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# Evaluation of WAP Services in Campus Environment Using Quantitative Approach

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***Abstract*—In this paper, we introduce a novel approach to sharing information between students and lecturers in order to enhance quality of information in campus environment via WAP technology. We describe a network for distributing campus information among lecturers and students. The concept of developing campus information via WAP technology is to ensure that student can access information at any time, at any locations and ad-hoc basic. WAP Based Students Information System helps the students and lecturers on campus to find and access information based on ad-hoc basic, which is of interest and relevant to students or lecturers; they only need a PDA or a mobile phone. The second purpose of this study is to evaluate the capabilities of WAP service for retrieving and sending information. This research, focus groups are being used to develop survey instruments for measuring students' satisfaction with WAP service implementation. Then, survey instruments will undergo testing and evaluation process for measuring the effectiveness of this WAP service implementation in campus environment. Students mostly agreed this WAP service is possible to utilize some of the campus problems in providing useful information solutions such as students' results, students' courses, announcements and news. The results and analysis show that based on framework the WAP-based customized information services have successfully performed in campus environment. Therefore, campus institutions can provide and offer information for mobile users (students) as value added services.**

***Index Terms*—WAP, Campus, PDA, Information, Students, Quantitative, Mobile Phone**

## I. Introduction

This study focuses on the development of a mobile browser in campus environment that supports WAP as well as Web service. The system will help students to check their academic result and related courses information, view the own personal information, check for announcement, and even courses registration. It performs managing student's information system in the wireless environment. Students will be provided with more value-added services, which are easy to use directly from a mobile phone to access information at any time, at any locations. The current issues are: i) information can not be access at any time, at any locations (not mobility); and ii) registration and result need to collect at main campus. This study is to improve the convenience for the student information retrieval. Deployment of campus information-oriented applications for mobile terminals, the wireless application protocol (WAP) has provided a promising solution. In addition, it is convenient to access online information via mobile device between students and lecturers. The students and lecturers can immediately access information about the campus news and save the time spent on reading large amount of electronic documents.

The first major effort entails researching and determining a set of criteria to use in evaluating the efficiency of WAP services. The second major effort involves WAP interface and design. This WAP services were evaluated their features and capabilities using quantitative approach. Students are asked to comment on the finding of efficiency WAP services. The quantitative survey method used in this study helped gain a deeper understanding of the features and characteristics WAP services.

## II. Related Works

Smart terminal equipments such as mobile phone, PDA etc., develop quickly at present [1]. Wap provides a viable technical solution for wireless data terminal applications. Wireless network has many characteristics, for example, it can be visited conveniently and fast, accessed anytime and anywhere. Therefore we want to focus on benefits, more specifically on the benefits that are associated with the use of mobile services. The obvious benefits of mobile services are related to mobility in space. Mobile devices and services offer people the opportunity to move around while maintaining access to relevant services and staying (socially) connected [2]. The nomadic value of mobile services is reflected in concepts like anytime and anyplace [3].

Pagani [4] mentions mobility, availability (anytime, anyplace), and personalization as important benefits of (multimedia) mobile services. Some educational communities and organizations have recognized the possibilities of m-Learning. m-Learning may provide tools to respond to the demands of working life and information society [6]. One way to enhance m-Learning is to raise the usability of mobile terminals as good usability is the basis for the meaningful and effective learning [5].

Most handheld devices have already been equipped with a web browser. A mobile browser can become a powerful platform for playing a variety of digital media contents, improving the current situation where service providers need to prepare their own players for many different types of media contents [7, 8, 9, 10, 11, 12].

Mackulak and Savory [13] carried out a questionnaire survey on the most important simulation software features. The most important features identified include: a consistent and user friendly user interface; database storage capabilities

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for input data; an interactive debugger for error checking; interaction via mouse; a troubleshooting section in the documentation; storage capabilities for simulation models and results; a library of reusable modules of simulation code; and a graphical display of input and output.

