

The Influence of Props-Based Learning Media Against Improved Construction Learning Outcomes and Building Utilities at SMK Negeri 4 Pariaman

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Received 18th August 2023; Revision 15th September 2023; Accepted 27th September 2023

ABSTRACT

This research was conducted based on the background of the unavailability of supporting learning media in Building Construction and Utility subjects, especially in the material of applying procedures for making detailed foundations, sloofs, columns and beams. This research aims to produce products that are valid, practical and effective and have an impact on improving learning outcomes in Building Construction and Utilities. This research uses the R&D research method using the 4D development model which consists of four stages, namely define, design, develop and disseminate. The instruments used in this research were learning media validation questionnaires for media and material experts, learning media practicality questionnaires for students, as well as learning media effectiveness test questions for students. The media validation results for detailed foundation, sloof, column and beam media show that the learning media can be categorized as very valid with a level of validity by media 1 of 85.45%, media expert 2 of 85.45%, expert media 3 of 87.27 %, material expert 1 was 85.71% with a very valid category; The practicality of the detailed media for foundations, sloofs, columns and beams based on student assessment was 89.87% in the very practical category; Furthermore, the effectiveness assessment was carried out by testing the N-Gain Score with a value of 36.6% in the quite effective category as well as testing the T-test. Students received a value of $t_{count} > t_{table}$ or $5.812 > 1.741$, which means that H_a was accepted and H_o was rejected. According to the results of the overall assessment of teaching aids media, the resulting learning media products were stated to be very valid, practical, and quite effective for use in supporting the learning process, as well as having a significant effect on improving learning outcomes in Construction and Building Utilities.

Keywords: Influence, Learning Media, Teaching Aids, Utilities.

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INTRODUCTION

Education is the effort of a person or group of people to prepare students through guidance, teaching and training activities for their future roles. According to Law Number 20 of 2003, Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and the skills needed by them, society, nation and state. The development of science and technology has an influence on the world of education, especially media in learning.[1]

Learning is a process that processes a number of values for students to consume. These values

do not come by themselves, but are obtained from various sources, for example school, home and society. In the learning process the teacher can convey learning creatively and innovatively so that students can easily accept the learning provided so as to improve student learning outcomes where student learning outcomes are the goal in learning activities. According to Sudjana in Iskandar (2011) suggests that "Learning results are a result of the learning process using measurement tools, namely in the form of tests that are arranged in a planned manner, both written tests, oral tests, and action tests" [2]. Learning can be obtained from schools, one of which is SMKN 4 Pariaman.

SMKN 4 Pariaman has a Building Information and Modeling Design (DPIB) expertise package which has subjects namely Engineering Drawing, Engineering Mechanics, Fundamentals of Building Construction, Building Construction and Utilities, Construction Cost Estimation, Software Application and Building Interior Planning, Road Construction and Bridge, and Creative Products and Entrepreneurship. One of the subjects that plays an important role in DPIB is Building Construction and Utilities.

This Building Construction and Utilities subject is one of the subjects that includes practice where students are asked to understand theory as well as students must be able to apply it by drawing. This subject plays an important role in DPIB because it discusses a complete building construction structure which can be a benchmark for studying other building construction structures.

Based on observations made by researchers at SMK Negeri 4 Pariaman on February 15 2023, there is still a lot of material that is difficult for students to understand in the Subject of Building Construction and Utilities, such as the material applying procedures for making detailed foundations, sloofs, columns and beams, which is almost 80% of the participants. students don't understand it. Observations were also made by researchers during the Employment Practices (PLK) in the 2021/2022 school year, in the learning process the teacher still uses the lecture method and modules as learning resources. However, there are still many weaknesses encountered when following the learning process. For example, when the teacher explains the material, students who are behind are chatting with friends who are sitting next to them. understand learning.

In the learning process of Building Construction and Utilities that can run well, adequate learning support is needed to make it easier for students to receive learning, but in reality the teaching method still uses the lecture method and modules, there are no media props to support learning. This makes lessons less interesting and students are less enthusiastic about learning. One example is that students do not bring drawing tools and equipment, even though the purpose of this subject is that students are required to be able to draw according to the material being studied. Many students do not do the assignments given, this situation can result in students' learning outcomes being low.

