Mobile Learning -Cyberlaw Course, The Application Development And Students Perceptions.

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Abstract: Mobile learning concept are growing rapidly and has brought many significant convenience to the user as it is using ubiquitous devices which follow the latest trend. But in some cases, the mobile learning application is built without serious consideration in security aspect especially related to integrity and privacy of data. This paper discussed the development of online content using the mobile application concept and the acceptance of students on this new way for teaching and learning. MyCyberLaw is a mobile learning application for learning Cyber Law course. MyCyberLaw is developed to help lecturers to deliver learning module to the students. It also allow students to easily access the learning content anywhere and anytime. There are sections for lecturer sharing notes, assignments, send messages and upload student's grade. Student can view all content that have been shared by lecturer. This application is open to be downloaded and used by students. Majority of them appreciated this learning tool and would like to see more courses offered in mobile application version. MyCyberLaw is an innovation for secured mobile learning application, as well set as example of Internet of things in Education sectors.

Keyword: Mobile application, online, learning content, Cyber Law course

1. Introduction

As the technology continues to develop, it has benefit people in many ways and gives many changes to the world. One of the biggest impacts of technology is on learning technology. Electronic learning or e-learning simply means the use of computer and internet to deliver part or all of a courses compared to the traditional learning which teaching and learning process are only held in classrooms. E-learning is using interactive technologies that can enhance the learning experiences. For this past few decades, electronic learning had been implement and adopted by many learning institutes including public schools and universities. In recent years, the e-learning technology has evolved to the mobile learning as the rapid progress of mobile application technology.

Mobile learning is a part of e-learning which have the same purpose with the different of mobility devices are being used instead of computer. Mobile learning integrate the concept of blended learning which combine the conventional teaching methods and electronic based resources. Mobile technology such as smartphones, PDA and tablet are used as devices for mobile learning. The concept of mobility is to make the learning and teaching process can happen at any time and anywhere make it more flexible.

Today over 1.75 billion are using smartphones as it become more affordable parallel to its advancement. Mobile technology has given great impact to the society and it existence has benefits the way people live and it started

to impact the way people learn. Mobile learning, known as m-learning is an educational activity that involve social and content interactions using electronic media. M-learning is a part of e-learning with the additional mobility characteristic. Mobile learning specifically use cell phones, smartphones, palmtops, and handheld computers; tablet PCs, laptops, and personal media player can also fall within this scope Ali, et.al. (2015. The Web 2.0 technologies (e.g., blogs, wikis, Twitter, Youtube) or social networking sites (such as Facebook and MySpace) have made mobile devices more dynamic and pervasive and also promise more educational potential (Park, 2011).

Learning with mobile technology enhances student's ability to learn and apply course content in context with other students. Student can collaborate and create knowledge with the interaction of larger range of content. Based on the recent studies on student perceptions on the integration of applying technology in the classroom instruction, the report revealed that students have positive experiences with the technology (Rossing et al., 2012). Students have also reported activities using tablet computers in class foster productive collaborative learning and improve interactions with peers and instructors (Shuler et al., 2010). Also, the use of mobile technologies in education is moving from small-scale and short-term trials or pilots into sustained and blended development projects.

In traditional education, students will learn in class and do their assignment to revise what they have learned in class. Students also will make notes for them to study and do revision easily. They also used their computer at their home or library to find notes and more information that available online. They find it hard to study and do revision online when they have to carry such a heavy laptop. Some of them cannot afford to buy a laptop so they have to use a computer at their house and computer laboratory. They need mobile application for learning and easily access to the learning site that can only use their smartphones so they can study and do revision anywhere and anytime. Therefore this paper will highlight on a mobile application for teaching a learning course-Cyberlaw had been developed. This paper discussed the development of online content using the mobile application concept for Cyberlaw course. In addition to that this paper will briefly highlight an observation study on the acceptance of students on this new way for teaching and learning.

2. Methodology

The idea of developing MyCyberLaw has adopted the theory Heutagogy framework which defined as the study of self-determined and learner-centered approach to learning and teaching (Blaschke 2012, Blaschke et al., 2016). The theory encourages learner to define their own learning path as it helps learner to develop skills that will benefit to the work force. This type of learning is further supported by the advent of numerous new technologies and Web developments such as Web 2.0 and Web 3.0, which support learner-centered design and activities, as well as learner exploration, creativity, reflection, collaboration, and networking (Gerstein 2013; Sharpe et al. 2010; Conole 2012; McLoughlin and Lee 2007).

