



Development of Mobile Application Supporting Students' Study Plans and Learning Processes: The Needs and Satisfaction of Users

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Article info

Article history:

Received: 9 October 2020

Revised: 18 December 2020

Accepted: 30 December 2020

Keywords:

Mobile application, Study plan, Learning process

Abstract

Digital technology has demonstrated its contribution to teaching and learning and educational management. With student-centered awareness, the mobile application enhancing students' study plans and learning processes was developed. The purpose of this research was to examine the needs of undergraduate students of Suan Dusit University on a mobile application supporting their study plans and learning processes. A needs analysis was conducted to develop the mobile application. The application was developed based on needs. Examining the satisfaction of the undergraduate students, the faculty members and the administrators of Suan Dusit University towards the mobile application supporting the students' study plans and learning processes, was conducted.

The samples comprised of 3 groups: The first group consisted of 120 undergraduate students studying on campus and at off-campus Science Center, the second group was 30 faculty members who acted as advisors working on campus and at off-campus Science Center and the third group consisted of 12 administrators who were relevant to the management of students' study plans. Purposive sampling technique was used to select the samples of each group. A research and development method was used. The research tools comprised of 8 open-ended questions used for needs analysis and a 20-item Satisfaction Questionnaire used to measure the samples' satisfaction towards the mobile application regarding the content and the usability, the design, the manual and the overall satisfaction of each function. The validity and reliability of the questionnaire were determined, confirming validity and high internal reliability.

The findings revealed that most of the students considered the Enrollment as the most essential function of the mobile application. The other important functions were Academic Calendar, Grade, Payment, Library, Advisor, Request, Assessment and Map, respectively. The overall satisfaction of the students, the faculty members and the administrators of Suan Dusit University towards the developed mobile application on the functions of Grade, Payment, Library, Request and Enrollment were at the highest level with the mean scores of 5.56, 5.53, 5.52 and 5.51, respectively.

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Introduction

Mobile application has demonstrated contribution to the young's lifestyles and integrated in utilization of teaching and learning. The mobile application, a modality of mobile learning (M-learning), has been introduced for academic use and educational management as an innovation that is likely to sustain and has an impact on learners or students in the 21st century. Various studies have been conducted to examine the mobile application usage, particularly mobile phone application. Research in many countries have been conducted to strengthen the use of M-learning in both teaching and learning management and supporting teaching and learning activities as well as mobile application development in the operating system of mobile smartphone or mobile application.

The development of mobile application technology of Suan Dusit University (SDU) follows the development guidelines of the university plan in the aspects of the quality of education management, that is consistent with the 20-year National Strategic Plan (2018-2047). The strategic plan has focused on the ability of people in continuous learning, accepting and adopting new technologies, developing lifelong learning, reforming learning process for the changes in the 21st century as well as increasing the effectiveness of educational management, with the ultimate goal of students' learning achievement.

Due to the aforementioned reasons, together with non-existence of the mobile application facilitating students' study plan and learning processes at SDU, the development of the mobile application is vital. This research study aimed to explore needs and develop mobile application to facilitate students in accessing information and support learning. Furthermore, satisfaction towards the mobile application has been examined.

Objectives

1. To investigate the needs of undergraduate students of SDU on mobile application used to support their study plans and learning processes.
2. To develop mobile application that meets the needs of SDU students in supporting their study plans and learning processes.
3. To measure the satisfaction of undergraduate students, faculty members and administrators of SDU towards mobile applications in supporting study plans and learning processes.

Literature review

1. Mobile application

A Mobile application is a software package that can be installed and executed in the mobile device (Yen et al., 2012). All mobile applications are designed to work according to the users design in various ways (Worapitbenja, Klinhnu, & Srison, 2015) resulting in the use of the device to its fullest potential. The development of new applications for users to use continuously and in the application industry, is evolving and making mobile application convenient tool for users (Sombat, 2015).

