# Online Trends on Project-Based Learning Model: Effective for Increase Motivation, Activity and Learning Outcomes

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**Abstract.** The selection of the Project Based Learning (PjBL) model provides opportunities for students to explore content with various techniques which are a means for themselves and collaborative experiments. The research was conducted on students of the Computer Engineering and Informatics Education Study Program at State University of Makassar (UNM), Indonesian. In general, the research objective was to determine the effectiveness of the PjBL Model in increasing motivation, activity and learning outcomes through online learning. This research is a quasi-experimental research type. The study population numbered 125 students who studied teaching and learning strategies courses. Purposive sampling technique was used to determine the number of selected samples as many as 76 people who were scattered in the experimental group and the control group. Data collection using questionnaires, observation and tests through digital instruments have been validated by experts. Data analysis used descriptive statistical techniques, with the SPSS version 25 for Windows application. The results showed; (1) Student learning motivation in the experimental group has increased; (2) Student learning activities in the experimental group tend to be better, and (3) The increase in learning outcomes is high, from an average value of 60.26 to an average value of 85.27.

**Key words:** *Model PjBL, Motivation, Activities, Learning Outcomes*

## Introduction

Changes in the education system were carried out by the Indonesian government through the ministry of research, technology and higher education, by regulating regulations in dealing with technological advances in the era of the industrial revolution 4.0, specifically on the use of information and communication technology (ICT) developments to be applied to distance education. The problem of education due to Indonesia's geography which consists of 13,487 islands and bureaucracy can be solved more or less. It is hoped that through the use of ICT it can provide convenience in improving the quality of learning and even equity and improving the quality of education in Indonesia.

Entering the era of the industrial revolution 4.0, the world of education, including in Indonesia, was shocked by the emergence of the Covid 19 pandemic which greatly affected the teaching and learning process, as if forcing the world of education to be ready to apply ICT through online learning. According to the Minister of Education and Culture (2019), effective education requires collaboration between teachers, students and parents. So that during the Covid-19 pandemic, professional teachers are very appropriate to innovate through online learning.

Implications of the Circular of the Ministry of Education and Culture of the Directorate of Higher Education Number 1 of 2020 concerning Prevention of the Spread of Covid-19 in the World of Education Regarding the Implementation of Online Learning and Recommending to study from each other's homes. Makassar State University, South Sulawesi-Indonesia, responded to online learning with LMS Syam OK, a special application development used to support online learning systems. According to Lee et al (2020), in online learning it is expected that intrinsic motivation will emerge from within (self-motivation), namely discipline, adaptation and extrinsic motivation that encourage online learning by using learning media, exams and assignments.

Online learning makes students more active and independent, because it places more emphasis on student centeredness, they will be more daring to express their opinions and ideas. Supported by Wijayanti (2017) students are directly involved in the learning process that utilizes internet facilities not only to find information, but students can also be more independent in carrying out online learning. Learning activities are one of the characteristics of student activities, Johar & Hanum (2016).

The results of Firman and Rahayu's research (2020), online learning during the COVID-19 period has flexibility in its implementation and is able to encourage the emergence of independent learning and motivate students to study harder. So even though it has to go through online learning, the teaching and learning process must also be able to motivate students to achieve learning goals as the key to successful learning.

Motivation has an important position in achieving the learning objectives that have been set, because the emergence of motivation is not only from students but educators must also involve themselves (Amna Emda, 2017) . According to Kompri (2016)  motivation can be interpreted as a person's strength that can lead to a level of enthusiasm in carrying out an activity, both from within the individual itself (intrinsic motivation) and from outside the individual (extrinsic motivation). Supported by Lin, M. H., Chen, H. C., & Liu, K. S. (2017), both intrinsic and extrinsic motivation will complement each other. Both intrinsic and extrinsic motivation will complement each other. The level of motivation possessed by students will increase at the level of the quality of their behavior in learning. Nasrah, A., Muafiah (2020), students who have the motivation to achieve achievements that are expected to be successful, but if they fail, will try harder to succeed.