In additional for the methodology approach, MyCyberLaw is gradually implementing the instructional approach of Gagne's Events of Instruction to address the learning's condition. The instructional approach's is used as guideline to design the courses. There are nine Events of Instruction based on Gagne's book, The Condition of

Learning. These include gain attention, inform learners of objectives, stimulate recall of prior learning, present the content, provide "learning guidance", elicit performance (practice), provide feedback, assess performance, and enhance retention and transfer to the job.

A brief and systematic application development methodology steps based on Mobile Development Application Lifecycle as Figure 1 is used to build a secure mobile learning application.

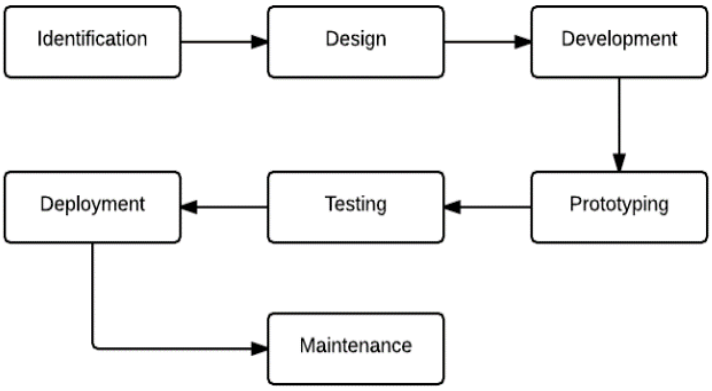

Figure 1: Mobile Application Lifecycle Methodology

The idea is to develop a mobile learning application for learning Cyber Law in a secured mobile environment. Literature have been conducted by the researcher to find improvements for mobile learning application especially related to requirement and security. In this phase, the problem statements, objectives, project significant and scope are determined. Based on comparison in literature review, it is found that Role-Based Access Control security model is suitable to implement in this application as the model use to manage and secure the application accessibility of user instead of using MAC and DAC security model.

2.1. Designing Phase

In this phase, an initial design to create a mobile learning application for Cyber Law course was developed. The specific target mobile platform were determined and Android platform is chosen as a target platform. The functional and security requirement in this application were defined. The requirements for the application such as the features must fulfil and compatible with the external application. The security requirement are based on RBAC model was defined. RBAC model is use to control the accessibility of different types of role for each users. The application flow were determined by using UML diagram which are use case diagram and sequence diagram to illustrates application logic and flow. Each user types are defined and will be assigned based on their role to gain the accessed to the application.

