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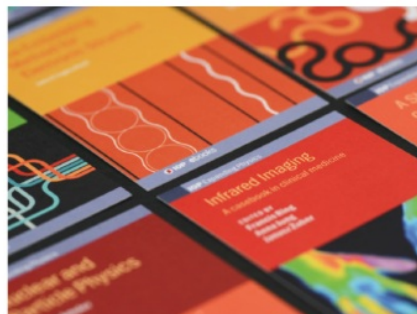
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Effectiveness of the use of Integrated Project Based Learning model, Telegram messenger, and plagiarism checker on learning outcomes

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Abstract. This research aims to determine the effectiveness of the implementation of integrated Project Based Learning (PJBL), to integrate Telegram Messenger (TM) and Plagiarism Checker (PC) on student learning outcomes. The sample consisted of 20 students as an experimental class and 20 students as a control class. The experimental class was given a learning treatment using the integrated PJBL model and PC while the control class used conventional models (lectures, discussions, presentations and demonstrations). Data collection techniques used observation, documentation, questionnaires, and tests. Data analysis techniques used Independent Simple T-Test. Learning outcomes show that the application of the TMBL integrated TM and PC models are effective in the learning process. Statistical test with Independent Sample T-Test shows that there are differences in learning outcomes between the control class and the experimental class. Significant differences indicate that the experimental class has a mean value of 81.00 better than the control class with a value of 73.30. The PJBL model makes learning interesting, students actively learning, actively collaborating, and practicing project management. Learning becomes meaningful because students feel the knowledge gained can be applied. TM as mobile learning as a connector between face-to-face and online learning. Plagiarism is a supporter of learning independence, preventing students from plagiarism in every assignment given.

1. Introduction

Era Industrial Revolution 4.0 (RI 4.0) has added to the increasingly fierce competition including in the field of education. RI 4.0 is an era of combining digital and internet technology with conventional which emphasizes the element of speed from the availability of information where all entities are always connected and able to share information with one another [1], [2]. From this definition, the link between the industrial revolution era 4.0. and its application in learning emphasizes the application of ICTs such as simulation, video-based, and distance learning. Another example is the use of Learning Management Systems (LMS) such as the use of moodle, edmodo, and mobile learning.

However, the emergence of RI 4.0. ICT-based people still leave complex problems in education. For example, the ease of access to internet for students in Indonesia is only used for entertainment without being balanced as a means of seeking knowledge that supports learning in the classroom. Indonesia is listed as the 6th internet user in the world. In 2017, e-Marketers estimated that Indonesian netter would reach 112 million people, beating Japan in 5th place [3]. This phenomenon must be overcome immediately and direct the development of science and technology for positive things in the

1

education community. The development of science and technology such as social media among students can be directed to Mobile Learning (M-Learning). M-Learning is capable creating a conducive academic atmosphere because students can study anywhere and anytime [4].

The results of preliminary research on samples taken at random in the UNIPMA Electrical Engineering Education Program shows that students who use technology for learning are still very few. Examples of the use of smartphone technology for social media occupy the largest percentage of 40%, watching TV 33%, and reading books or learning resources that support learning only 27%. Judging from the learning outcomes, the average student learning completeness in electronic material was only 42%. Based on the results of the interview, practical material and the concept of calculation were felt difficult for students. The curriculum in the Electrical Engineering Education Study Program is one of the Learning Media courses which the output of this course is a media project / practicum tool. The results of the interviews also showed that students were always having difficulties in making projects. This means there was a tendency to lack readiness in project-based courses.

An approach to overcome these problems by applying the Project Based Learning (PJBL) model. The PJBL method uses a suitable cooperative approach because it is in accordance with the characteristics of electrical engineering education whose curriculum is mostly practice. It is supported by Presidential Instruction No. 9 of 2016 concerning Revitalization of Secondary Schools in the Context of Excellence and Competitiveness in Improving the Quality and Competitiveness of Indonesian Human Resources. In facing HR competitiveness at the Regional and Global levels, an applicative concept of learning, learning center, in accordance with DUDI (business / industrial world), innovative, and science and technology based. PJBL is a student-centered learning model, demands creativity, critical thinking, problem solving, collaboration, and helps in investigations that lead to the resolution of real (applicable) problems [5], [6].

