

Educational Platform based on Smartphone to Increase Students' Interaction in Classroom

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Abstract—Current smartphones meet all the criteria for university application. This technology opens the door to develop new techniques to enhance teaching methods. In addition, it presents an interest solution for students' guidance and helping. Thus, the idea of this proposal aims to provide a platform around smart phone based on android to help student and teachers managing their courses. It is based on the Internet of Things to increase digital interaction and improve the teaching process while delivering traditional lectures. The system encompasses three main parts. The first step is carried out for guiding students to find their classroom and teacher's desk. The second part was developed to help teachers to monitor the attendance of students. The third part is dedicated for improving e-learning in classroom by managing the educational process with the purpose of providing the adequate platform for data management. The platform, therefore, succeeded to provide the adequate solution to prevent the misuse of smart phone in classroom, and to enhance the learning methods using smart technologies.

Keywords—Android; classroom; e-learning; data management; IoT; smartphone

I. INTRODUCTION

Today, smartphone immersion phenomenon of almost all students becomes a critical problem from an educational point of view. Obviously, the presence of a mobile phone decreases performance during and negatively affects the ability to concentrate. Unfortunately, smartphone can be a tool for students' distraction. Social Medias are among reasons that cause lack of course follow-up. Gowthami, S., and Kumar, S. V. K, discussed the factors that lead the loss of concentration for students in classroom, such as, the use of smartphone for chatting, playing online and checking e-mails [1]. In addition, Masadeh, T. S. Y, tackled the same problem of students' distraction in classroom by providing the barriers of using smartphones [2]. Furthermore, another research analyzed four hypotheses for the effects of smartphones usage of different cultures including, distraction, addiction, the non-usage of smartphones and the effects of female users [3]. This research conducted to prove the defects of using smartphone in classroom. In addition, Al-Furaih, S. A., & Al-Awidi, H. M. proved the disengagement cause of students when using their smartphones in classroom [4]. Otherwise, a research focused on the use of smartphone even in online courses, proved that students who learn using their smartphone showed a stronger negative effect in academic performance [5].

According to this brief analysis, these factors lead to ensure compliance with the rules and the law. The use of telephones is prohibited in class. It's a way to protect students from loss of concentration due to tablets and phones. Should you or shouldn't you have your cell phone at university? The question, which is a matter of discussion in many universities in the country, leads to a larger problem.

In fact, prohibiting students of using smartphone presents a real challenge. This leads to study the aspects of using smartphones in the classroom, to propose solutions to turn the smartphone into classroom aid. UNESCO in a series of documents on mobile learning paints an excellent portrait of the perceived advantages and disadvantages of using mobile devices in a learning context. Two documents are particularly interesting, namely Policy Guidelines for Mobile Learning [6] and Turning on Mobile Learning in North America: Illustrative Initiatives and Policy Implications [7]. They highlight a number of pedagogical benefits, but also more personal benefits to the use of smartphones in the classroom.

- Possession of a mobile device in the classroom would make it possible to personalize learning by offering the flexibility to pace one's learning and to learn according to one's preferred mode [8].
- Mobile devices in the classroom would facilitate immediate feedback and assessment by leveraging the interactive capabilities of the devices [9].
- Mobile devices would promote productivity and active learning by maximizing the time spent in class and moving away from more passive modes of knowledge transmission [9].

UNESCO also addresses barriers perceived by policy makers and teachers to the use of mobile devices in the classroom for educational purposes [10].

- Issues of behavior and civility are often raised.
- The disruptive and distracting nature of AMCs. For example, a 2013 research report demonstrated that the use of laptops in the classroom can impact concentration and learning both for the student they use it and for the students who are close to the user [11].
- The heterogeneity of mobile devices and the size of screens can be a barrier to their use in class.

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Thus, applications around Smart phone should be developed to prevent its misuse. Incorporating technology into education is a great way to actively engage students, especially as digital media surrounds young people in the 21st century. Interactive white boards or mobile devices can be used to display images and videos, which help students visualize new academic concepts. Learning can become more interactive when technology is used as students can physically engage during lessons and instantly research their ideas, which develops their autonomy.

Therefore, many searches were well developed to include technologies in classroom [12]. These led to prove the reliable ways to use smartphone in classroom preventing its misuse. Here, G. McKinley reviewed the benefits of using smartphone in classroom and how it can be a source of distraction [13]. Therefore, it is pivotal to extract the application of smartphone to be used as learning aid such as, incorporating multitasking by smartphone in order to prevent the blank time [14], accessing supporting information or teaching materials [15].

These projects led to develop application around the smartphone for the real time interaction in classroom, which is the main objective of the proposed idea. It is aimed to turn the smartphone as a learning aid in classroom. The proposed application provided a reliable platform for e-learning improvement. It guides new students to find their classroom or teacher's desk, it helps teachers to monitor attendance of students automatically, it helps students to download daily courses and follow-up from their smartphones and it offers the possibility to perform chatting group for classroom activities.

