Thesis Supervision Mobile System for Enhancing Student-supervisor Communication

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Abstract—This paper investigates the problems facing masters' students with their thesis writing phases and completion. This research seeks to provide a smart solution that is beneficial, both to the advisor and student(s). Survey and interviews were conducted among masters' students to determine the challenges facing masters students in the course of their thesis writing phases and completion process. Based on the results of the survey and interviews, a concept model for thesis supervision system (TSS) was developed Providing an automated supervision systemmight encouragestudents and advisors to communicate in an efficient way resulting in more quality of thesis outcomes and reducing the delay in thesis process. Moreover, the user interface mimics the TSS process in an interactive way that illustrates how the application would be depicted when designed.

Keywords—Thesis supervision system, higher education, mobile learning, mobile application, student-advisor communication, peer collaboration.

1 Introduction

The internet and technology have altered traditional education into more efficient and flexible learning due to the introduction of e-learning systems and m-learning applications. However, despite the rapid growth in these educational technologies, graduate students are facing challenges with progress in their thesis as the same traditional methods are applied. Many graduate students are facing obstacles to obtaining their degree because of the delay in thesis completion. Research shows that 50% of graduate students do not get their degree awarded to them, and 25% of the students dropped out of graduate school, after finishing their coursework, but before completing their thesis [1].

In most universities in Saudi Arabia, it is expected for master students to graduate in two years. However, a lot of students do not graduate in two years due to delay in thesis completion. Therefore, to identify the difficulties and obstacles of graduate students and their advisors to complete master thesis and determine users'

requirements and expectations of Thesis Supervision System (TSS). This paper used survey and conducted a case study about King Abdulaziz University (KAU) students and advisors. Students claimed that lack of communication with thesis advisors result in failing or delaying in thesis completion. For advisors, with their busy schedules and other responsibilities, it is challenging to provide instant communication and supervision for students on time. Currently, students and their advisors are communicating either face to face or through email, without having a proper tool or platform that enables structured supervision, showing both the advisory monitoring and student's progress. The unavailability of this mechanism results in some problems such as: lack of documentation for student's work and advisor's feedback. In some cases, students submit their work and the advisor do not receive it; or the advisor takes a long time to respond to grant the student feedback and approval. The use of email for communication also results in many received messages that contain students' research work which could be hard to be tracked by the advisor. This eventually delays the progress of the thesis. Moreover, it is difficult for the faculty management to monitor and observe the reasons behind the delay of thesis completion because of unavailability of documented/recorded progress between advisor and student. Thus, the advisor or the student cannot prove who caused the delay when the expected time for submission ends. Another challenge students are facing is the inability to structure, plan work, and commit to thesis tasks [2].

The use mobile applications with Information and communication technology (ICT) in higher education would bridge the gaps between the students and their advisors as well as reduction in the miscommunication between them. According to [4] and [5], it was reported that the central aspect of supervision process in higher education is the advisor-student relationship, which could be related to other factors. For instance, time constraints, quality of work and process of learning of the learner, the benefits and satisfaction of student and advisor, to understanding, improving and evaluating the supervision processes. Related to this, to guarantee the successful relationship between the student(s) and their advisors by following up students' process of thesis completion through ICT and attending meetings from student and advisor through technology. To highlight the cooperation between the group of students who are supervised by one advisor, based on [6] and [7], who is a member of Cardiff University. They asserted that the project or the master thesis is a multi-actor collaboration, between advisor or sub-advisor, student and the other students who are supervised by one advisor. However, research students depend on contact with their advisors to lead or guide the students and to contribute in these theses. University always encourages advisors and students to backup and document proofs as the instructions and decisions of each meeting.

This paper examines the problems that are facing masters' students with their theses. It provides a smart solution that is beneficial for both the advisor and students, which would facilitate the progress of their theses writing and completion. The proposed TSS is a novel way to allow masters students to manage their thesis progress along the semester. Students and advisors will be able to manage the thesis writing phases and tasks on the system, starting from the proposal until submitting the final version of their thesis. Communication and supervision are important factors to com-

plete thesis during the allowed and expected time limit. Documenting the thesis progress electronically through a university-accredited platform keeps students and advisors' rights in case of any issue. The system should allow exporting reports that can be reviewed by faculty management, advisors, and students to monitor the workflow. However, having all the mentioned features supported by using the intelligence of smartphone applications, it is expected that it would achieve the primary objectives with a high level of quality in thesis outcomes. When users have direct access to the system through their phones, they would have the chance to record all notes that might come up in their mind at any time. Also, the system will encourage advisors to provide frequent feedback and comments on student's work, resulting in modifying the work before it's too late for major changes.

