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On Demand Scoring System to Enhance Collaborative Learning Experiences in Mobile Learning

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Abstract--- *How do you know if your students have truly learned what you set out to teach? This system is built around a class or remote class to assist the instructor and the students to control the result of their performance in real time. This application was designed with research and development in mind as a special tool for knowing the progress of learning in a collaborative environment. The results and findings will show not only increasing performance and motivation of the students, but also instructor's awareness about the strength and weaknesses of actual session and class performance, and he or she can make adjustment for the next sessions accordingly to improve learning experiences.*

Keywords--- *On Demand Scoring, Collaborative Learning, Learning Experience, Mobile Learning.*

I. INTRODUCTION

On Demand Scoring System (ODESSYS) is a lightweight Learning Management System (LMS), that was built with special requirements in mind. First we wanted to create an application, which can be used in certain areas of Indonesia, where schools can't afford to have a dedicated LMS server for the teachers, or to host an LMS Server in Cloud. Second requirement is to have an application with "mobile first design", a web specification of Responsive Web Design discussed in Rumsey, E., Roth, L., & Shane, W. (2013) and Kennedy, D., Journal, S. A. B. A., August, N., & Kennedy, D. (2019), which means that the learner can use mainly his or her cellphone to participate in a local or remote class-room using a web-browser. The third requirement, the system should be easy to use, easy to administer, easy to maintain, and it needs only a short learning curve.

On demand scoring means that the teacher can have the results or review student's performances in real time. The objectives of our solution are to provide a simple app that would provide guidance for in recognizing student performances in real time using mobile learning activities.

II. LITERATURE REVIEW

Many studies showed that Collaborative Learning (CL) promotes and improves learning, and increases learning experiences. CL has become the latest trend in education towards active learning; where students actively engage in small groups and building their knowledge through peer learning, learning by doing, and learning by teaching. CL leads to the theory of constructivism and now to connectivism (Bodendorf, F., 2014), and has been used as a learning strategy practiced worldwide for many years (Baekley E.F., Major C.H., Cross K.P., 2014) .

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Our study focused not only on CL in a blended learning environment, which will strength student-centred learning experiences (Sarmento, T. S., Gomes, A. S., & Moreira, F., 2018), but also in implementing CL techniques in that environment.

In mobile learning we found some literatures in developing application in a mobile learning environment (Maccallum, K., & Parsons, D., 2017). The findings show that simple application can help to develop the integration of learning theories into mobile learning activity design.

III. Learning Environment and Methodology

3.1 Learning Environment

Back to basic, with the Intranet the students can use cellphone with web-browser to access the teacher's server thru wifi. The teacher is equipped with a standard laptop including hot-spot and allow the students to login. This is considered as the first option of learning environment.

