International Journal on Advanced Science Engineering Information Technology

Vol.10 (2020) No. 2
ISSN: 2088-5334

Comparative Study of the Development of Android-Based Flipped Classroom Model between Jeddah and Indonesia

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***Abstract*— The development of information communication and technology has brought a new paradigm of education globally and particularly in Indonesia. Face to face learning has some limitations in terms of understanding, space, and time. The general concept of the flipped classroom method is that the students learn the materials at home and do the reinforcement in the classroom as well as learn the materials they yet to understand. The teacher dominates the learning process verbalism and stressful due to the overload materials in time limitation. This leads to teachers' unawareness of the student's understanding. Therefore, in Industry 4.0, the learning process internet-based become the primary alternative to overcome the gap. Android-based flipped classroom model is one of the chosen solutions in this research to develop the online teaching media and learning materials. The research aimed to compare the effect of the Android-based flipped classroom model against the students' achievement in one of the schools in Jeddah and Indonesia. Research and Development (R&D) adapted from Dick and Carey used in this research. The development of an Android-based flipped classroom model effectively implemented in Indonesia but did not effectively implement in Jeddah. The results showed that the students' achievement for Indonesian students was significantly higher than of Jeddah students. However, both students and teachers in both schools showed a positive response to the Android-based flipped classroom model.**

***Keywords*—android; learning process; flipped classroom; Moodle; learning.**

I. INTRODUCTION

The development of information communication and technology has brought a new paradigm of education globally and particularly in Indonesia. Education in this century allows the use of innovative teaching methods suitable for various students' characteristics [1], [2]. For such teaching methods is an outdoor learning class [3], which is suitable for early childhood to late childhood stages, which still love to play [4]. However, it needs to be integrated with technology such as a computer and smartphone supported by software to manage the learning process [5]. By integrating such technology into the learning process, the effectiveness could be increased by 75% [6].

Generally, a lesson plan must be developed based on the students' characteristics. For that reason, the teachers need to be able to choose an appropriate method to deliver the teaching material [7]. In the traditional method, the learning is carried out by giving an explanation in the classroom and reinforcements in the form of homework. As a consequence, many students find difficulties in doing their homework due to less supervision from the teacher.

On the contrary, in a flipped classroom model, students learn through e-books and videos independently [8]. It has been proven that learning independence and creativity have a significant impact on student achievement [9]. The students are asked to make a summary, jot down important information, ask questions, do a peer discussion, or read more literature studies at anyplace [10]. Therefore, the flipped classroom method seems more suitable to be implemented compared to the traditional method, recently.

The general concept of the flipped classroom method is that the students learn the materials at home and do the reinforcement in the classroom as well as learn the materials they yet to understand [11]. Lately, the process has been integrated with technology [12], such as Moodle. A flipped classroom is a unique such learning approach that generates knowledge over information. Furthermore, to the flipped classroom method, it is a similar procedure as an

indispensable portion of evolving line-up knowledge expertise.

Modular Object-Oriented Dynamic Learning Environment (Moodle) is one of the learning management systems widely used around the globe. The contents included in Moodle are texts, web, animations, multimedia, e-books, slide presentations, discussions, and online quizzes. Previously, Moodle can only be accessed through a web browser. Nowadays, it provides an android-based application, namely Moodle Mobile, to help users in accessing Moodle installed in their school's site [13].

Android-based Moodle Mobile has been tested on several Android devices [14]. The result showed that Moodle Mobile could work well; students can do the quizzes directly, less data package consumption, and run faster than a browser.

Although the flipped classroom method claimed to be useful in improving the students' achievement, its effectiveness to the students from the same nationality with different domiciles is rarely revealed. Therefore, the present study aims to investigate the effect of the flipped classroom method Internet-based to students' achievement between two countries with the same nationality.