The quantitative methods are Experimental Design and Analysis; Case Study Design and Analysis; Survey Design and Analysis (refer to Figure 1). For example, evaluation on software development as below [14] [15]:

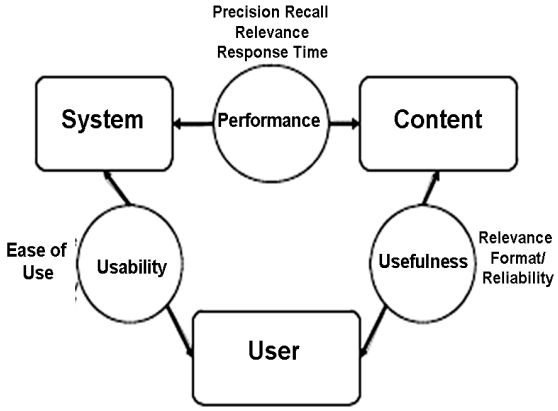


Fig. 1: Evaluation Technique for Software Development

## III. Methodology and System Architecture

Figure 2 shows the overall framework of the WAP services implementation in campus environment. There are four phases development process such as: i) Web server; ii) WAP gateway; iii) WAP content/server; and iv) link to existing campus network/Internet/GSM/3G.

The network architecture design of the campus WAP Based Students Information System, consists of two-system architecture: i) existing web server network; and ii) new implementation of WAP service. Students and lecturers can access information via traditional Web service or WAP service (see Figure 3 and Figure 4). Figure 5 shows WAP services evaluation process using qualitative approach. Students from Malaysian Institutes Information Technology faculty, University of Kuala Lumpur, will select to response the performance of WAP services.