Telegram Messenger (TM) is used in an effort to support the learning process and create innovative learning methods according to technological developments. TM was also chosen as an effort to foster learning comunity. The use of digital technology has facilitated learning through teaching, construction, discussion, and collaboration [7]. Telegram is a messaging application where users have easy control of interacting quickly anytime and anywhere. This application also makes it easy for educators to monitor students' progress regularly on individuals without exception easily.

The rapid development of technology and the ease of access to the internet are widely misused especially by students. Both students and educators even make easy ways to make assignments and papers. The concept is to copy completely articles from the internet without editing, reading, and understanding. Many students just copy or copy paste without knowing the contents of the copied material. Plagiarism Checker (PC) is used to suppress the plagiarim and include in the learning process. Plagiarism application is very effective to improve students' understanding [8]. Moral about academic integrity increases and certainly the number of plagiarism is reduced.

2. Method

The population in this study were the first (1) semester students in the Electrical Engineering Education Program. The random sample which was taken consisted of 20 students as the experimental class and 20 students as the control class. The study design used control group post-test only by comparing the final test in the control group and the experimental group after being treated (treatment). The experimental class was given a learning treatment using the integrated PJBL model and PC while the control class used conventional models (lectures, discussions, presentations and demonstrations). Data collection techniques were using observation, documentation, questionnaires, and tests. Data analysis techniques were using Independent Sample T-Test.

3. Results and Discussion

Tabel 1 The following is the average post-test value data between the control class and the experimental class.

Tabel 1. Means and SD of the Control and Experimental Groups of Scores Post Test

	Class	N	Mean	Std. Deviation	Std. Error Mean
			Group Statistics		
Result of study	Experiment	20	81.00	7.22	1.61
	Control	20	73.30	7.16	1.60

Based on the results of the statistical test analysis, obtained Sig. (2-tailed) value of 0.002 cognitive learning outcomes for control and experimental classes 0.02 less than 0.05. Then according to the basis of decision making, the Independent Sample T-Test can be concluded that Ho is rejected and Ha is accepted. This means that there are differences in learning outcomes between the control class and the experimental class. The difference can be seen in Figure 1 that the experimental class learning outcomes have a mean value of 81.00 better than the control class with a value of 73.30. In the experimental class, the maximum value of students is 97 and the minimum value is 70. While in the control class, the maximum value is only 87 and the minimum value is 57.
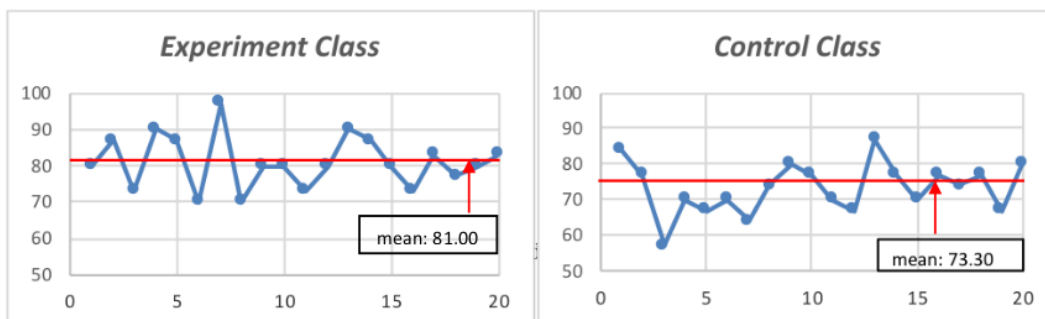

Figure 1. Learning Outcomes from the Experiment and Control Group

3.1. Implementation Procedure

The implementation procedure of learning uses the integrated PJBL syntax of TM and PC with steps such as Table 2.

Tabel 2. Learning Procedures with integrated TM and PC PJBL models on Learning Outcomes

	Implementation Procedure TM dan PC	Syntax PJBL	Description
ONLINE LEARNING	**Step 1:** *Begin of the TM process and make group*	-	• The TM Group consists of 20 students under the name "Electronic Series". • From the group, divided into 5 groups, each consisting of 1 chairman as admin.

Step 2: *Online instructor insert learning activities related to course of electronics circuit (video and modul)*	*Start with Essensial Question:* Lecturers provide stimulus to analyze videos about passive and active electronic components.	• Students analyze videos and discuss with groups by studying the modules rovided.

