

Implementation of the Project Based Learning Method in the Digital System Course Based on IlearnUnand

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ABSTRACT

The rapid development of science today requires the application and innovation of online technology in the teaching and learning process. UnandIlearn is used as a data center and activities both online and offline for digital systems courses. By applying the Project Based Learning (PjBL) method in these courses, it can improve the assessment of students' hard skills and soft skills. PjBL is focused on creating a simple digital system application circuit working principle in addition to a comprehensive PjBL report on a personal blog. By using the PjBL-IlearnUnand method, it will be able to increase the maximum absorption of knowledge to students so that student grades can also increase. This results in students having to be ready in terms of course material to be presented while lecturers are more challenged because lecturers are more likely to act as facilitators. The score of 138 students for the 2019/2020 school year in the digital system course with the application of PjBL-Ilearn Unand is good with an average student score of 68.38 (B +) on a scale of 100.

Keywords: Project Based Learning, i-learn, hard skills, soft skills, and Assessment

1. INTRODUCTION

The competencies in digital systems courses include students being able to explain components and design and simulate a series of simple digital system applications. Meanwhile, the problems that arise so far are that students are less active in lectures and group discussions, many of the tasks are copy & paste and assignments are rarely asked at the next meeting. In the current era of online-based technology, the world of education is carried over into it. This certainly implies that lecturers and students are able to apply and be innovative with the use of online technology [1], [2]. Based on the foregoing, it is necessary to further improve the application of e-learning at a still simple level, namely as a place to upload projects to be presented through Blogspot [3], [4]. In the future, research will combine project-based learning methods with UnandIlearn (optimizing the use of tools) so that students will be more active, enthusiastic and can improve their competence in hard skills and soft skills [5], [6].

2. METHODS

This research is a project-based development (PjBL), because in its implementation it develops a project starting from design, analysis, implementation [7], evaluation and revision as well as recorded in Ilearnunand. Implementation of simple digital system problem solving oriented projects to improve students' critical thinking skills. This project is a simulation of a series of simple digital system applications using the Proteus program, reported and presented via Blogspot. The data of this research are students who take digital systems courses in the even semester of the 2019/2020 academic year in class A (44 people), B (46 people), and C (48 people). The percentage of assessments collected in the study, namely in the form of data: attendance; liveliness; participation; assignment assessment on blog; Presentation; Midterm exam; and Final Semester Examination as shown in table 1.

The data collection instruments used are: from ilearn (attendance, practice, quizzes, assignments, Mid-term exam & Final Semester Examination); activeness [8]; participation; blog rubric; presentation. In addition to hard skills activeness, soft skills activeness is also assessed, which includes: intrapersonal skills, interpersonal skills and basic student values such as table 2.

There are 8 validated indicators to determine the quality of blogs set by digital system experts, namely: titles, objectives, tools & materials, theory, simulation experiment procedures, application circuit working principles, videos and download files such as table 3.

Through video, which is one of the ingredients that can determine the student has correctly understood the simple digital system application circuit.

By utilizing Unandilearn as a data center for all activities, one of which is student activity data, namely reading course material and taking online tests. Through Unandilearn which can be programmed so that students will be able to read the next course material if the test scores meet the pass requirements.

Table 1. Percentage of assessment

No.	Activity	Percentage of assessment (%)
1	Attendance	5
2	Activeness	2 5
	Hardskills	
3	participate	1 0
	Quiz	
4	Blog	5
	Exercises	
	Quiz	
	Group assignments	
	The final task	
5	Presentation	1 5
	Exercises, Quiz and Group assignments	
6	Midterm exam	20
7	Final exams	20
Total		100

Table 2. Soft Skill Assessment

No.	Competence
1	Intrapersonal skills
	1.1 Mandiri
	1.2 Critical Thinking
	1.3 Analytical
	Interpersonal skills

2	Teamwork	
	2.1	Leadership
	2.2	Communication Norms
	2.3	Effectiveness
	Communication skills	
3	2.4	Oral Communication
	2.5	Written Communication
	Basic values of students	
	3.1	Integrity
	3.2	Discipline
3	3.3	Hard work
	3.4	Polite / Ethical / Have values
	3.5	Confidence

To measure the success rate of the PjBL-ilearn unand method in digital system courses, questionnaires were distributed to students as shown in table 4.