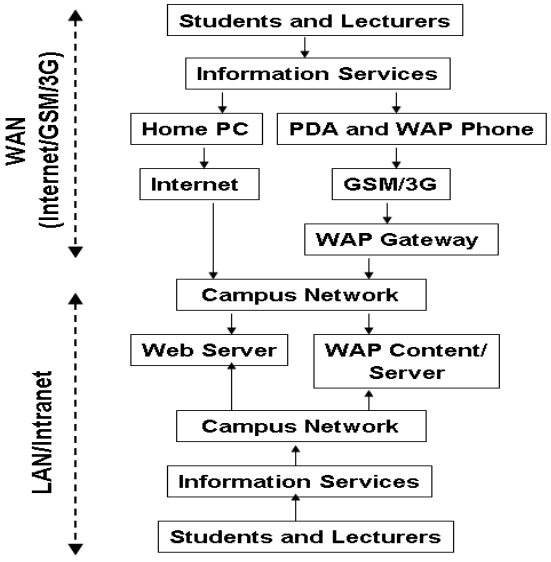


Fig. 2 Framework of WAP Service Implementation

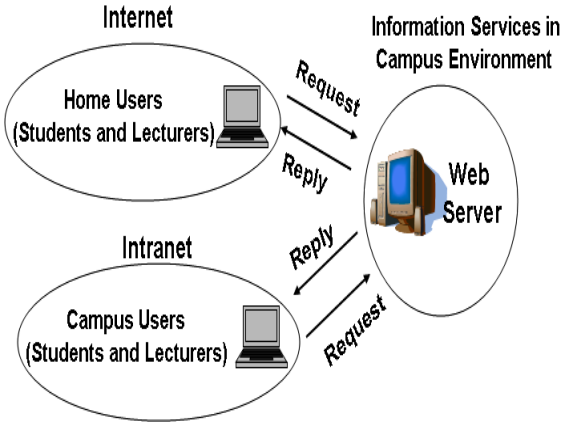


Fig. 3 Traditional Web Service Architecture

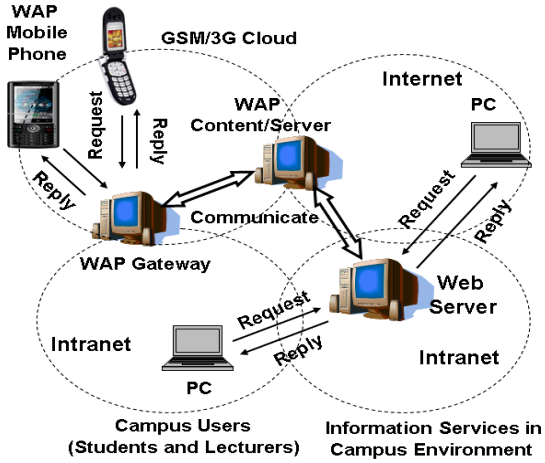


Fig. 4 Convergence of WAP and Web Service Architecture

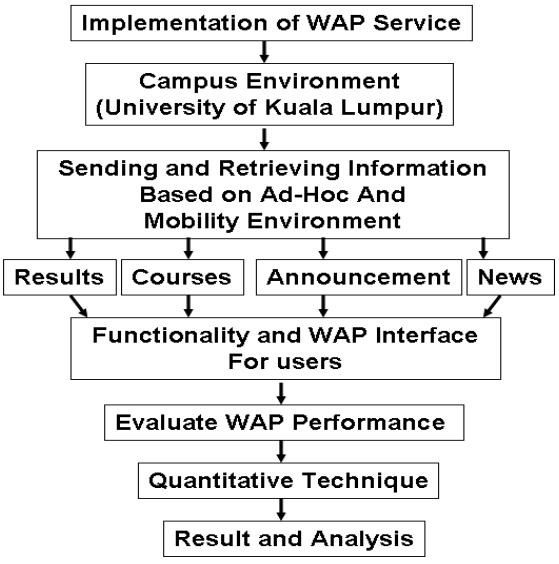


Fig. 5 WAP Services Evaluation Technique

## IV. Evaluation And Results Of WAP Services

**Results of WAP Services:** We have setup a WAP service environment to retrieve information at University of Kuala Lumpur in Malaysia based on mobility approaches. The main objectives of this convergence technique between WAP and

Web as follow: i) provide an easier method to access information; ii) provide a WAP based information retrieval system to build an information system that could be available to the students at any location; and iii) provide easy key access and menu-driven interface. Figure 6 shows the current Web-base Students' Information System. We have converged WAP and Web service to ensure that students are able to access student information system at anytime and at any location. Figure 7 shows the design of the campus WAP Based Students Information System that consists of three-system modules: i) student; ii) course; iii) personal record information and iv) announcement. The WAP Based Students Information System is also provided a security system, therefore, students need to key-in their 'ids' and 'password' (see Figure 8). In addition, students are able to display their profile (see Figure 9). Students are also able to register (add, delete, modify) their semester subject through WAP Based Students Information System and access their semester result from everywhere using PDA or mobile phone (see Figure 10 and Figure 11). Menu driven interface will apply in the system to minimize text entry by keypad. The selection menus are well categorized in order to assist the student and navigate the application.