Mobile applications have been used to manage education at all levels. The government also has a policy to promote the development of mobile applications that can maximize the benefit for students' learning. Since most students can access the applications easily via mobile phone (Rattanamahattana, 2018). It has been anticipated that the trend of mobile applications for learning would be well received by both educators and students (Wai, Ng, Chiu, Ho, & Lo, 2018).

2. Developing mobile applications for students in Thailand

The characteristics of mobile applications for students in Thailand are as follows.

1. One Stop Service Application that facilitates students with the university's activities, course calendar and registration guides (Thammasat University, 2019) class schedule, teaching timetable, personal data record, academic achievement report (Kunlittipon, 2014).

2. Registration System Application that supports study planning, including the system of registration and evaluation to provide information services for students (Thammasat University, 2019) and applications for education management of Thai universities (Webuild & Operate Co., Ltd., 2019).

3. Being a source of learning, such as searching and borrowing books from libraries and visiting learning centers (Thammasat University, 2019), as well as disseminating academic knowledge to public societies, such as the application called KKU CASCAP APP under the program of Cholangiocarcinoma Screening and Care Program in the north eastern region of Thailand (Khon Kaen University, 2016).

4. Being a connection between universities, academic staffs and students (Chiang Mai University, 2019).

5. Providing information for students such as students' personal QR codes, university maps on all campuses and publicizing news and activities of the

universities via university email (Kunalittipon, 2014).

3. Mobile applications development to support learning system

The development of mobile applications to support learning system is significant to increase communication channels with students and those who are interested in further education, or to communicate with the university through mobile devices to facilitate the use of students and users. Mobile application is a way to access information more quickly. This includes educational institutions information, courses offered at different levels, education calendars, event calendars, contact information, including places in the universities (Chartpreecha, 2016). Most users choose to use the application services from mobile phones as they meet the needs and are convenient to use anytime and anywhere (Srisuwan as cited in Saetiew, 2016).

Mobile applications are useful for supporting data access, information sharing, data transmission and distribution to users (Chartpreecha, 2016). Mobile applications also increase opportunities for students to learn without limitation and escalate students' confident to learn (Semertzidis, 2013 as cited in Sombat, 2015). A previous study (Roger, 2009) showed that the use of mobile applications promoted students' engagement in teaching and learning and demonstrated significant impacts on the improvement of students' learning.

The development of mobile application to support teaching and learning system needs careful consideration on attractive features and styles, the usefulness, as well as accessibility and user-friendliness. The color and font styles should be clear to read and visible on mobile phones (Saetiew, 2016). Mobile application is also useful in supporting data access, information sharing, data transmission or distribution of information to users with greater speed (Chartpreecha, 2016) and supporting teaching and learning process without boundary. The application should encourage students' responding towards learning processes. (Semertzidis, 2013 as cited in Sombat, 2015).

Conceptual framework

The conceptual framework of the research are presented in figure 1.

Independent variables

Mobile applications requirements to support study planning and learning of Suan Dusit University undergraduate students

Mobile applications to support study planning and learning of Suan Dusit University undergraduate students

Dependent variable

Satisfaction with mobile applications to support study planning and learning of Suan Dusit University undergraduate students
 1. Undergraduate students of Suan Dusit University
 2. Faculty members of Suan Dusit University
 3. Administrators of Suan Dusit University

Figure 1 Conceptual framework

Research methodology

1. Population and samples

Research and development method was used to explore general perspectives of undergraduate students of SDU on the needs of mobile application for supporting students' study plans and learning processes, develop the application and examine satisfaction toward the application. The population of the research consisted of 11,692 undergraduate students of SDU (data accessed in December 2018, Suan Dusit University), 692 faculty members acting as advisors working on campus and at off-campus Science Center (data accessed in July 2019, Suan Dusit University) and 12 administrators who were relevant to the management of students' study plans (data accessed in July 2019, Suan Dusit University).

Based on the objectives of the research, the research samples were divided into 2 groups as follows:

1.1 The samples for the interview to study the needs of undergraduate students on mobile application to support the study planning and learning comprised of 120 undergraduate students studying on campus, selected by simple random sampling.