2 Background and Literature Review

The completion of a thesis is what most of the graduate students struggle with, resulting in a delay of their degrees. Study [8] examines the reasons behind the delay in thesis completion. The research found out that the thesis advisor plays a vital role in thesis progress, and influences the end of the thesis. According to [8], results have shown that meeting frequently with advisor would facilitate the work and progress of the thesis. However, for some students, providing structure for the thesis process had no impact. That might be as a result of the individual's variances such as the students' level of motivation, experience with research, and time management skills.

In regard to institutions benefits, according to [9], for any educational institution, the level of student's performance, institutional goals and outcomes depends on the staffs' qualitative level of their performance. For that reason, advisor's outcomes and affections on student must be measured to get a better level of the rate of the university between other universities [9]. By tracking students' activities, tools, and the grade of their progress on the system, they will increase the level of the quality in their projects and assignments, and it is easier for the advisors to direct students. Recent studies confirmed that some ICT tools play a critical role to shape the pedagogical process and teaching, supervision mechanism and protocols of the lecturers and advisors [3].

For students' benefits, enhancing teamwork and cooperation is one of the most critical roles of ICT as a promoter of students' cooperation. In [10] studied many cases of students' cooperation with the use of ICT. Where, the high rate of cooperation which is observed with that group of students wasn't accidental. Thus, to analyze and classify the cooperation between the learners, the teachers recognized the high cooperation among learners in the educational environment as a clear result of the use of ICT and required characteristics in the learning process. Therefore, all the universities should allow different access to ICT at home and in school. Furthermore, the students gained good qualities, became more active and had a desire to learn more than before.

The evolution of wireless technology and handheld portable devices has resulted in changes in the lifestyles of people. A lot of technological devices today are in portable form [11]. Also, the growth of wireless technology and information technology

increases the availability of mobile devices. The mobile devices are attracted by all, because it is cheap, portable, and flexible [12].

According to [12] , M-learning is a type of electronic learning (e-learning). By using the mobile application, students can flexibly access the contents. Furthermore, the application is more useful where the students could not attend their classes due to the personal or medical reasons. The mobile application was developed in integrated environment, and it is uploaded in the application stores. The user can download the mobile app from the store. Mobile application helps the learner and makes education more efficient. Study [13] mentioned that M-learning is any learning which uses wireless mobile devices such as PDAs, smartphones, and tablet PCs. M-learning spreads because these devices can move with students and allows learning anytime, and anywhere. The fast spread of mobile devices and wireless networks in the campuses makes it a suitable place to use m-learning.

Study [11] found that the features of mobile learning makes information accessible and available, supports group work, improves collaborative learning and communication in the classroom, and enables content to be delivered quickly. Mobile Learning facilitates interaction and cooperative learning, regardless of physical location, and it offers immediate feedback. Thus, mobile learning increases motivation and influences educational outcomes by shifting the nature of education and learning into more personalized, learner-centered, and ubiquitous learning by the use of mobile technology [14]. M-learning is a successful approach, and also in the future because these devices (tablet PC, smartphone, PDAs) are attractive among students, especially higher education students. These devices allow university students to access course materials and ICT; learn in a collaborative environment and obtain from instructors the evaluation and feedback [13].

3 Methodology

In this research, we hypothesize that adopting an online thesis supervision system will reduce the problems in thesis completion and enhance thesis outcomes. Hence, we present our research questions:

- What are the difficulties facing graduate students and advisors in master's thesis process?
- Will the usage of TSS solve these problems?

To answer these questions, we conducted the following:

1. Survey on the issues facing graduate students with thesis completion. This survey was available in an online format to collect the data from graduate students and their advisors.
2. Use KAU as a case study. Interviews were conducted with students and advisors from different fields to investigate and have insights about the cur-rent process of thesis problems.

Based on the survey and interviews results, a conceptual model for TSS was developed.The conceptual model illustrates the process of TSS and different types of communication/interaction that can be facilitated through TSS mobile application. Moreover, an interface design for thesis Supervision System Mobile Application was developed to mimic the TSS process interactively to illustrate how the application would work. The two methods will be discussed in the following sections.