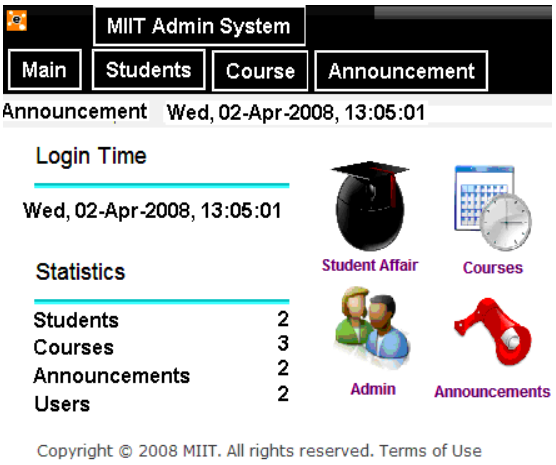


Fig. 6 Web-base Students' Information System

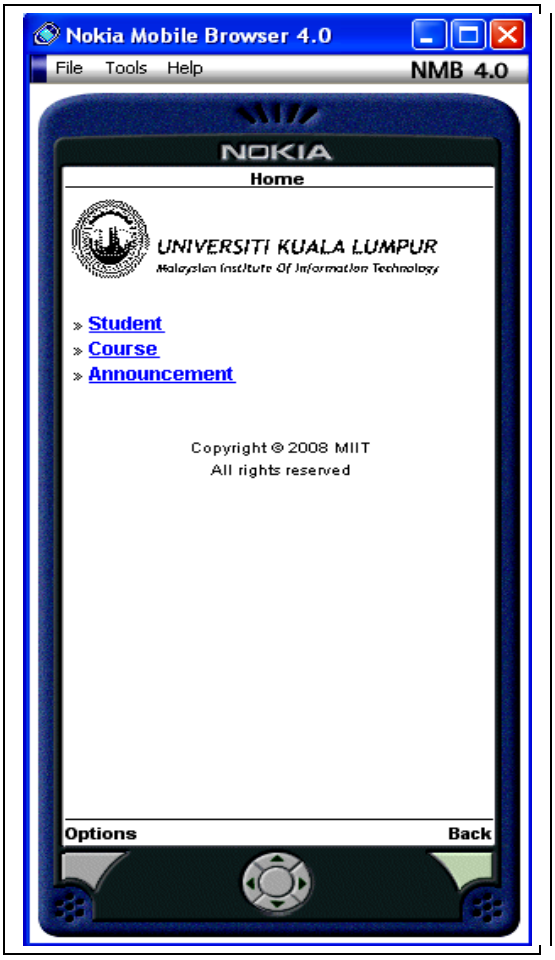


Fig. 7 Student Main Menu

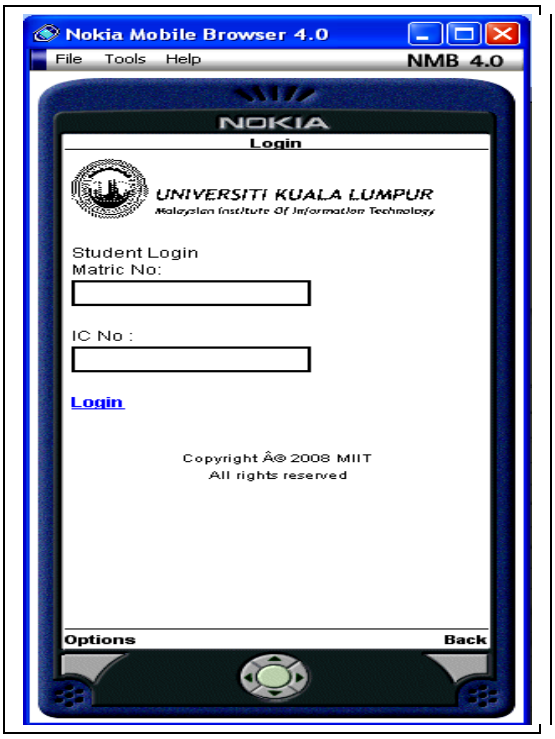


Fig. 8 Student Login Page (Security Purpose)



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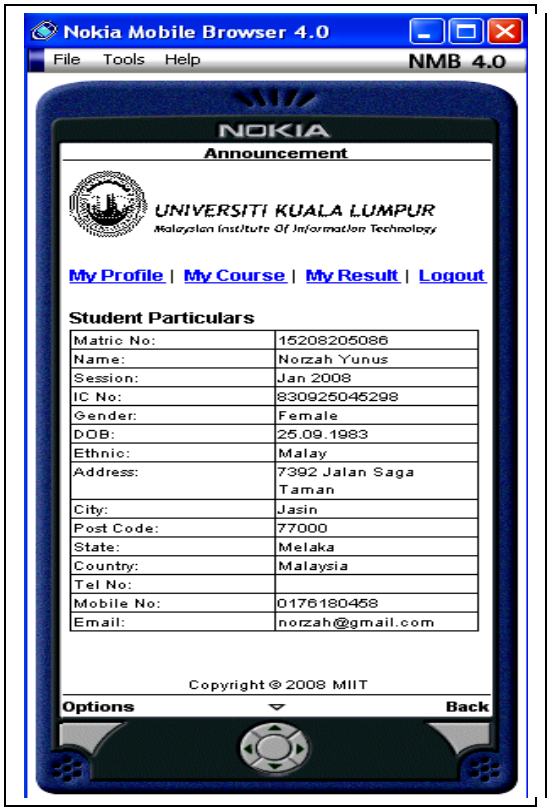