II. Materials and Method

Research and Development method by Dick and Carey was employed in this study by some adaptations in accordance with the needs of this study [15]. From 10 stages, only four stages were implemented, namely define, design, develop, and disseminate. The define stage included documents and needs analysis. The design stage included curriculum, teaching materials, teaching media, and evaluation tools development. Develop stage included the implementation of the developed product to find out its' effectiveness. The last stage was a dissemination that is spreading the developed product.

The learning material was Indonesian civic education. The product was designed for five grader students in Indonesia and in Jeddah, Kingdom of Saudi Arabia. All the participants could speak in Bahasa Indonesia properly; therefore, the media was made in Bahasa Indonesia, which was translated into English for publication purposes.

III. Results and Discussion

A. The Development of Flipped Classroom Moodle

Flipped classroom Moodle was developed to have a suitable method, and teaching media with primary school's needs in-line with the basic competence stated to recognize kinds of joint decisions. The first step was to analyze the needs. An overview of the learning progression, the expected students, would be able to pass the minimum standard score in their learning outcomes. Where many students did not pass the standard score.

Hence, integrating the technology into the flipped classroom model, allowing students to have a major improvement in their knowledge [16]. However, the effect will be significantly increased whenever they were ready with e-learning; therefore, readiness plays a key role in the flipped classroom [17]. Consequently, it was needed to develop the lesson plans with the flipped classroom method using Moodle. The Moodle from http://espedas.com was used as a learning management application, make user, manage teaching content, and develop evaluation tools as well as manual user of Moodle Mobile. The use of technology across the program is strongly recommended as it produces positive consequences in learning and understanding the concepts [18], [19]. Fig. 1 presents the flowchart on how to operate the Moodle Mobile as students or teachers.

In order for implementation to follow in an effective way, teachers must value the technology enhancement activities to be valuable Moodle mobile for their teaching and student learning [20]. Teachers must have careful preparation regarding the pedagogy of integrating these tools and suitable for classroom management that allow the teachers to feel confident in their classroom [21].

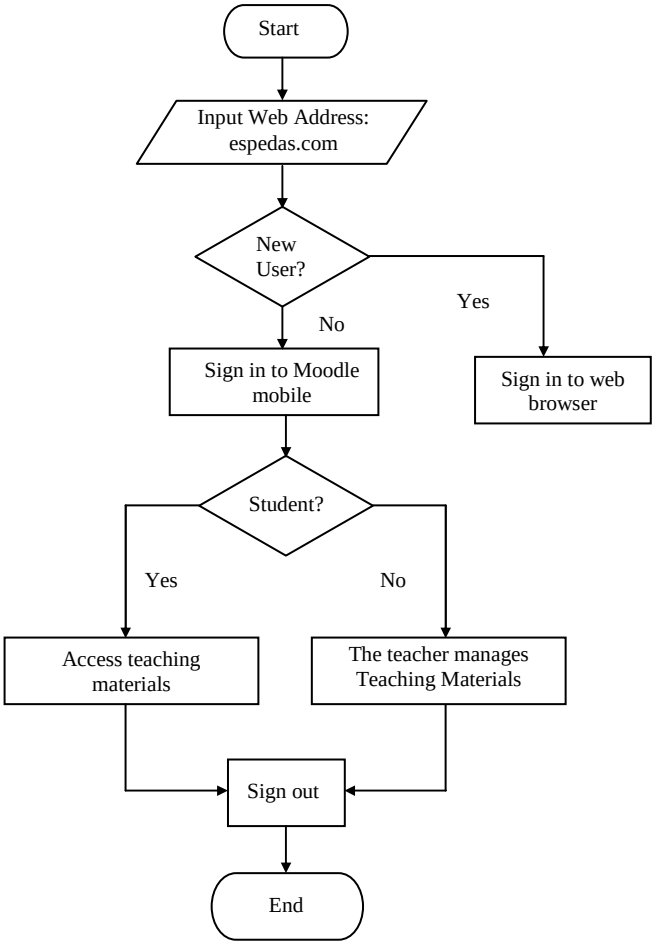

Fig. 1 Flowchart Moodle Mobile

B. Flipped Classroom Moodle Mobile

Fig. 2 shows the learning content from the Moodle Mobile applied in this study. The learning contents included in the Moodle Mobile are Discussion Forum, E-Book, Video Learning, and Quiz. Constructed on the combined results of this study, a typology of content groups of Moodle mobile learning readiness can begin to be acknowledged. At the level of enthusiasm are teachers at the commencement Adoption of Technology stage, who desire and possibly need face to face skills development [22].