3.1   Survey participants and results

A quantitative questionnaire was used. It was available in an online format to collect the data from graduate students and their advisors. The goal of the survey was to understand the issues and obstacles facing master's students and advisors to complete master thesis with no delay. Also, to understand the users' requirements and expectations of an automated thesis supervision system (TSS). The survey involved 72 participants. Most of the participants are master students and only 19.7 percent of Ph.D. students. According to the survey result, more than half of the participants did not complete their thesis, and 31 percent of them spent more than two years to complete it and only 2.8 percent of students completed their thesis in one year. The majority of participants found that reaching their advisor or student was hard. According to the survey result, most of the participants were graduate students. More than half of the participants did not complete their thesis, and 31 percent of them spent more than two years to complete it and only 2.8 percent of students completed their thesis in one year. The majority of participants found that reaching their advisor or student was hard. A large number of them use Email to communicate with their advisors or students, and some of them use WhatsApp, SMS, and phone call. More than half of the participants faced distances restrictions, and 38 percent faced schedule restrictions to meet their advisors or students. Almost all of the participants think that creating a new recording system or tool for thesis supervision will resolve the problems of the current way of supervision. 28.2 percent preferred to use mobile application for TSS, 15.5 percent most likely to use a system, and 56.3 percent chose both platforms. Participants suggested to put standardization plan with two side notifications for meeting that should be controlled by the Deanship of Graduate Studies to enhance the commitment for all parties, using recorded voice, reminders, and schedules. Also, they suggested having monthly reports from advisors to explain tasks' status to reduce the duration of thesis completion.

3.2   KAU case study content

King Abdulaziz University (KAU) has a master's degree for 19 colleges and 115 study programs as reported on their website. According to the conducted interviews with master students and advisors, KAU has many facilities for both of them to achieve the primary goal of the master educational process and the thesis outputs. Whereas, it provides various electronic services to support the initial stage of the master as well as thesis stage. KAU has a membership with Saudi Digital Library (SDL), which contains 200 million scientific articles, including 550 thousand digital

references, and 160 thousand journals, periodicals and articles. Furthermore, it depends on a Gmail platform to send and receive by many different methods and tools, such as: drive, documents, meet, hang out, and so on. These services are useful but not enough as reported by the interviewees, for many reasons. Firstly, students and advisors cannot reach most of the services after graduation or resignation because the accounts would be expired. Secondly, thesis parties need a more specialized and interactive platform that meets the user's requirements and expectations to bridge the gap. Therefore, advisors sometimes suffer from time and schedule limitations with his/her students, students' procrastination in attendance for meetings. On the other hand, students want more flexible way of meetings with their advisors, delay in response to their work and lack of a specific time-bound plan. All of these difficulties complicate the advisor's work and delay the student's graduation.

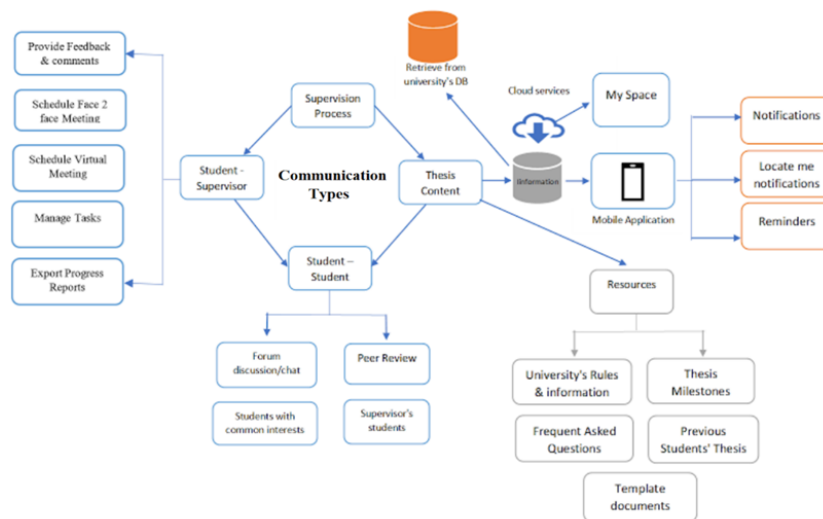## 4 Thesis Supervision System (TSS) Conceptual Model

