5.10 which shows that user can cancel an operation and help them to recover from error.

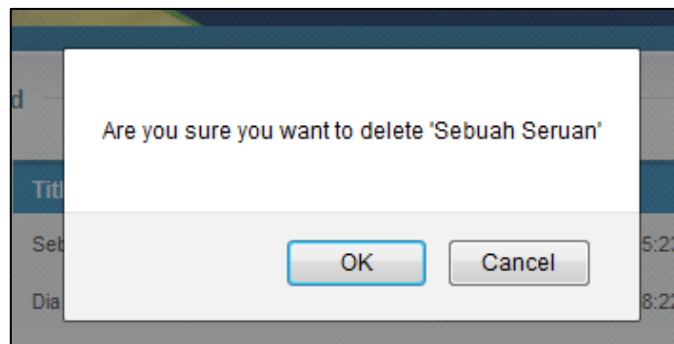


Figure 5.10: Popup message

Meanwhile, Figure 5.11 shows a function that matches Question 7. The error message describes what user has to do in order to recover from errors.

IC No	:	<input type="text" value="900011999283"/>	
			<i>e.g 987654321234</i>
First Name	:	<input type="text"/>	*This field is required
Middle Name	:	<input type="text" value="Mira"/>	

Figure 5.11: Validation for required field

- i. Question 6: Actions taken can be undo or cancel and easily corrected

According to the pie chart shows in Figure 5.15, 48% of respondents strongly agree actions taken can be undoing or cancel and easily corrected in KSUP. Meanwhile, 40% only agree, and 12% disagree.

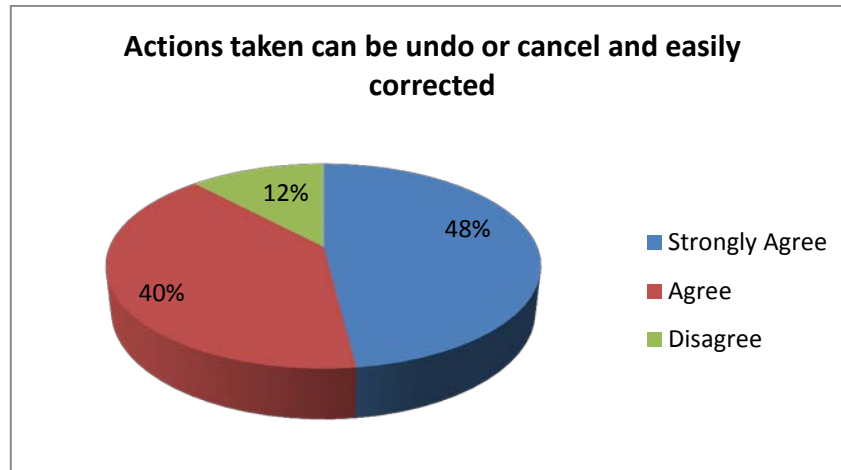


Figure 5.12: Actions taken can be undo or cancel and easily corrected

- ii. Question 7: The error messaged describes what action is necessary to fix the problem.

According to the pie chart shows in Figure 5.13, 56% of the respondents strongly agree that the error messaged in KSUP always describe what action is necessary to fix the problem. Meanwhile, 44% are only agreeing. This result shows that majority agreed with the statement.

