Faculty of Cognitive Sciences and Human Development

IGUIDE FCSHD: DEVELOPMENT OF MOBILE-BASED APPLICATION FOR FACULTY GUIDEBOOK

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Bachelor of Science with Honours (Cognitive Science) 2019
UNIVERSITI MALAYSIA SARAWAK

Grade: A-

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Final Year Project Report ☒
Masters ☐
PhD ☐

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IGUIDE FCSHD: DEVELOPMENT OF MOBILE-BASED APPLICATION FOR FACULTY GUIDEBOOK

FADZILAH HANIM BINTI ZAKARIA

This project is submitted in partial fulfillment of the requirements for a bachelor of science with honours (Cognitive Science)

Faculty of Cognitive Science and Human Development
UNIVERSITI MALAYSIA SARAWAK (2019)
The project entitled ‘iGuide FCSHD: Development of Mobile-Based Application for Faculty Guidebook’ was prepared by Fadzilah Hanim binti Zakaria and submitted to the Faculty of Cognitive Sciences and Human Development in partial fulfillment of the requirements for a Bachelor of Science with Honours (Cognitive Science).

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Date:

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Grade

A−
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ABSTRACT

Today, more universities around the world are aware of the lack of program information and interest among students, which tends to be one of the main factors that influence attrition among public HEIs. As the mobile-based application has become very prevalent among the student community, it is guaranteed to increase student satisfaction in using the latest technology to obtain specific information in tandem with overcome attrition issues. This project is a development of mobile application for faculty guidebook. The development of this application is due to the need of student to intensify information dissemination and ensuring understanding of the course description, university and faculty's policies, rules and regulations, and improve delivery of quality services. The main purpose of the project is to develop a mobile-based application to replace the printed version of faculty guidebook used by students and staff in Faculty of Cognitive Science and Human Development. Specifically, the project aimed to develop an Android-based faculty guidebook application that runs on any android devices with offline or online setting. The method used in this project is Mobile Application Development Lifecycle (MADLC) which consist seven phases: identification, design, development, prototyping, testing, deployment and maintenance. The result based on usability testing shows that the proposed mobile-based faculty guidebook application meets criteria for the software quality standards and on the requirements of the users. Moreover, the proposed application gives a better approach for processing and displaying an operation with responsive and attractive user interfaces (Uls).

Keywords: attrition, guidebook, mobile application, Mobile Application Development Lifecycle (MADLC), user interfaces (Uls).
ABSTRAK

Kini, lebih banyak universiti di seluruh dunia sedar akan kekurangan maklumat program dan minat dalam kalangan pelajar, yang menjadi salah satu faktor utama yang mempengaruhi penghentian pengajian dalam kalangan pelajar IPT. Oleh kerana aplikasi mudah alih telah menjadi sangat lazim dalam kalangan pelajar, ia dijamin meningkatkan kepuasan pelajar dalam menggunakan teknologi terkini untuk mendapatkan maklumat khusus seiring dengan mengatasi masalah penghentian pengajian. Projek ini merupakan pembangunan aplikasi mudah alih buku panduan fakulti. Pembangunan aplikasi ini adalah disebabkan oleh keperluan pelajar dalam memperoleh maklumat dan pemahaman mengenai penerangan kursus, dasar dan peraturan universiti dan fakulti serta peningkatan penyampaian perkhidmatan yang berkualiti. Tujuan utama projek ini adalah untuk membangunkan aplikasi berasaskan mudah alih untuk menggantikan buku panduan fakulti versi cetakan yang digunakan oleh pelajar dan kakitangan di Fakulti Sains Kognitif dan Pembangunan Manusia. Secara khusus, projek ini bertujuan untuk membangunkan aplikasi buku panduan fakulti berasaskan android yang beroperasi pada mana-mana peranti android dengan tetapan luar talian atau atas talian. Kaedah yang digunakan dalam projek ini ialah Kitaran Hayat Pembangunan Aplikasi Mudah Alih (MADLC) yang terdiri daripada tujuh fasa: pengenalpastian, reka bentuk, pembangunan, prototaip, pengujian, penggunaan dan penyelenggaraan. Akhir kajian berdasarkan uji kebolehgunaan menunjukkan bahawa buku panduan fakulti berasaskan mudah alih yang dicadangkan memenuhi kriteria untuk standard kualiti perisian dan keperluan pengguna. Selain itu, aplikasi mudah alih ini memberikan pendekatan yang lebih baik untuk memproses dan memaparkan operasi dengan antaramuka pengguna (UI) yang responsif dan menarik.

