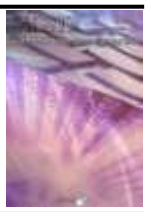

QR-Code for Smartphone: An Implementation of Recording & Calculating Attendance

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ABSTRACT

Many members of the faculty at the university depends on attendance and absence of the students in the lecture to calculate participation mark and give ultimatums for the students. Many of the members of the University think that, the amount of absorption of student material subjects directly proportional to the number of lectures attending held by the course schedule. Therefore, this application has been developed to work on smartphones, which scans the QR code assigned to each student through the smart phone's camera to inserted and record the attendance in the list of student's attendance and absence. The user can sign up for the application with civil ID to have a unique username. The user can sign up as instructor or student. Using QR code in Education is an effective addition to the education sector.

Keywords: mobile learning, m-learning, QR codes, context-appropriate information literacy, location -aware devices

1. Introduction

The world lives a tremendous scientific and technological revolution, which impacted on the various aspects of life, and that lead to community and education institutions claim to look for new methods and techniques and educational systems, to keep pace with these developments and use them in the field of education.

Barcode is considered as one of the modern techniques, and it intended that the code used in supermarkets, shops, and pharmacies in many other places. This code can be decoded by scanning using a mobile learning provider with a camera and software to read barcodes. The barcode binary multi-use existing dimension for more than seventeen years old, but its use in the educational process is still in its initial stages, but since the advent of mobile learning devices that have the ability to connect to the Internet; barcode witnessed significant

development in the emergence of many applications. As the use of barcodes in the educational process is still in its infancy.

This paper is among the first papers dealing with the use of barcodes in the educational process [1].

Barcode can be placed in the context of mobile learning, as the barcode is a two-dimensional code written, composed of black models on a white background. Those square symbols models can contain information, such as a written text, the title of the sites on the Internet, or any other data. To decode the barcode code on, the user must have a device caravan equipped with a camera and software to read codes «Barcode reader» to the process of scanning barcode to view the written text, to open a web page, or to send a short message. There are many programs that arise and read barcodes.

Many studies have shown that the barcode can be employed in the educational process to support:

1. Collaborative learning strategy.
2. Increase motivation toward learning.
3. Outdoor activities.
4. Self-learning.
5. Learn English.

When considering the barcode in the educational context, it is important to realize that the technique used in these icons are supportive technology to the educational process. Therefore, it should focus on learners and teaching methods more of a focus on the same technology. These codes are not responsible for improving the learning process, but it depends benefit of the barcode on the development of appropriate teaching strategies that enhance learning. Therefore, it should be the primary purpose is to promote and design suitable for this technique learning environment [1].

2. History of Barcode

Barcode Linguistically composed of two parts, the word in the English language are Bar, which means column, and Code means the data encoding. These two words together mean encoding or encryption data are converted to Barcode using the device are printed these codes in the form of dark columns on white forms the background of different sizes [2].

The Barcode is a code representing a substance, readable by computers, has blades filamentous be one-dimensional, or in the form of boxes or points or hexagons or other geometric patterns within images called code or two-dimensional matrix codes. Although the binary systems used more lines symbols (thread), it is known as Barcodes as well, and is designed for Barcode reader can read it in a way accurate and fast mechanism by a program called Barcode reader [2].

The importance of Barcode in the First invented the Barcode is «Max Baddeck» in 1880 but due to the lack of a hand did not see his light. Moreover, in 1932 the graduate student «Wallace Flint» left Search «grocery mechanism» in the College of Business Administration at Harvard University in which he explained the use of an automated system grocery, and because the United States was experiencing the economic crisis did not implement this idea. In 1948, «Bernard Silver» has a graduate of the technological Drexel Institute student in collaboration with his friends «Norman Joseph» and «Woodland and Norman Johansen» developed the first

system that works in ink ultraviolet to chain stores in Philadelphia to read product checkout time. However, due to the cost of the system failed, then Woodland work on the development of the system and reduce the cost and has registered his patent on October 7, 1952m, and saw this invention and widespread success. In 1974, chewing gum pack introduced to the grocery store as the first product in the history using a Barcode system [2].

QR code: is Quick Response Code and it is a type of matrix barcode or 2D barcode that is used to provide easy access to the information through a smartphone. A barcode is a machine-readable optical label that contains information about the item to which it is attached. A QR code uses four standardized encoding modes (numeric, alphanumeric, byte/binary) for the automotive industry in Japan [2].

3. Problem Statement

If we look at the educational problems of absenteeism found frequent interruptions to the student's school abnormally and one of the most dangerous.

What is known in educational circles, the absence of the causes are linked to either the student or the school or the family or multi-socialization institutions [1].

For example, students miss school motivated by his hatred for a particular teacher, a specific article, to the large school burden of appointments (homework), accumulation, as a result of the failure, neglect and indifference of the student himself, to sense the presence of weakness or a decline in the level of study. Also, because of the total reliance by some students to private lessons, which they consider convenient and rewarding for attendees to school and so on [3].

The school administration might tolerate adjusting attendance, or there is the cruelty of some teachers in their dealings with students or stuffing the curriculum. Alternatively, for failure to diversify teachers modern teaching strategies, or to the high rate of student density per class and the inadequacy of the physical environment in school and is so one of the reasons boredom and boredom occur when students and thus encourage them to absenteeism [3].