1.2 The samples for evaluating satisfaction with mobile applications to support study planning and learning of undergraduate students at SDU were divided into 3 groups:

1) A simple random sample of 120 undergraduate students of Suan Dusit University;

2) A simple random sample of 30 faculty members acting as advisors working on campus and at off-campus Science Center; and

3) Twelve administrators of SDU who were relevant to the management of students' study plans comprised of the Rector, Vice-Rector for Academic

Affairs, Vice-Rector for Information Technology, Faculty Deans and Director of Academic Promotion and Registration Office.

2. Research instrument

2.1 Based on the research' objectives, the research tools were as follows:

1) A tool exploring the needs of mobile application requirements to support study planning and learning processes for undergraduate students of SDU was interview questions focused on two areas:

- Mobile application requirements and
- Mobile application functions to support study planning and details of the required information needed and listed by frequency of usage.

2) Mobile applications developed to support study planning and learning processes for undergraduate students of SDU.

3) Research tools used to measure the satisfaction of the samples towards mobile applications to support study planning and learning processes for undergraduate students of SDU was a satisfaction questionnaire developed by using a 6-level rating scale questionnaire, with 1 = least satisfied, 6 = most satisfied. The satisfaction scores were obtained as average value by summing and divided by the number of items so that a score ranges from 1-6, with score of 1 as least satisfied and 6 as most satisfied.

2.2 Assessment of research tools

The design of the tools used to collect data in the research has the following steps;

1) Study textbooks, research document, techniques of constructing rating scale questionnaires and configuration and evaluate other similar research to create tools for data collection.

2) Define issues as guidelines on constructing tools for data collection.

3) Define the issues that will be queried, design questionnaire and draft the questionnaire.

4) Have the questionnaires checked for validity by 3 experts in terms of accuracy according to the research objectives and language clarity.

5) The satisfaction of the questionnaire was examined for its validity by 3 experts.

6) Correct and revise the satisfaction the questionnaire according to the experts' suggestions.

7) The satisfaction of the questionnaire was tested for reliability by 30 students, yielding Cronbach's alpha coefficient of .89.

3. Collection of data

3.1 The process of studying the needs for mobile applications to support study planning and learning for undergraduate students of SDU is divided into;

1) Interview a sample of 120 undergraduate students of SDU to inquire about the needs for mobile applications to support study planning and learning. Two issues for the interview are

- mobile application requirements and
- mobile application functionality to support study planning and details of required information listed by frequency usage.

2) Analyze the results of the interview, categorize and calculate the mean and percentage of the needs on mobile applications to support study planning and learning processes for undergraduate students of SDU.

3.2 Data collection to measure satisfaction in undergraduate students, faculty members and administrators of SDU on the developed mobile applications to support study planning and learning processes for undergraduate students at SDU.

1) After developing of mobile applications to support the development of study planning and learning processes, the samples were asked to respond to the questionnaire asking about the satisfaction towards the functions of the mobile applications in 9 aspects which are Academic Calendar, Enrolment, Grade, Payment, Advisory, Learning Resources, Assessment, Requirement and Map. The questionnaire focuses on the satisfaction in four aspects of the mobile applications: content and use, design, manual and overview.

2) The data from the satisfaction questionnaire were analyzed using descriptive statistics, frequency, percentage, mean and standard deviation.

4. Data analysis

The results of the development of mobile applications to support study planning and learning processes for undergraduate students of SDU are presented as follows.

4.1 Studying the needs of SDU undergraduate students on mobile applications to support study planning and learning processes. The results reveal that the majority of samples indicated the functions of Enrolment as the most useful for their study planning and the other functions include academic calendar, grade, payment, learning resource, advisory, request, assessment and map respectively.

4.2 Developing the mobile applications to support study planning and learning processes for undergraduate students of SDU according to the following steps:

1) Design screen, color layout on background and icon for the use of application.

2) Design the links on each screen of the mobile applications.

3) Design the content and have the experts assess the consistency and appropriateness of the content.

4) Develop mobile applications to support study planning and learning process for undergraduate students of SDU as planned.