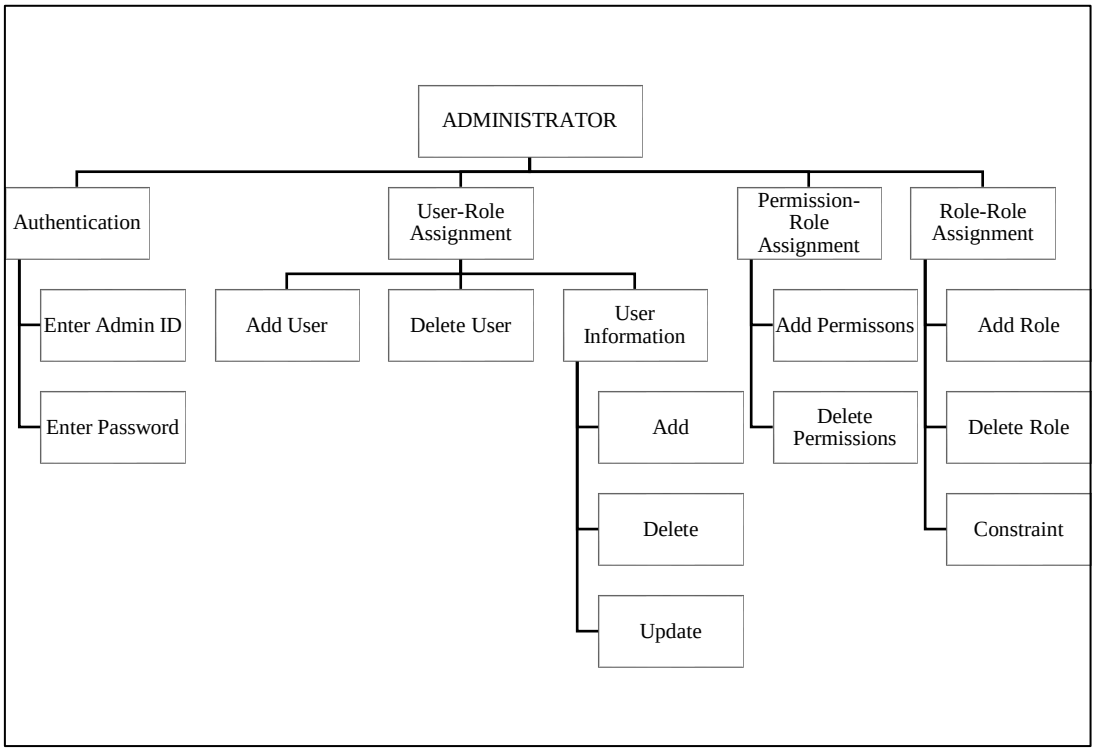

Figure 2: Structure for Administrator Role

In figure 2, the structure for the administrator role section are stated. Admin have to log in first in order to verify the identification. Admin will add user information when there is a new user. Admin also can delete user roles. There are two major user: Students and Lecturers. When the assignation of role is done, admin will assign a permission based on the user role. Admin will then add the role in the application.

The figure 3 shows the structure of permissions and tasks of each role. All user have to login first in order to perform their task. The tasks are read and write. Each main task has its specific small tasks that each user can perform based on their role. After user login, the ID will indicate their role and proceed to the task that they can perform. Students can only read the notes, view the assignments, grade and message send by lecturer whereas lecturers can upload notes, assignments, grades and send messages to students.

In figure 4 shows the software architecture of mobile application. The architecture is an organizational design to describe the entire of the mobile application. It rely on operating system and database use to perform the application tasks. In this project the operating system are Android and using MySQL as the database. The architecture also show how the application will interact with the server and database. Once the user login with

the connection of the internet, it will direct to the application server where it consist of graphical user interface server, business logic server and database server.

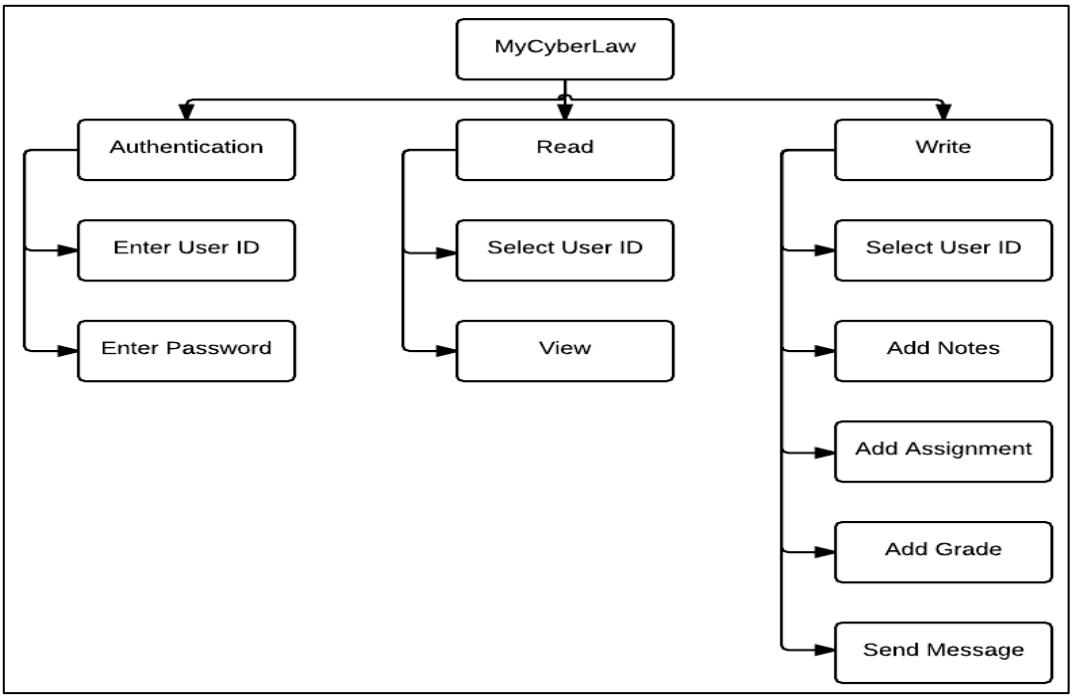

Figure 3: Structure for MyCyberLaw mobile learning application permission and task