This along with family education or the role of socialization institutions that cause the other in the growing phenomenon of absence, some parents living luxury they pamper their children. In contrast, there are some families from low-income families cannot afford school requirements and multiple needs. For example, vulnerable in communication or relationship between home and school, such as the reluctance of some parents from participating in the councils. Alternatively, school committees, or to undermine the family relationship as a result of divorce or growing and persistent and other problems, along with the surrounding environment. The effects of which are modern digital technology and the like losing educational institution luster that has been unable to keep pace with these significant shifts, the students sign in frequency to the futility of attendance to school already!

4. Using Barcode in Learning

Uses barcode in the educational process:

Guide learners to sites providing academic services the university: University of Bath barcode used in the educational process in many applications including:

i Search indexing University Library: There barcode gives a summary explains the book's title, author's name, the location of the library book. Hypotheses enrollment of learners at the Faculty of Engineering and the required cover designs of the same code. Publications

learning management system Moodle, so that it contains the barcode on each decision-mail address. There is a barcode across the university, and in brochures on activities, as a reference for codes that provide services, marketing services relating to the different sections [2].

ii Pacific community discovery through outdoor activities: where learners to discover their surrounding community and solve problems they face. This type of activity it is possible to take the form a cooperative, and it is organized in the form of competition among the educated. In addition, it can be used to support the individual studies, where the Activity for the implementation of the path of mathematics in which learners are discovering their communities and create mathematical problems related to what they discovered in different places during the exercise activity. The learners to answer the question by reading the code of the barcode and the codification of the answer in the paper. It was discovered that learners had enjoyed this activity, but they had a curiosity to learn about the new trends that are distancing their routine tests [2]

iii Motivate learners to research and exploration and raise motivation for learning in the classroom: the practical application of this experience amazing results in this direction resulted. This is done through several steps:

- Step one: assigning the task of downloading the educated reader rapid response program. By having a parameter of students download barcode reader on their mobile devices as one of the tasks in their homework [3].
- Step Two: encoding parameter things, at least through the barcode reader, then printed and posted on the wall, and these things carry some tasks like watching entertaining videos or text message or phone number ... etc.
- Step Three: Start the lesson and explain the FAQ by asking learners to know each task by reading the encoded messages affixed to the wall during 7 minutes at least.
- Step Four: Training educated on how to use the barcode by reference to their computers and search for another barcode and paste it into Word file unique to each of them and put it on blog or site with all of them [4].

iv Self-evaluation of school costs: through the use of barcodes in paper activities, barcode could contain links to various sources of multimedia voice as materials or video clips. In those activities, which uses barcode guide learners through self-evaluation process, which can be directed barcode learners Internet page showing them the correct answers, including the learner, recognizes the extent of his understanding of the lesson. Barcode has been used to illustrate how to use it in the listening exercises. Also that the barcode helps learners effectively and flexible to access the resources available. Educated responses have shown that the use of barcodes with mobile devices easier and more convenient for individual tests. Learners can also be the answer to a short test after surveyed allotted to the code [5].

v Write instructions and the instructions for completion of assignments and duties: it can be directed learners' teacher set of instructions and guidelines that help learners in completing homework. The Siebel example: in art workshops, the barcode can be placed on tools such as brushes of different drawing, and engineering workshops, placed on electronic gadgets to guide the learners during use, and so we find that this trend supports self-learning, as in the study [6].

vi Write reports and create interactive experiences through the participation of educated their business on the Internet: With regard to the appropriate content for the learner, writes scientific reports on the Internet, and then share their work through barcode. For example, learners studying some books and attach a barcode to what they wrote, or write books for children and record their readings of what they wrote. Then add barcodes such links audio tracks to create interactive experiences, as in the study [7].

vii Check the attendance of the students automatically: The BLE (Bluetooth Low Energy) beacon was used to record the student attendance. The system checks the student's attendance once he entered the classroom without the need to enter the application. However, it is not clear how the system used the QR code in recording the attendance. In addition, in case of BLE beacon equipment malfunction, the student would be recorded as absent without noticing [9].

viii Monitor the attendance of the students: The QR code was used to monitor the attendance by assigning a unique QR code for each student. Using a smartphone, the student's QR code will be scanned by the instructor to confirm attendance. Yet, the system requires a massive QR code-database [10]

5. How to Read Barcodes

i Download the custom application for iPhone from App Store, which is using to scan the barcode, QR Scanner application.

ii Run the Application and then photographing the QR code or wait a bit until the shooting by the application.

QR-Code:

Before beginning the explanation, this code means the bar code that stores a set of numbers that enables the user to see a particular product, and it is read by special devices, especially in shops and is available at post offices [5]. Fig.1 shows a QR code example.

