

A Design of Mobile Application for University Management Systems Using Android

Tarek H.Ahmed^[1], L. Abdul Kadhar Sheriff^[2], A.ShameemFathima^[3]

College of Administrative and Financial Sciences

Taif University
Taif - Saudi Arabia

ABSTRACT

Android is an open source operating system for mobile devices. During the last few years, much research has been shaped, targeting to bring Android to other platforms such as sub-notebooks or embedded systems. Our target is to appraise if Android is a suitable platform for University Automation. Taking into consideration this promising setting, a study was undertaken to realize the impact of such an environment, made possible by the android platform, on the learning process amongst students. In the research undertaken, the goal of study is three-fold: first, to understand the benefits of learning through mobile devices (m-learning), second, to provide an analysis of principles, patterns of mobile interface design and tactics for solving common mobile development problems, and third, to produce a new m-learning application, based on the findings of this study, which offers direct communication between students and teachers. In order to establish this communication, the application offers poll forms that can host questions with various answer choices. The use of polls also enables the fast collection of students' responses and viewing results on the screens of mobile devices. The proposed system will introduce and improve interactivity, accessibility, and convenience in the learning process. Overall, this college management system application can be utilized as an inexpensive but potent tool that compliments the learning process.

Keywords: — Android, Android SDK, Mobile Network, Education System, m-learning

I. INTRODUCTION

The convergence of Mobile technologies is playing an increasingly important role in college students' academic lives. Due to the combination between advanced mobile phone technology and computer technology at present, mobile phones are not just telephones, they have become smart phones. Particularly, after the 3rd Generation International Mobile Telecommunications or 3G mobile networks were officially launched in Thailand in May 2013, smart phones and other mobile devices can be used efficiently because the transmission speed of data increases significantly.

Devices such as smart phones, tablets, and e-book readers connect users to the world instantly, heightening access to information and enabling interactivity with others. Applications that run on these devices let users not only consume but also discover and produce content.¹ As such, they continue to transform how college students learn, as well as influence their learning preferences, both within and outside the classroom.

The popularity of mobile technologies among college students is increasing dramatically. Results from the ECAR research study on students suggest that many undergraduate students bring their own digital devices to college, favoring small and portable ones such as smart phones and tablets. Although students still rate laptops (85 percent) as the most important devices to their academic success, the importance of mobile devices such as tablets (45 percent), smart phones (37 percent), and e-book readers (31 percent) is noticeably on the rise. Increasingly, students say they want the

ability to access academic resources on their mobile devices. In fact, 67 percent of students' smart phones and tablets are reportedly being used for academic purposes, a rate that has nearly doubled in just one year.⁴

Convenience, flexibility, engagement, and interactivity are all factors that make mobile learning more attractive to students. Many universities now use mobile technologies and create mobile-optimized versions of their websites or build stand-alone applications that can be downloaded from mobile application stores.[1]

Many colleges and universities use CMS to deliver course content to their students via an Internet browser to the students' personal computers or laptops. One of the most popular CMS is Blackboard Learn, which provides course announcements, syllabi, documents and handouts, assignments, external links, blogs, discussions, and grades. Blackboard Mobile Learn is a newly released mobile application (or app) that offers similar course content on mobile devices, giving students "anytime, anyplace" access to their Blackboard courses (Caudill, 2007, p. 1). The mobile devices currently supported by this mobile application are iPad, iPod Touch, and smart phones iPhone, Android, and BlackBerry (Blackboard Inc., 2010). Like most mobile applications, Blackboard Mobile Learn requires a network connection; hence, the mobile device needs either a Wi-Fi (Wireless Fidelity) connection or a 3G/4G cellular network connection with a data service plan. Blackboard Mobile Learn allows students not only to browse course content but also to interact with courses. For example, a student may read course discussions using his or her iPhone and then add comments to it; this practice is an example of mobile learning.

There is little research regarding mobile applications, as companies who develop these applications only recently released them to the public. The findings of this study may support decision making at other colleges and universities to deploy mobile learning applications, thus providing students with a new educational tool that will make edification possible whenever and wherever students desire it.

