

# Implementation of Blended Learning-PjBL in the Sensor Course Based on Ilearn Unand

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## ABSTRACT

With the rapid development of science today, it is necessary to apply and innovate online technology in the teaching and learning process. By developing blended learning in sensor courses that emphasize the Project Based Learning (PjBL) method with data centered on Unand ilearn, it can improve the assessment of students' hard skills and soft skills. PjBL is focused on making a video of the application's working principles in addition to a comprehensive PjBL report on personal blogs. By using this method in the teaching and learning process will be able to increase the maximum absorption of knowledge to students. Besides, students must be ready in terms of the lecture material to be presented as well as lecturers who are more challenged to be better prepared because the blended learning-PjBL method makes more lecturers as facilitators. By applying this method, the results obtained in the form of a student average score (140 people) from the sensor course in the 2020/2021 academic year were 63.22 on a scale of 100.

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

## 1. INTRODUCTION

In the current era of online-based technology, the world of education cannot help but plunge into it. This certainly implies that educators and those who are educated are able to apply and innovate in the teaching and learning process by using online technology. In other words, educators or those who are educated must be able and understand online technology in order to carry out their duties properly according to curriculum material. The rapid development of online technology nowadays requires innovation and transformation in learning, one of which is blended learning [1], [6]. Based on the foregoing, it is necessary to improve again from the application of e-learning at a still simple level, namely as a place to upload projects to be presented through Blogspot [2]. Based on this, this study combines project-based learning methods with Unand ilearn (optimizing the use of tools) and changes some conventional (face- to-face) learning into blended learning so that lectures become effective [3], [7].

## 2. METHODS

This research is a project-based development, because in its implementation it develops a project starting from design, analysis, implementation, evaluation and revision [4]. Implementation of simple problem solving oriented projects to improve students' critical thinking skills. This project is a simulation using the proteus application program, reported and presented via blogspot. All materials, processes and activities are recorded in Unand ilearn and are equipped with teaching materials in the video as a reference in completing a project. With video which is an asynchronous way of learning and can be used as part of the blended learning method. The data of this research are students who program the sensor course for the odd semester of the 2020/2021 academic year in class A (44 people), B (45 people), and C (51 people). The data collected in this study include the percentage of: attendance; activeness (hard skill & soft skill); take part in exercises & quizzes, assessment of assignments on the blog (exercises, quizzes, assignments, major assignments, midterm and final semester exams); Presentations (exercises, quizzes, group assignments and final assignments); UTS; and UAS as shown in table 1.

The data collection instruments used in this study were: from ilearn (attendance, practice, quizzes, assignments, mid-semester and final-semester exams); activeness (hard skills & soft skills) [8]; blog rubric; presentation. Soft skills include:

- intrapersonal skills (independence, critical and analytical thinking),
- interpersonal skills (teamwork and oral communication) and
- basic student values (integrity, discipline, hard work, courtesy / ethics / values, and self-confidence).

**Table 1.** Percentage of assessment

No.	Activity	Percentage of assessment (%)	
1	Attendance	5	
2	Activeness	Hardskills	25
		Softskills	
3	participate	Exercises	10
		Quiz	
4	Blog	Exercises	5
		Quiz	
		Group assignments	
		The final task	
		Midterm exam	
5	Presentation	Exercises, Quiz and Group assignments	15
		The final task	
6	Midterm exam	20	
7	Final exams	20	
<b>Total</b>		<b>100</b>	

The quality of the blog is determined based on the results of validation by experts. There are 8 validated indicators, namely: title, objectives, tools & materials, theory, experimental procedures, work principles of the circuit, videos and download files such as table 2.

Video is one of the materials in blended learning which is placed on students' personal blogs. Blog quality is determined by the combined score of the eight indicators with a maximum total score of 75. The quality of the blog is expressed by the value calculated (1)

$$Score = \frac{\text{the total score obtained}}{75} \cdot 100$$

Student activeness in blended learning, especially the presentation of the working principles of the correct application was videotaped. It was analyzed using descriptive statistics, namely using the classical average score [5]. The scores obtained are converted using guidelines such as table 3.