Figure 1 QR code Example

QR Code is a development of the bar the old code where the idea of the Q-R code began in 94 under Denso name and then changed to the current name, has been used by Japanese companies such as Toyota to identify the pieces for its cars. In the year 2002, the use is increased in Japan, and the keenness of Manufacturers phones included on users to be able to rely on. [4]

The Q-R feature code does not need to be linked to a database; it means that it does not require the reader to have a knowledge about the product because the Q-R-code contains all the

information inside it, and these many different formats and multiple concealed beneath much information. [5]

The feature in the Q-R is that some types can contain more than 7,000 symbols inside, while the barcode does not exceed scores. The Q-R also contains a lot of languages, including Arabic code. In addition, the Q-code can be read from any side of any form, so if signed appointed the reader to read it without a budget. While the barcode has to be balanced on the reader [4]. QR Code can store an enormous amount of information reverse barcode.

The QR code can be read using the mobile camera through some existing applications in it. Also, when user read some of the codes will transform him a link to the Internet, which allows him to expand its use. This means that we can produce BB addresses, websites, e-mail addresses, texts, and SMS.

6. Why QR code?

There are many features of the barcode, including:

Multi-use codes.

i Provides a means «to enter and data collection» characterized by simplicity, accuracy, and low cost.

ii Multi-language symbols connected to the title on the Internet, or automatic text message, or a business card.

iii Provides access to various information easily and quickly.

iv Lack of technical obstacles in the design and barcode reading.

v Provides an opportunity for learners to integrate into educational activities.

vi Collect and display information fast and accurate manner and easy exchange process.

vii The speed and simplicity of information retrieval and storage.

viii Barcode can be read by all available means, whether the reader or scanner [8].

ix Barcode embedded information can be protected. Any sensitive data that is stored in Barcode can be secured by a high payload secret hiding mechanism. So that, only the authorized user has the ability to reveal the sensitive data from the QR code [11]

7. System Requirement

i Xcode: is a developing program tool created by Apple for developing software for OS X and iOS.

ii Sublime Text 2: Text Editor to write the PHP code.

iii Web Hosting (www.godaddy.com): to provide web service to iPhone application

iv phpMyAdmin: create database and tables on the web server.

v Email Account & phpMailer_5.2.1: a code library to send (transport) emails safely and efficiently via PHP codes from a web server.

vi Cyber duck: is an open source FTP/SFTP to transfer PHP files to the web server.

vii Photoshop: Application software by Adobe Systems to design icons, lunch Images, and buttons.

viii iConify: Application to generate assets (icons) with different sizes for IOS app.

ix Microsoft Visio Professional: Create Flowchart.

8. System Design

In this part of the research, the captured images of the application will be displayed while testing the application to make sure that all the parts are working correctly.

The application has divided into two parts, the first part is concerning with the records and the second section is concerning with the student. In addition, the last section is regarding operations that relate to the work of the application on the mobile phone, such as access to the application information on the application and other.

A. The Login and Services screenshots:

As shown in Figure 2, the user can log in to the QR code application or sign up as Student or Instructor.

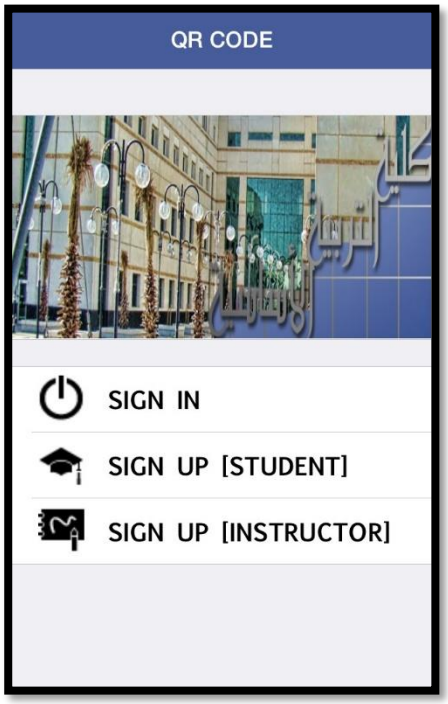

Figure 2 Main screen

Figure 3 shows the sign-up screen that allows the user to sign up by entering the required information about himself as Civil ID, full name, email address, and password. All this information is required to sign up. Then the user should press tick button to complete the registration process.

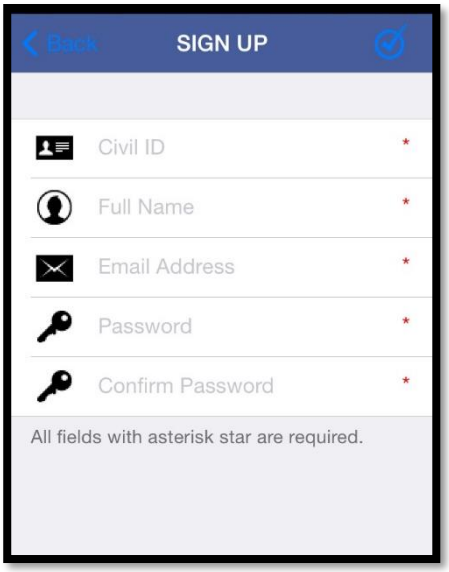

Figure 3 Sign Up screen

As shown in Figure 4, the user can sign in as instructor or student by entering the Civil ID and the password. Additionally, if the user does not remember the password, he/she can press on 'Forgot your password?' button, which moved user to the next screen (Fig.5)