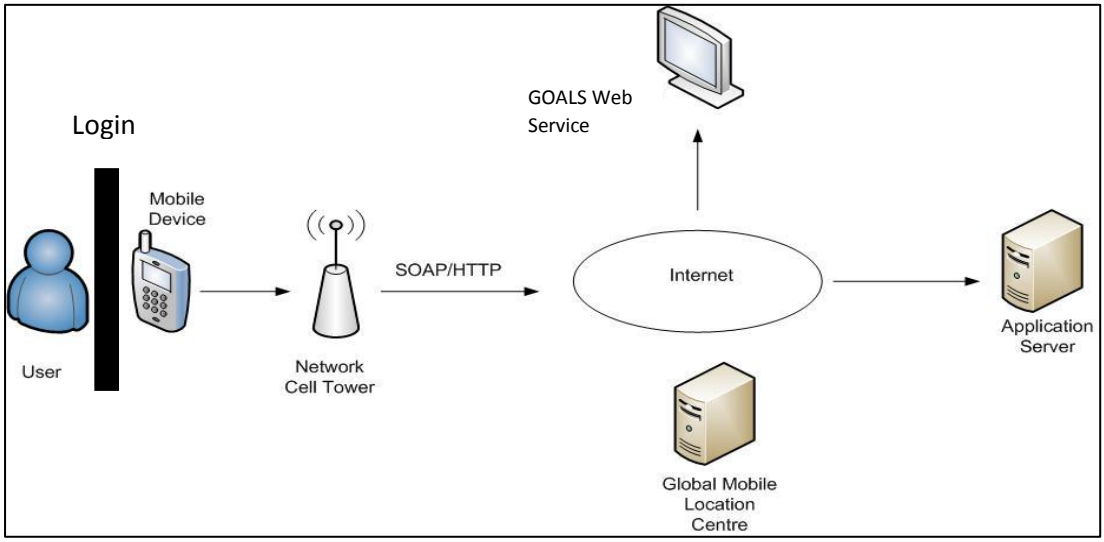

Figure 4: Software Architecture for Mobile Application

2.2. Development Phase

In this phase, the mobile application were developed. The programming language used to develop the application are JAVA language and using MySQL as the database. This phase transfer the design and model application into coding part. The coding part is proceed for different modules of the same prototype. The development of the application process are divided into two stages:

1. Coding for Functional Requirement
2. Coding for UI requirements

The code for functionality were developed first. The development of modules of same prototype but independent to each other were continued to be and integrated. In second stage, the user interfaces were designed suitable for the operating system platform used which is in android platform.

2.3. Prototyping Phase

In this phase, the analysing process for functional requirement of each prototype were done. The prototypes were tested and send to the client for feedback.

2.4. Testing Phase

In this phase, the prototype is tested on emulator provided in Software Development Kit (SDK) and follow by on the real Android devices. The testing also conducted on multiple Android versions, and multiple versions of mobile phone with various screen size. In this phase, the application were tested by inserting any input and unexpected data input to detect any error and bugs. After the test, the error and bug were fixed.

2.5. Deployment Phase

This is the final phase of the development process. After the completion of testing phase and the final feedback from client were obtained from the testing part, the application were ready to deploy. The application were uploaded to the GOALS server and there were page with link provided for downloading the application. The application also has been uploaded to the Google Play Store and it is free to download. Before the deployment, the rules and regulation of the application were check first.

2.6. Maintenance Phase

In this phase, the feedback from users is collected and analysed for any changes. The changes is in the form of bug fixes or improvements. The appropriate security patches, functionality improvement, performances improvement and new user interfaces should be provided if the application required update. The server and operating system must be maintained as well. This process is a continuous process.

2.7. Project Tools

In developing the application, there were some of tools used to developed, design, coding and deploy the application. The tools used are listed in Table 1.

Table 1 shows the recommended system requirement for hardware use to develop the mobile learning application. The Android Studio which is the application to build the mobile application will consume large space of the computer. The computer must have at least 500 MB disk spaces to support the Android Studio application. Table 2 showed the software used for developing and testing the mobile application.

Table 1: The hardware requirement for development

Tools	**Requirement**
OS versions	Microsoft Windows 7, Microsoft Windows 8, Microsoft Windows 10
RAM	2 GB RAM is minimum. Recommended using 4 GB RAM
Disk Spaces	500 MB disk spaces
Space for Android SDK	At least 1 GB for Android SDK, emulator system images and caches
JDK Version	Java Development Kit (JDK) 7 or higher
Screen Resolution	1280x800 minimum screen resolution
Smartphones	Google Nexus 4 by LG (768x1280) use as emulator

Table 2: Software used for development

Software	**Description**
Android Studio	It is the integrated development environment (IDE) which comprehensive facilities to computer programmers for software development
MySQL database	This is an open source Relational Database Management System (RDBMS) that uses Structured Query Language (SQL). This database system is flexible and easy to maintain
Hostinger	This is the free web hosting services which provide PHP, MySQL and free domain. This free domain is used for testing the connection to the server before the application moved the server to GOALS server.
Sublime	This is the text editor used to create .php file. The php file needed as a bridge to call data from the database.
LucidChart	The tools to draw and design UML diagram for this project.