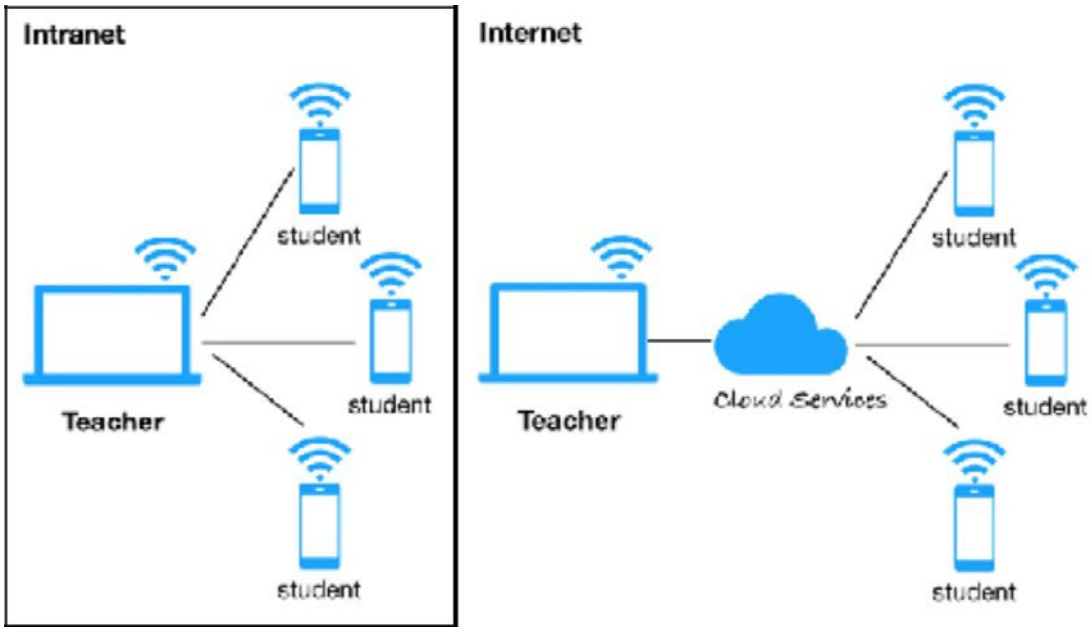

Figure 1: Intranet and Internet with Smartphones as Clients

The second learning environment is using the internet thru a cloud provider. The teacher has to install ODESSYS through the cloud and the students can access the application using their cellphone from anywhere. The student needs internet connection from home or anywhere. This environment is especially needed to implement the collaborative online learning.

As the third learning environment, we can use the available server at school and will be handled the same way as Cloud.

The application will be implemented with the design "mobile first", which means that the layout of the web components should fit the available screen of a standard smartphone. And the next implementation could be the layout of an ipad or a desktop. This design is in line with the concept of smartphone as the learning devices.

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To write the mobile application, we followed the agile design thinking and agile practices for software engineering (Corral, L., Fronza I., 2018). What we have done: collaborating closely with students to understand their needs, constantly releasing software of limited features, and focusing on working products. We also always prepared for changes, responsive to newer technology, and using iterative process.

We took care especially for User Interface and User Experience (UI/UX). Our purpose is to write a simple attractive and easy to use web app using UI/UX principles (Qin, X., Holla, S., Huang, L., Montijo, L., Aguirre, D., & Wang, X. , 2017).

3.2 Methodology

We used the ADDIE (Analyze Design Development Implementation Evaluation) framework (Branch, R. M., 2009) to work with our agile model described previously. We started with problem identification, entry behavior, objectives, design and development, implementation/demonstration, evaluation including revision.

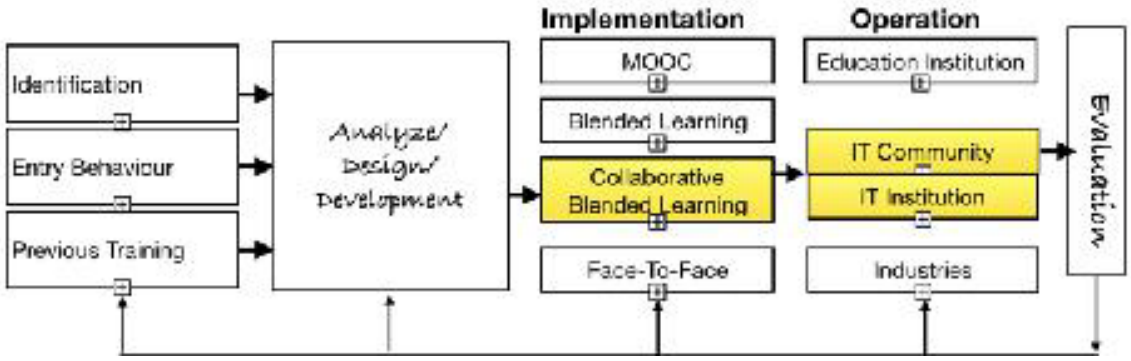

Figure 2: Model of Instructional Design

IV. LEARNING SCENARIOS

The key design features of the tool were based on the following requirements. First, the tool should provide quick result of given quiz, rubric, and/or exam. Second the tools give the teacher and students control over the student's performance, and third with collaborative learning strategies, they will have better understanding of what they have learnt.