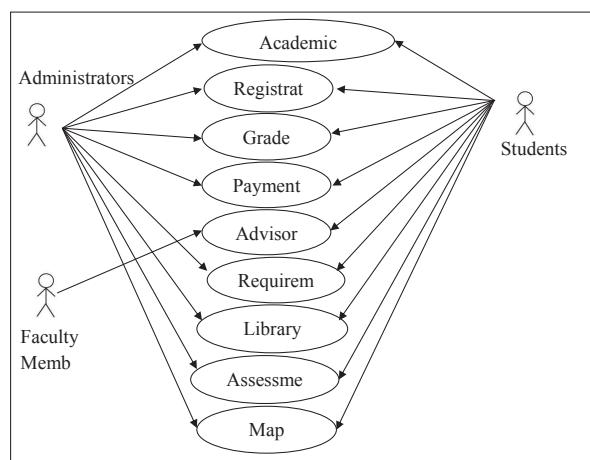


Figure 2 Features of mobile application and parties involved in exploring needs and satisfaction

4.3 Test the applicability of the mobile application in supporting the improved learning processes.

4.4 Measure the satisfaction of students, faculty members and administrators on mobile applications to support the improved learning process.

Features of Mobile Application and Parties Involved in Exploring Needs and Satisfaction are illustrated in Figure 2

Results

1. The results of the study of SDU undergraduate students' needs on mobile applications to support study planning and learning processes

The study found that the majority of samples indicated the functions of Enrolment as the most useful for their study planning and the other functions include

academic calendar, grade, payment, learning resources, advisor, request, assessment and map, respectively.

2. Results of the development of mobile applications to support study planning and learning process for the undergraduate students of SDU have been developed from the study of the needs of a sample of undergraduate students, faculty members and administrators at SDU. The details of the working screen are as follows:

Function 1 Academic calendar displays information about events according to the university's Academic Calendar. Displays in the calendar image, where students can click on the details and have notification as shown in figure 3.

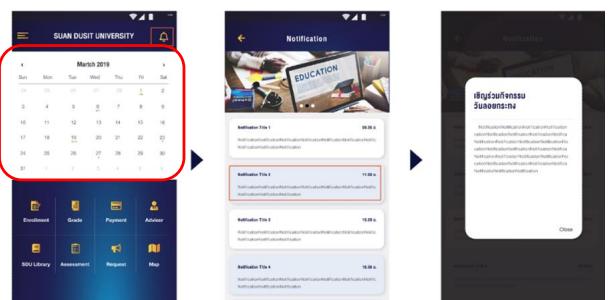


Figure 3 Function screen 1 academic calendar

Function 2 enrolment displays course information enrolled in each semester showing the learning day, classroom, lecturers, exam date, exam time and exam room as shown in figure 4.

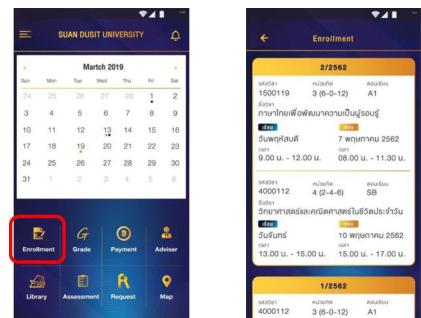


Figure 4 Function screen 2 enrollment

Function 3 grade displays the achievement results of each semester, the number of credit, accumulated credit, average and accumulated GPA as shown in figure 5.

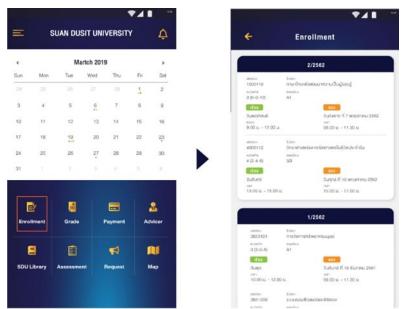


Figure 5 Function screen 3 grade

Function 4 payment displays the payment status information for each semester showing payment completed or owed as shown in figure 6.

