JURNAL PENDIDIKAN TEKNOLOGI KEJURUAN

**Vol. 5, No. 3 August 2022** **P-ISSN: 2621-3273**
**E-ISSN: 2621-1548**

# The effectiveness of the product-based learning model corresponding to Indonesian national standard competency (SKKNI) for the furniture industry in learning applications of wood construction

**Ari Syaiful R.A*, Fani Keprila Prima, Yuwalitas Gusmareta and Sukma Yudistira**

Department of Civil Engineering, Faculty of Engineering, Universitas Negeri Padang, **INDONESIA**

*Corresponding author: arianto41@gmail.com

https://doi.org/10.24036/jptk.v5i3.29123

**Abstract**—The industrial revolution era has significantly impacted Indonesian education's development. Education is not only monotonous to study students but also provides opportunities to develop themselves according to their interests and talents. In this lecture, students' practicum products usually only become waste and are not yet suitable for use and even worth selling. The researcher plans to develop a Wood Construction Application learning with a product-based learning approach combined with SKKNI no. 61 of 2021, the wood furniture industry standard. This research is essential to find the most suitable strategy or practice in the Wood Construction Applications lecture. This study aims to develop learning based on the wood furniture industry with a product-based learning approach. The type of research used is research and development with the ADDIE model. The targeted outputs are in the form of books. The experimental and control classes' results of the pretest and post-test obtained an average result of pretest 20 and post-test of 93.31. In the control class, the average results of the pretest were 22.5, and the post-test was 73.38. While the results of the N-Gain value in the experimental and control classes, the experimental class obtained a value of 0.92 with a high category. In the control class, a score of 0.65 is included in the medium category.

**Keywords:** *Learning Model, Product Based Learning, Wood Work Practice*

## I. INTRODUCTION

The era of the industrial revolution impacted the development of Indonesian education. Education is not only monotonous to study students but also provides opportunities to develop themselves according to their interests and talents. It is supported by government policies related to the independent campus learning program, which offers challenges and opportunities for developing creativity, capacity, personality, and student needs, as well as developing independence in seeking and finding knowledge through realities and field dynamics. The policy requires universities to produce graduates who have multiple competencies. It means that students are expected not only to master the competence of their field of expertise but also to master the competencies that support the development of their field of expertise.

The Department of Civil Engineering, Faculty of Engineering, Universitas Negeri Padang is the part that is responsible for advancing education and producing multi-competent graduates. One of the efforts made is to promote self-development and entrepreneurship activities. Wood Construction Application is a practicum course that provides knowledge and skills to operate wood tools and machines to make connections and wood connections and assemble them in an object of construction/furniture work. The learning achievement is that students have the knowledge, attitudes, and skills to make wood connections applied in furniture products. In general, students can make wood connections. However, the resulting product has no value or is used, and in the end, it becomes practical waste. It is a very unfortunate workshop that has not been able to produce products that should have an industrial standard.

Production activities occur for production, equipment, and people who do the production. Production activities will not be realized and carried out without the tools or objects used to produce an

item [1]. Based on the researcher's initial survey of 64 students who had completed the Wood Construction Application lectures, only 28% said they were skilled at carrying out practicals. The rest said they were not skilled. The skills of students are closely related to skills that students should have. Skills obtained from lectures are closely associated with the ongoing lecture process. One of the factors that support the lecturing process goes well is the use of appropriate learning models.

In the Wood Construction Application course, student creativity and good teamwork are needed to produce good quality products. For now, the products produced are still included in the product category that does not meet industry standards under SKKNI no. 61. Also, the learning methods commonly used tend to be more conventional (ordinary demonstrations) without any particular learning resources. Therefore, in this course, it is better to use Product Based Learning based on SKKNI no. 61, which is considered the most suitable.

The product-Based Learning model based on SKKNI no. 61 aims to improve students' ability in problem-solving, with the result in the form of a genuine product. In contrast to other learning models, Product Based Learning tends to have a longer duration of practice and can be combined with the implementation of entrepreneurship so that students can develop their ability to create and market a product. A workshop majoring in Civil Engineering has the potential to become a production unit but must be supported by qualified human resources. This research is essential to find the most suitable strategy or approach in the Wood Construction Applications lecture.