A professional educator must be able to choose the right learning model to use, because it is a determinant of success in learning activities. One of several learning models that can be used in bold learning is the project-based learning model (PjBL). The PjBL model in general can activate students by starting projects, training in collaboration, mutual cooperation and empathy that encourage students to think creatively to solve problems together. Supported by the results of research by Utami, et al (2018), that after applying the PjBL model there was an increase in student activity. PjBL is a learning model that uses the project as a medium. Students will get assignments to synthesize, assess, interpret, and produce information to produce learning outcomes (Hosnan, 2014). Kartika Chrysti Suryandari, et al (2017), the PjBL model is an innovative learning that involves project work, students work independently in constructing learning and culminating it in real products. Supported by Muskania & Wilujeng (2017), the syntax of the PjBL model is; (a) Submission of real

problems, in accordance with the daily experiences of students; (b) Focusing on interdisciplinary interrelationships, from various disciplines, (c) Authentic investigation, because students investigate real problems through analysis, observation and experimentation, (d) observation of products/works and their exhibitions, (e) Work together, both in pairs and in small groups to motivate developing thinking skills through brainstorming.

According to Kenneth (2015) effectiveness is a measure that states how far the target (quantity, quality and time) has been achieved, or the greater the value of the target achieved, the higher the effectiveness. The effectiveness of learning can be measured if students learn to complete projects with high marks and at the right time. Therefore, from learning that will indirectly emerge the cultivation of character values in the learning activities, (Indrasari, 2017). Based on some of the opinions above, it is concluded that motivation can encourage students to be more active in learning, until changes occur, as a result of interactions called learning activities in independence. Based on the characteristics of the PjBL model that undergoes a learning process, the motivation of students in independent learning activities strongly supports the achievement of the planned learning objectives. Learning activities occur in a planning context to achieve a certain change, (Rusman, 2017). Therefore, in the online learning process, the selection of the PjBL model is very possible to motivate students to get the opportunity to be active and learn independently

**Methodology**

This research is an experimental research. The research design used a quasi-experiment in 2 groups. The Experimental Group (Exp-G) was treated with the PjBL model approach syntax (assignment) and the Control Group (Co-G) with the Conventional model (lecture). The research design is seen in Figure 1:
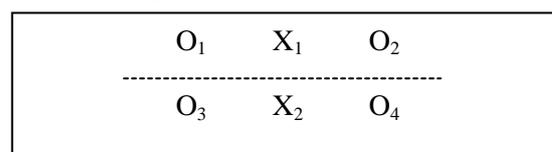
$$
\begin{array}{ccc}
O_1 & X_1 & O_2 \\
\hline
O_3 & X_2 & O_4 \\
\end{array}
$$

**Figure 1.** Research design  (Sugiyono, 2010)

Explanation :

$O_1$: Exp-G Pre-test  Ability    $O_3$: Co-G Pre-test  Ability
$O_2$: Exp-G Post-test Ability   $O_4$: Co-G Pos-ttest Ability
$X_1$: Exp-G Treatment          $X_2$: Co-G Treatment

Determination of the sample using purposive sampling technique, returned 76 students who follow the teaching and learning strategy, spread over Exp-G and Co-G. The technique of collecting data is through digital instruments using a Likert scale on questionnaires, observations and tests that have been validated by experts. Data analysis used descriptive statistical techniques, with SPSS version 25 for Windows application. The use of research

instruments with alternative answers regulates the scores given to each option, adjusting the needs of the category by modifying the Likert scale.

The use of a questionnaire instrument for learning motivation was observed in Exp-G students using the PBL model, which was analyzed in four categories namely, positive, tended to be positive, tended to be negative and negative, referring to Table 1, as follows;

**Table 1.** Criteria for Learning Motivation

| Learning Motivation Score | Category |
|---|---|
| 3.50 – 4.00 | Positive |
| 2.50 – 3.49 | Tended to be positive |
| 1.50 – 2.49 | Tended to be Negative |
| 1.00 – 1.49 | Negative |

Furthermore, the instrument of observation of learning activities was observed in both groups of students, which were analyzed in four categories namely; very high (4); high (3); moderate (2) and less (1). The test was conducted to determine the extent to which the increase in motivation and activity through the learning outcomes obtained by students during the learning process. The questions used are multiple choice test questions in the form of objective tests. The test was conducted twice, namely pre-test and post-test.