3. System Design

3.1. Structure Of Mycyberlaw Mobile Application

Figure 5 illustrates the structure of MyCyberLaw mobile application that is derived from the design phase. It contains 3 phases; there are interface layer, abstract layer and physical storage layer. In interface layer

represents the user interface designs, the process of the application and storage are defined in abstract and physical storage layer. Interface layer contain the layout of user interfaces from login page which is the first page until each layout of every user's role. In abstract layer contain the abstract process such as acquiring user data input and file uploaded and retrieval data. Last layer is the physical data storage which is the database for MyCyberLaw application.

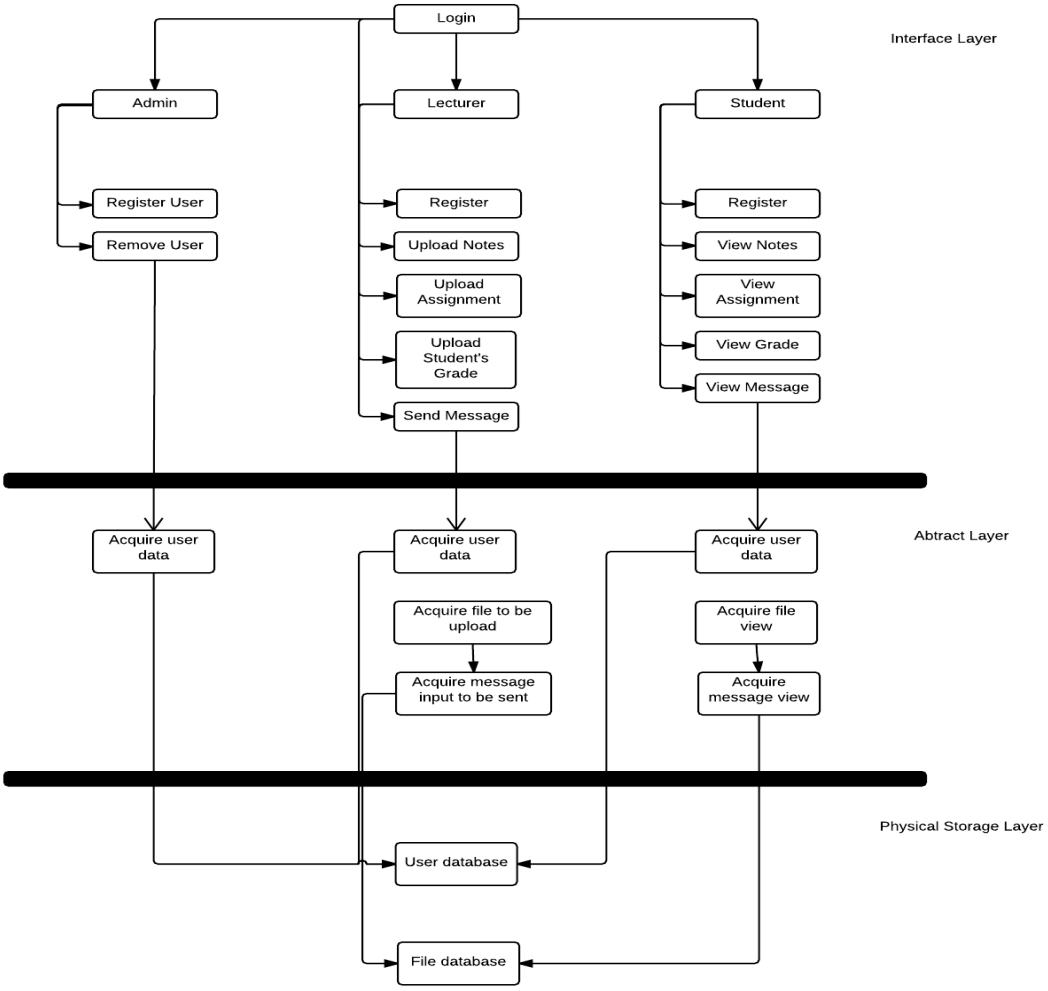

Figure 5: MyCyberLaw Mobile Application structure

Figure 6 represents the application architecture. The application use mobile application framework to ensure the application are ready and easily accessed by user. The architecture of MyCyberLaw consists of presentation layer (User Interface), business layer (Java EE Server) and data layer (Database Server). In the design, consists of one database with three different modules, the admin module, lecturer module and student module. The admin module design to manage the user of the application. The lecturer module is designed to manage the learning course material contain in the application and the student module design to view the learning course material. The database of the application is used to store user information and learning course material.