## II. METHODS

### A. Types of Research

The type of research was research and development (R&D), which aims to produce new products. The research and development model used is the ADDIE model: Analysis, Design, Development or Production, Implementation or Delivery, and Evaluations. The consideration for choosing the ADDIE model as a development model in this research is a more straightforward and more systematic model. At each stage, an evaluation is carried out to increase the quality of the product developed to the final stage. This development research, if carried out in all its aspects, takes quite a long time. Therefore, researchers will conduct this research in the stages of Analysis, Design, Development, and Implementation. At the same time, evaluations are planned for further investigation. The development procedures that will be carried out are, Design, Analysis, Development, and Implementation, with the output being a Journal. The technique of processing data using quantitative research uses statistical calculations with existing formulas. Analyzing learning media data can be done in the following stages:

**1. Cognitive Ability**

**a. Validity Test**

An instrument is said to be valid if it can reveal data from the variables studied appropriately [2]. This study used 30 students who were respondents.

$$r_{xy} = \frac{N\Sigma\ .\mathrm{xy} - \Sigma\,.\,\mathrm{x}\Sigma\,.\,\mathrm{y}}{\sqrt{(N\Sigma\,.\,x^2 - (\Sigma\,x)^2(N\Sigma\,Y^2 - (\Sigma Y)^2)}}$$

Description:

rxy = Coefficient correlation
X = Score items
Y = Total score of each question
N = Number of respondents

declared invalid [3]. interpretation correlation rxy can be seen in Table 2.

Table 1. Interpretation Coefficient Correlation

| Interval coefficient | Level of relationship |
|---|---|
| 0.00 – 0.199 | Very Low |
| 0.20 – 0.399 | Low |
| 0.40 – 0.599 | Medium |
| 0.60 – 0.799 | Strong |
| 0.80 – 1,000 | Very Strong |

The validity of the 20 items in the trial was calculated with the help of the SPSS 17 application. The results of the analysis of the validity calculations can be seen in Table 2.

Table 2. Results of the Validity Test of Questions

| No questions | Correlation coefficient | Information |
|---|---|---|
| 1 | 0.563 | Valid |
| 2 | 0.453 | Valid |
| 3 | 0.382 | Valid |
| 4 | 0.368 | Valid |
| 5 | 0.427 | Valid |
| 6 | 0.417 | Valid |
| 7 | 0.633 | Valid |
| 8 | 0.326 | Invalid |
| 9 | 0.303 | Invalid |

| No questions | Correlation coefficient | Information |
|---|---|---|
| 10 | 0.355 | Invalid |
| 11 | 0.386 | Valid |
| 12 | 0.322 | Invalid |
| 13 | 0.485 | Valid |
| 14 | 0.324 | Invalid |
| 15 | 0.374 | Valid |
| 16 | 0.367 | Valid |
| 17 | 0.430 | Valid |
| 18 | 0.442 | Valid |
| 19 | 0.424 | Valid |
| 20 | 0.444 | Valid |

Table 2 shows the data from the instrument test results between rtable = 0.361 with an r count of 20 items, 15 items are declared valid, and five items are declared invalid. Fifteen valid questions are a benchmark for students' cognitive abilities.

**b. Difficulty**

The level of difficulty of an item is one indicator that can ensure the quality of the item is included in the difficult, medium, or difficult category. The level of difficulty as an indicator is used to show differences in the cognitive abilities of the test. The difficulty level formula used is [5]:

$$P = \frac{\sum X}{SmN}$$

Description:

P : Difficulty level
Sm : Maximum score
N : Number of students respondents who answered correctly

The interpretation of the difficulty level can be seen in table 3.

Table 3. Interpretation Level of Difficulty [6]

| Value of DP | Interpretation |
|---|---|
| P = 0.00 | Very Difficult |
| 0.00 < P 0.30 | Difficult |
| 0.31 < P 0.70 | Moderate |
| 0.71 < P 1.00 | Easy |
| P = 1.00 | Very Easy |

The results of the calculation and analysis of the level of difficulty of 20 items with a level of difficulty examiner, from 20 items obtained eight questions with easy categories, namely items 1,3,4,5,6,9,11,20, and 12 items including in the medium category, namely items 2,7,8,10,12,13,14,15,16,17,18,19. From the difficulty level test, it can be concluded that the cognitive abilities collected in Table 5 of 20 items were obtained with an easy level, and the rest could be used in research.