Figure 2. The Example of Discussions and Assignments

Step 3: *Cek originality file di Plagiarism Checker (file doc/docx).* Insert assignment in TM (doc or pdf)	Lecturers give assignments to students to make papers on various passive and active components.	• Tasks are uploaded by each group. Before uploading, it is ensured that the file has been checked through Plagiarsm Checker with an originality file limit of not less than 60%. • Lecturers conduct assessments

Figure 3. The Example of Sending Assignments by *Telegram Messenger*

OFFLINE LEARNING	Step 4: Discussion project in group	*Desain Project and Create Scedule*	• In class learning, groups present video analysis and assignments. • After students understand the material, are given related project assignments. • Students plan projects and make implementation schedules.

Figure 4. The Example of Project Planning

Step 5: *Monitor and discusion*	*Monitor the Student and the Progress of the Project*	*Data Colection and Make a project*. At this stage students begin to make projects, prepare materials, work methods, and analyze the results.
Step 6: Upload project result (figure and description)	*Asses the Outcome*	Students present the project. The result is: multitester **Figure 5**. The Example of Project Result
Step 7: Provide next material assignments	*Evaluate the Experiences*	As the final stage is *evaluate the experiences*. Provide input, correct deficiencies and conduct evaluations.

3.2. Effectiveness of the Use of Messenger Telegram and Checker Plagiarism in the Learning Process

The results showed that learning to use PJBL integrated TM and PC had a positive and effective impact on learning outcomes aspects of student knowledge. Based on the value of the t-statistical test, there are differences between the experimental class and the control class. This is supported by the fact that the experimental class has a better average learning outcome than the control class.

PJBL integrated TM and PC are the right and innovative learning models in the face of the RI 4.0 era. The existence of interconnection between implementative learning models, based on real-world problems, and based on industry with Information and Communication Technology (ICT). PJBL is effective in developing technological skills and teamwork in the face of the 21st century [9]. PJBL emphasizes project-based learning, is student-centered, demands group collaboration, shares ideas, manages and manages deadlines in completing projects. Some research on PJBL, PJBL is able to relate the experience of students in schools to real life and encourage thinking to gain new knowledge [10]. PJBL by utilizing technology can also reduce the cost of learning and the learning process become more effective. Students have more opportunities to interact with peers in handling projects [11], [12].

The use of Telegram Messenger and Plagiarism Checkers has the potential to build learning community in distance education. Of course this learning concept supports the Indonesian Minister of Education and Culture Regulation No. 109 of 2013 concerning the Implementation of Distance Education in Higher Education. All learning resources are easily accessible, whether in the form of modules (text format, doc, pdf, powerpoint), images, simulation videos, streaming videos, questions, etc. This strongly supports the 3 basic skills that are very much needed in the RI 4.0 era, namely digital literacy, technology, and humans [13]. Telegram Messenger as mobile learning allows students to access a variety of learning resources, improve discussion skills, give back impressions with peers and enhance collaboration without time and space [14].
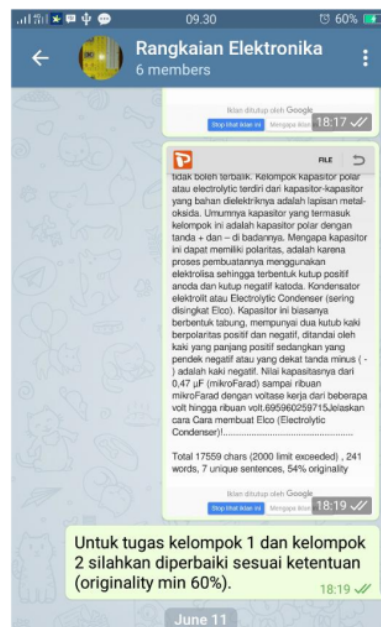

Figure 6. Result of task check by Plagiarism Checker

The role of Plagiarism Checker is as a tool in restricting students from plagiarism. The results of the initial research showed that students only copy paste in the task. As shown in Figure 6. The assignment of student papers shows the originality of the file by 54%. This shows that the level of student copy paste is still high and does not match the standards set at 60%. From this result, it is necessary to revise the task. The benefits obtained are of course encouraging students to analyze the source, read carefully in an effort to solve the problems faced, and explain the concept with their own thoughts based on the literature study obtained in order to obtain a higher originality file. Through the use of Ckecker's Plagiarism software, students are facilitated to learn how to recognize sources and correct according to findings, plagiarism numbers decline, and students' perceptions of the use of plagiarism detection are also very positive [8].