To successfully adopt mobile technologies across our Taif University, however, we need more information about the student population's mobile access and use. We have to focus our study on students' access and use of mobile technologies, paying particular attention to their use of mobile devices and applications, and their learning practices. Our research sought to answer the following questions:

1. What mobile devices do college students have for accessing and engaging with digital content? Do demographic factors influence this access?
2. How do college students use mobile technologies (devices and apps) for academic purposes? What demographic factors influence this use?

Our goal is to provide a baseline of mobile technology ownership and usage on which to build future research. We expect that the results will guide potential initiatives to help students and instructors in adopting more effective learning and teaching practices across content areas. We specifically address the implications for student training and skill development and for instructor support. An application that offers operations to support distance learning, such as enabling a student to share his opinion through polls, a teacher to post announcements, share his files with his students and quickly collect the students' responses from polls, can be the start of an m-learning promotion and, thus, is one of our goals in this research project. In order to produce a useful m-learning application, we also study the benefits of m-learning and make an analysis of principles and patterns of mobile interface design.

II. LITERATURE SURVEY

All researchers have aimed to develop and provide a generalized solution to monitor the various works that are carried out by a college for automation of various tasks. They provided up to date information of the system which improved the efficiency of college record management and decrease the room between student and college. A few major contributions to this topic are summarized below:

S. Shivasubramanian, S. Sivasankaran, and S. Thiru Nirai Senthil [1] proposed one of the first computational schemes An Android Based Mobile Application to Monitor Works at Remote Sites. This application provided a generalized solution to monitor the various works that were carried out by a construction company at different geological points. By using a Web Service the data was stored in the remote database. This mobile application requires General Packet Radio Service (GPRS) or Wi-Fi technology to reach the remote database. Using data in the remote database various reports were generated and projected as a MIS [Management Information System] web application.[1]

Sanjay T. Attendance [2] proposed attendance Management System to generate an android application to calculate the attendance of the students in colleges and updating the result directly into the college server. The data would be stored in the smart phone if the internet connection was unavailable at that time. When the internet connection was available, then the faculty could login into their college account and update the attendance result.

Shradha S. Chawhan, Mangesh P. Girhale, and Gunjan Mankar [3] worked on MPBAS that helped lecturers to take the attendance of students using Smart-phone. Lecturers would login to the phone application, get connected to the server and take attendance using Smart-phone. After taking the attendance in the mobile, lecturers would send it over to the server using GPRS and attendance list would be updated automatically. Lecturers would be able to edit the attendance by login on to the website. Students would be able to view their own attendance as well as curriculum details. To reduce the chances of fake attendance, the project would include Location detection using GPS. Also email would be sent to the students by the lecturers, notifying them of their regular activities.

S. R. Bharamagoudar, Geeta, S.G. Totad [4] worked on Web Based Student Information Management System that provided a simple interface for maintenance of student information. It could be used by educational institutes or colleges to maintain the records of students easily. The creation and management of accurate, up-to-date information regarding a students' academic career is critically important in the university as well as colleges. Student information system deals with all kind of student details, academic related reports, college details, course details, curriculum, batch details, placement details and other resource related details too.

Eiichiro Tsutsui, Kazuharu Owade, Yusuke Kondo, Michiko Nakano [5] A Proposal For A New-Dimensional Online Feedback System: Focusing On Individual Learner Differences purpose of this study was to create a new method of assessing individual learner differences in the contexts of language learning. Their questionnaire-type items used in that system was based on SILL (Strategy Inventory of Language Learning) questionnaire items.

Namrata Shahade, Priya Kawade and Satish Thombare [6], proposed Student Information Tracking System an Android application to manage student attendance on mobile. In many colleges teachers used to take attendance manually. Main objective of this project is to add mobility and automation in the existing attendance process. This system helps teachers to take attendance through mobile and also keep in touch with student in some aspect. This System allow teachers to take attendance, edit attendance, view student's bunks, send important documents in pdf format such as exam time table, question bank etc. and also helps teachers to inform students about the events that college was going to organize. This system also helped students in specifying bunks, deleting bunks, viewing their bunks. This system gives a prior

intimation to student as soon as his attendance goes below the specified attendance deadline in the form of an alert. This system helps students to keep in touch with the events that college was organizing.