Fig. 9 Student Profile Layout

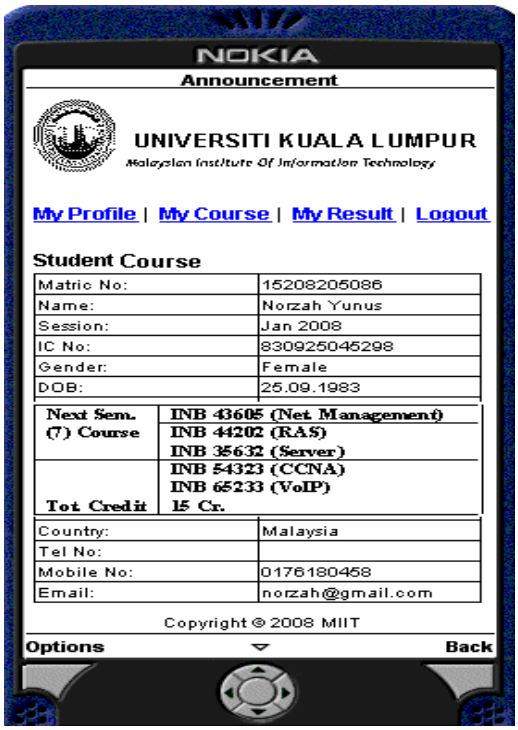


Fig. 10 Subject Registration via WAP Service

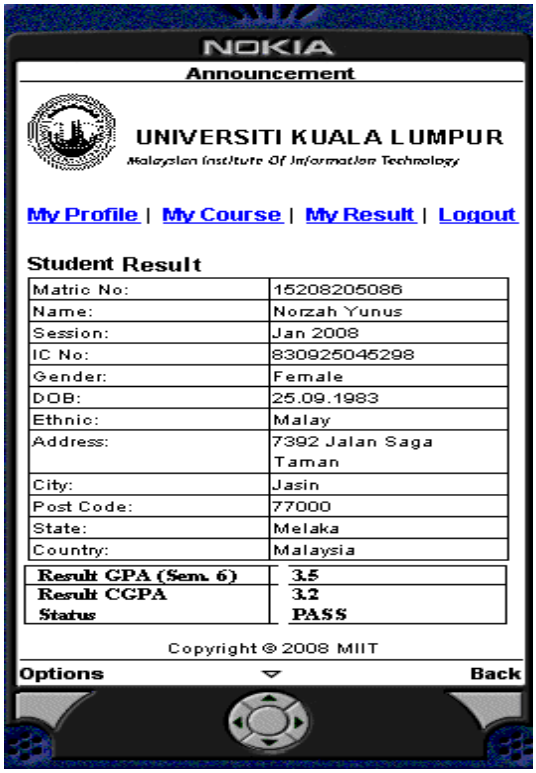


Fig. 11 Display Student Result

**Evaluation of WAP Services:** Students from MIIT faculty, University Kuala Lumpur have selected to be evaluator of WAP services implementation in campus environment. Number of students from each department is 20 students (refer to Table 1). Table 2 shows the criteria categorized and classification of WAP services evaluation.

TABLE 1: SAMPLE OF MIIT STUDENTS EVALUATION

| Students Response: Faculty of MIIT, University of Kuala Lumpur | |
|---|---|
| System and Networking Department | 20 students |
| System Engineering Department | 20 students |
| Multimedia Department | 20 students |

TABLE 2: EVALUATION OF WAP SERVICES

| Evaluation of WAP Services Implementation | |
|---|---|
| Functionality and Interface | Easy of Information Display |
| | Easy of Information Organization |
| | Provide help utilities screen |
| | Format and Position Arrangement |
| | Error Message Provided |
| | Able to Navigate Information, News, Events, Results |
| | Mobility and Ad-Hoc |
| | Easy to use |
| | Adequate Information provided |

Most of the students agreed and categories this WAP services moderately satisfy in information organization (50%), information display (50%), format and screen arrangement (30%). Other students agreed and categories information organization and display is 30% satisfy and 20%

categories very satisfy. More than 60% of student responses that WAP format and screen arrangement is satisfied (refer to Figure 12).