**c. Analysis of Differentiating Power**

The discriminating power of a question is the ability of a question to distinguish between high-ability students and low-ability students [7].

$$D = \frac{BA}{JA} - \frac{BB}{JB} = PA - PB$$

Description:

J = Number of tests takers
JA = Number of participants in the upper group
JB = Number of participants in the lower group
BA = Number of participants in the upper group who answered correctly
BB = Number of participants in the lower group who answered correctly
PA = Proportion of upper group participants who answered correctly
PB = proportion of lower group participants who were correct

Table 4. Differential Power Interpretation [6]

| Value of Dp | Interpretation |
|---|---|
| Dp 0.00 | Very poor |
| 0.00 < Dp 0.20 | Poor |
| 0.20 < Dp 0.40 | Enough |
| 0.40 < Dp 0.70 | Good |
| 0.70 < Dp 1.00 | Very Good |

The results of the analysis of the difference in power of 20 cognitive ability test items can be seen in Table 5.

Table 5. Results of the Item Distinctive Power Test Item Question

| No. Question | Differential Power | Remarks |
|---|---|---|
| 1 | 0.28 | Enough |
| 2 | 0.28 | Enough |
| 3 | 0.75 | Very Good |
| 4 | 1.24 | Very Good |
| 5 | 0.65 | Good |
| 6 | 0.27 | Enough |
| 7 | 0.35 | Enough |
| 8 | 0.08 | Poor |
| 9 | 0.62 | Good |

| No. Question | Differential Power | Remarks |
|---|---|---|
| 10 | 0.45 | Good |
| 11 | 0.32 | Fair |
| 12 | 0.15 | Poor |
| 13 | 0.67 | Good |
| 14 | 0.62 | Good |
| 15 | 1.02 | Very Good |
| 16 | 0.97 | Very Good |
| 17 | 0.78 | Very Good |
| 18 | 0, 43 | Good |
| 19 | 0.94 | Very Good |
| 20 | 0.55 | Good |

Table 5 shows six items in the very good category, seven in the very good category, and five in the good category. Five items are in the enough category, and two items are in the poor category.

**d. Reliability Test**

The reliability test was calculated and analyzed using SPSS software version 17.0 by performing the Cronbach alpha test. If the value of r has a reliability coefficient or reliability of 0.60 or more, then the instrument is said to be reliable, and vice versa. If r has a reliability coefficient or reliability smaller than 0.60, the instrument is declared unreliable [2].

$$r_{11} = \left(\frac{K}{K-1}\right)\left(1 - \frac{\sum \sigma_i^2}{\sigma_t^2}\right)$$

Description:

$r_{11}$ = instrument reliability
K = number of questions or number of questions
$\sum \sigma_i^2$ = total variance of items
$\sigma_t^2$ = total variance

Based on the calculation of the reliability of 20 items, the results ability test cognitive has a reliability index of 0.718, so it is declared a reliable instrument. Ability test cognitive can be concluded as in Table 6.

Table 6. Ability Test Cognitive

| No Questions | Validity Test Difficulty | Level | Differential Power | Conclusions |
|---|---|---|---|---|
| 1 | Valid | Easy | Enough | Use |
| 2 | Valid | Moderate | Enough | Use |
| 3 | Valid | Easy | Very Good | Use |
| 4 | Valid | Easy | Very Good | Use |
| 5 | Valid | Easy | Good | Use |
| 6 | Valid | Easy | To | Used |
| 7 | Valid | Moderate | Enough | Use |
| 8 | Invalid | Moderate | Poor | Discarded |
| 9 | Invalid | Easy | Good | Discarded |
| 10 | Invalid | Medium | Good | Discarded |
| 11 | Valid | Easy | Enough | Use |
| 12 | Invalid | Moderate | Bad | Discarded |
| 13 | Valid | Medium | Good | Used |
| 14 | Invalid | Medium | Good | Discarded |
| 15 | Valid | Medium | Very Good | Used |
| 16 | Valid | Medium | Very Good | Used |
| 17 | Valid | Medium | Very Good | Used |
| 18 | Valid | Moderate | Good | Used |
| 19 | Valid | Medium | Very Good | Use |
| 20 | Valid | Easy | Good | At Use |