Yohei KAWAGUCHI , Tetsuo SHOJI , Weijane LIN, Koh KAKUSHO , Michihiko MINOH proposed a system that took the attendance of students for classroom lecture. Their system took the attendance automatically using face recognition. However, it is difficult to estimate the attendance precisely using each result of face recognition independently because the face detection rate was not sufficiently high. Here they propose a method for estimating the attendance precisely using all the results of face recognition obtained by continuous observation. Continuous observation improves the performance for the estimation of the attendance .They constructed the lecture attendance system based on face recognition, and applied the system to classroom lecture.

Researchers who focused on specific mobile learning applications include Chapel (2009) and Andone et al. (2007). Chapel provided a case study of the implementation of the Montclair State University's (MSU) Campus Connect application. This mobile application integrated communication, collaboration, safety, and academics (Chapel,2009). Academic resources were available through the mobile Blackboard Learning System, which provided course information, such as announcements, syllabi, assignments, handouts, and access to podcasts and video casts. The reasons provided for implementing MSU Campus Connect included supporting technology initiatives that align with the university's mission, maintaining a lifeline with the students in case of emergencies, increasing academic participation, improving student retention rates, and "strong student participation in a more well-defined campus culture" (Chapel, 2009, p.17). Chapel focused on the four-phase implementation of this mobile application; however, he did not augment the study by surveying students to gain their perceptions of the mobile application.

Researchers of the scholarly journal articles reviewed for the literature review used a variety of research methods, including surveys with a cross-sectional design, qualitative case studies, and mixed methods.

III. KEY ISSUES TO BE ADDRESSED

Although some research exists on mobile technology use in higher education, many factors influencing this use have yet to be fully explored. Multiple devices are available to and owned by students, which can complicate issues such as the design of training and provision of support. Although many students own mobile devices, ownership is not universal. Identifying specific student demographics that might relate to ownership trends is thus critical. It is also important to determine which devices are most helpful for academic use; mobile technologies afford new opportunities for learning, but their use does not guarantee that effective learning will take place. Effective use of mobile technologies requires that students

exhibit digital literacy skills such as being able to access, manage, and evaluate digital resources.⁸ Further, students might be informally using many different applications for academic purposes, making it difficult to determine what they use and how. Research has shown that having a clearer understanding of students' mobile practices encourages the university to implement more student-centered support and services.[9] Technical training and skill development emerge as important factors, and students perceive both as more important than the technology itself.[10] These issues of student access and use of mobile technologies also have implications for instructor development. Although students expect instructors to use technology to engage them in the learning process,[11] Instructors generally are unprepared to integrate mobile technologies in learning, as most faculty professional development opportunities do not specifically focus on it. Also, because student performance is usually assessed by finished products, it is difficult to ascertain if using technology contributes to or limits students' engagement and learning. Finally, technology use is further influenced by the modality of courses in which it is used. Understanding students' mobile practices more deeply can guide informed instructor development in the future.

Because the technology is moving at a faster pace than research, mobile learning research is still in the relatively early stages, [12] with mobile phones and PDAs the most studied devices. [13] The implications of newer mobile technologies — such as tablets and e-book readers — on learning are less discussed.

Mobile learning often takes place outside a formal learning environment, and it tends to become personalized via users' personal mobile devices. As a result, one major challenge for mobile research is capturing data on user demographics and usage of specific mobile devices. Moreover, previous studies focused mainly on investigating student motivations, perceptions, and attitudes toward mobile learning,¹⁴ but few focused on mobile learning practices and strategies.[15] Although mobile learning support is rare in classroom settings, research on faculty support regarding how mobile technologies can be used for teaching is even scarcer. Therefore, more research is needed for mobile teaching and learning strategies and how these strategies are implemented to engage learning. [16].