Table 3. Criteria for Blog values

Indicator	Scale				Percentage (%)
	Very Good (A) Score: ≥ 75	Good (B) Score: 60 + 74	Less (C) Score: 50 + 59	Very less (D) Score : < 50	
Title	There, right	There is too long	Yes, it's not true	There is no	2.5
Purpose	There are and two purposes according to the applications	There are and two (more) purposes according to the applications	There is and one (more) purpose but not according to the application	There is no	2.5
Tools & Materials	There are and the amount according to the application	There are and the number exceeds what is in the application	There are and the number is less than what is in the application	There is no	5
Basic theory	There are and the amount is according to the application and complete	There are and the number exceeds what is in the application and complete.	There are and the number is less than what is in the application and is not complete	There is no	15
Experimental procedure	There and according to the application	There is and exceed the needs of the application.	There is and not according to application needs.	There is no	5
Simulation circuit (+ working principle)	There are and the number & working principle according to the application and the simulation is successful.	There are numbers according to the application but the working principle is too long and the simulation works.	There are and the number does not match the application and the working principle does not explain the whole and the simulation does not work.	There is no	25
Video	There and the amount according to the application and the simulation was	There are and the numbers exceed those in the application and the	There are and the number is less than what is in the application and the	There is no	20

	successful.	simulation is successful.	simulation does not work.		
Downloaded files	There are and the amount is according to the application and complete. (file2: *.html, proteus, video, datasheets & library).	There are and the number exceeds what is in the application.	There are and the number is less than what is in the application.	The re is no	25
Total					100

3. RESULTS

The quantitative data on the final score of the digital system course from each activity in the PjBL- ilearn unand teaching and learning process is as shown in Table 5. From table 5, the average score of students in digital systems courses is 68.38 (B) and the quality of student blogs is obtained from the blog rubric of 64.4 (B-).The score of the blog rubric is rather good because students are not familiar or have no experience in making the working principle of digital system application circuits.

Table 4. Questionnaire (student responses)

Question	
A	PjBL-ilearn unand perception
	1 Application of science
	2 Application of PjBL-ilearn unand
B	PjBL-ilearn unand planning
	1 RPS has PjBL-ilearn unand attributes
	2 PjBL-ilearn unand assessment score
C	3 RPS is given to students
	PjBL-ilearn unand implementation
	1 Lecturer explains the attributes of PjBL-ilearn unand
D	2 Lecturers motivate to achieve PjBL-ilearn unand
	3 Lecturers give feedback on PjBL-ilearn unand achievements
	PjBL-ilearn unand assessment
E	1 PjBL-ilearn unand attributes are assessed during lectures
	Impact
	1 PjBL-ilearn unand value helps the final grade
	2 Students are more confident from the application of PjBL-ilearn unand

For the value of the questionnaire (student responses) from 20 students (randomly) who took the digital system course, it was found that it was 72 (B +). The results of this questionnaire are of better value because students have begun to realize the need to have the ability to make correct working principles of digital system application circuits.And it can be concluded that the PjBL method by involving centralized data on

ilearnunand and personal blogs on digital system courses is quite good.Besides, this method is still applied for the first time and students have not had enough experience in making the working principle of application circuits, so it can be estimated that next year the graph of the value will tend to increase towards very good [2], [9].

Based on the value of the questionnaire is A- then in the future students will be even more enthusiastic in making the working principle of the application circuit. The working principle of the application circuit is the culmination of understanding a PjBL method so that it will have an impact on all activity assessments, especially the value of soft skills [10], [11] which is increasing.

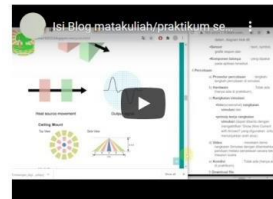
The results of learning activities with the PjBL- ilearn unand method for digital systems courses are shown in Figure 1, Figure 2 and Figure 3.