The results of interviews with students showed that the combination of PJBL with TM and PC was very interesting and helped problems quickly and practically. The learning process can be done online and offline. Discussions between students and lecturers can be done easily. Group formation is carried out evenly based on the level of intelligence or each group has key members. This is done so that the inter-group discussion forum can run well. For example, if a key member is not present in a group discussion, another student will take a role. Social media like Facebook as a Learning Management System (LMS) facilitates the interaction of learning between students and teachers [15]. The application of social media increases student learning motivation, communication is easy to do anywhere and anytime, allowing educators to support the concept of distance learning, easy to form discussion forums between groups of students, easy to build knowledge, and easily share information quickly [16].
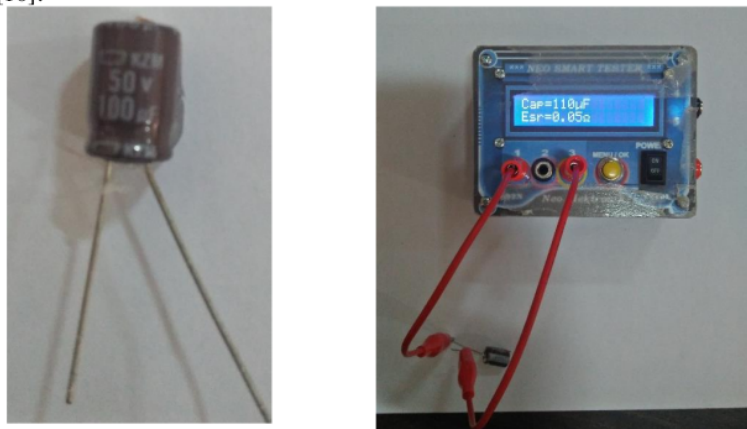

Figure 7. Result of Project Implementation

One of the results of the project was done in the form of a Smart Tester tool. The knowledge is gained from this project is that students can apply theories about the basic concepts of electronic components, be able to measure components, and assemble components. Smart Tester can be used to check electronic components. Unlike Multitester, which can only measure current, voltage, and resistance in an electronic component. Smart Tester is able to measure component poles and component legs that are assisted with Atmega 328P microcontroller. Direct measurement results can be displayed on the LCD screen. Implementation is carried out for testing passive and active electronic components such as resistors, transistors, capacitors, diodes, and inductors. In Figure 7 shows the test capacitor with a value of 100 μF then using Smart Tester shows the same value of 100 μF. The difference between Smart Tester and Multimeter, if testing using Multimeter can only know the value of the capacitance, then with Smart Tester until it can be known the value of Esr (Equivalent Series Resistance). Esr value is the main indicator to determine the condition of the capacitor.

4. Conclusion

The use of integrated Project Based Learning models Telegram Messenger and Plagiarism Checker is effectively applied in supporting student learning outcomes. In the dimension of knowledge, the ability of students increases. In working on projects, students are required to master theory, design, and make products first. In addition, the PJBL model also trains skills aspects. Characteristics of a student-centered PJBL model, improve the ability to collaborate, practice managing the project, and apply the knowledge gained at school to real problems in life. PJBL emphasizes problem solving skills and applies knowledge gained in learning to practical situations that will be faced in the Figure [17]. PJBL can develop diverse skills in students such as problem solving, critical thinking, knowledge integration, information technology, communication skills facilitate teamwork, improve peer interaction, develop team spirit, and encourage students to complete joint projects [18].

The application of Telegram Messenger and Plagiarism Checker as a form of technology application (mobile learning) is in supporting the concept of distance learning. The application of ICT as a faculty interface in facilitating students in increasing knowledge, skills, practicing critical, collaborative, and communicative thinking. Students are motivated in learning because the application of TM and PC helps the problems faced. Problems that have not been completed when learning in class, easily and quickly can be overcome through TM without limits of space and time. Between students and lecturers can interact and communicate in groups. TM as mobile learning is effectively applied in learning and students' abilities are more improved than learning to use traditional classes. TM can also be used to review students' level of understanding in groups such as private chat in the form of questions, [19], [20].

5. Acknowledgement

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