Fig. 1. Thesis Supervision System Concept Model

The conceptual model illustrates the process of TSS and the different types of communication/interaction that could be facilitated through TSS mobile application. This process enables students and advisors to communicate in an effective way resulting in more quality of thesis outcomes and reducing the delay and communication issues found; based on the survey and KAU case study. Advisors can provide feedback and comments. Also, students and supervisor can schedule meetings either face to face or virtual through a video call. Additionally, students will be encouraged to self-manage their tasks under a structured .supervision Tasks can be specified according to priority and importance with the ability to add an alarm or reminder for each task. Any progress happens between the student and advisor will be recorded and

exported as reports if needed. Furthermore, TSS process supports peer collaboration where students and other students with common research interests can easily communicate and exchange information and expertise. Students will have access to required thesis materials and resources easily without being dependenton the advisor to provide all the resources and information. The use of TSS mobile application will make the communication process more coherent and user-friendly, where students and advisors will have the option to receive notifications and reminders from the application. One of the features that TSS shall support is the use of Location-based service (LBS) that specifies the location information of students and advisors; they have the option to either activate the feature or disable it. Through the telecom operator's network based on a supportive electronic map platform. We call this feature " Locate me" it will allow the student/advisor to know if they are near each other and easily schedule a meeting when the time is suitable. TSS would be more efficient when it is implemented based on cloud computing storage, to take advantage of itsservices. In [15] study asserted that the Cloud computing service is a type of IaaS, that most users prefer to use cloud storage services which provide additional differentiated functions through mass storage. The main reason is the ease to access cloud storage services via using smartphones and tablet PCs, to access through a Web browser via Windows or Mac system and applications via iPhone or Android platforms. Also, it allows users to edit and manage all of the textual notes, images, Audio files, videos, and email capacity, through offering services such as namely Google Docs, Dropbox, Amazon S3, and Evernote. Therefore, TSS needs to use cloud computing storage with mobile application and LBS, to reach a higher level of satisfaction and quality for all TSS parties. TSS supports the query process for students and advisors parallelly with collaborative filtering via clustering. That splits the big data into clustered data with same characteristics in one section. By using K-means algorithm for clustering collect and deliver similar services to the user for mining big data to retrieve data efficiently and in less time. Moreover, TSS application interacts with database management system (DBMS) hosted on the existed KAU database server to retrieve the needed data for queries and processing. The smartphone's user interface (UI) for iOS apps is suggested to be developed by Swift language and Android via XML resource files with Java code.
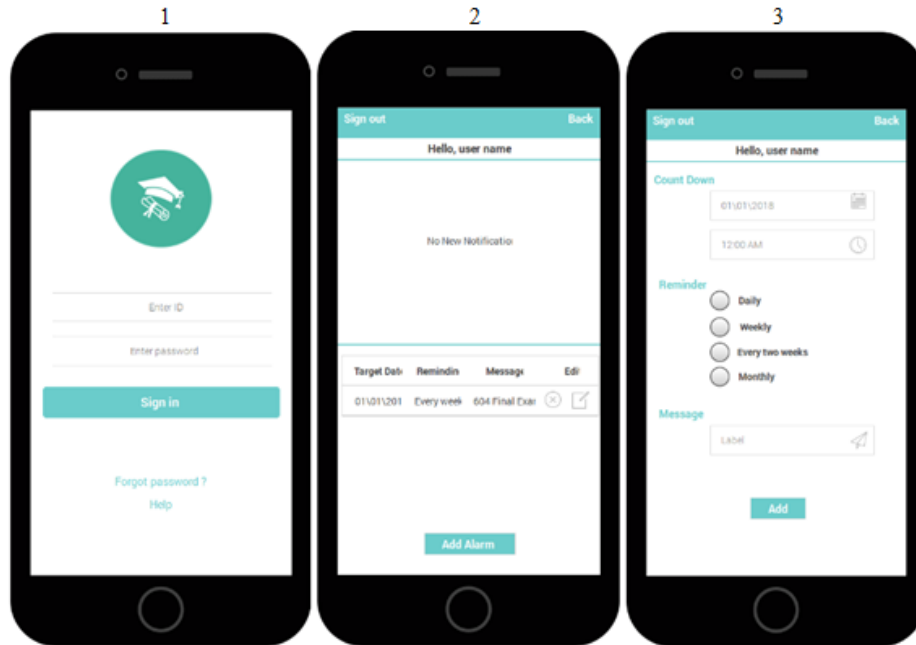
5 User Interface Design