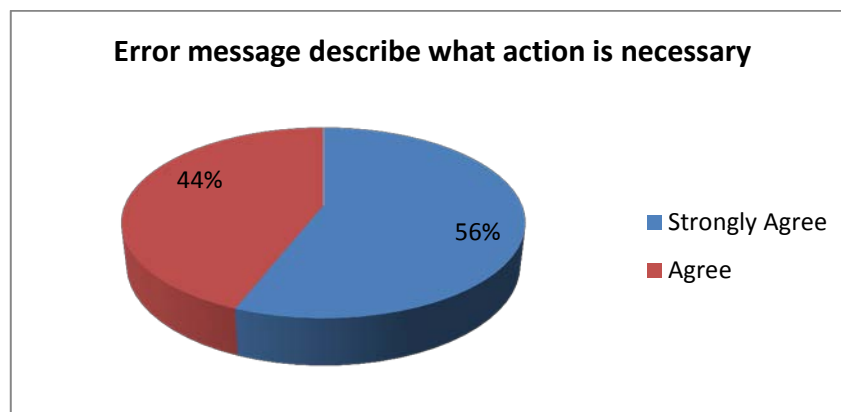


Figure 5.13: Error message describe what action is necessary

5.2.5 Error prevention

Figure 5.14 shows a function that matches both Question 8 and 9. The error message occurs only when user fill wrong input and messages were displayed in a plain and understandable language.

Password	:	<input type="text" value="dedS"/>	
IC No	:	<input type="text" value="900011999cd"/>	Please enter only digits. <i>e.g 987654321234</i>
First Name	:	<input type="text" value="Farah"/>	

5.14: Validation for type of character

- i. Question 8: Error messages occur only when necessary.

According to the pie chart shows in Figure 5.15, 56% of the respondents are agreeing with the statement. Meanwhile, 44% are strongly agreed. This result shows that, all respondents agreed with the statement.

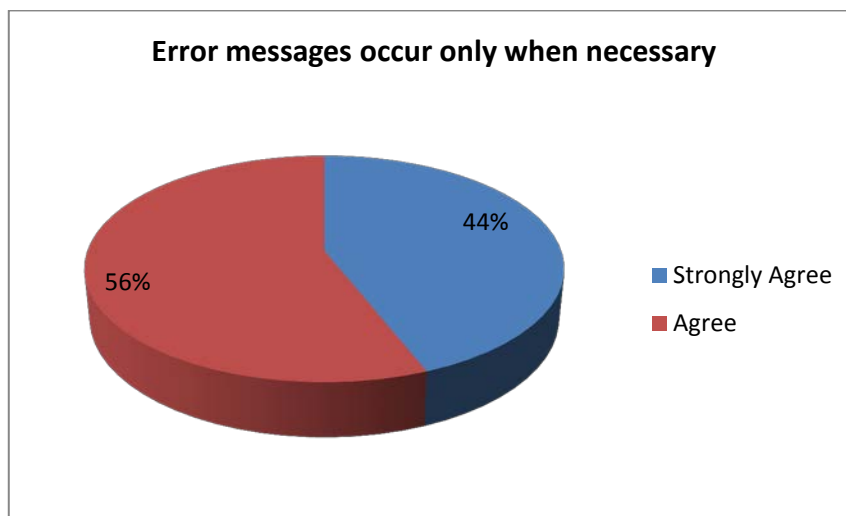


Figure 5.15: Error messages occur only when necessary

- ii. Question 9: The error messages were displayed in a plain and understandable language

According to the pie chart as shows in Figure 5.16, 52% of the respondents strongly agree the error messages in KSUP were displayed in a plain and understandable language. Meanwhile, 48% are only agreed.