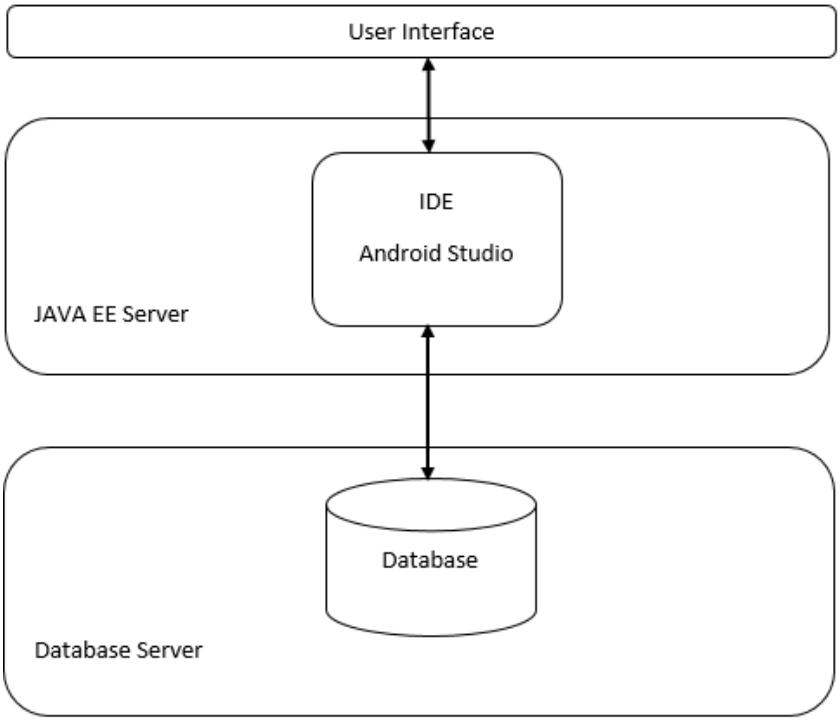

Figure 6: Model of application architecture

3.2. Use Case Diagram

Figure 7 describes the scenario of the application. The purpose of use case diagram is to capture the dynamic aspect of the application. This scenario is an interaction between actors and the use case. The actors in this use case are admin, lecturer and student. The use case involved in this scenario are register new user, add new file and view file.

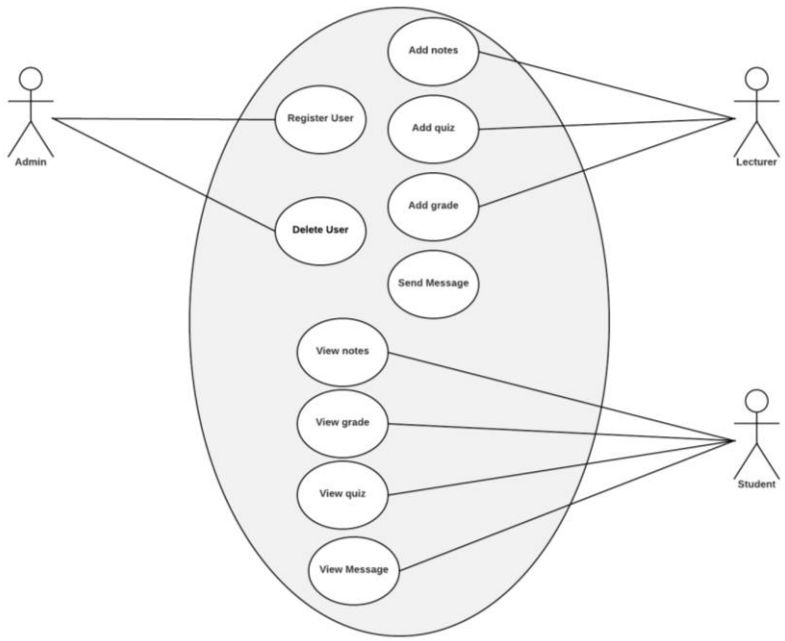

Figure 7: Use Case Diagram

3.3. User Interface Design

MyCyberLaw mobile application are able to display interfaces that can perform differences task and function for every users.