Based on Table 6, it can be concluded that the results obtained from 20 items contained 15 valid items, of which 15 met the criteria. Thus, the researchers took the test questions for research on as many as 15 items, of the 15 declared suitable for use in research based on reliability tests.

**2. Observation Sheet**

Observation is a data collection technique with specific characteristics compared to other techniques [4]. Observation is also not limited to people but also other natural objects. Implementation of the observation sheet through validation of expert lecturers. The following formula calculates the Problem-Based learning model Learning:

$$\% \text{ Implementation} = \frac{Total\ score\ obtained}{Total\ maximum\ score} \times 100\%$$

Table 7. Criteria for Implementation of Learning Model [7]

| Percentage average | Category |
|---|---|
| 0.00 – 24, 90 | Very Poor |
| 25.00 – 37.50 | Poor |
| 37.60 – 62.50 | Moderate |
| 62.60 – 87.50 | Good |
| 87.60 – 100.00 | Very Good |

### 3. N-Gain Test

"The Gain Normality Test is a test that can provide a general description of the increase in learning outcomes scores between before and after the implementation of a treatment" [8]. The N-Gain test formula is:

$$Test\ Gain = \frac{Posttest\ Score - Pretest\ Score}{Maximum\ Score - Pretest\ Score}$$

Meanwhile, for the category using the modified Hake interpretation of the normalized gain index, it can be seen in Table 8.

Table 8. N-Gain Test Interpretation [9]

| Normalized Gain Value | Interpretation |
|---|---|
| -1.00 g < 0.00 | Decreased |
| g = 0.00 | No Decrease |
| 0.00 < g < 0.30 | Low |
| 0.30 g < 0.70 | Medium |
| 0.70 g 1.00 | High |

## III. RESULTS

The results of the *pretest* and *post-test* of the experimental and control classes, the experimental class obtained an average result for *pretest 20* and *post-test of* 93.31. In the control class, the average results of the *pretest were* 22.5, and the *post-test* was 73.38. While the results of the N-Gain value in the experimental and control classes, the experimental class obtained a value of 0.92 with a high category. In the control class, a score of 0.65 is included in the medium category.

Table 9. Conclusions from the results

| Class | Pretest | Posttest | N-Gain | Category |
|---|---|---|---|---|
| Experiment | 20 | 93.31 | 0.92 | Height |
| Control | 22.5 | 73.39 | 0.65 | Medium |

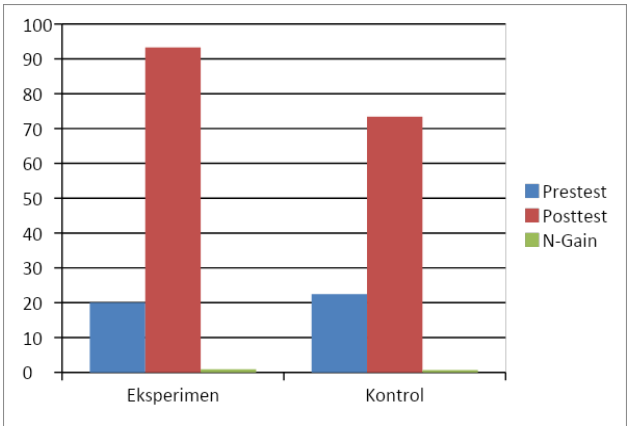


Figure 1. Barchart Data Analysis

The test of students' critical thinking skills is carried out at the beginning and end of learning. The questions given are 15 *essay* questions. Critical thinking skills are on the *Pretest* and *scores.* Interpreting critical thinking ability test results, from identifying problems to analyzing and evaluating problems, is also a critical thinking process. The results of the *pretest* and *post-test* of the experimental and control classes, the experimental class obtained an average result for *pretest 20* and *post-test of* 93.31. In the control class, the average results of the *pretest were* 22.5, and the *post-test* was 73.38. While the results of the N-Gain value in the experimental and control classes, the experimental class obtained a value of 0.92 with a high category. In the control class, a score of 0.65 is included in the medium category. The research was conducted to determine the effectiveness of a model used when teaching, and it can be concluded that research using *Product Based Learning is effective* on students' critical thinking skills.