Some of students (50%) are moderately agreed this WAP services able to generate error and alert message, while some of the students (50%) are agreed and categories this WAP services good for providing error and alert message. Most students (83%) agreed this WAP services able to provide output, menu utilities and user friendly. While, other students (16%) categories this WAP services very good for generating output, menu utilities and user friendly (refer to Figure 13). Figure 14 shows that 83% student categories this WAP services menu able to help and easy for students to navigate the relevant information.

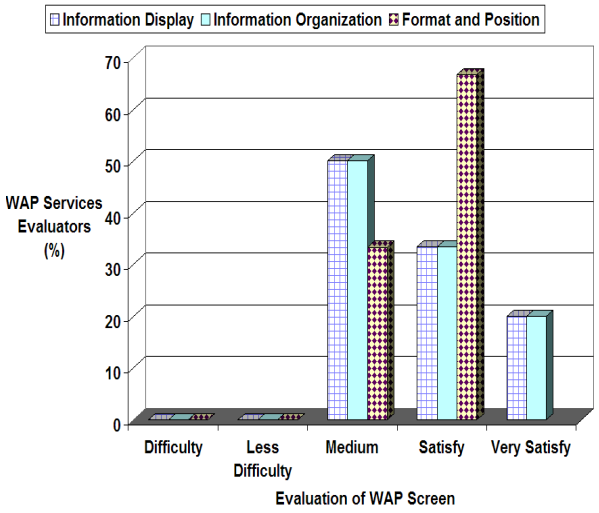


Fig. 12 Evaluation of WAP Screen

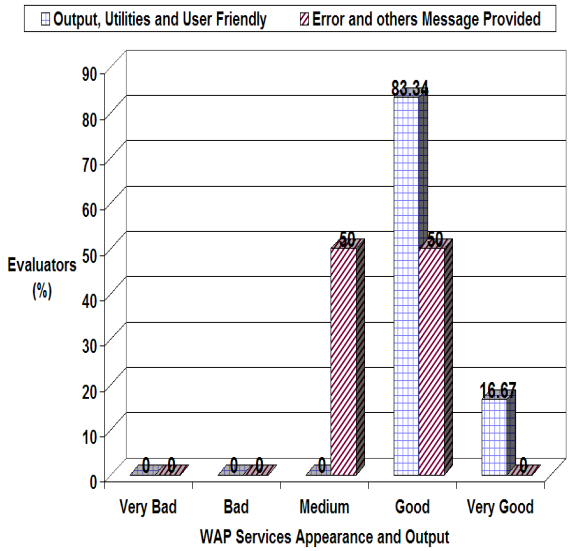


Fig.13 WAP Services Appearance and Output

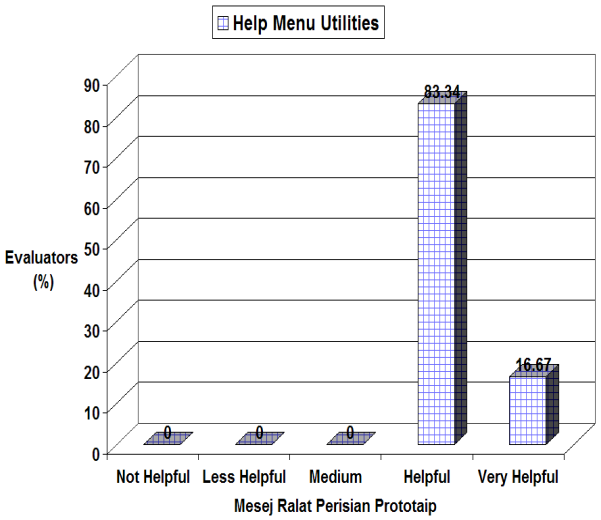


Fig. 14 Helpful Menu

Majority of students (83%) are agreed this WAP services able to make course registration. Minority students (16%) classified this WAP services able to make course registration very excellent (refer to Figure 15). Some of the students (66%) are agreed this WAP services able to view the examination results and others 16% students classified as moderate and excellent. Some students (67%) agreed this WAP services able to send and retrieve information based on ad-hoc and mobility environment, and others 33% students classified as excellent (refer to Figure 15). Some students (67%) agreed this WAP services able to navigate information, and others 33% students classified as excellent for navigation information (refer to Figure 16). Majority of students (67%) are moderately agreed this WAP interface is easy to use (refer to Figure 16).