These have a tendency as students who have been in studying for many years. Yet students of this type have technologically advanced strong opinions about options or

benefits of mobile learning, though they share apprehensions with Moodle mobile learning types about external impacts.

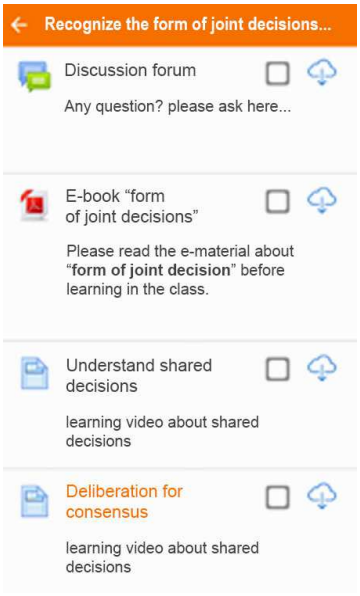

Fig. 2 Learning Content

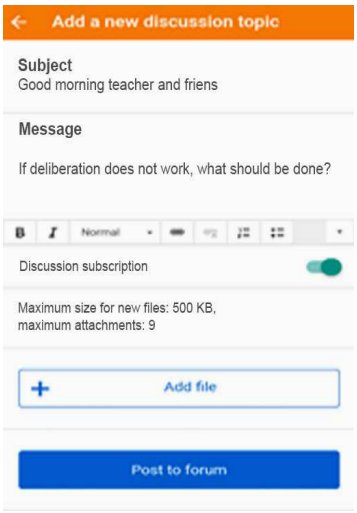

Fig. 3 Post to Forum

Fig. 3 shows the menu of the Discussion Forum. The students could input the subject and message they wanted to discuss the difficulties they found during their self-learning at home. Moreover, students were able to attach files. Concluding the changed types of facts, transformation progression involves four ways of collaboration among implicit and explicit information. Intrinsically, it leads from socialization than to externalization, to combination, to internalization, at that point, over to socialization and so on. At every single stage of conversion, different kinds of information are actuality shaped, completed, and completed once more [23]. All the techniques finished the present argument, though the points of the conception of varied forms of information were explored; the critical attention of all those distinctions was about the conversion of tacit and explicit knowledge. Subsequent division claims the assembly between types of knowledge and the process of information conversion to the teacher or learner-centered e-learning systems. Sessions in traditional classes and a learning system in its non-tacit delivery form of knowledge. This standard provisions (allows) the requirement of taking the method of spiral cycles using a learning system for this resolution (tacit-to-tacit acquaintance transfer); through enchanting the opinion concluded the subsequent progression [24]. However, students showed their less contribution in using this Forum.

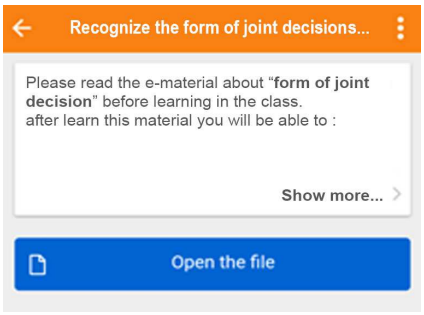

Fig. 4 Open E-Book

Fig. 4 displays how the Moodle Mobile opens the e-Book included in the application. Students used the e-Book as their reference in making a summary or jotting down the important points. Thus, students were also able to ask questions on things they found difficult to understand from reading the e-Book at home to be asked at school the day after.