Furthermore, the increase in learning outcomes is calculated by normalized gain using the gain index formula (Hake 2007), with data classification as in Table 2 below;

**Table 2. Gain Index Classification**

| Average Gain Index (N) | Classification |
|---|---|
| $0.70 < N \leq 1.00$ | High |
| $0.3 \, N \leq 0.7$ | Medium |
| $N \leq 0.3$ | Low |

Source : Hake 2007

Furthermore, descriptive data from the observation of learning activities and learning test results, then analyzed with the SPSS version 25 for Windows application, to be tested statistically whether there were significant differences between the two groups. The block diagram in this study is presented in Figure 2.
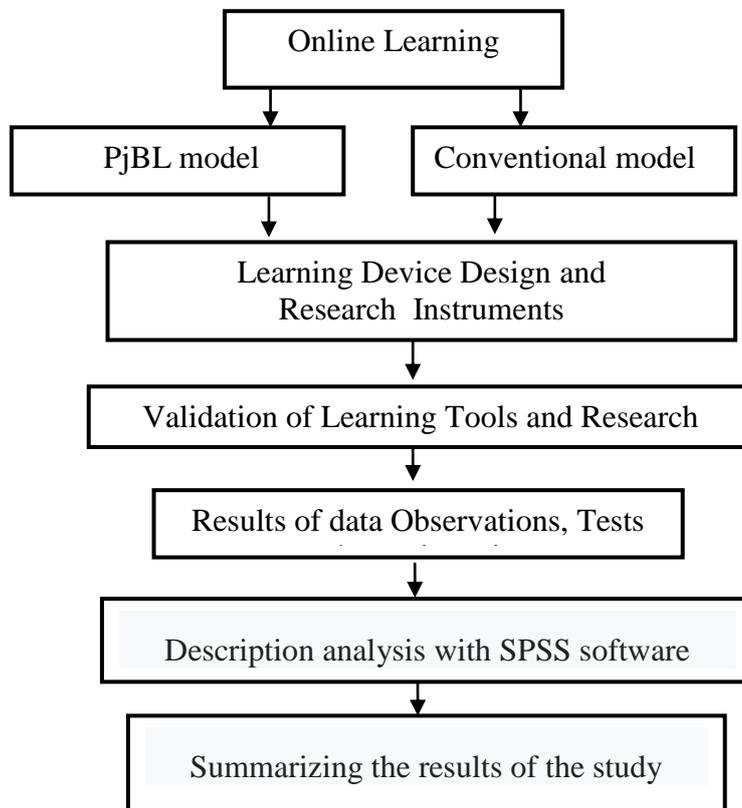
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                    ┌─────────────────────────┐
                    │     Online Learning      │
                    └─────────────────────────┘
              ┌──────────────────┐      ┌──────────────────┐
              │    PjBL model    │      │ Conventional model │
              └──────────────────┘      └──────────────────┘
                    ┌─────────────────────────────────┐
                    │   Learning Device Design and     │
                    │      Research  Instruments        │
                    └─────────────────────────────────┘
                ┌─────────────────────────────────────┐
                │ Validation of Learning Tools and Research │
                └─────────────────────────────────────┘
                  ┌───────────────────────────────┐
                  │ Results of data Observations, Tests │
                  └───────────────────────────────┘
                ┌─────────────────────────────────────┐
                │ Description analysis with SPSS software │
                └─────────────────────────────────────┘
                ┌─────────────────────────────────────┐
                │ Summarizing the results of the study  │
                └─────────────────────────────────────┘
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**Figure 2.** Block Diagram Research

## Findings / Results

*Descriptive Data on Increasing Learning Motivation*

The results of descriptive analysis of student response data on learning motivation instruments using the PjBL (G-Exp) model, show criteria that tend to be positive and positive, can be seen in Table 3 below;

Table 3. Percentage of Learning Motivation

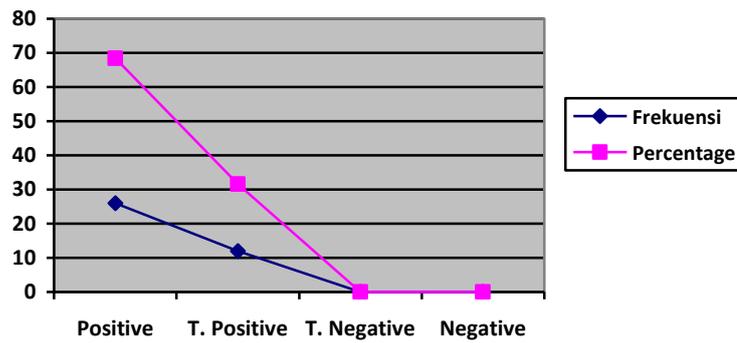| Score | Criteria | Motivation learn | |
|---|---|---|---|
| | | Frequency | Percentage(%) |
| 3.50 – 4.00 | Positive | 26 | 68.42 |
| 2.50 – 3.49 | Tren Positive | 12 | 31.58 |
| 1.50 – 2.49 | Tren Negative | 0 | 0 |
| 1.00 – 1.49 | Negative | 0 | 0 |
| Total | | 38 | 100 |