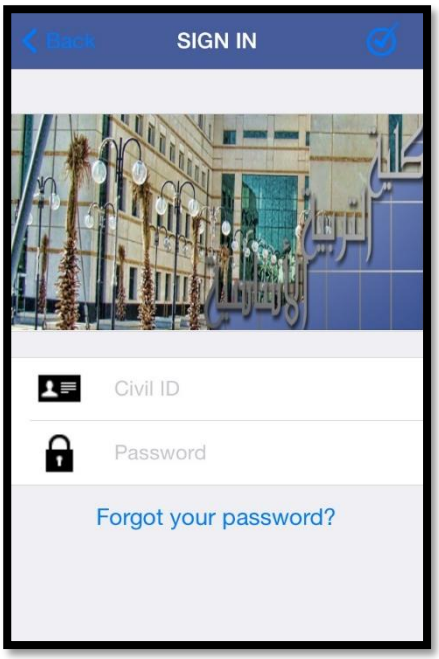

Figure 4 Sign In

Figure 5 the Forget Password screen. In this screen, the user can get back the password of the account by entering his email address. Then the password will be sent to the entered email address.

Figure 5 Forget Password

B. The Instructor Screen Shots:
Figure 6 shows the main instructor menu, which contains Course List, Attendance, Absent Notice and the "Sign Out" button. Additionally, the instructor can see his/her information (Civil ID-full name).

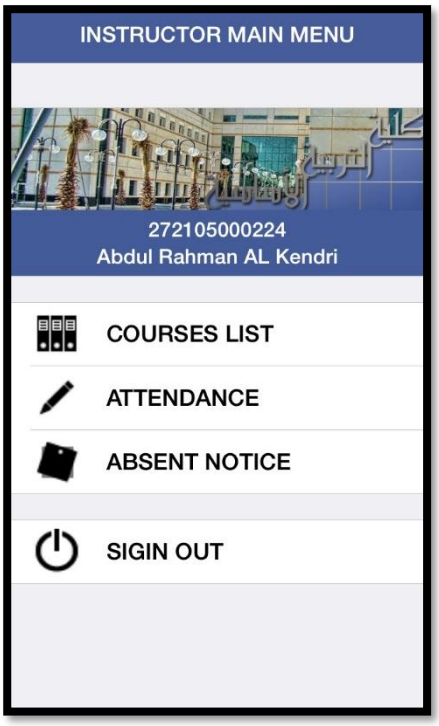

Figure 6 Instructor Main Menu

By pressing on the “Courses List” button, the instructor will be moved to the Course List screen (Fig.7), which is displaying the instructor’s courses.
Additionally, the instructor can press the plus button to add a new course and entering the course information.

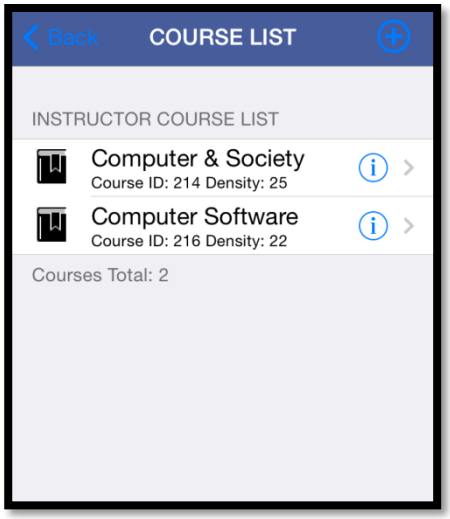

Figure 7 Course List

To view the course details, the instructor should press the course name on the "Course List" screen.
As shown in Figure 8, the instructor can see the course details as Course ID, Course Name, Student Density and the QR Codeword.

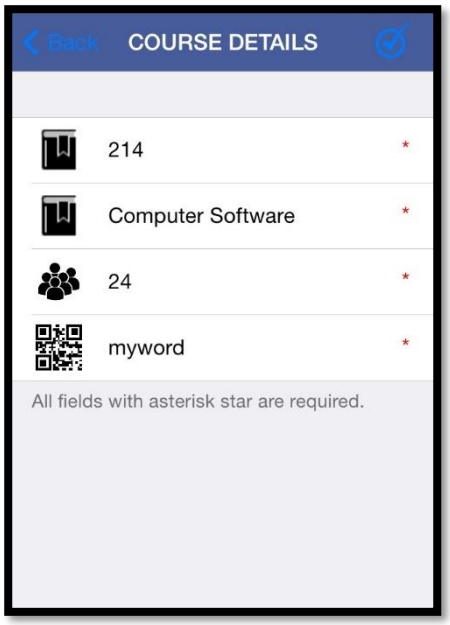

Figure 8 Course Details

Figure 9 shows the Student List screen. In this screen, the instructor can see the student list with the total of attendance and notices in the course. It also provides sending Absent Notice.

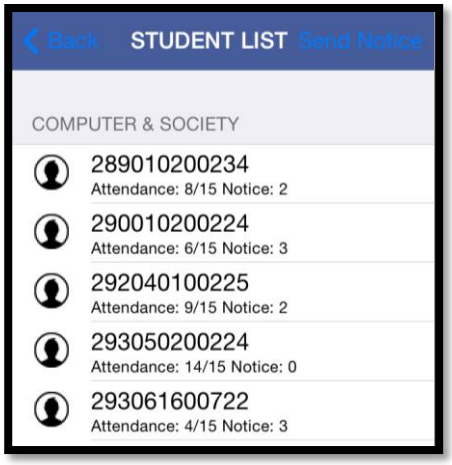

Figure 9 Student List

C. The Student Screenshots:

As shown in Figure 10, the main student menu contains Courses & Attendance, Absent Notice and the "Sign Out" button. In addition, the student can see his/her Civil ID and full name.

