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### LEARNING MODEL DEVELOPMENT FRAMEWORK WITH FLIPPED CLASSROOM METHOD AND SMART LEARNING DIAGNOSIS SYSTEM FOR VOCATIONAL HIGH SCHOOL

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#### **ABSTRACT**

The Flipped classroom has reached some popularity in last decade. Theoretically, flipped classroom means particular classroom-based learning activity are shifted into outside class hour by using videos or other eLearning materials while common class time is spent on highly interactive learning activity. Vocational high schools especially in engineering still use tradition learning method by in-class learning and homework after class. In order to increase learning quality and learning engagement, the author propose a research framework to implement flipped learning. Flipped learning also can be designed to increase literation score because according to the survey that PISA score in Indonesia needs to be increased. This paper proposes a framework to design implementation flipped learning in vocational high school and evaluation using intelligent system. Hence, the other schools could take benefit and review what is the advantage, evaluation scheme and cost planning of this topic.

#### **INTRODUCTION**

Currently education in Indonesia, especially in vocational high schools, is more focused on the outcome, namely the competence of students. Vocational High School is a secondary education level that focuses on producing graduates who are competent and able to compete in the world of work and are also expected to participate in advancing the ranking of human resources in Indonesia. SMK education has varied majors and competencies, one of which is software

engineering. Vocational High School students who major in software engineering are required to become programmers who are reliable and able to adapt to the times and fill information technology-based job opportunities in various sectors. Therefore, the teacher has a central role in teaching quality material and developing creative ideas in teaching so that the knowledge provided can be well absorbed by students.

This activity is motivated by the still validity of learning methods commonly carried out in class, namely teachers still use teaching hours in their class to explain the material and provide training to their students [1]. Then to provide additional stimulus, the teacher gives assignments or homework to be done by students in their respective homes in order to increase student knowledge. However, sometimes to do this assignment, students need to ask friends or discuss with the teacher regarding the assignment given. This results in students not being able to reach their highest thinking power so that the potential and intelligence of students have not been fully explored, while the potential and intelligence are very necessary to be able to meet the specified competencies [2]. Therefore, we need a method that can improve the learning process and learning media to facilitate this method so that it can participate in increasing learning interactions between teachers and students.

This community service activity discusses the implementation of flipped learning which is the opposite of the learning method previously described. If in general the teacher provides all material and explanations in class, in flipped learning students get homework in the form of subject matter and exercises through multimedia devices in the form of videos, and other digital materials using computers [3]. Meanwhile, face to face in class can be used to form study groups, discuss a problem and solve problems. Flipped learning is a popular learning model and has been implemented in various countries and has been proven to improve student performance [4].

Students can measure the extent to which their ability to absorb knowledge and aspects of expected competences. Meanwhile, teachers in the classroom can focus more on learning activities such as guiding and directing discussions and problem solving so that students can develop their creativity and thinking power. Targeting students and teachers majoring in software engineering with a partner institution called SMK Assalam Bandung. This activity is expected to provide benefits to partner institutions with an increase in both students and teachers in several fields including knowledge, skills and services. The output of this community service activity is in the form of a national journal indexed by Sinta and articles published in the printed / electronic mass media.

### **STUDENT READING INTEREST**

The Program for International Student Assessment (PISA) has released the results of its study on Tuesday 3 December 2019. According to the report, when compared to the 2015 results, there has been a decline in Indonesia's ranking in 2018 [6]. The study was conducted in 2018 by assessing 600,000 teenagers aged 15 years from a total of 79 countries with a span of every 3 years. Children 15 are considered as crucial ages and are prepared to face the challenges of the

times. This study can provide an overview of whether the generation of a country is ready or not in an increasingly developing era. A study conducted by PISA by comparing the math, reading and science performance of each child. For the category of reading ability, Indonesia is ranked 74th. Indonesia's average score is 371, just below Panama with an average score of 377.

The results of the 2018 PISA study show that there are at least five qualities of teachers in Indonesia that are considered to hinder learning, namely [5]:

1. Teachers do not understand the learning needs of students.
2. Teacher attendance rate.
3. Teachers tend to resist change.
4. Teachers do not prepare for learning well.
5. Teachers are less flexible in the learning process.

The PISA score shows that every country is forced to constantly compete to achieve a better ranking. Through this competition, it is hoped that each country will prepare human resources that are competitive and in accordance with the global era. Some efforts can be made to increase this, including [5]:

### ***Utilization of Technology and Information (ICT) in the Classroom***

The involvement of ICT in the learning process can have a positive impact on reading ability scores. Regardless of socioeconomic background, the use of ICT can increase reading scores by up to 40 points. This means that the ownership of ICT infrastructure in schools alone is not sufficient if it is not balanced with utilization in the aspect of learning activities.

### ***Involving students in teaching reading***

Based on the results of the PISA study in 2018, it shows that when teachers are more involved in reading lessons it can increase 30 points higher than students who are never or rarely involved. Therefore, it would be better if all students participate actively in reading activities when learning. The teacher can implement several strategies in order to increase the active role of students in reading, some of which are to invite students to have an opinion, make a list of characters, explain the contents of the reading, make a connection between the reading and the surrounding environment, make comparisons of the content of the reading with other reading with the same theme. , determine the parts of the reading that are liked or not liked and also provoke the curiosity of other students to understand the reading.