To summarize, there is a suggestion that the theory of m-learning must be tested against the following criteria:

- ✓ Is It Significantly Different From Current Theories Of Classroom, Workplace Or Lifelong Learning?
- ✓ Does It Account For The Mobility Of Learners?
- ✓ Does It Cover Both Formal And Informal Learning?
- ✓ Does It Theorize Learning As A Constructive And Social Process?
- ✓ Does It Analyze Learning As A Personal And Situated Activity Mediated By Technology?

IV. PROPOSED METHODOLOGY

There is a great need for a fast, reliable, efficient and easy automated system which will help in updating and provide the best way for interaction in short duration of time. The challenge is that “people expect to be able to work, learn, and study whenever and wherever they want to” (Johnson et al., 2010, p. 4). Mobile computing solves this challenge by “maximizing the impact of learning by ensuring it is timely and efficient” (Johnson et al., 2010, p. 4). Mobile devices now provide access to information and services that were previously available only on networked personal computers.

The proposed Android and Web Based Application that Manages College System is designed to provide more easier way to the users to add and retrieve information quickly. Once the users open this Android and web application, at the front end all the schedule/event is available to everyone in a precise manner. There are mainly five types of users. They are Student, Parent, Teacher, Higher Authorities and Administrator of the college. The administrator is the master user; he gets the most number of priorities than the other users. The different functions involve in the case of an administrator are updating college information, approvals, events etc. The administrator can view and approve the various records.

Students can use the Android application with the some authentication. Students can view and enter information around the clock and from any location. Students can edit their Profile, and update them constantly. Students can very flexibly search for other student and view College schedule and details, and interact with other student and also teacher via messaging. They can also send a feedback to higher authority. A registration of Student is done by the class Teacher. Student will be kept in touch by an automated notification by message. They will have access of forum, with which they can post queries, reply queries. This will help the student as there will be sharing of ideas by wall. Students on notification will also use the system to read important announcements, to obtain information on performance, to see the results of assessments recorded in the system.

The teacher can also use the Android application with some authentication. Teacher can edit their Profile, and update them constantly. Teacher can view College schedule, events and details. They can take Attendance using the application, and also update the performance of student. Teacher has authority to provide an authentication to student, also interact with students via messaging. Teacher has access of forum, with which they can post queries, reply queries. This will help the student as there will be sharing of ideas by wall.

Higher authority uses the web application and can assign specific work to the teacher. The higher authority can set the events also send a queries on wall and the very important thing is that they can read the feedback which is sent by students. They can send the queries to student, teacher and can see the performance of overall class or particular student and also interact with them via messaging. They are second higher

authority who will control the departmental work. Administrator is connected with this system using web application. He has centralized control on this system. He will have the authority to allocate the higher authorities to various departments. He can check the department wise performance and send the queries on wall and also interact with others via messaging. He arranges the events, set the notices using this system. The guideline is approved by administrator which follows by other.

With the advancement of technology, paperwork is being reduced substantially in every single field. With the introduction of this application, an institution can operate efficiently without the use of a medium like paper. Hence, this will prove to be a very useful application for any institution.

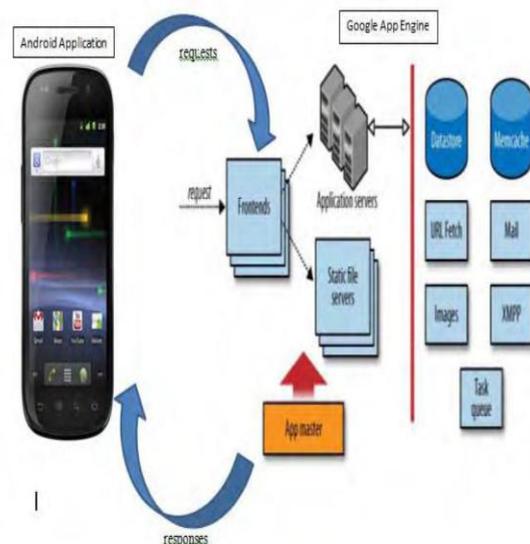


Fig. 1 Overall System Architecture

Also, as more and more students and teachers find out about the use of this application, other developers will be encouraged to make this Android application in other languages, which will improve education in different ways.