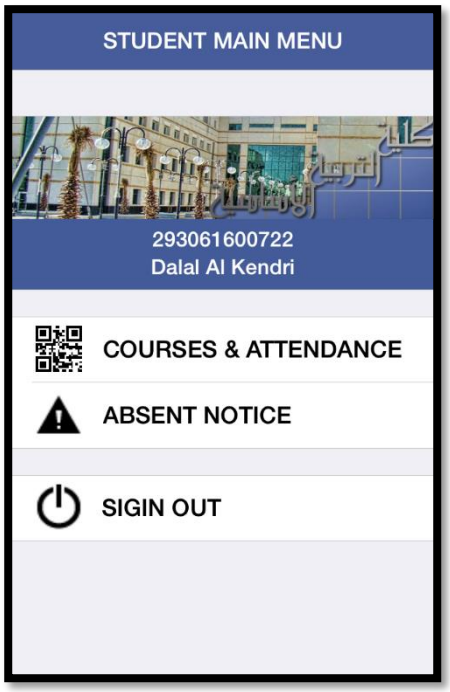

Figure 10 Student main menu

In Figure 11, the user can see the courses, which enrolled in this semester as course list. Additionally, the student can press the plus button to add a new course through Course ID.

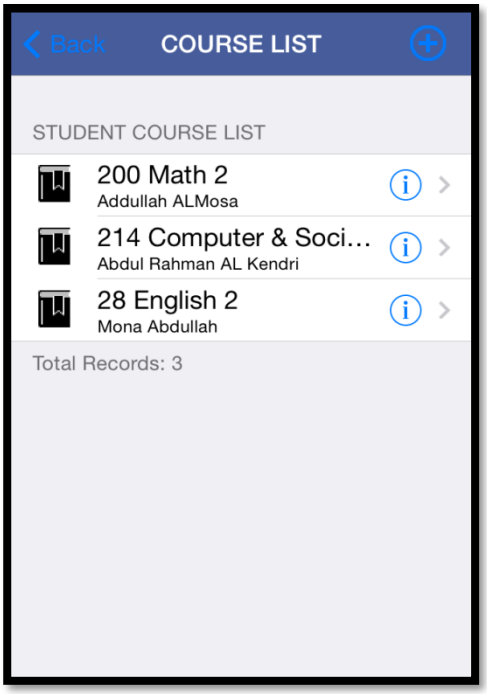

Figure 11 Course List

The student can add a new course by entering the Course ID; as shown in Figure 12.

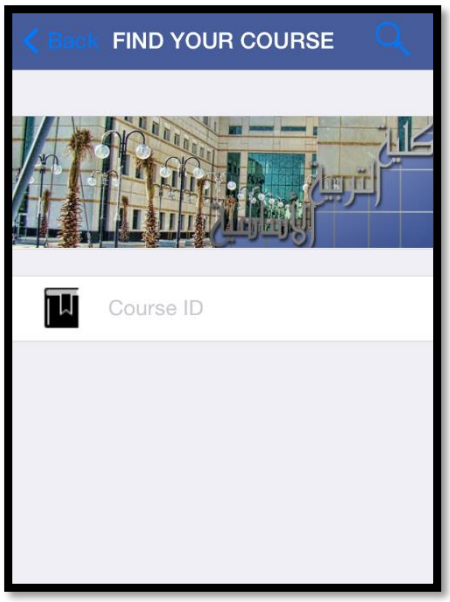

Figure 12 find the course

After entering the Course ID, the student can see the course details as Course ID, Course name, and instructor name; then the student can press the plus button to add this course to the course list. Additionally, the student can press the Main Menu button to return to the main menu screen. Figure 13 shows the course details.

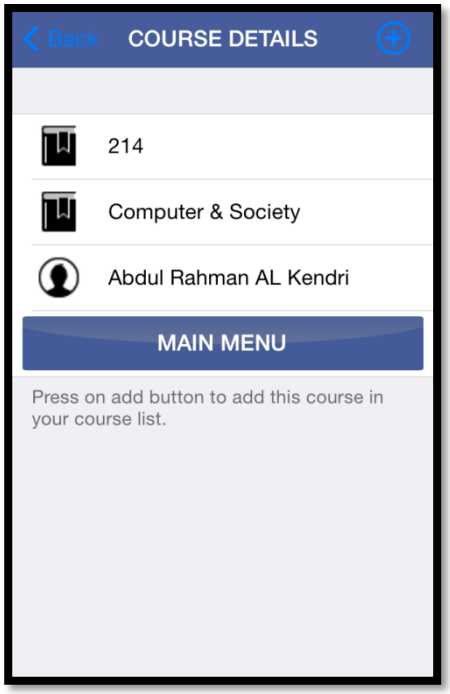

Figure 13 the Course Details

In Figure 14, the student can scan the QR code of his/her course by the mobile camera to record his/her attendance.