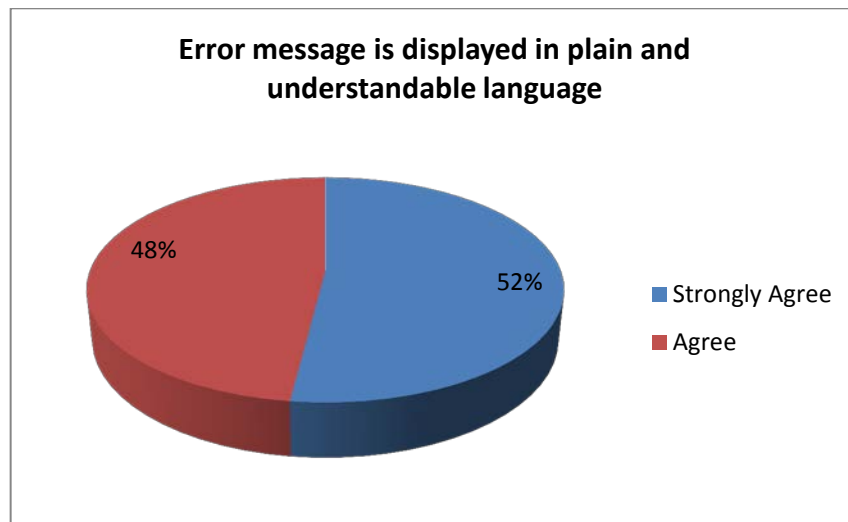
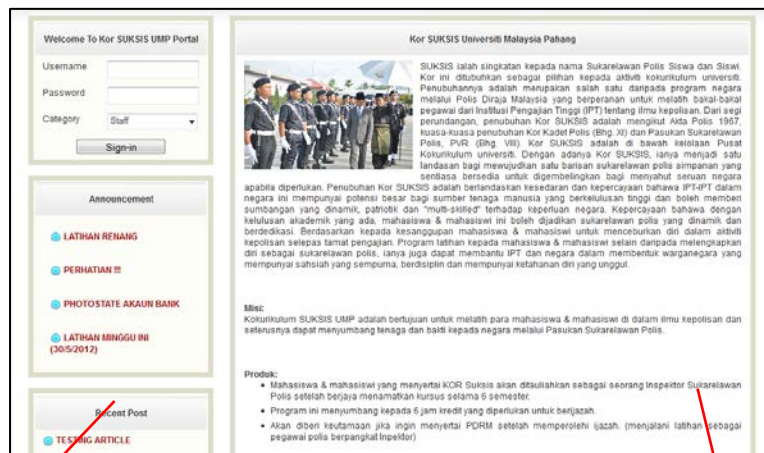


Figure 5.16: Error message is displayed in plain and understandable language

5.2.6 Consistency and standards

Figure 5.17 and Figure 5.18 shows where the consistency was applied. The element positions, colors and texts inside each menu box in both figures were not change. Hence, make user recognized that the connecting page is similar to the previous one. If failing to do so, user will get confused and hard to find information inside the page. The same thing also applied in how the developer defined the content in the portal. Content in each page in KSUP is placed exactly at the right side which is next to left side menu. Besides, the content's font type, font size, color and spacing are also consistent. The consistency will help to prevent user getting tiring to read the content.



Left Side Menu

Figure 5.17: Home page

Content

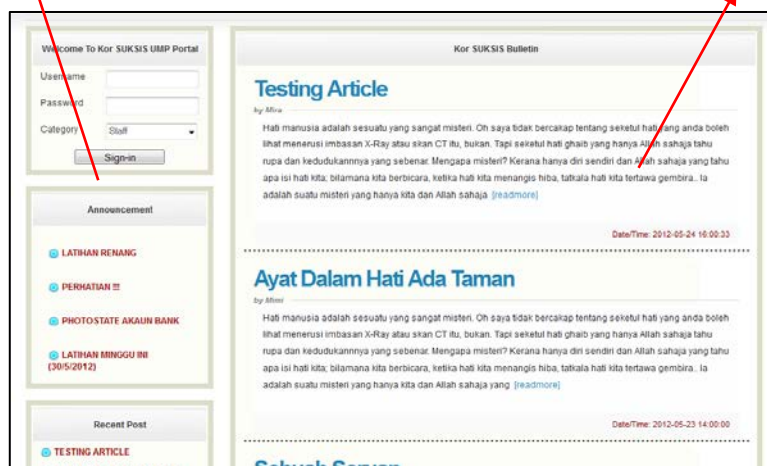


Figure 5.18: Bulletin page

These figures show that KSUP always applied the rules of consistency and standard which match with the Question 10 and 11.

i. Question 10: Navigation is consistent throughout website

According to the pie chart shows in Figure 5.19, 60% of respondents agree the navigation is consistent throughout website. Meanwhile, 32% strongly agree and only 8% disagree with the statement.