Table 5. Final scores

No.	Activity	average value	
1	Attendance	98.00	
2	Activeness	Hardskills	66.00
		Softskills	60.00
3	participate	Exercises	79.00
		Quiz	82.00
4	Blog	Exercises	60.00
		Quiz	70.00
		Group assignments	85.00
		The final task	52.00
		Midterm exam	64.00
		Final exams	77.00
5	Presentation	Exercises, Quiz and Group assignments	82.00
		The final task	63.00
6	Midterm exam	60.00	
7	Final exams	67.00	
Total		68.38	

Isi Blog:

Video pembelajaran: menjelaskan tentang ketentuan isi blog



0. Judul aplikasi

1. Tujuan: tuliskan sekurang-kurangnya 2 tujuan (boleh disamakan kata-katanya seperti praktikum)

2. Alat dan Bahan:

-Alat: tuliskan peralatan yang diperlukan beserta foto-nya, seperti:

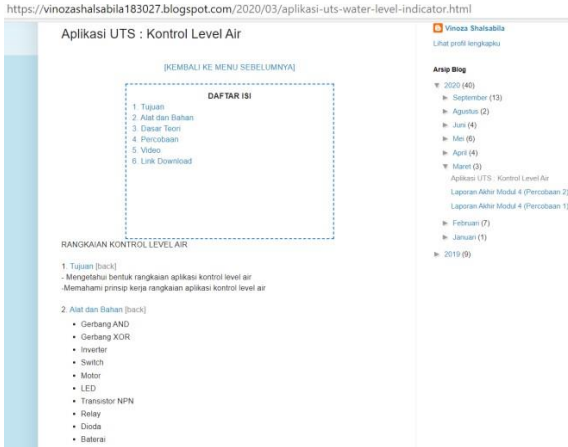
•Instruments : Oscilloscope, signal generator, DC voltmeter dll.

•Probes : Voltage, Current, dll.

•Generators : DC, Sine, Pulse, DCllock dll.

•sedangkan bahan, juga dituliskan komponen/perangkat apa saja yang diperlukan beserta foto-nya, seperti:

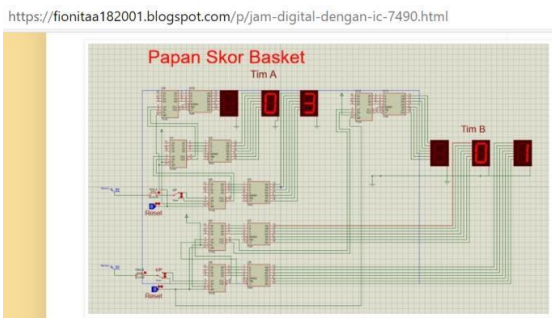
Figure 1 Terms of blog content are placed in ilearn unand



(a).



(b)

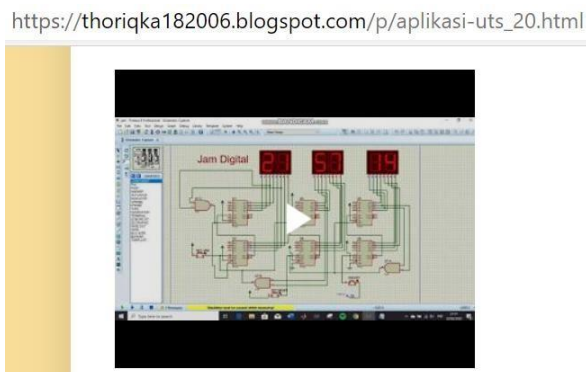


(b).



(c)

Figure 3 Student activities (a) presentation of assignments and (b) discussion of application circuits (c) Mid semester exams



(c)

Figure 2 Student presentations: (a) blog content and (b) application circuits (c) video on the working principle of simple application circuits



(a)

4. CONCLUSION

With the application of the PjBL-ilearnunand method in digital systems courses, conclusions can be drawn from this research, namely:

1. The average student score in the digital system course is good (B) and it can still be improved if more and more students are active and create blogs according to the provisions and presentations (especially making final assignments).
2. The blog rubric score is quite good (B-). This is because there are still many students who make blogs that are not in accordance with the provisions so that it has a bad impact in explaining the working principle of the application circuit.
3. Understanding of hard skills based on the PjBL method becomes better, especially students can explain the working principles of application circuits correctly.
4. The success rate of the PjBL-ilearn unand method is better (72 (B +) out of a scale of 100) than 20 student questionnaires taken randomly.

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