Figure 14 QR reader

Figure 15 shows the Absent Notice screen, which allows the student to see the course list with the total of attendance and notices for each course.

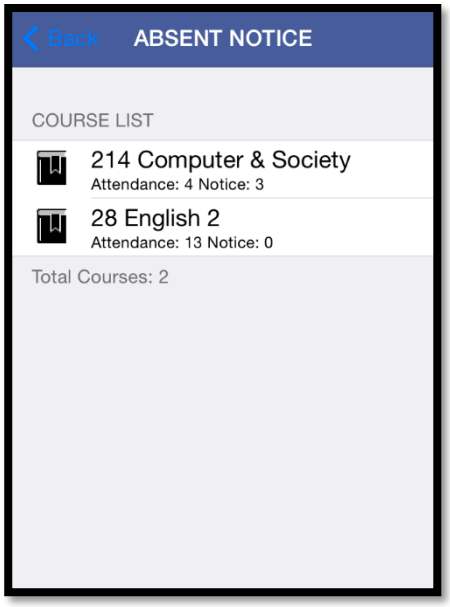

Figure 15 absent Notice

9. Implementation

In this application, there are two types of interfaces, and the use of each specific category is a member of the faculty, student, presented in this paper will explain the mechanism of the use of the application for each user:

A. Faculty member:

On the organ faculty, the mobile application is installed where the lecturer to register in the application and then enter their name and email address and password own civil number is calculated as the name of a unique user, after registration in the application the lecturer to the application through the civil number and password.

Figure 16 Shows the Data Flow Diagram (DFD) of the student and the faculty member sign up. First, User should enter all required information, then, the application will make sure, if the user exists or not. If the user already exists, the application will view alert message to sign in, and if the user does not exist, in this case, the user will be signed up, and the user's information will be saved. Then, the user can access and use the application.

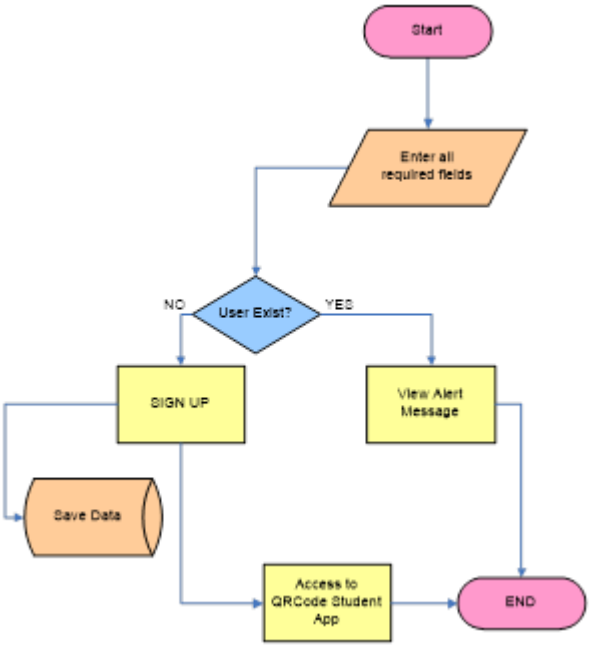

Figure 16 the student and the faculty member sign up

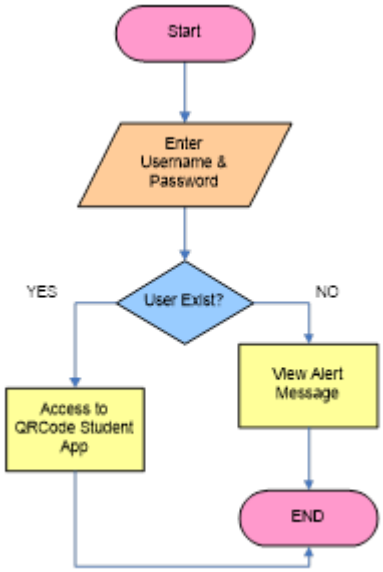

Figure 17 User sign in

Figure 17 shows the sign in DFD. When the user enters the username and password, the application will make sure, if the user exists or not. If the user does not exist, the application will view alert message to sign up. Moreover, if the user exists, the user can access the application.

After Signing in to the application appears on the mobile phone screen are many options such as lectures during the hand of the minutes and the number of students in the division who identified through their civil figure for each student to prevent the repetition of the names. Also, through the interface of its usage, it can be doing a survey of the code each student through a smartphone camera to be counted in the list of attendees. If it is not scanning the student that was released through Q-R-generator code name, the lecturer can enter the secret word belonging to each student preferably usually civil numbered to repeat does not happen by mistake and print attendance sheet to be surveyed in each lecture.

The application shall calculate the student on the list of absence from the lecture in the case did not pass the mobile phone to the student code, and the lecturer can access the list of students to against them alarms due to their absence from university lectures and other data for dismissal students.