A. Widening Participation:

The key advantage for most regions was enabling wider access to digital learning for “any person, anytime, anywhere.

B. Adaptable and flexible teaching/learning:

The use of digital materials and methods allowed easy adaptation and updating of material for an increasingly diverse student base, incorporating an ever wider range of teaching tools e.g. the capacity to provide content in 2nd or minority languages for specific learner needs.

C. Motivating teaching/learning environments:

All regions reflected on the “transforming and inspiring” potential of eLearning for the teacher and teaching method.

D. Quality and Efficiency:

A final consideration was the potential of eLearning to improve the efficiency and effectiveness of the learning process.

V. SUMMARY OF THE DESIGN FEATURES FOR MOBILE APPLICATION DEVELOPMENT

This section presents the design features that would be beneficial for a mobile application to have. A description of the design characteristics of m-learning applications is given, followed by an analysis of the general mobile design principles and mobile user interface patterns. Some key points for the proper design of the activities that are supported by the mobile devices are the following:

- ✓ The relationship between the student and the teacher must be important, because it helps students understand the technology and apply it to practical educational scenarios in basic education.
- ✓ The various activities that rely on mobile devices should help teachers associate the use of mobile devices with traditional teaching in classroom.
- ✓ The moral dimension is critically important as we move towards a world where technology is ubiquitous. So we need to respect the privacy of each student.
- ✓ The representation of data on mobile devices is also an issue. What must be taken into consideration is not only the small size of the screen, but what representations are more suitable for data presentation of the course. For example, poor presentation of the text on the screens of mobile devices acts as a constraint on the optical types.
- ✓ The role of mobile devices in the process of socialization and its impact on learning is still under investigation.

The important thing is to see that m-learning can play a more facilitating role in learning, rather than its own autonomous role. The main contribution of this research is the design and development of an android based college management system. Collaborative learning seems to be a teaching and learning innovation whose time has come. It will make a student actively engage in building their own minds. Basically, the main objective of android based college management system is to obtain learning advantages on hand-held devices particularly mobile devices which allow accessing and sharing of learning materials anywhere and anytime. The application will not only help the students to obtain notifications from the admin, but it will also help the staff by providing a convenient system to communicate with

the students and inform them about upcoming submissions and events.

Application is based on an existing system called Moodle (acronym for Modular Object Oriented Dynamic Learning Environment), which is a free software e-learning platform. It is also called Learning Management System, or Virtual Learning Environment.

The advantage of application is that the existing system has been taken and made portable by creating an application that can be used on a mobile device, both by students and staff alike.

Portability does not just provide convenience; it also reduces the amount of paperwork by a substantial margin. Hence, the entire research project helps the students and teachers, along with the admin, to operate and learn in an environment that is more transparent, convenient and direct.

VI. CONCLUSION AND FUTURE WORK

The contribution to the education and mobile developers' community is described in this section. The contribution is addressed below:

- ✓ A study and analysis of m-learning and its theory was made:
 - Key features were analysed.
 - The factors that create learning incentives in m-learning were analysed.
 - Current perspectives and valuable elements were analyzed.
 - The benefits and the arguments for/against the m-learning were defined.
- ✓ Design principles and patterns of mobile interface design were analyzed. Guidelines and instructions were given, which can be followed by new mobile developers for designing and developing good applications. This analysis may also help developers understand and consider a few important things when they want to design a new mobile application or transfer a full-sized computer application to a mobile environment.
- ✓ Study of the Android platform was made, and presented and its architecture was analyzed.

Having taken all these factors into consideration, we put them into practice and created an m-learning Android application, suitable for use both in and outside the classroom, as it provides the ability for students and teachers to communicate and exchange educational material through the use of the application from their mobile devices. The application thus provides significant benefits to the education field, as it enables constant mobile learning, which enhances the educational experience, making it ubiquitous. To conclude, we believe that, with further improvement, we can successfully create an useful application that can be fully operational

within the education system, as it has much to offer by greatly adding to and evolving the educational process.

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