Based on these problems, researchers are interested in creating learning media based on visual aids and looking at the influence of the media on improving learning outcomes of Building Construction and Utilities. The purpose of making this media is to make it easier for students to receive and understand learning. The media for the visual aids created are detailed foundations, sloofs, columns and beams as in the original on a reduced scale.

MATERIALS AND METHODS

This type of research is research and development (Research and Development) or R&D. Sugiyono (2017) suggests that Research and Development is a research method used to create certain products and evaluate the effectiveness of these products [3]. The research method using the 4-D development model consists of four stages, namely define, design, develop and dissemination (Thiagrajan, et.al. 1974). Researchers use this 4-D research model because it is easy to understand the working procedures of this model and many other researchers use it so that it can be a source of reference in carrying out the procedure.[4]

In this study, the media created not only creates products in the form of learning media but also to determine the effectiveness and feasibility of the media to be made and used. The main material that will become teaching aids is material applying procedures for making detailed foundations, sloofs, columns, and beams. This media is made of wire, stone, cement, sand and plywood according to the sketches that have been made.

This research was conducted at the Department of Design Modeling and Building Information at SMK Negeri 4 Pariaman. This research was carried out in August 2023. Before carrying out research on media teaching aids, they were tested for validity and practicality and continued with an effectiveness test. Media validity was carried out by 3 media experts and 1 material expert, for practicality the media was given to Class XII DPIB students, totaling 24 people. In accordance with the opinion of Arikunto (1992), if the total population is less than 100 people, then the whole sample is taken, but if the total population is more than 100 people, then 10-15% of the total population can be taken. While effectiveness is given in the form of objective test questions which are also given to Class XII DPIB students, totaling 24 people.[5]

The instrument technique used in this study was a questionnaire as a data collection technique. According to Sugiyono (2017), a research instrument is a tool used to collect data [3]. In the study using 2 questionnaires and 1 question test. The questionnaires are the media validity questionnaire and the media practicality questionnaire, while for the test the questions are given in the form of 20 objective questions. The validation and practicality questionnaire in this study used an existing questionnaire from the previous researcher, Vina Sofiana S. Pd.[6]

Data processing techniques use statistical calculations with existing formulas. Analyzing learning media data can be done in the following stages:

Validity Test

Valid or not suitable for a learning media can be analyzed with the following steps:

- 1) Questionnaires were given to 3 media experts and 1 material expert assigned to assess the validity of the media.
- 2) Conduct a questionnaire to see the validity given by experts.
- 3) The product is said to be valid if the average for each assessment at least gets good criteria. This average can be calculated using the following calculation:

$$\text{Skor} = \frac{\text{total score obtained}}{\text{maximum score}} \times 100\%$$

After making a percentage of validity values, then provide a validity assessment with validity level categories based on table 1.[7]

Table 1. Percentage of Validity Assessment

No	Rating Level %	Category
1.	81-100	Very Valid
2.	61-80	Valid
3.	41-60	Less Valid
4.	21-40	In Valid
5.	0-20	In Very Valid

Media Practicality Test

The practicality test of learning media was carried out to analyze data on the results of using the media, the resulting data were taken from research on DPIB XII class students who had studied. The practicality test is analyzed with the following calculations:

$$\text{Skor} = \frac{\text{total score obtained}}{\text{maximum score}} \times 100\%$$

Based on the formula above, the practicality value is determined according to the media category that has been created. These categories can be seen in table 2. [8]

Table 2. Percentage of Practicality Assessment

No	Rating Level %	Category
1.	81-100	Very Practical
2.	61-80	Practical
3.	41-60	Less Practical
4.	21-40	Impractical
5.	0-20	Very Impractical

Media Effectiveness Test

To determine whether there is an increase in learning outcomes after testing the test, the data obtained will be analyzed using the normality test and homogeneity test. After that, proceed with the N- Gain Score test and the T test.

1) Normality test

To test the normality of pretest and posttest scores, the Liliefors normality test was used [9]. With the following formula:

$$Z_i = \frac{X_i - \bar{X}}{S}$$

Information

X_i = Learning outcome value

\bar{X} = Average Learning Outcome

S = Standard Deviation

2) Homogeneity test

This test is carried out to fulfill whether the sample is taken from a homogeneous variant or not. With the following formula:

$$F = \frac{\text{varians terbesar}}{\text{varian terkecil}}$$

$$F = S_1^2 / S_2^2$$

Information:

S12 = the largest variance

S22 = smallest variance

Test T-Test

This test is to find out how significant the influence of detailed foundation, sloof, column and beam teaching aids is on improving Building Construction and Utilities learning outcomes, carried out at a significance level = 0.05. This test is used to determine whether the hypothesis is accepted or not.