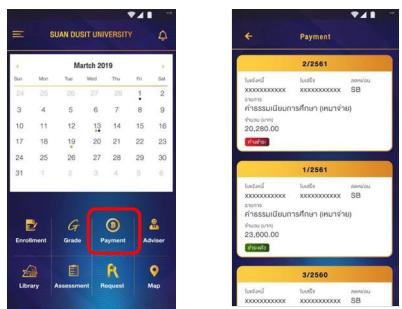


Figure 6 Function screen 4 payment

Function 5 library displays links to various online learning resources of the university such as e-book, e-database, Gen-Ed learning materials, etc. as shown in figure 7.



Figure 7 Function screen 5 library

Function 6 advisor displays information about advisors which include contact information, appointments from advisors via mobile application as shown in figure 8.

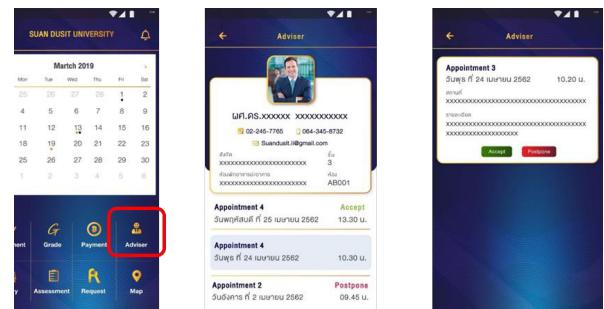


Figure 8 Function screen 6 advisors

Function 7 request displays the status of the request forms submitted by students to the Office of Academic and Registration as shown in figure 9.

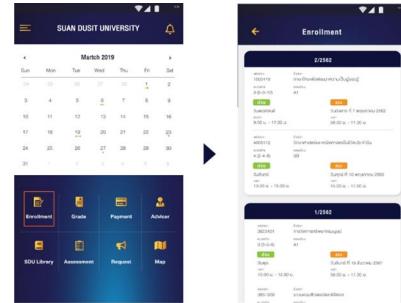


Figure 9 Function screen 7 request

Function 8 assessment displays the evaluation form for online teaching used by students to assess the lecturers' teaching management in each subject and semester as shown in figure 10.

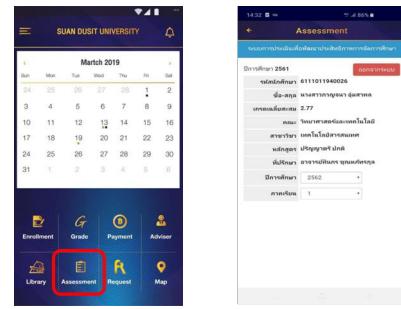


Figure 10 Function screen 8 assessment

Function 9 map displays information about the location of buildings, offices, telephone numbers of various sections of SDU and shows the same route as Google Map as shown in figure 11.

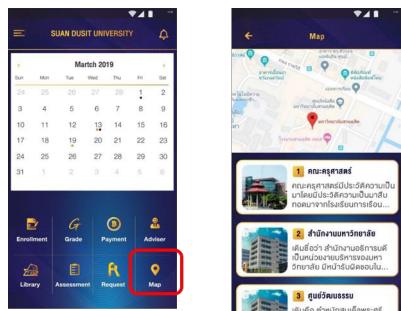


Figure 11 Function Screen 9 Map

3. The results of satisfaction assessment of undergraduate students, faculty members and administrators of SDU on Mobile Applications to support study planning and learning processes.

The study of samples' satisfactions towards the functions of the developed applications were examined. It was found that the highest satisfaction was with the function of Grade (Mean = 5.56, SD = 0.57). The satisfaction of other functions: Payment (Mean = 5.53, SD = 0.57), Library (Mean = 5.52, SD = 0.69) Request (Mean = 5.52, SD = 0.64) and Enrollment (Mean = 5.51, SD = 0.58).