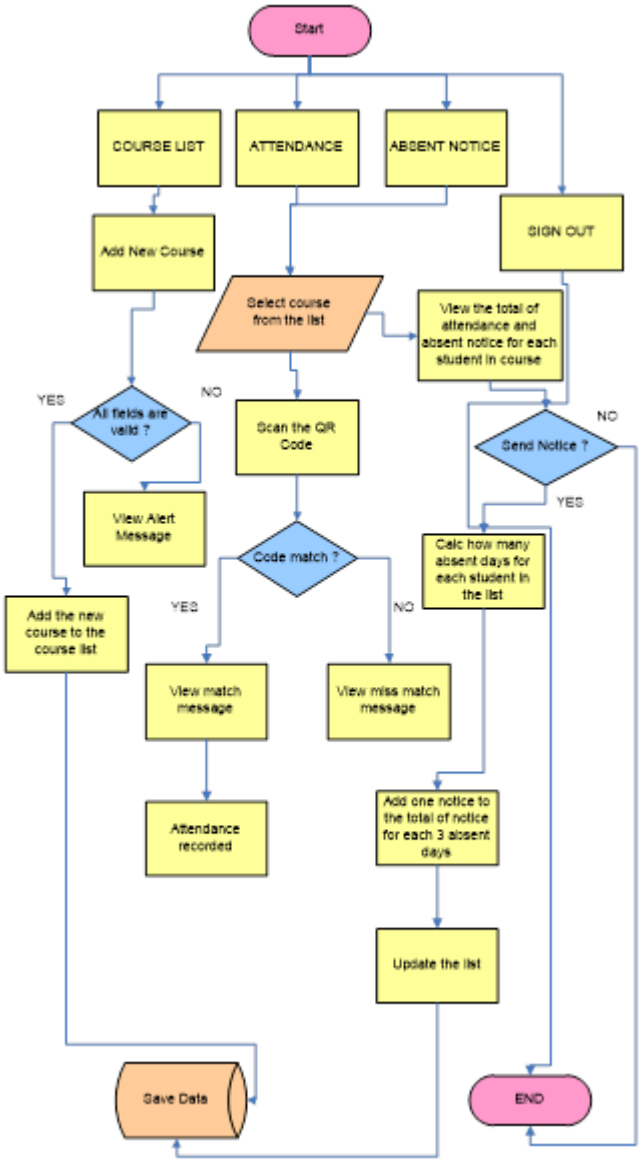

Figure 18 the application DFD

Figure 18 shows the DFD of the application, which explains how the application works as an instructor account. The main menu contains Courses list, Attendance, Absent Notice and the sign out button.

- The course list: in this screen, the user can see all courses list and adding a new course by entering all the required fields. If one of the required fields is empty, the application will view alert message to complete the all required information. Moreover, if the all required information is complete, the application will add the course to the course list.
- Attendance: in this screen, the user should select one of the courses from the course list. Then, the user should scan the QR code by using the smartphone camera. In this case, the application will make sure if the code match or not. If the code did not

match, the application would view miss match message. Moreover, if the codes match, the application will view match message, then the attendance will be recorded.

- Absent Notice: When the user selects one of the courses from the course list, the application will view the total of attendance and absent notice for each student in the course. The application counts the attendance and absence of each student; therefore, if the student absents three days, the application will send notice. Then the list will be updated.
    - Sign out button: to sign out from the current account, and return to the sign in screen.

B. Student:

College students can download the Basic Education application on their mobile phones as each student has a username, civil ID, and password to enter the student's application to material selection and know a number of absences in the article. The student can that scans its code to be counted in the list of attendees at the event was lecture absent until the application does not record on the list of student absences because the application automatically calculates the absence.

Figure 19 explains how the application work as student account. The main menu contains Courses & Attendance, Absent Notice, and the sign out button.

- Courses & Attendance: in this screen, the student should select one of the courses from the course list. Then, the student should scan the QR code by using the smartphone camera. In this case, the application will make sure if the code match or not. If the code did not match, the application would view miss match message. Moreover, if the codes match, the application will view match message, then the attendance will be recorded. In addition, the student can add a new course to the courses list by entering the course ID. If the course ID did not exist, the application would view the alert message. Moreover, if the course ID exists, the application will view the course details; then the student can add this course by press add a course to add it and update the list.
- Absent Notice: shows the total of absent notice for each course.
- Sign out button: to sign out from the current account and return to the sign in screen.