Electronic books (e-book) regularly comprehend multimedia structures such as active portraits, contextual resonances, and music that show laterally through the edition that qualify learners to study further intensely associated with plain or standing non-multimedia enhanced script [25]. Through Moodle mobile learning, this multimedia additions that in a straight line associate to the stated material are exposed to add to education, e.g., in section and verbal comprehension such as heeding toward multimedia improved stories progresses comprehension equaled to attending the sections using non-multimedia attachments [26]. Consistent multimedia arrangements increase the ability of the material and improve the learning of influences in children than reading text only. It is because composed to conclude significances of new arguments with dynamic graphics than applying standing illustrations since animated drawings envision the information making it easy to connect the words and descriptions, consequently supports the understanding of the stated material. Henceforward expression learning and conception can be simplified using multimedia attachments as fewer on work is mandatory to contest the verbal and non-verbal information [27].

Besides Discussion Forum and E-Book, Moodle Mobile also has a learning Video menu, as shown in Fig. 5. The videos inserted into the applications were downloaded from www.youtube.com, including materials about (1) understanding joint decision, (2) voting, (3) deliberating to agree, and (4) acclamation.

Students on entirely educational stages wrist watch instructional videos, for instance, short information slides, web discourses, and how to exam videos for well-defined learning determinations on websites, for instance, YouTube [28]. In prescribed learning situations, instructional videos are gradually actuality used. Using videos are frequently surrounded popular on out-of-date progressions, normally

attend as an important factor in blended sequences, and the highest resources for offering information in enormous virtual exposed progressions and flipped classrooms [29].

Fig. 5 Learning Video

This previous work has formed highly useful perceptions into the conditions under which learning from the instructional video is current or may possibly be further optimized, and several evidence-based design principles. YouTube uses an algorithm to decide correlated videos to display, based in part on the viewer's request of comparable videos (measured in interactions of views, divisions, and other use-related data) and, for subscribers, their profile, showing the history and formal and informal common connections to providers and other users [30].

One of the videos in the application is the example of the process of selecting a Class Leader. Each video's length is around two to six minutes. Students were needed to watch the videos at home as their preparation for learning the day after.

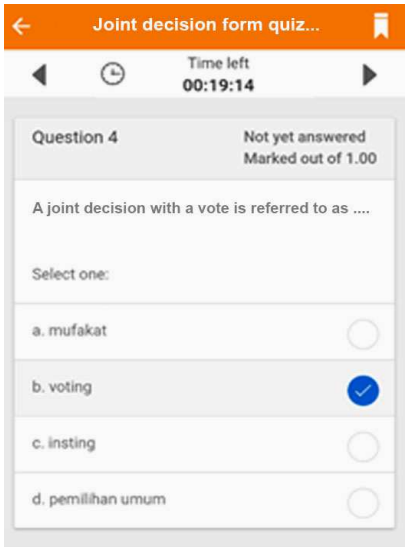

Fig. 6 Quiz

The last feature from the application is Quiz, as presented in Fig. 6. In order to find out the effectiveness of the Moodle Mobile, students did a quiz from the application to get their cognitive learning outcomes. The Quiz has consisted of 10 questions of multiple-choice questions with 20 minutes of allocation time for them to finish. In addition, they only had one chance to do the Quiz.

Quizzing increases learning through generating enhanced continuing retention of examined contented associated with restudied content [31]. Therefore, research provisions the recommendation that teachers can take advantage of on the test-enhanced learning by on condition that repetition quizzes and tests to sustenance students' retention of sequence substantial [32].