## IV. DISCUSSION

Product Based Learning model based on SKKNI no. This program aims to improve students' ability in problem solving, with the result in the form of a real product. This research is important to do to find out the most suitable strategy or approach to use in the Wood Construction Applications lecture. The wood construction workshop majoring in Civil Engineering has the potential to become a production unit, but must be supported by qualified human resources. the research used is research and development or research and development (R&D) which aims to produce new products. The research and development model used is the ADDIE model, namely Analysis, Design, Development or Production, Implementation or Delivery and Evaluations.

The test of students' critical thinking skills is carried out at the beginning and end of learning. The questions given are 15 essay questions. Critical thinking skills on the Pretest and Posttest scores. Interpreting critical thinking ability test results, starting from identifying problems, analyzing and evaluating problems which is also a critical thinking level process. The results of the pretest and posttest scores of the experimental and control classes, the experimental class obtained an average result of 20 pretest and 93.31 posttest. In the control class, the average results of the pretest were 22.5 and the posttest was 73.38. While the results of the N-Gain value in the experimental and control classes, the experimental class obtained a value of 0.92 with a high category. In the control class, a score of 0.65 is included in the medium category. The research was conducted to determine the effectiveness of a model used when teaching and it can be concluded that research using the Product Based Learning learning model is effective on the critical thinking skills of students in the Wood Work Practice Course.

## V. CONCLUSION

Based on the results of research, in the experimental class and the control class, where in the cognitive ability test, the experimental class obtained an average pretest score of 20, while the post-test score was 93.31, by obtaining an N-Gain test score of 0.92 with high category. In the control class, the average score for the pretest was 22.5, while the average score for the post-test was 73.38, with an N-Gain test score of 0.65, which was included in the medium category. From the data analysis, it can be concluded that research using Product Based Learning effectively improves students' critical thinking skills. It proves that students' cognitive abilities are further improved after the Product Based Learning in the Woodworking Practice Course.

## REFERENCES

Yori, Akbar Rizki. 2017. Analisis Faktor-faktor yang mempengaruhi Produksi Industri Furniture Kaca dan Alumunium di Kota Pekanbaru. Jurnal Online Mahasiswa Fakultas Ekonomi Universitas Riau. Vol. 4, No. 1, Hal. 434-444.

Arikunto, Suharsimi. 2010. Prosedur Penelitian Suatu Pendidikan Praktik. Jakarta: Rineka Cipta

Apitasari, Minung, dkk. 2015. *Effect Of The Quality Of Service and Location Of Consumer Decision To Use The Service FotoCopy Simongan. Jurnal Of Management Semarang*. Vol 1.1 No.7.

Sugiyono. 2017. Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Bandung: Alfabeta, CV.

Amalia, Yana Dirza, dkk. 2014. Pengaruh Penerapan LKS Berorientasi Pembelajaran Berbasis Masalah Terhadap Kompetensi Siswa Kelas X SMA Negeri 1 Gunung Talang. Pillar Of Physics Education.

Hamzah, Ali. 2014. Evaluasi Pembelajaran Matematika. Jakarta: PT Raja Grafindo Persad.

Daryanto. 2010. Evaluasi Pendidikan. Jakarta: Rineka Cipta.

*Sundayana*, Rostina. (*2014*). Statistika Penelitian Pendidikan. Bandung: Alfabeta.

Sundayana, Rostina. 2012. Pengaruh Perkuliahan Statistika Berbantuan Ms. Excel dan SPSS dengan Model Pembelajaran Tutorial Terhadap Kemampuan Pemecahan Masalah dan Komunikasi Matematis. Universitas Pendidikan Indonesia.