**Figure 3**. Graph of G-Exp Learning Motivation

*Descriptive Data on Increasing Learning Activities*

The results of the descriptive analysis of student learning activities during the application of the PjBL (G-Exp) model showed an increase in student activity, based on the results of the SPSS software statistical test. The results of data analysis are presented in graphical form as shown in Figure 3 below;
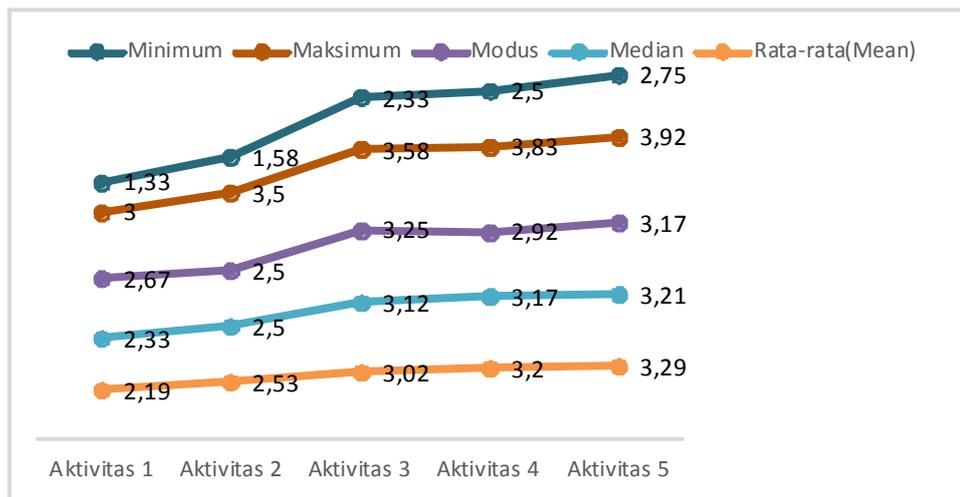


**Figure 3.** G-Exp Graph. Learning Activities

Furthermore, based on the results of descriptive analysis of student learning activity data at G-Co, it shows that students are less interested in lectures so they are less supportive to improve learning activities, even tend to go up and down. The results of statistical tests using SPSS show the data presented in graphical form as shown in Figure 4 below;
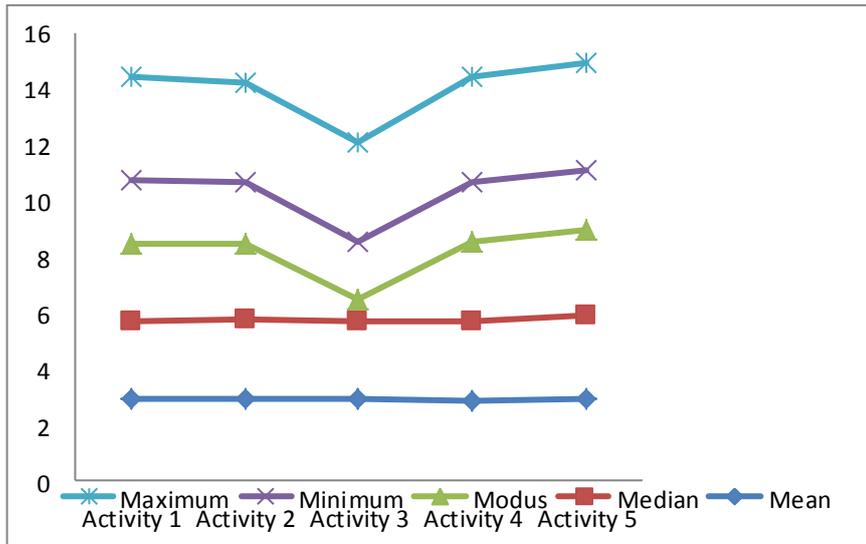
**Figure 4.** Graph of G-Co Learning Activities