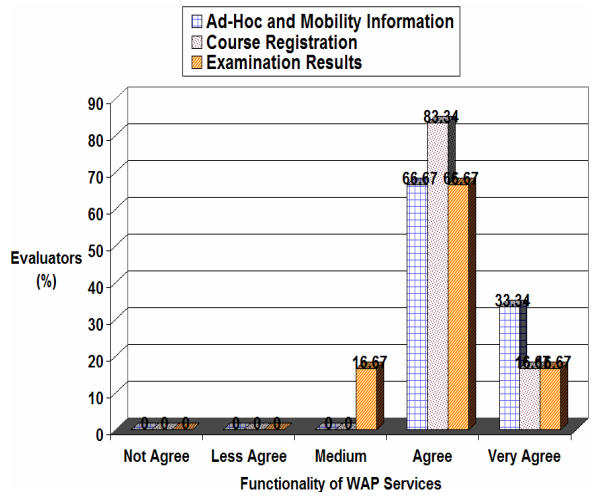


Fig. 15 Functionality of WAP Services



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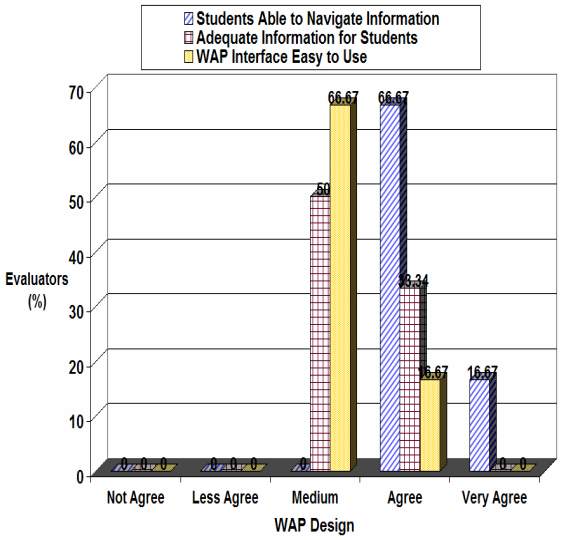


Fig. 16 WAP Design

## V. Conclusion

In this paper, we presented WAP Based Students Information System, a mobile WAP browser for handheld devices. This study focuses on the development of a mobile browser in campus environment that supports WAP as well as Web service. It is clear that there is a need for development for mobile services and terminals in campus environment and students are able to retrieve information at anytime and at any location. The practical value of mobility in teaching will be greater in the future because mobile terminals are flexible to use and they enable real time and place independence. Our WAP services will evaluate by MIIT students using quantitative approach. Our WAP services can determine and solve problems for retrieving information. Based on the results, it shows that WAP Based Students Information System enabled mobile students to enjoy much valuable information and a large number of services over mobile networks. This WAP application provides students to request the academic information using wireless devices. By using this application, students are able to request and retrieve their examination result, view their profile, check announcement and register course. It can use to retrieving information based on ad-hoc and mobility environment. In addition, it is easy to use and provide a user-friendly graphical and text interface. This study presents a comprehensive list of criteria structured for evaluating WAP services architecture. The results from our study show that evaluators mostly agreed this WAP services that has combined with mobility environment is able to generate valuable in sights for students to use the information anywhere in and out campus environment. In general, evaluators perceive this WAP services in a positive manner. Initial quantitative findings from this study will provide a valuable assessment of satisfaction with this WAP services as it being implemented. Based on focus group feedback, this WAP services can significantly enhance to make communication with students and lecturers. The system can be further enhanced to become a more powerful and sophisticated system. There are still many aspects for improvement and enhancements of the WAP system can be made in the future to meet changing needs of the students. There are several enhancements that could be extended the usability of system development such as reporting module, linked with other faculties' student information system and SMS Messaging.

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