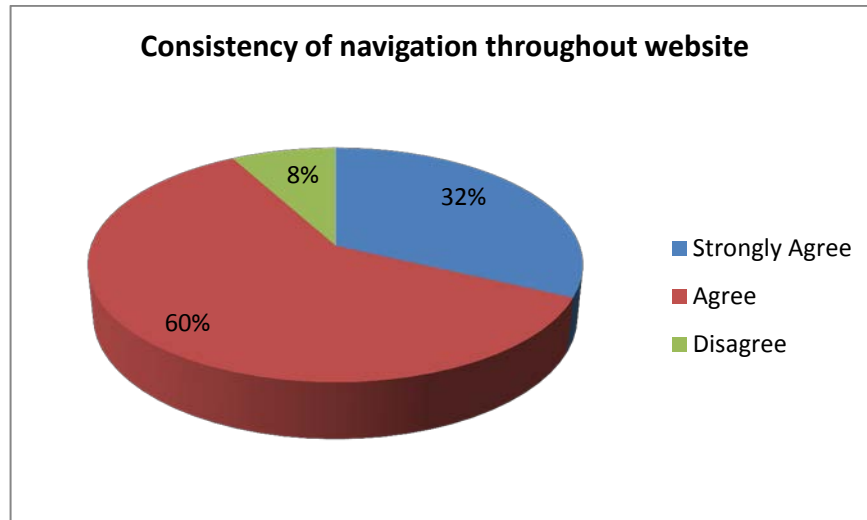


Figure 5.19: Consistency of navigation throughout website

- ii. Question 11: Content in the portal are readable and use standard font type and size

According to the pie chart shows in Figure 5.20, 52% of the respondents agree that the content in KSUP are readable and the use standard font type and size. Meanwhile, 40% strongly agreed and only 8% disagree with the statement.

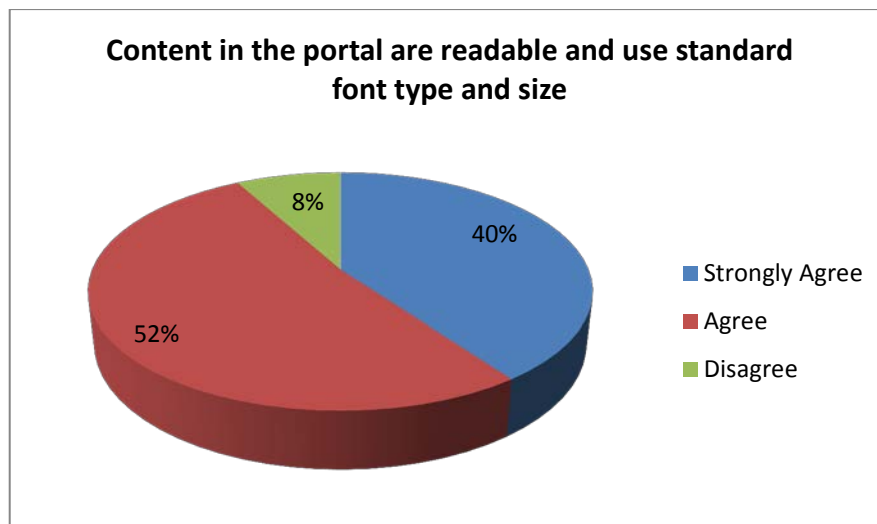


Figure 5.20: Content in the portal are readable and use standard font type and size

5.2.7 Aesthetic and minimalist design

Figure 5.21 shows the banner of KSUP. The color of the portal's banner is dark blue meanwhile font color is yellow. Different contrast of color is applied in this banner. Lighter color is used as the banner text is a good decision to be made since it can prevent the text banner look dim



Figure 5.21: KSUP Banner

- i. Question 12: The portal banner look attractive since it use different contrast of color

According to the pie chart shows in Figure 5.22, 40% of the respondents agree that the portal banner look attractive since it use different contrast of color. Meanwhile, 36% of respondents strongly agree and only 8% answered they disagreed.