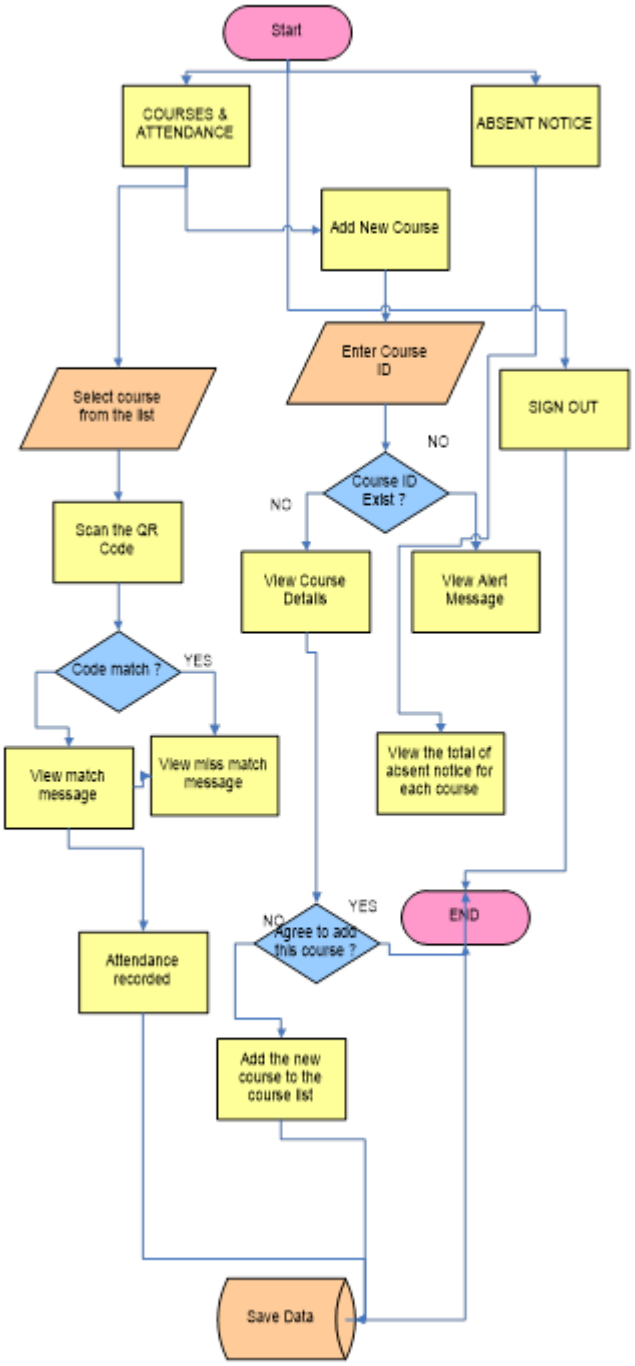

Figure 19 the Student application DFD

In case, any of the instructor or the student had lost their password; they can retrieve it by clicking on the “Forgot my password” button. Then the application will ask the user to enter the email that registered with the application. Then the application will send a message containing the password for the user. Figure 20 explaining how to get the password back.

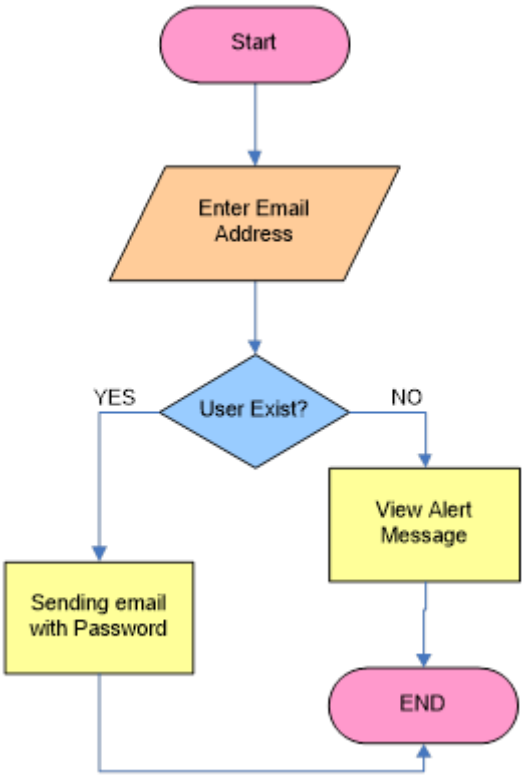

Figure 20 the request for the password

10. Results and Discussion

The application has been programmed for all users; students and teachers. Users must log in to the application through a username and password assigned to them. After trying the application, it is as follows:

When the instructor wants to add a new course process:

The instructor must sign up or login. Then the instructor can add a new course (course id - course name - student density - QR code). The new course will be adding to the course list. In addition, the students can use the application when the instructor gives them the course ID. Also, the student must sign up or log in the student can add the new course by entering course ID. Then the new course will be adding to the course list.

Instructor and student can do the attendance process as the following:

When the student or the instructor login to the application they can select the course from the course list. Then scan the QR code of the student if the QR code match with QR code for the course then the system will increase the counter of attendance by 1.

Notice the process is done by the student and the instructor as the following:

The instructor must log in to the application then select the course from the course list and view the list of student civil ID with the total of attendance and notice for each student if the instructor wants to send notice the system will calculate the absence days.

If the total of absent days is more than or equal 3 and less than six the application will count notice 1, and if the total of absent days is more than or equal 6 and less than nine the application will give the student notice 2. However, if the total of absent days is more than or equal nine the application will count the notice 3, and it is the last one. If a student wants to view the notice

of absent the student must log in. Then select the course from the course list. Moreover, the student is able now to view the total of attendance and total of notice.

11. Conclusion

This paper presents an application to use QR code in Education. This application offers a system to help the instructor and the students in the mechanism of calculating attendance, which makes the mechanism of calculating attendance easier. The application is a new and distinct idea of where it has been designed carefully to serve the College of Basic Education in Kuwait. So, to keep up with the technology, as the technology has become spreads steadily. This application has been submitted and explained in this paper, to help in the mechanism of calculating attendance (absence in college).

In addition, the student feels more responsible where he could identify the number of lectures attended along with a number lectures that are absent.

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