*Descriptive Data on Improving Learning Outcomes*

Based on the difference between the mean, median in the pre-test and post-test, it can be seen that the students' scores on the G-Exp have increased. Descriptive analysis of pre-test and post-test data on G-Exp for student learning outcomes who apply the PBL model is shown in Table 7 as follows; because there was an increase in the mean value of $25.01 > 0.7 >$ gain index, from the mean value of 60.26 (Pre-Test) to the mean value of 85.27 (Post-Test).



Figure 5. G.Exp . Bar Chart

Based on the results of the descriptive analysis of the Pre-test and Post-test data by paying attention to the mean and median values for G-Co, it can be assumed that there is an increase in student learning outcomes through the application of lecture learning, but this increase is relatively low, as shown in Figure 6 below;
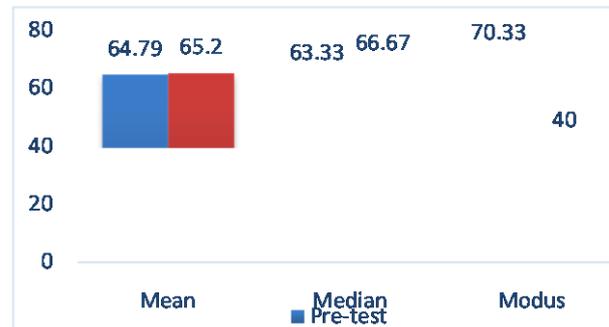
**Figure 6. G.Co Bar Chart**

## Discussion

Based on the results of the study and analysis, it was concluded that statistically, student learning motivation showed criteria that tended to be positive (31.58%) and positive (68.42%) after using the PBL model. This is an indicator that students are motivated to seek learning experiences through real problems, investigate authentically and even form the character of working together in groups to exhibit their work together. According to Kompri (2018) learning motivation is a psychological aspect that is experiencing development, which is influenced by physiological conditions and psychological maturity. Supported by Lin, M. H., Chen, H. C., & Liu, K. S. (2018). On the otherhand, learning also requires some driving force and extrinsic motivation as it is common to learn for parent expectations, added objectives, and acquisition of some incentives.

The results of data analysis prove that the syntax in the PBL model is not only attractive but also able to encourage active students to learn independently. Descriptively the differences in these activities were shown in 2 groups of students (G-Exp and G-Co). The G-Exp which uses the PjBL model has a significant increase in student learning activities at each meeting (Figure 3). And in G-Co, learning activity is very low even at each meeting the graph shows student learning activities up and down, (Figure 4). According to Muskania & Wilujeng (2017), PBL is a project learning model that begins with a problem and leads to the final product produced by students through collaboration and active participation in the learning process with the aim of forming students as a whole. Supported by the results of research by Bengi Birgili (2015), it is shown that through PBL students actively participate in creating innovative solutions to problems through their experiences, so that they can increase learning activities.

According to Suardi (2018), learning is assistance provided by educators so that the process of acquiring knowledge and mastering skills, as well as forming attitudes and beliefs in students can occur. Learning outcomes will be influenced by learning models, curriculum design, and teaching (Jude et al., 2014). In the results of the study the increase in learning outcomes in the use of the PBL model after being analyzed included high classification,

because there was an increase in the mean value of 25.01 > 0.7 > index gain, from a mean value of 60.26 (Pre-Test) to a mean value of 85.27 (Post-Test).

According to Bruce R. Maxwell (2020) and Maggi Savin-Baden (2020), PBL focuses on direct learning not memorizing, so it will encourage students to use higher order thinking skills, requiring analysis, design-making, maintain and evaluate. Furthermore, the PBL model is one of the constructive models, has the potential to empower high-level cognitive abilities, which can motivate students to increase activities, independent learning activities from home through distance learning (Online).

## Conclusion

Based on the results and discussion in this study, some conclusions can be drawn as follows: (1) Student learning motivation in the experimental group has increased; (2) Student learning activities in the experimental group tend to be better, and (3) The increase in learning outcomes is high, from an average value of 60.26 to an average value of 85.27.

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