Judging from the results of the study conducted by PISA and some suggestions for improvement, in this PKM activity we will try to apply the Flipped classroom technique and the Smart Learning Diagnosis System for students majoring in RPL at SMK Assalam. Flipped classroom and Smart Learning Diagnosis System are efforts to improve learning and improve the quality of human resources in the SMK environment. Unlike the traditional classroom learning model, flipped classroom is the opposite activity between assignments

/ homework and classroom activities. Homework is used optimally to deepen the material and exercises with the help of interesting computer and audio-visual ICT devices to increase students' reading interest. Meanwhile, class activities will be filled with the active role of students in discussing reading, retelling and solving problems faced. The Smart Learning Diagnosis System will be used to monitor the learning process. With the help of the system, the achievement of student learning targets will be known. The system will be able to diagnose in the form of information about the activities carried out by students during the learning process so that with the help of information technology it will make learning activities more controlled.

## **METHODOLOGY**

The Flipped Classroom method can be divided into several activities in detail. Basically, Flipped classroom activities can be categorized into two interrelated activities, namely in-class and out-class [4]. Here are the components of in-class activities and out-class activities.

In-class activities, including:

- a. Discussion
- b. Small group activities
- c. Feedback
- d. Problem solving
- e. Case studies, etc.

Out-class activities, including:

- a. Read
- b. Video
- c. Presentation
- d. Interactive tutorials, etc.

Some preparations must be made so that the Flipped Classroom can be done optimally. Therefore, it is necessary to allocate a good time for preparation, especially in terms of teachers / teachers, students, learning media.

The proposed flipped learning uses the LMS technology platform which has been recognized for its reliability, namely Moodle. Moodle LMS acts as the main learning medium used by both students and teachers. In addition, the PKM team can focus on developing content and monitoring the learning process because from a technology perspective it has been supported. Moodle platform can be implemented along with teaching and learning activities in a school. Some of the advantages possessed by this platform are as follows:

### ***Materials can be uploaded online***

As previously reviewed, smartphones have become part of students, so the material uploaded online will make it easy to access anytime and anywhere. Of course, the uploaded material will be able to adjust to the school curriculum in question. This is an advantage because the different cultures in each school with

different conditions of students can only be understood by the school. Schools can adjust the competency structure and material according to the achievements and abilities of students. The material can also be modified to attract students' learning interest, such as video and SCORM. Videos and Scorm packages can be easily integrated with Moodle as a suggestion to support this flipped classroom.

***Assessment, an assessment activity aims to test the extent to which students' abilities***

The learning process for students by following the material every week will have no meaning if it is not equipped with an evaluation process. Various evaluations can be done through the Moodle platform such as assignments and multiple choice questions. Schools can design itself how ideally the assessment process should be or simply follow the assignment pattern which have existed. So that it becomes easier for the adaptation process to use more profitable technology.

***Monitoring, learning is a process that requires time with varying duration.***

At one time the evaluation showed unsatisfactory results, but on the other hand the learning process did not stop there. Opportunities will still be given in accordance with applicable provisions where students repeat and try again until they get satisfactory results. This will be easy to do with the help of technology because the process can be done automatically and activity logs are always kept. In addition, with the development of the Smart Learning Diagnosis System, information about student learning outcomes will be easy to obtain.

To support the Moodle platform so that it can run on a client server environment, a minimum specification is required according to the needs of the school. The following is an estimate of the minimum required server specifications:

- a. RAM 20 GB
- b. OS Linux x64
- c. CPU 2 Core
- d. 2 GB Hardisk space

Training also needs to be carried out regarding the concepts from in-class and out-class to participants from students and teachers. Training is conducted prior to the implementation of the flipped classroom in accordance with the schedule stated on the proposed schedule. The flipped classroom method requires good preparation so that the results obtained can be optimal. The Smart Learning Diagnostic System is used when implementing the Flipped Classroom and at the end of the semester, where this system can record and measure during the learning process and evaluate at the end of the semester assessment. When what is needed has been collected, it can be measured the level of success of this Flipped Classroom whether it is the same or better as the traditional method. If possible, an evaluation can be made of this method by analyzing the output and correcting the missing components as a suggestion for future improvements.

Thus it is expected that the continuity of the Flipped classroom method can be maintained along with the increase in student learning abilities in the Assalam Vocational School students.

**TABLE I.** TIMELINE AND SCHEDULING

No.	activity	month											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Arrange for licensing from the school regarding the scheme activities												
2	Assessment, initial condition survey and preparation												
3	Flipped Classroom method training, preparation of video material and digital books for selected classes.												
4	Introduction to learning methods for flipped classroom to students												
5	Implementation of flipped classroom in the selected class												
6	Activity monitoring using a smart learning diagnostic system												
7	Recent survey and comparing with previous surveys												
8	Server infrastructure preparation												
9	Upload content to the Moodle platform												
10	Method evaluation												

## CONCLUSION

This research shows a framework and different aspect that need to consider to make valuable learning method. Studies shows that flipped classroom could make effective and innovated pedagogy. Learning technology usage by using Moodle LMS can hold many learning materials like videos. Learning participant can watch it over and over to improve their understanding about particular lesson. In order to improve reading ability, the digital learning assistant held by LMS can provide ubiquitous learning material to the learner not only videos but also e-book. Therefore, learner can access it anytime and everywhere with their own gadget. Finally, the intelligent monitoring system can monitor whole activity including booth student and teacher.

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