Kata kunci: penghentian pengajian, buku panduan, aplikasi mudah alih, Kitaran Hayat Pembangunan Aplikasi Mudah Alih (MADLC), antaramuka pengguna (UI).
CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Attrition or well known as student drop out from completing courses in higher education institutions (HEIs) became a normal scenario in all the world including Malaysia. This problem has been studied since 1980’s which concern about the rate and varied factors of attrition among undergraduates and postgraduates in HEIs (Sangodiah & Balakrishnan, 2014). According to the statistic, 30 000 out of 168 000 students who continue their studies for certificate or diploma in Malaysia would not graduate. Meanwhile only 83 000 out of 100 000 students in degree programme were able to complete their studies (Borneo Post, 2012). These conclude that 17.5% of students who registered in HEIs in Malaysia have dropped out (Gonvindarajo & Kumar, 2012).

Many factors contribute to the attrition percentage among Malaysian student either public or private HEIs. The main factors that influence the attrition among public HEIs student are not able to proceed their study in courses or programme taken due to inadequacy of available resources and interest toward the courses, and also failed in examination. While most of attrition cases in private college are caused by financial issues, quality of teaching and lack of facilities provided by the management (Sangodiah & Balakrishnan, 2014).

Due to this problem, students would require a great deal of information and guidance from universities to help them get to their future career that they desire. Today, more universities around the world are aware about the lack of programme information among students. Thus they tend to provide the information in several ways. Currently the information - such as courses description, admission notices, timetables, event details assessment and others - are provided to student through university website. The resources present on the website are
general and involving a large group of students and other stakeholders. For instance, the information showed on the website are not only explicit for students despite some notices are mixed up together for lecturers, staff member and general public use.

Recently, a mobile application has become very prevalent among student community. As the mobile application can be divided into five main categories - personal productivity, Social network, transaction-based, leisure-based, and content dissemination-based (Vithani & Kumar, 2014) – it is guaranteed to increase student satisfaction in using latest technology to obtain specific information.

As a suggestion to overcome the issue for obtaining information about Cognitive Science program courses, the knowledge about computer science and human-computer interaction should be utilized in the proposed mobile-based application. It also should provide a student-centric focus which increase student satisfaction towards faculty and university service (Taneja and Goel, 2015), thus can help to overcome the attrition issues.

1.2 Problem Statement

Current situation in FCSHD, Faculty guidebook is one of the items that is provided on the university’s website (UNIMAS website). The guidebook contains important information about FCSHD and university policies, and resources that allow students to navigate their academic journey and gain experiences as a student of Universiti Malaysia Sarawak (UNIMAS) through the years. FCSHD guidebook provides the student a comprehensive reference especially about their specific program and courses (“Faculty Guidebook of FCSHD”, 2018).

Unfortunately, the guidebook is not applicable in printed book while the softcopy version only can be downloaded through the university website. Despite it can reduce the cost
for producing the printed books, many students face difficulties to deal with the technology. The approach prompted a lack of personal touch since the students have to filter information needed regarding faculty guidebook from university's site by exploring through different links or applying numerous channels. As the key stakeholders for educational institution, students expect to fulfill their information needs instantly instead of "going to get" required information.

1.3 Research Objective

Main objective:

- To design a mobile-based application for FCSHD to replace traditional Faculty guidebook.

Specific objective:

- To develop a mobile-based application for FCSHD student guidebook using Shoutem Software.

- To evaluate the satisfaction of using mobile application to obtain course's information among FCSHD students using usability testing method.

1.4 Contribution of Study

As mentioned, the existence of proposed mobile application will benefit student from Cognitive Science program in obtaining information and description about the course that should be taken in comprehensive way. It also can provide current courses information to the student in a fast, customized, accurate and convenient way. Student satisfaction toward faculty service also would be increased by introducing the proposed mobile-based application.
1.5 Conclusion

In this chapter, the clear explanation about why the project should be done is included in the background of study. Additionally, the problem statements, objectives, significant of study and contribution of study are also provided and elaborated in this chapter.

The remainder of this project is structured as follows: Chapter Two discusses current literatures and related works done by previous researchers; and Chapter Three shows an overview of research methodology for this project. While in Chapter 4, system application development for this project is discussed, and system testing and discussion for evaluation is discussed in Chapter 5.
CHAPTER TWO

LITERATURE REVIEW

2.1 Student Attrition and Its Factors

Attrition or well known as student drop out from accomplishing courses in higher education institutions (HEIs) became a normal scenario in all over the world including Malaysia. HEIs around the world are facing difficulties in preserving the number of students. Therefore, there is a need to identify the factors that affecting attrition among students. According to Griffith University (2012), they indicated some of the universal reasons for student drop out higher education institutions which are (Sangodiah & Balakrishnan, 2014):

i. **Personal difficulties** – Which related to family, finance, work, health and also a difficulty to make friends in college that could be the most common reason for attrition.