II. RELATED WORKS

The use of mobile phones in education is both a controversial and fascinating subject. For many, these devices appear as inconvenient objects in the classroom, which disrupt the smooth running and promote the dispersion of the concentration of the students. In addition, there are charters, internal regulations, which explicitly mention the prohibition to bring his telephone in the enclosure of the school establishment, which in the effective uses results in a use outside the courses. This idea is very beneficial during distance learning, which was relied heavily in the period of COVID-19 pandemic. In some reasons, the classroom can be accessed from home relying on interfaces of virtual classroom, including, course materials and homework [9]. In fact, this period proves the efficiency on using technologies in classroom. As cell phones continue to advance in power and functionality and prove their usefulness as an educational tool, the inherent limitations of these technologies should not be ignored. Already not everyone trusts the digital revolution: the supporters of the traditional school and the blackboard are of course opposed to it, but also the defenders of alternative education systems in which the press has often been interested in recent years. More and more voices are raised against these innovations which aim to impose the intensive use of digital technology in schools [16]. Thus, introducing smartphone in classroom is critical, that lead to develop the adequate application and systems around this device. This maintains the advantages of using smartphone in classroom as aid tool. K. Machmud, et al. developed a fruitful method to overcome the

anxiety related to whom learning English as foreign language [17]. In this contest, the use of such application like "Let's talk" can be useful to practice English language [18]. In addition, several applications around smartphone support the theory of using this device in classroom can be beneficial [19] that help to manage course materials. Otherwise, smartphones' applications can be used for attendance monitoring in classroom [20]. In fact, almost applications tackled some aspects of effective uses of smartphone in classroom. This led to develop an application around the smartphone which encompasses the management of attendance, assessments, and course materials management, focusing on students' interaction in classroom using their smart devices.

III. SYSTEM ARCHITECTURE

Fig. 1 presents the entire system's architecture of the proposed application.

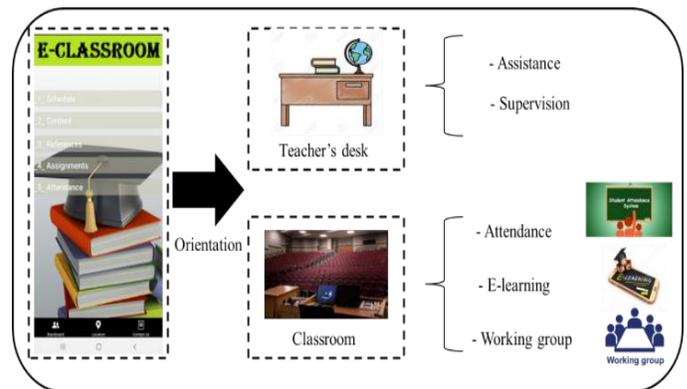


Fig. 1. System Architecture.

The first step is carried out for students' guidance. The student login with his university ID. The application, therefore, moves to the second step by guiding the student to the teacher's desk for assistance or the classroom for attendance. Here, the application provides a new technique to facilitate hand over the assignment. In fact, the Google map was applied to achieve this goal as illustrated in the application interface under the item "location".

The third step will be performed when student find its classroom. It is a great platform to improve techniques of e-learning and attendance monitoring. This technique confirms that the student is part of this course and records the entry time. When the confirmation is done, the application enables student to participate at the course interface which contains the lecture. In addition, it provides the possibility of making discussion groups when assigning activities. Thus, this method offers a new technique to improve e-learning and to use technology to fully engage student physically during the lesson.

IV. METHODOLOGY

In order to ensure the feasibility of the proposed architecture, a multilayer structure was adopted as shown in Fig. 2. The application structure is composed by three layers, including, main, data service and data analysis layers.

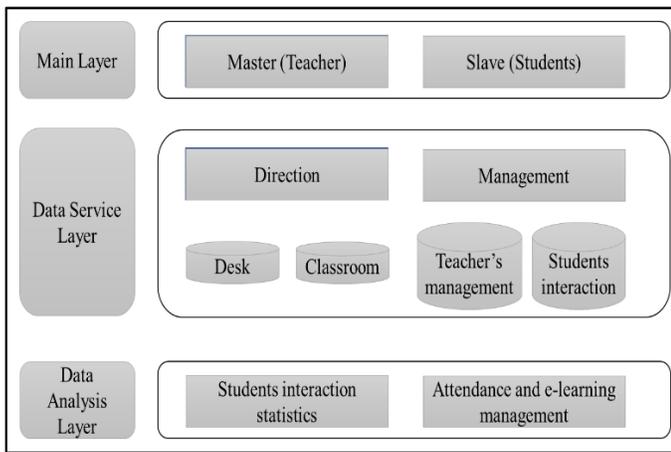


Fig. 2. Multilayer Structure of the Application.