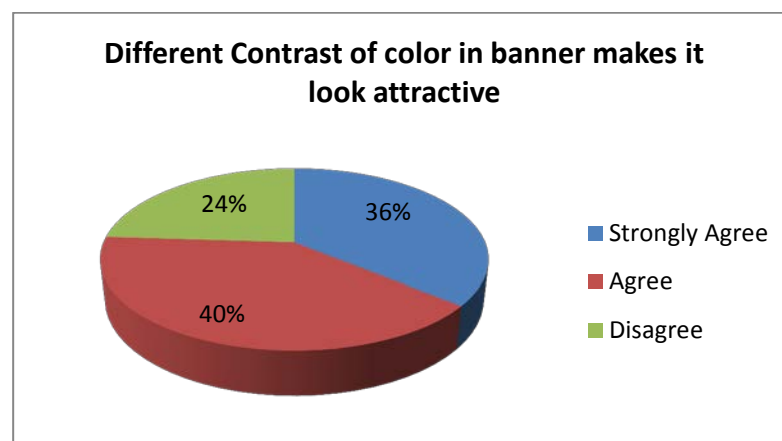


Figure 5.22: Different Contrast of color in banner makes it look attractive

5.3 Summary of result

Usability test have identified significant percentage of the usability problem in KSUP. Figure 5.23 shows a bar chart entitled usability problem rating score by heuristic. The bar chart is representing the overall result of the research project, where x-axis represents the heuristic (the twelve questions used during the usability test). Those questions are categorized to which Jakob Nielsen's rules were violated. Meanwhile, y-axis represents the percentage of usability problem which represented by the line of severity and the bar chat is representing four answer choices answer by respondents. The percentage of severity is concluded based on the percentage of respondents who are not disagreeing with the question asked. The higher the percentage of respondent disagrees with the question, and the higher the usability problem is. This is because, questionnaire used during the usability test is constructed based on heuristic rules which can be used by developer to measure which rules has been violated in KSUP.

From the bar chart shown in Figure 5.23, most violations were due to the rules of aesthetic and minimalist design (percentage of severity =24%), followed by the rules of help users recognize, diagnose, and recover from errors (percentage of severity =12%). Meanwhile, the rules of visibility of system status; user control and freedom; and consistency and standard have percentage of severity 8%.