Regarding satisfaction towards the mobile application in each group, undergraduate students reported 3 highest satisfaction on Grade (Mean = 5.56, SD = 0.62), Payment (Mean = 5.55, SD = 0.63) and Enrollment (Mean = 5.54, SD = 0.63). Faculty members reported 3 highest satisfaction on Payment (Mean = 5.65, SD = 0.55), Assessment (Mean = 5.65, SD = 0.57) and Grade (Mean = 5.64, SD = 0.57). Administrators reported 3 highest satisfaction on Grade (Mean = 5.47,

SD = 0.53), Academic Calendar (Mean = 5.44, SD = 0.52) and Map (Mean = 5.44, SD = 0.54). The details are shown in table 1.

Discussion

The results of the research on the development of mobile application to support learning processes for the undergraduate students of SDU revealed that the students, the faculty members and the administrators laid emphasis on the design, the use of beautiful colours, the recognizable symbols design, the clear separation of searching menus, the appropriateness of layout and visible fonts in making the application easy to use. The mobile application was developed based on a needs analysis of the users. According to the research study by Chatpreecha (2016), it is necessary to increase communication channels with students and those who are interested in further education, or to contact the university through mobile device to facilitate the use of students and users. The design that meets the user's needs is a vital element affecting the willingness to access and use the application. (Kunalittipon, 2014; Saekow, 2015; Saetiew, 2016)

The undergraduate students, faculty members and administrators placed the importance on the easy-to-use content, the accurate result displays, the up-to-date information and the clear and easy-to-understand explanations in the manual. According to a research study of Chatpreecha (2016), mobile application is a way to access educational information more quickly. This information includes courses offered at various levels, academic calendar, activities calendar, contact information, as well as places on campus. This results in the increase

Table 1 Satisfaction towards the functions of the developed mobile application reported by students, faculty members and administrators

Function of the mobile application	Satisfaction scores						Value average	SD	Satisfaction level			
	Students		Faculty members		Administrators							
	Mean	SD	Mean	SD	Mean	SD						
Grade	5.56	0.62	5.64	0.57	5.47	0.53	5.56	0.57	The most satisfied			
Payment	5.55	0.63	5.65	0.55	5.40	0.53	5.53	0.57	The most satisfied			
Library	5.51	0.93	5.53	0.62	5.43	0.53	5.52	0.69	The most satisfied			
Request	5.44	0.72	5.57	0.67	5.43	0.53	5.52	0.64	The most satisfied			
Enrollment	5.54	0.63	5.59	0.57	5.40	0.54	5.51	0.58	The most satisfied			
Academic Calendar	5.47	0.69	5.52	0.64	5.44	0.52	5.48	0.62	Very satisfied			
Assessment	5.50	0.69	5.65	0.57	5.42	0.55	5.48	0.60	Very satisfied			
Map	5.53	0.67	5.59	0.65	5.44	0.54	5.48	0.62	Very satisfied			
Advisor	5.45	0.72	5.46	0.70	5.39	0.51	5.43	0.64	Very satisfied			
Total	5.51	0.70	5.52	0.64	5.42	0.53	5.48	0.62	Very satisfied			

of frequent use of mobile applications via mobile phones to access information conveniently anytime and anywhere (Srisuwan, 2012 as cited in Saetiew, 2016).

The undergraduate students, faculty members and administrators reported that the developed mobile application could support study planning for the students of SDU. This finding is consistent with the research study of Chatpreecha (2016) which found that mobile applications are useful in accessing and sharing information to other people. The research study of Semertzidis (2013) (as cited in Sombat, 2015) found that mobile applications provide unlimited area of study and increase students' confidence in showing their learning progress.

The students, the faculty members and the administrators of Suan Dusit University reported most satisfaction towards the developed mobile application on the functions of Grade, Payment, Library, Request and Enrollment, with the remaining at a very satisfactory level. As a result of developing the mobile application based on the needs of the users, the high satisfaction was achieved.

Suggestion

Research studies evaluating the use of mobile applications to support study planning and learning processes for undergraduate students of SDU for efficiency improvements is of value for further study. Research studies improving the use of mobile applications to support education planning and management for the faculty members, academic staff and administrators of Suan Dusit University is recommended.

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