Fig. 3. Application's Interface.

The main layer presents the application's parts, which consists of master-slave architecture; the master (teacher) manages the students' interactions during classroom lesson.

The second layer is composed by the services of the application provided. It is adopted here to aid students for attending their classroom and/or teacher's desk. When student attend his classroom, he will benefit by the system of e-learning maintaining the objective of interaction during the lesson, which will be managed by the teacher.

The last layer ensures the connectivity of the data for analyzing of its statistic.

Based on the smartphone application, this platform encompasses the real-time classroom interaction and evaluation of learning quality. The main parts of the system include teacher data management, student response management, and data statistical analysis, as explained below.

- Teacher data management includes data import, question and exercises management, students' answers, etc.
- Student answer management, including, teacher's exercise answering, submission, results displaying, etc.
- Data analysis including statistical analysis of learning situation, of student attendance, of marks, etc.

V. IMPLEMENTATION AND RESULTS

The platform is implemented based on iBuildApp [21]. The data stored in the server provided by this application. The main interface of the application is presented in Fig. 3. It helps students to attend their classroom. It contains the lessons schedule, the content which will be available upon attending, the course references and assignments that depends on needs.

The application was applied for computer sciences' students of first level. The number of participants reached 25 students. For accessing the platform, students should login with their university ID. Therefore, the teacher can manage attendance easily. In addition, he can hold statistics of students' participations in assignments.

Upon student logs in to the platform, he can upload the content of the course as mentioned in Fig. 4.

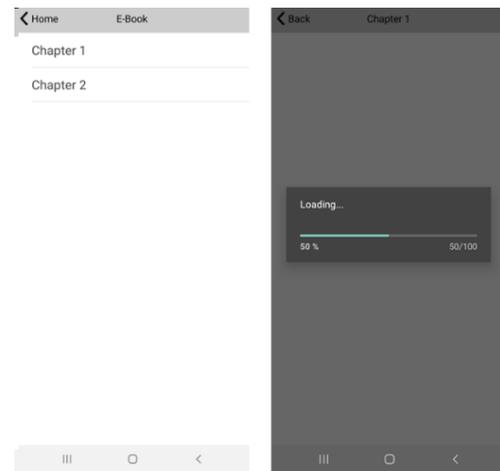


Fig. 4. Course's Content Uploading.

Indeed, the method proposed for accessing the content from the smartphone imposes students to use their devices for learning in classroom. It is proved by the statistics accumulated by the master's platform (Fig. 5).

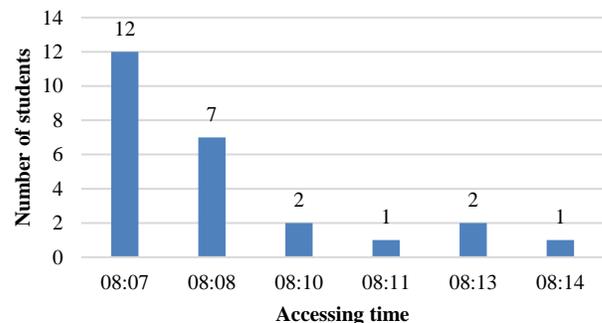


Fig. 5. Content Accessing Time by Students.

The upload of content by students takes about 7 minutes. The time spent is caused by the internet connection for some students. Basically, almost of all students were succeeded to upload the content autonomously. Indeed, the result proves the possibility of transferring the pocket smartphone on classroom aid, without the need of providing training. Otherwise, the master's platform was developed to monitor the participation of students during the lesson, including the online/offline identifications.

In order to fully benefiting the use of smartphone, 8 exercises were conducted for students' evaluation and for applying the teamwork. The exercises were distributed for 8 groups of students. According to Fig. 6, almost all students actively participate in answering assignment. This proves the good effect of students' interaction using this platform. Based on this platform, the student interaction in class was significantly improved. When comparing with the traditional methods, the proposed platform is more efficient.

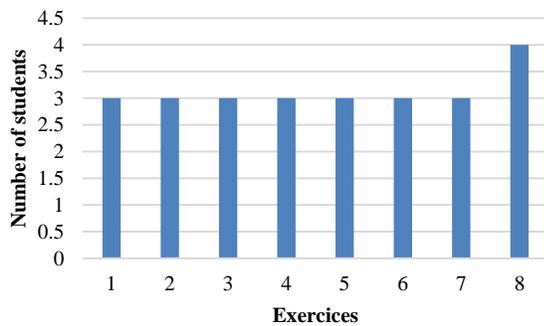


Fig. 6. Groups of Students by Exercises.