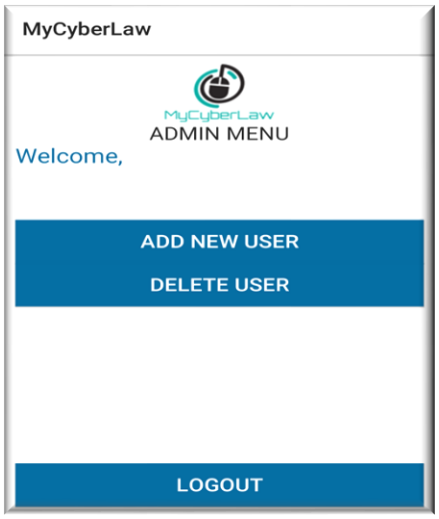

Figure 8: Admin Menu page

This is the main page of administrator. Only admin have privilege to access this page. Each action only can be done by admin. Admin can add new user and remove user.

Table 3: Description of Menu for Admin Menu page

Menu	Description
Add New User button	Direct to page where admin can add new user to the application.
Delete User button	Direct to the page where admin can delete user from the application.
Logout button	Logout from the application and back to login page.

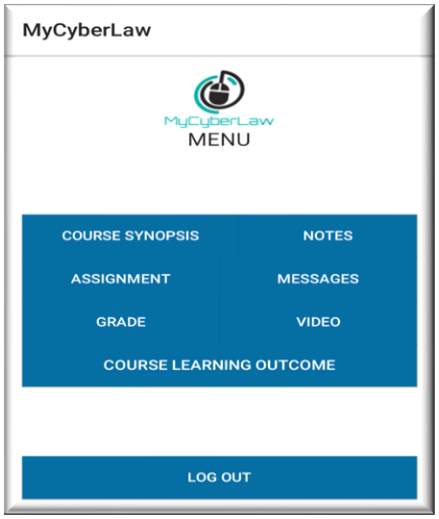

Figure 9: Main Menu page

This is the main page of MyCyberLaw mobile learning application. Once student and lecturer login, they will be directed to this page.

Table 4: Description of Menu for Main Menu page

Menu	Description
Course synopsis button	Display synopsis of Cyber Law course to student and lecturers
Notes button	Display notes by chapter for student. For lecturer will display upload new notes button.
Assignment button	Display list of assignment for student. For lecturer will display upload new assignment button.
Message	Display all message sent by lecturer to student. For lecturer will display field to type message and send to the students.
Grade	Display marks for each test and exam for student. For lecturer will display field to insert student's mark and upload.
Video	Display video about Cyber Law course.
Course Learning Outcome button	Display course learning outcome for student and lecturer to read.
Logout button	Logout from the application and back to login page.

Figure 10: Guest Main Menu page

This is the open main page of MyCyberLaw mobile learning application. Anyone from outside USIM who wants to learn this course, can access this application without having to register and login.

Table 5: Description of Menu for Guest Main Menu page

Menu	Description
Course synopsis button	Display synopsis of Cyber Law course to student and lecturers
Notes button	Display notes by chapter for student. For lecturer will display upload new notes button.
Video	Display video about Cyber Law course.
Course Learning Outcome button	Display course learning outcome for student and lecturer to read.

The courses contents in MyCyberLaw includes the chapters, notes and course outline of CyberLaw courses where learners can choose chapters and notes to read.

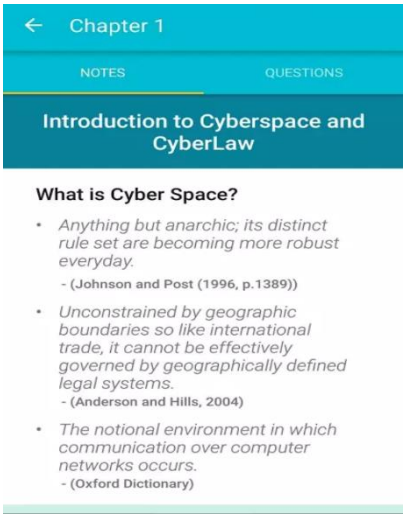

Figure 11: Chapter 1 page

Figure 12: List of Laws notes

3.4. Students Perception

The application has been offered to be tested in a class of 30 (first year) students. The objective of this activity is to observe on the acceptance and design of the content. Adopting Donaldson, R. L. (2016), this simple survey manage to capture the perception of students towards mobile learning applications. Majority of them agree that this application is the alternative for learning and revision content since it can be use offline once everything is downloaded. The users addressed that the design of the content in the application is simple and easy to understand. Furthermore this activity manage to capture some suggestions and comments to be improve for the future work. Majority of them appreciated this learning tool and would like to see more courses offered in mobile application version.

Table 6: Results on Students Perceptions

Construct	**Results**		
Respondents	Yes %	No %	Total %
Performance Expectancy	83	17	100
Acceptance	100	0	100
Ease of Use	73	27	100
Design Expectancy	77	23	100

4. Discussion

Based on the MyCyberLaw mobile learning application complete version, the application have a unique strength such as the security. However there are few enhancements can be made in the future to make the application more reliable, flexible and interactive for the user.