ii. **Academic difficulties** – Some students with weak study skills and academic knowledge will have low academic preparedness. Thus it will affect their academic entry scores and first semester GPAs.

iii. **Full time and part-time status** – Full time students are more likely to continue their studies in second year compared to part time students.

iv. **Wrong or uncertain program and university choice making** – Poor information provided for enrolment and insufficient consideration of educational and career goals.

v. **Not being the University of First Choice** – Some students will rather leave their current university in order to enrol to more interesting opportunity at other university.

vi. **Loss of interest in the program or subject area** – Another factor of lack of information provided reflect to loss of interest among students.
vii. Inability to manage time and workload demands and in consequence falling behind.

viii. Dissatisfaction with the university experience, quality of curriculum or teaching service.

According to Hoff (2015), Approximately 34% of first year student drop out of HEIs every year, meanwhile only 10% of those drop outs have grades below a C. Thus, it concludes the number of attritions does not only relate to grade. As students require a great deal of information from university desperately, university started to provide such information through their website to engage with students. However, disadvantages of university website are the information provided is general and applicable to a large group of students and other stakeholders, and lack of personal touch (Taneja & Goel, 2015). This could lead to dissatisfaction among students towards university service quality and increase in student attrition. Thus, Hoff found that by engaging students with university mobile-based application could help in minimizing the attrition among students (Hoff, 2015).

2.2 Faculty of Cognitive Science and Human Development Background

Faculty of Cognitive Science and Human Development (FCSHD) which also known as The Signature Faculty was developed on August 1994. Due to the increasing of courses demand in this program, now FCSHD had offered four main undergraduate courses – Cognitive Science, Human Resource Development, Counselling and Psychology – and three postgraduate courses.

Cognitive science programme is a multidisciplinary study that focus on human mind and how it functions in order to explore the technology innovation, individual achievement and organizational productivity. Some interdisciplinary study in this cognitive science program are
psychology, anthropology, neurosciences, philosophy, education, linguistic, artificial intelligence, ergonomic and computer science (Faculty Guidebook of FCSHD, 2018).

There are 122/126 credits hour need to be taken in order to graduate in Cognitive Science program. Therefore, students especially first year student need a guidebook about the courses provided in this program. The traditional faculty guidebook was provided to the student through the University website. However, it is inconvenient to student as they require an instant information access rather than wasting their time to download and scroll down the pages in traditional faculty guidebook.

Figure 2.1. Faculty Guidebook of FCSHD front cover
2.3 Mobile-Based Applications in Cognitive Science Perspective

Cognitive science is known as an interdisciplinary study of brain and mind, joining the ideas and concepts, strategies and insights of vast parts of neuroscience, psychology, developmental science, philosophy, linguistics, anthropology and sociology, and formal techniques from mathematics, computer science and physics. However cognitive science is not so much to the merged field of study such each of the disciplines themselves, yet to their converging work or on explicit issues (Friedenberg and Silverman, 2016).

By discovering cognitive science can be useful for new technologies development rather than just for teaching and learning technologies, Gaddam, et al. (2017) conclude that cognitive science teaches practitioners to view problems from various perspectives and search for new and innovative approaches to solve them. For instance, Wilmer, Sherman and Chein (2017) reviewed a research about relationships between mobile technology habits and cognitive functioning by focusing on three features of cognition – memory, attention and gratification delay – that are implicated by mobile technology.

Current research revealed that cognitive overload can be a significant part of usability. Because of their probable deployment in numerous task settings and confinement of size, it seems mobile devices might be particularly sensitive to the effects of cognitive overload. This aspect of usability is frequently unnoticed in existing usability models which are intended for mobile applications (Harrison et. al., 2013).

2.4 Mobile Applications for Learning Based

The use of mobile application as a digital tool for education and research purposes has been debated which focused on opportunities and challenges. Bowen and Pistilli (2012) claimed that mobile learning as the future of learning. Mobile application began to be use as a
key component of mobile devices and can be beneficial in higher education for some activities such as gathering and utilizing information, promoting communication, accessing content, collaboration and reflection. Despite using mobile applications are personally driven and motivated, identified information management and digital literacy support needs to be connected from the earliest stages of planning in order to ensure teaching and learning occur effectively (Hinzel, et al.). Meanwhile, Page (2014) found that a smart device such mobile application is most common used for sharing or presenting work together with creating it directly on the device.

Moreover, a mobile application also can be used as a platform for learning the correct method to read or learn verse of the Holy Quran. For instance, Alqahtani and Mohammad (2015) found a positive connection between mobile application 'Say Quran' and students' perceived performance, behaviour and satisfaction while occupied in learning the Holy Quran. They found that by using the mobile application as a modern learning tools, can enable learners with improved study and individual skills.