To measure the success rate of blended learning [10], questionnaires were distributed to students as shown in table 4.

by the following equation (1).

**Table 2.** 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 are 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 are and the amount according to the application and the simulation was successful.	There are and the numbers exceed those in the application and the simulation is successful.	There are and the number is less than what is in the application and the simulation does not work.	There is no	20
Download 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.	There is no	25
<b>Total</b>					<b>100</b>

**Table 3.** Criteria for the conversion of student activeness scores in making videos and the contents of the questionnaire

Score range	Category	
	Activeness	questionnaire
$X_p \geq 75$	very high	very positive
$60 \leq X_p \leq 74$	high	positive
$50 \leq X_p \leq 59$	medium	medium
$40 \leq X_p \leq 49$	low	negative
$X_p < 40$	very low	very negative

where:

$X_p$  = Classical average score of students

**Table 4.** Questionnaire (student responses)

Question		
A	Blended learning perception	
	1	Application of science
	2	Application of blended learning
B	blended learning planning	
	1	RPS has blended learning attributes
	2	Blended learning assessment score
C	Blended learning implementation	
	1	Lecturer explains the attributes of blended learning
	2	Lecturers motivate to achieve blended learning
D	Blended learning assessment	
	1	Blended learning attributes are assessed during lectures
	Impact	
E	1	Blended learning value helps the final grade
	2	Students are more confident from the application of blended learning

**3. RESULTS**

The quantitative data on the final score (until mid- semester) of each blended learning activity is shown in Table 5.

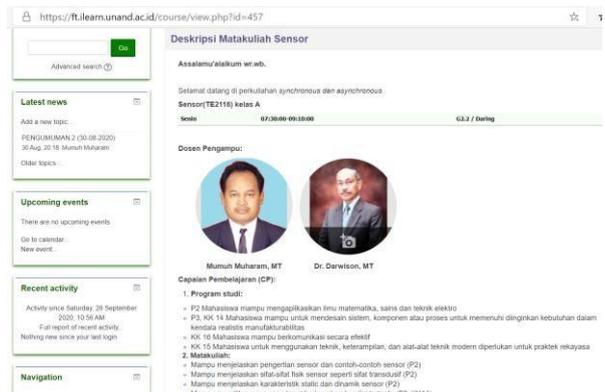
From table 5 with an average value of 69.82 (good), while the quality of student blogs is obtained from the blog rubric of 73.4 (good), and the score of student activity in making correct videos is 68 (high) and the questionnaire is 72 (positive). It can be concluded that the PjBL method involving blended learning and centralized data on Unand ilearn and personal blogs is quite successful. Besides that it is still the first time and the assessment is still in mid-semester, it can be estimated that the final score tends to be very good [6], [9].

**Table 5.** Final grades (until Mid semester)

No.	Activity	average value	
1	Attendance	97.00	
2	Activeness	Hardskills	63.00
		Softskills	70.00
3	participate	Exercises	97.00
		Quiz	77.00
4	Blog	Exercises	56.00
		Quiz	63.00
		Group assignments	85.00
		The final task	66.00
		Midterm exam	97.00
5	Presentation	Final exams	0.00
		Exercises, Quiz and Group assignments	70.00
6	The final task	63.00	
6	Midterm exam	65.00	
7	Final exams	68.00	
<b>Total</b>		<b>69.82</b>	

Based on the data obtained from the activeness score is high and the questionnaire is positive [11], in the future students will be more enthusiastic in making videos, especially explaining the working principles of the application. The working principle of the application is the culmination of understanding a PjBL such as a sensor application which will have an impact on all assessment activities such as student participation in presentations and increased activeness.

The activities resulting from learning activities with the Blended Learning method emphasize PjBL based on Unand ilearn as shown in Figure 1, Figure 2 and Figure 3.