We originate that answering questions after reading each section and answering questions after reading the whole pages on condition that corresponding benefits on the final test [33]. We also presented that the questions led to countless learning than control conditions in which questions read the part once or read it once and then reread critical parts that were to be tested late. Although prior research contrasted interposed questions with questions providing after study, in the accepted set of reading mobile learning, such an either/or prearrangement need not be used. Students may be greatest obliged to answer questions both for the duration of learning and after learning because continual retrieval increases the testing result [34].

C. Discussion

The instruments were tested to find out its validity and reliability before the implementation. Validation was also carried out to assess the content and media of Moodle Mobile. It resulted that the content and media of Moodle Mobile were very valid to use.

The research was conducted in two meetings (4x35 minutes) that began by giving pretest to the students to figure out their initial ability in recognizing joint decisions. Then, students were introduced to the flipped classroom, and they were taught how to operate Moodle Mobile. In the second meeting, the flipped classroom method was implemented. After the implementation, the students did a quiz by using Moodle Mobile to find out its' effectiveness.

TABLE I
RESULT OF N-GAIN IN INDONESIA

	Pretest	**Post-test**
Average	62.50	80.94
N-Gain	0.49	

In accordance with the result of N-Gain, that was presented in Table 1. Through the gap between pretest and posttest scores proved that the treatment given was effective that the N-Gain score includes the medium category that is 0.49. Students who passed the minimum standard score were 90.63% of them, with an average score of 80.94.

This shows that learning using flipped classroom Moodle was effective. A comparison, Table 2, shows the n-gain result from students in Indonesian school in Jeddah.

Through the gap between pretest and posttest scores proved that the treatment given was not effective where the N-Gain score includes the low category that is 0.17, and the student's average score is 61.25, smaller than the desired minimum standard score. This shows that learning using *flipped classroom* Moodle was not effective for this group.

TABLE II
RESULT OF N-GAIN IN JEDDAH

	Pretest	Post-test
Average	53.16	61.25
N-Gain	0.17	

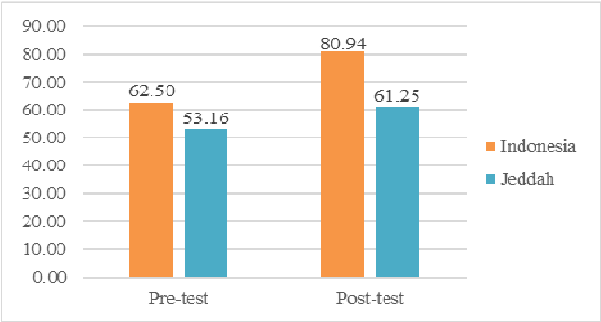

Fig. 7 The achievement comparison of both countries

Fig. 7 shows the average score of pretest and posttest from students in Indonesia Jeddah School. It shows a significant difference in the average score of Indonesian students. There was an increased score of 9.34 between the average score pretest and posttest of Jeddah students, and there was an increased score of 19.69 between the average score pretest and posttest of Indonesian students. Thus, the development of an Android-based flipped classroom model effectively implemented in Indonesia and did not effectively implement in Jeddah.

These probably caused by the different perceptions of students regarding the curriculum goal. The students of Indonesian school in Jeddah feel that the learning material was not so important for them. On the contrary, the students in Indonesia feel that the knowledge from the learning process has a strong relationship with them since they are living in Indonesia. However, based on the questionnaires, students gave a good response toward the implementation of flipped classroom Moodle. Moreover, teachers were interested in applying Android-based flipped classroom Moodle in their class.

IV. CONCLUSIONS

The development of flipped classroom Moodle was carried out through four steps: (1) define, (2) design, (3) develop, and (4) dissemination. In general, flipped classroom Moodle learning made students' scores on cognitive learning outcomes higher with a good average score. The development of an Android-based flipped classroom model effectively implemented in Indonesia but did not effectively implement in Jeddah. However, the students and teachers responded positively toward the implementation of the product.

ACKNOWLEDGMENT

Our research was fiscally sustained by the "*Postgraduate Research Grant*" of Universitas Negeri Semarang in the financial year 2018.

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