2.5 Mobile Applications in Human Computer Interaction

As the growth of technological modernity in mobile devices, the user interfaces of mobile applications are continuously become more complex. Thus, mobile user interface design need to be equally usage and useful, also user-centered (Alnanih and Ormandjieva, 2016). Jones and Marsden (2006) claims that the smartphones and their applications must be carefully considered, in terms of their usability, aesthetics, utility and emotional aspects of user experience.

Current study carried out to investigate the interaction between human and mobile device. Alnanih and Ormandjieva (2016) mapped human computer interaction principles to design mobile user interface quality by using quality-in-use measurement model (QiU-4-MUI).
In the research, they conclude that the effect of HCI principles on the quality of MUIs could enhance user safety by reducing human error, expanding the viability and efficiency of the implementation of the task carried out by user, increasing productivity and also reducing cognitive load.

Studies discover that HCI is a discipline without a fusing design interface, and there is no coherence and consistency in estimating HCI interface execution. Thus, Bunagan and Kadhi (2016) comes out with the result of 7 HCI principle that can be applied in mobile phones development in users' commentaries. Based on the study, it shows that consistency, synthesizability and substitutivity appeared as the most relevant principles. They recommended to investigate the prioritization of the HCI principles as executed by the developer of mobile phone to specifically identify the impact of a specific design principle for certain design.

2.6 Comparison Between Different Process Model Adopted for Mobile Application Development

Mobile application technology has been increasingly demanded among user, which made it need a better specialized software for mobile devices. Instead of using conventional life cycle process model, developer must concern with a customized life cycle process model in order to develop the application which are more complex nowadays.

Some traditional mobile development methods tend to ignore specific characteristic of mobile devices such as processing power, connectivity factors, memory capacity, bandwidth factor, graphic interface, input interface factor and lower battery factor, which are not similar to desktop applications (Kaur & Kaur, 2015). Therefore, a distinct mobile application development life cycle model need to be applied. As the mobile applications are more faster developed than desktop application, it need faster lifecycle model. Table 2.1 shows a
comparison between different process models which have been applied in mobile application development.

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<td>User-centred design</td>
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<td>For non-expert who wants to develop specialized mobile application</td>
<td>Large, expensive and complicated project</td>
<td>For apps which have similar idea and are already existing in market</td>
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<th>architecture</th>
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*Table 2.1. Comparison Between Different Process Model Applied in Mobile Application Development*

### 2.6.1 Agile Model (Abrahamsson, 2004)

Various agile model for developing mobile application was proposed by different authors. One of the popular model was proposed by Abrahamsson, *et. al.* (2004) called Mobile-D process. Five stages in Mobile-D process including explore, initialize, productionize, stabilize and system testing and fixing. In 2010, Spatura proposed the similar Mobile-D process with addition of Evolve phase that focus on application future releases (Spatura, 2010). Based on table 2.1, agile model is suitable for non-sequential project as the application designed when there are current requirements. In addition, it requires only a small group of developer, short time to market the application and constant user involvement of user in term of user feedback.

### 2.6.2 Iterative Model (Kemper & Wolf, 2005)

Iterative model was developed by Kemper and Wolf on 2005. Distinct from other model, iterative model has a number of development sub-processes where the precursor system is updated, outdated features are eliminated, bugs are fixed, and new features are included as
new modules based on current requirements. Iterative model process includes evolutionary models, gradual models and semi-structured models. Additionally, it is characterised by repeated development blocks and significant use of prototypical method (Kemper & Wolf, 2002). Based on the table 2.1, iterative model focus on producing a new version of applications that can satisfied customer requirements. As the application is designed when the system requirements are understood and define clearly, thus this model is only suitable for a complex and dynamic application. Consequently, the team size must be bigger equally with the application size.

2.6.3 Model-Driven (Fernandez & Hussmann, 2008)

In 2008, Fernandez and Hussmann suggested a model-driven method for mobile application development. In this model, an application high-level and platform independent model were first developed. After that, the model is changed into platform dependent code (Fernandez & Hussmann, 2008). Based on table 2.1, model-driven is the only model that focus on user-centred design. In addition, it is suitable for non-expert who wants to develop specialized mobile applications. Thus it only requires small developer group size and short time of application to be marketed.

2.6.4 Spiral Model (Ann Nosseir et. al., 2012)

Another mobile development process model is proposed by Ann Nosseir et. al. in 2012 called Spiral Process Model. Spiral model has several iterations which every step refines and result the prototypes. This model contains five steps which are: 1st iteration – identification of users, context and tasks that will be utilized in application; 2nd iteration – prioritization of usability characteristics and interpret a metric to measure each of them; 3rd iteration – specification of absolute and acceptable value for every measurement; 4th iteration –