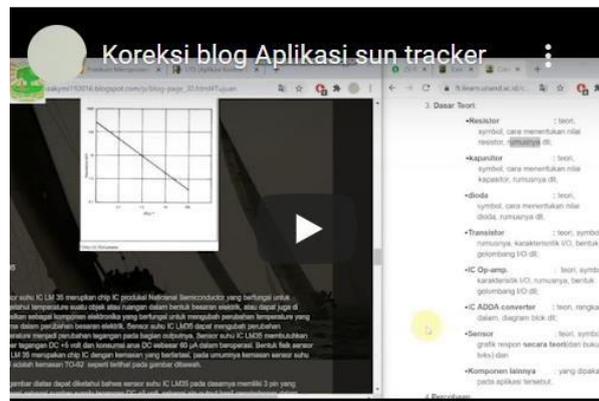


(a)

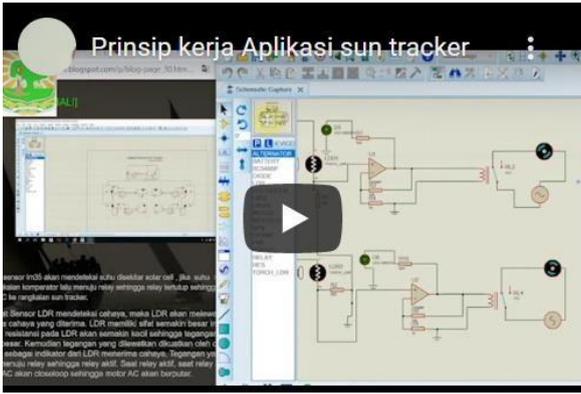


(b)

**Figure 1** Blended Learning Activities (a) Ilearn page and (b) online lecture meetings with zoom

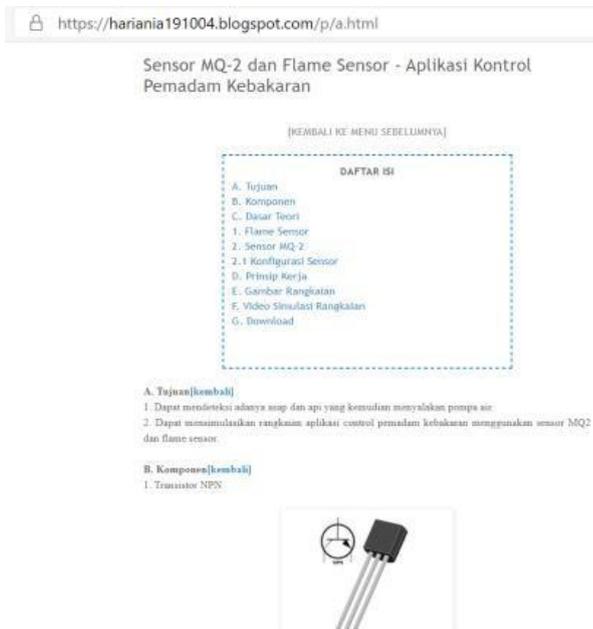


(a)

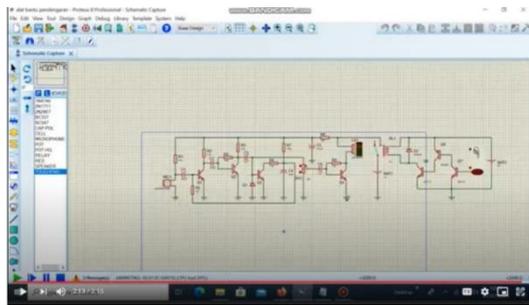


(b)

**Figure 2** The video explains (a) the provisions of the blog content and (b) the working principles of the application.



(a)



(b)

**Figure 3** Student presentation (a). blog content and (b). video of the working principle of the application

**4. CONCLUSION**

With the application of the Blended learning-PjBL method based on Unand Ilearn in the Sensor course, conclusions can be drawn from this study:

1. The implementation of Blended Learning-BjPL based on Unand Ilearn is said to be quite successful because it has achieved an average student score of 69.82 (good) from a scale of 100.
2. With this method, blog scores were also generated, activeness and questionnaire scores were in the good (73.4), high (68) and positive (72) categories.
3. Understanding of hard skills is better because of understanding the working principles of the application through videos.

**ACKNOWLEDGMENT**

Authors thank Lembaga Pengembangan Pendidikan dan Penjaminan Mutu (LP3M) Universitas Andalas, Padang, Indonesia that funded this research with contract no.: 461/XIII/R/KPT/2020.

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