4.1. System Strength

MyCyberLaw mobile learning application is a secure mobile learning application which implement Role-Based Access Control security model. This application has advantage in managing of access control which manage the accessibility of different users to access the information and data in the application. The security model implemented can protect the application from improper access and protect the data confidentiality and integrity. The application also is user friendly as it does not contains difficult functions for user. User can simply understand on how the application work easily. The application has proper user data management as the user are classify based on privileged. Besides, the application is a mobile type which is using mobility devices. User can access the application anytime and anywhere they want.

4.2. Future Enhancement

For future enhancement, the interactive course learning material can be added by providing quizzes where student can answer directly from the application and feedback form where student can give feedback or ask questions to the lecturer. This is to complete the Gagne's isntruction which has mentioned earlier. There also can added games to make the learning process become more interesting for user to learn.

This application features for outside user are very limited. Guest user only can view certain features such as Notes, Course Synopsis, Course learning outcome and video. In the future, features for Guest page can be added to attract more user from outside USIM to try this application and learn Cyber Law course effectively.

5. Conclusion

This paper has highlighted the development of a Cyber Law courseware mobile application with RBAC security model to enhance the management of access control of the mobile application. Mobile application especially related to education have attract many people attention as it is more flexible and convenient to all people. The mobile learning application will advantages many people and will changes the lifestyles of studies.

6. Bibliography

Ali, A., Alrasheedi, M., Ouda, A., & Capretz, L. F. (2015). A study of the interface usability issues of mobile learning applications for smart phones from the users perspective. arXiv preprint arXiv:1501.01875.

Bidin, S., & Ziden, A. A. (2013). Adoption and application of mobile learning in the education industry. Procedia-Social and Behavioral Sciences, 90, 720-729.

Conole, G (2012). Designing for learning in an open world: Explorations in the learning sciences, instructional systems and performance technologies.

Davis, L., & Hase, S. (2001). The river of learning in the workplace. In Proceedings of Research

Donaldson, R. L. (2016). Student acceptance of mobile learning.

Gerstein, J. (2013). Education 3.0 and the pedagogy (andragogy, heutagogy) of mobile learning. [Blog post.] User generated education. http://usergeneratededucation.wordpress.com/2013/05/13/education-3-0-and-the-pedagogy-andragogy-heutagogy-of-mobile-learning/

Gu, X., Gu, F., & Laffey, J. M. (2011). Designing a mobile system for lifelong learning on the move. Journal of Computer Assisted Learning, 27(3), 204-215.

Kamburakis, G. (2013). Security and Privacy in m-learning and beyond: Challenges and state of the art. International Journal of u- and e- services, Science and Technology, 3-6.

Blaschke, L. M. (2012). Heutagogy and lifelong learning: A review of heutagogical practice and self-determined learning. The International Review of Research in Open and Distributed Learning, 13(1), 56-71.

Blaschke, L.M. and Hase, S. (2016). Heutagogy: A Holistic Framework for Creating Twenty-First-Century Self-determined Learners.

Maycock, D. (2011). Enterprise Mobile Application Lifecycle. Slalom Consulting.

McLoughlin, C. & Lee, M. J. W. (2007). Social software and participatory learning: Pedagogical choices with technology affordances in the Web 2.0 era. In Proceedings from ascilite, December 2–5, 2007, Singapore

Naismith, L., Lonsdale, P., Vavoula, G., & Sharples, M. (2004). Literature Review in Mobile Technologies and Learning. United Kingdom: FutureLab.

ark, Y. (2011). A Pedagogical Framework for Mobile Learning: Categorizing Educational Applications of Mobile Technologies into Four Type. The International Review of Research in Open and Distributed Learning, Vol 12, No. 2.

Kearney, M., Schuck, S., Burden, K., & Aubusson, P. (2012). Viewing mobile learning from a pedagogical perspective. Research in learning technology, 20.

Parsons, D. (2014). The future of mobile learning and implications for education and training. Increasing Access, 217.

Rossing, J. P., Miller, W. M., Cecil, A. K., & Stamper, S. E. (2012). iLearning: The future of higher education? Student perceptions on learning with mobile tablets. Journal of the Scholarship of Teaching and Learning, 1 – 26.

Vithani, T., & Kumar, A. (2014). Modeling the Mobile Application Development. Hong Kong: Proceedings of the International MultiConference of Engineers and Computer Scientists 2014 Vol I.