4.1 Face-To-Face Strategy

This strategy especially needed when using blended learning model, where 20% of the total learning is face-to-face. The teacher will have the role as facilitator and the students take the active role in peer learning, learning by doing and learning by teaching. The progress will be controlled through quiz and/or rubric so that the facilitator can have an overall picture of the student's progress and performance. This can be achieved, because the scoring system is in real time.

4.2 Flipped Blended Model

A combination of flipped classroom and blended learning environment takes advantage of technology for a more flexible learning environment and facilitates a more learner-centered as well as a more active learning in classroom (Wibawa, B., & Kardipah, S., 2018).

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Participants can explore themselves in class by doing lab work or doing research in small group or individuals. “Flipping the classroom” means that activities that have traditionally taken place inside the classroom now take place outside the classroom and vice versa. This model fits with our concept, where face-to-face meeting should be done anywhere, not only in the classroom. The mobile learning nature of the system make the teacher easy to move the learning environment outside the classroom, for example in garden, or even in a cafe.

4.3 Think-Pair-Share

The think/write, pair, share strategy (Tyminski, A.M., Richardson, S.E., Winarski, E., Tyminski, A.M., & Richardson, S.E., 2019) is a learning technique that encourages individual participation and is applicable across all grade levels and class sizes. Students think through questions using three distinct steps:

- Think: Students think independently about a question that has been posed, forming ideas of their own and write them down.
- Pair: Students are grouped in pairs to discuss their thoughts. This step allows students to articulate their ideas and to consider those of others.
- Share: Student pairs share their ideas with a larger group, such as the whole class. Often, students are more comfortable presenting ideas to a group with the support of a partner.

In addition, student’s ideas have become more refined through this three-step process. These strategies proofed not only learning by peers, but also learning by teaching will enhanced the participant’s skills and knowledge’s.

There are more than 30 strategies for enhancing performances that can be taken from Barkeley, Major and Cross (pp. 153-158, 2014) in their book "Collaborative Learning Techniques". It will be further explored in the next research.

V. FINDINGS AND CONCLUSION

We found that the system is an exciting tool for teachers and students. We had 21 teachers in 4 cities in Indonesia as our respondent. The feature that the teacher like most is, how simple to use the application and move from place to place using the intranet without hassle (no data or power cables).

Table 1: Rubric of Application Features

Features	*Excellent*	*Very good*	*Good*	*Need improvement*	*Unusable*
Easy to configure or setup the application	9	9	3		
Easy for the teacher to build a session (e.g. Quiz, Exam, Questioner, Rubric, etc.)	5	9	6	1	
Easy for students to access the application, using the 'state of the art' technology to web-responsive design (from teacher's perspective)	6	8	7	-	-
Easy to move the application server (which is a mobile platform) from one place to another without hassle (no data or power cables).	12	9			

The application made it easier to implement collaborative learning strategies online. Second, the tool should be available to run on mobile devices. This requirement was based on the concept of providing appropriate modelling for mobile activity design. The features helps learners to see what has been and can be achieved.

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The application ODESSYS has proven that interaction and feedback are most essential components of classroom lecture, which can improve the quality of learning. ODESSYS supports teachers, mentors and others to deliver a quick results of a class-performance, and it enables for a creating ad hook learning strategies depends on the result of the actual scoring. The system also help online collaborating techniques to be implemented as a real online collaboration, which will help the students to beher and faster understand the essence of the given lessons.

From the results of questioners, it was observed that most teachers found the system very useful, not only to show the individual performance, but also the possibility to rearrange the sequence of the learning materials to fit the actual condition of the students. It can be arranged, which topics will need deeper discussion and which topics are already mastered by the students.

There are still many things to do, escpecially in implementing the many collaborative learning strategies like *jigsaw, Fishbowl, Note-Taking-Pairs, Think-Aloud-Pair Problem-Solving (TAPPS)*. In the future, we plan to generate the rules based on the user behavior, further improve the model by incorporating online machine learning methods and also run the system for a larger dimension.

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