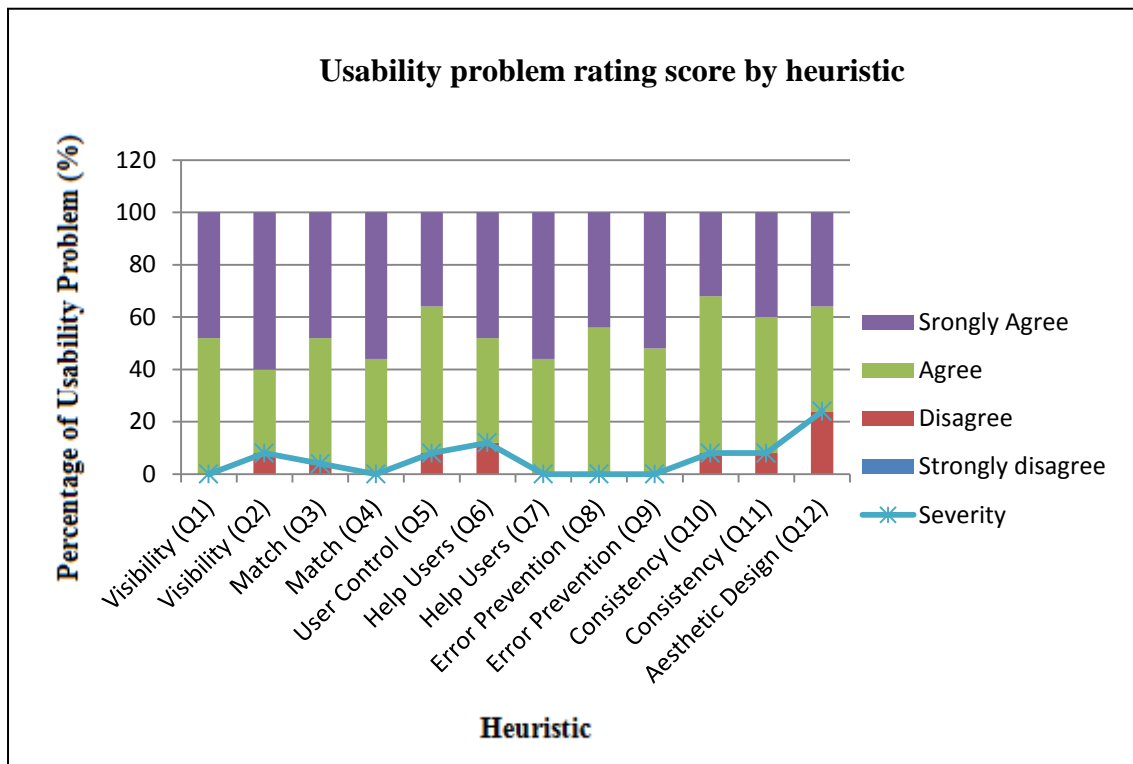


Figure 5.23: Usability problem rating score by heuristic

The following examples will describe the problem faced by respondent during the test, which heuristics are violated, and the corresponding design solutions that will be made to fix the problem.

- i. Q12: the portal banner look attractive since it use different contrast of color

Percentage of respondent disagrees: 24%

Heuristic violated: Aesthetic and minimalist design

Design solutions: Redesign the banner especially the pictures displayed in the banner. Developer have to ensure that the pictures used are relevant to the services that the portal offering.

- ii. Q6: actions taken can be undo or cancel and easily corrected

Percentage of respondent disagrees: 12%

Heuristic violated: Help users recognize, diagnose and recover from errors

Design solutions: The error message was re-set up to be more precise (avoid from using too general error message such as 'syntax error') and constructive advice on how to fix the problem.

- iii. Q2: Navigation buttons and bars easy to understand and use

Percentage of respondent disagrees: 8%

Heuristic violated: Visibility of system status

Design solutions: Text and design in buttons were customized. Simple text is used and consistent look is applied so that user can easily understand which button they have to click to go to another page.

- iv. Q5: Colors use in all pages (e.g. font color, layout) are consistent and I can find any information in the portal easily

Percentage of respondent disagrees: 8%

Heuristic violated: Match between system and the real world

Design solutions: Text and design in buttons were customized. Simple text is used and consistent look is applied so that user can easily understand which button they have to click to go to another page.

- v. Q10: Navigation is consistent throughout website

Percentage of respondent disagrees: 8%

Heuristic violated: Consistency and standard

Design solutions: Buttons were changed to be consistent in font, color and title case. Besides, buttons positions also have to be the same in all pages.

vi. Q11: Content in the portal are readable and use standard font type and size

Percentage of respondent disagrees: 8%

Heuristic violated: Consistency and standard

Design solutions: All text in the portal was changed to be more consistent in font type and size. Font type Arial is used since it is appealing and easy to be read.

5.4 Project Constraint

Project delay is one of the main impacts of project constraint. In order to deliver it on time, developer had to manage their time wisely. In addition, there are two types of project constraints which are development constraint and system constraints. Followings are the development constraints identified in the development of KSUP are as follows:

- Lack of adequate programming skills (PHP and MySQL) which is the most important thing in developing a good system.
- Resources not complete (less communication between developer and stakeholder).
- Time management (some module cannot complete in short time).