Fig. 2. Login (1), Notifications (2) and Adding alarm (3) interfaces of student and advisors

Students and advisor have an interface with many icons which includes many services and sub-services (see figure 3.1). Task management icon allows the advisor to add or response tasks and enables the student to manage their own tasks and assigned or pending assignments. There are theses milestones to view students' plan by the students and modify them by the advisor. Resources provide templates, frequent questions, previous students' theses and university rules for both users. My space depends on cloud storage that allows users to download and upload many types of files (see figure 3.2). Peer collaboration supports the communication with students that supervised by the same advisor or students with common interest. Meetings supply virtual and face-to-face meeting services. Reports are provided for viewing and printing by users. Finally, users can adjust the services options or activations status, especially detecting user's location by others to ask for a sudden meeting (see figure 3.3).
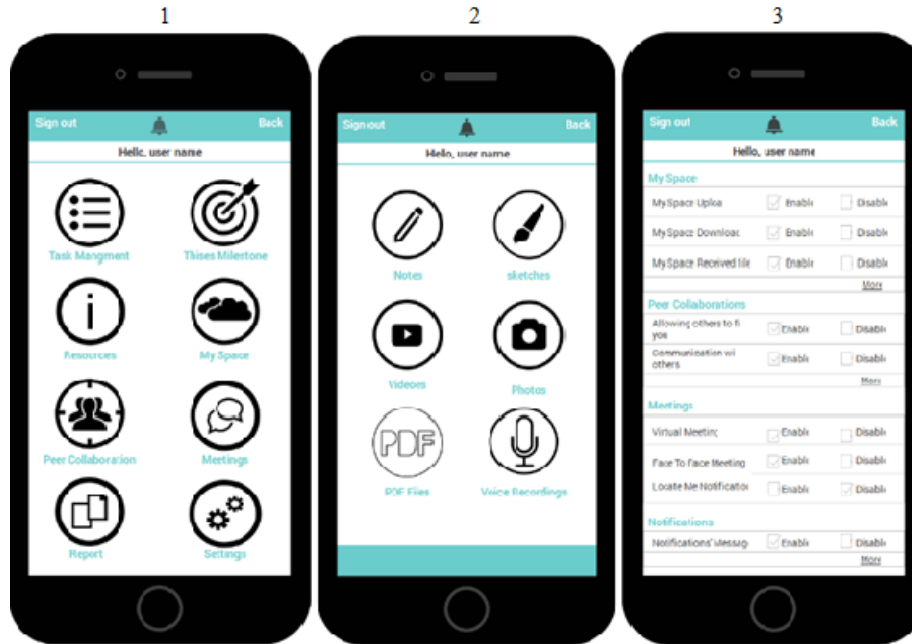
Fig. 3. The main UI (1), uploading files on my space (2) and settings of student and advisor (3)

The interface is designed to test the usability of TSS by master students; (see section 6) however, the functionality is yet to be tested in future work.

6 Usability Test

There were 10 master students in this test. Overall most of the participants had an expected opinion by using the system which was positive, especially the level of their satisfaction when achieving the goal of the system. Thus, most of them thought that by using this system during their postgraduate studies would increase the level of their research outcomes in term of the quality, since it helps them to achieve more progress in their thesis completion in shorter time with a faster way of communicating with their supervisors. On the other hand, for the supervisors, in terms of providing feedback and viewing the drafts, they thought that the system has a friendly user interface and an attractive design.

7 Conclusion

This paper examined the obstacles and problems facing graduate students and their advisors in theses process, and suggested a concept model for thesis supervision based on the findings of the survey and case study. A main finding of this paper is that almost all the survey and interviews participants thought that creating an online tool for

thesis supervision will resolve the problems of the current way of supervision. Most of the participants were enthusiastic about the idea of using a mobile application for managing thesis tasks and resources. Thus, a smart solution was suggested to solve all the issues found in the results of the survey and interviews. Providing an automated supervision system might encourage students and advisors to communicate in an efficient way resulting in more quality of thesis outcomes and reducing the delay in thesis process. The use of TSS mobile application will allow users to have direct access to the resources and information which would enable the advisor(s) to provide prompt feedback and comments on student's work easily, resulting in modifying the work before it is too late for significant changes. Peer collaboration encourages students to work together by reviewing each other's work and receiving feedback from different perspectives.

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