To demonstrate the efficiency of the proposed method for teamwork, the master's platform was developed to provide assignments' marks by application. In fact, the instantly evaluation encourages students for interacting. In addition, this method improves the feedback.

VI. DISCUSSIONS

The application was conducted to ensure the adequate evaluation of students preventing the misuse of smartphone in classroom. Thus, the evaluation was performed in three steps: At the beginning, the mid and the end of course.

A. The Evaluation at the Beginning of the Course to

- Become aware of the initial level of the students, so as to adapt their teaching according to their achievements.
- Starting from their devices management to ensure benefiting the platform.
- Engage their interest by asking a cryptic or problematic question.
- Recall, remember, the concepts covered in the previous session.

In fact, smart devices and tablets have invaded markets, homes and even schools, and it has become necessary to take advantage of these modern technologies to benefit the students

in their academic achievement, especially if taking into account the motivation shown by most of them to use their personal devices in the classroom and the long time wasted in front of them. Thus, the quick response of platform accessing by students proves the efficiency of using the proposed application with the targeted users, and to adopt smartphone in classroom. It took all students to get in and start learning about 7 minutes (Fig. 5). In addition, students' enthusiasm for using their devices was noted. It is proven by the participation of students in recalling the main parts of the previous lesson. This ensures that students remain fully focused during the lesson.

B. Mid-Course Assessment for

- Maintain students' attention.
- Make the student active and actor, he participates in his learning for a better appropriation of knowledge.
- Foster discussion and collaboration among groups. They can be asked to think and answer a question.
- Engage all students.

As the students' aspiration to everything technological facilitates the process of their response to the lessons, and then consolidates the educational materials for them in the long run.

In fact, the use of mobile phones in classrooms may result in many problems and inconveniences, especially in light of the predominance of the negative nature of the use of them which is represented in violating the rules of the education system. During the class, isolation from the teacher, sending and receiving messages, exchanging information, and joking with each other, which can lead to a lower level of academic achievement among students. Thus, the master platform was developed to ensure the connection during the lesson. An indicator assigns the log out of student if he opens another application. In addition, the developed platform broadcasts lectures and discussions in a sophisticated way that students can interact with each other and with the teacher. This prevents the misuse of smartphone in classroom, providing the adequate solution to engage students.

C. The Evaluation at the End of the Course for

- Check the students' understanding and be able to readjust their teaching the next session if the concept has not been well understood. It can be a question or an application exercise.
- Promote the recall, and therefore the appropriation, of the main concepts that were discussed during the session.

Regardless of the wide controversy that characterizes mobile education and the differences between academics and those interested in educational affairs around it (mobile education between supporters and opponents), technological development imposes itself on everyone, especially if it is accompanied by great interest and knowledge on the part of the center of the education process, who are the students.

Indeed, the proposed idea succeeded to build a knowledge system, in which the features of the image of mobile learning technology, its environment, characteristics, and benefits

become clear. It is based mainly on telecommunications, so that the learner can freely access educational materials, lectures, and assignments in order to be an active element in the educational process.

Finally, the marks achieved by the students at the end of assignment proved the success of the applied educational process (Fig. 7). It is proved that all students were engaged during the lesson. Reviewing and evaluating the duties and achievements of the students, presenting the results of the assessment and providing feedback to the students, contributed to further enriching the advantages of using the smartphone during the lecture.

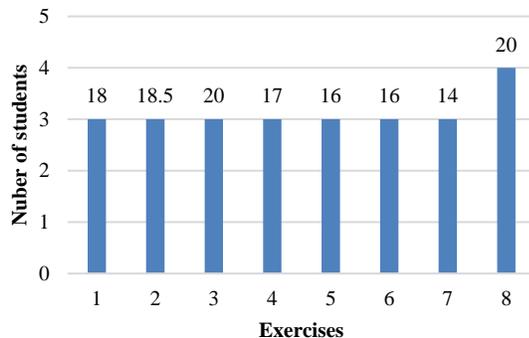


Fig. 7. Assignment's Marks.

VII. CONCLUSION

Smart devices have become necessary to exploit these modern technologies for the benefit of students in their academic achievement, especially if taking into account the motivation factor that most of them show in using their personal devices in the classroom. In fact, the cost of this technology is relatively low; education by mobile phones will not cost students additional financial burdens.

In this paper, a novel technique was applied using this smart device in order to be the main tool of the educational process in classroom. Thus, an application around Android platform was developed to achieve the idea's goal. It provided many layers for teachers to manage their classroom, and the possibility for students to be active element in the educational process.

In addition, the method of assignment answering and evaluating led to the success of adopting smart phone as educational tool in classroom. Adding more activities to the traditional lessons led to the attractiveness of the scientific material and the learning environment.

This platform, therefore, can open the door to develop more applications around smart phones for other courses.

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