Meanwhile, followings are the system constraints identified during usability testing on KSUP:

- KSUP only provided with English language.
- No encrypted password. The log in system in KSUP is created without password being encrypted. When admin log in into system (database) they will see the full word of the password belongs to other user.
- User must have basic knowledge of computing. At least, they have to know how to start the portal and understand certain simple term in the portal. Besides, they also should now how button in the portal will work.

5.5 Future Discussion

There are still weaknesses in KSUP. For example, KSUP is only provided with English language. Most of KSUP user's use Malay language in user's daily conversation. Not all of them are familiar with English language. Therefore, in the future enhancement KSUP should provide dual language which allow user to choose either English language or Malay language. Besides, database KSUP also should be redesign in the future enhancement. This is important in order to ensure all data kept in KSUP are saved and user can retrieve data quickly and efficiently. Besides, login system in KSUP is created without the password being encrypted. When, people log in into database they may see the clear password. In order to prevent people from use other user account without permission, KSUP should implement the encrypt password and this can help to prevent user's account from being hacked.

CHAPTER 6

CONCLUSION

For the conclusion, KSUP was developed to help member and instructor of Kor SUKSIS UMP to manage their organization. Refer Chapter 1 (Introduction) for the problem statement. KSUP was developed based on two techniques. The first technique was by applying Jakob Nielsen's rules on KSUP and then was being tested by usability test. Meanwhile, methodology used for the development process is created based on the two techniques used. By following all phase in the methodology, KSUP has been delivered on time.

On top of that, this project also considered success since KSUP has met all the objectives and scope as state in previous chapter, Chapter 1 (Introduction). The objectives are to develop a prototype of KSUP, to implement Jakob Nielsen's rules in KSUP and to evaluate the prototype with usability test by using evaluation form. Instead of met its objectives, KSUP also has worked around scope where KSUP allow instructor to retrieve member's information or detail quickly and let Kor SUKSIS UMP member getting up to date with SUKSIS program. Even though KSUP has achieved it target, further enhancement may be required in order to improve performance or to adapt the system if there is any changes environment.

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APPENDIX A
Web Usability Questionnaire

Please use this questionnaire to evaluate e-community (UMP Portal). There are two section in this questionnaire; section A and B. Please answer all section.

A. Personal Background

1. Gender:
 - Male
 - Female
2. Faculty :
3. Age:
 - 17-20
 - 20-24
 - 24 and above

B. Questionnaire

1. What interests you in using the web?
 - a. For personal knowledge
 - b. For official purpose
 - c. For official purpose
2. Up to what level are you familiar with working over the net?
 - a. I have the web knowledge till school level
 - b. I have no knowledge in web using
 - c. I am very much accustomed with it
3. Does the web satisfy your purpose?
 - a. It always does
 - b. It never does
 - c. Sometimes yes sometimes no, depends!
4. Are you happy by the way the web is presented to you?
 - a. Yes I am satisfied with the style
 - b. I am not at all satisfied with the style
 - c. There are rooms for improvement

APPENDIX B

Gant Chart

APPENDIX C

Evaluation Form for Usability Test

Please use the following rating style to answer the evaluation form.

Task: _____

4: Strongly agree

3: Agree

2: Disagree

1: Strongly disagree

		1	2	3	4
1	The portal always kept me informed about what was going on through appropriate feedback. (e.g validation form, alert box)				
2	Navigation buttons and bars are easy to understand and use				
3	The language (word, phrase and concepts) used in the portal is easy to understand.				
4	Appropriate image used for icons help me process information more efficiently.				
5	Actions taken can be undo or cancel and easily corrected				
6	The error messages describe what action is necessary to fix the problem.				
7	Content in the portal are readable and use standard font type and size.				
8	Error messages occurs only when necessary.				
9	The error messages were displayed in a plain and understandable language.				
10	Colors use in all pages (e.g font color, layout) are consistent and I can find any information in the portal easily.				
11	Navigation is consistent throughout web site				
12	The portal banner look attractive since it use different contrast of color.				