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

Information:

\bar{X}_1 = average posttest learning outcomes

\bar{X}_2 = average pretest learning outcomes

n1 = Number of Posttest Students

n2 = Number of Pretest Students

S12 = Largest Variance (Posttest)

S22 = Smallest Variance (Pretest)

S2 = Combined Variance

The price of tcount is compared to ttable with significant test criteria = 0.05, namely:

a) If tcount > ttable, it means that there is a positive and significant influence between detailed foundation, sloof, column and beam teaching aids on improving Building Construction and Utility learning outcomes.

b) If tcount < ttable, it means that there is no positive and significant influence between detailed foundation, sloof, column and beam teaching aids on improving Building Construction and Utility learning outcomes.

N- Gain Score Test

To determine the level of effectiveness of teaching aids, the N-Gain Score test is carried out with the following formula:

$$N\text{- Gain} = \frac{\text{Skor Posttest} - \text{Skor Pretest}}{\text{Skor Ideal} - \text{Skor Pretest}}$$

After making an assessment, then giving an assessment of effectiveness with the gain score category based on the following table.[10]

Table 3. Classification of N-Gain Score

Value	Classification
< 30	Not effective
31- 70	Moderately effective
71- 100	Very effective

RESULTS AND DISCUSSION

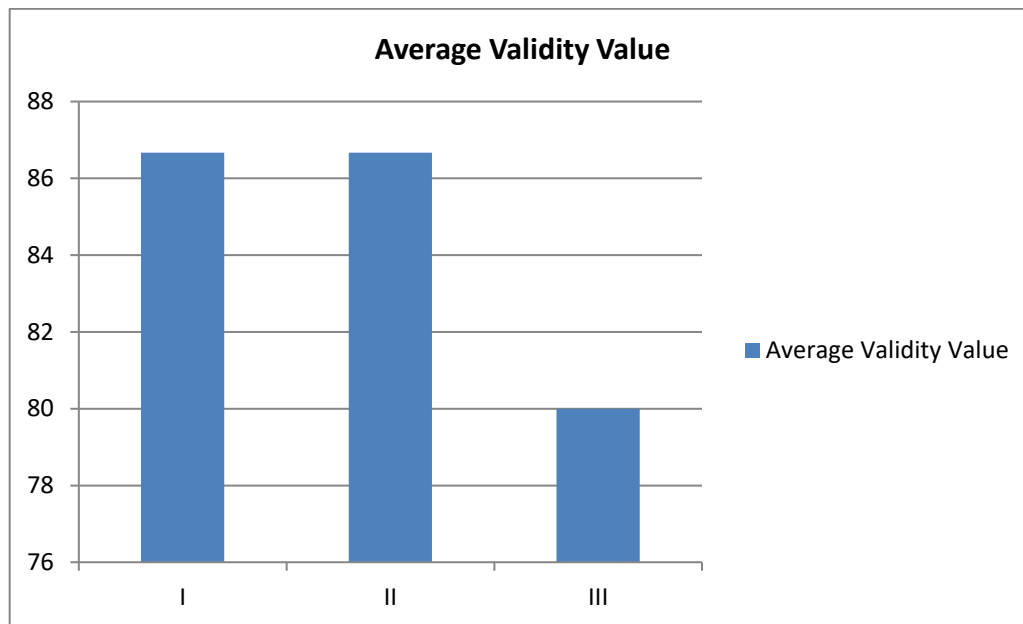


Figure 1. Average validation result for each validator

The results of the assessment of the validator and students, namely the assessment of the material aspects by material experts 1, obtained a score of 85.71% in a very valid category. Furthermore, the assessment of the media by media expert 1 obtained a score of 85.45% with a very valid category, the assessment of media expert 2 obtained a score of 85.45%, and the media expert's assessment of 3 obtained a score of 89.27% with a very valid category. In line with the assessment carried out by material and media experts, the assessment of 24 students obtained a score of 89.87% for the detailed foundation, sloof, column, and beam teaching aids, the resulting learning media products were very practical. The practicality value of teaching aids-based learning media in the subject of Building Construction and Utilities which was carried out to 24 students majoring in DPIB class XII was 89.87% with the criteria of "Very Practical".

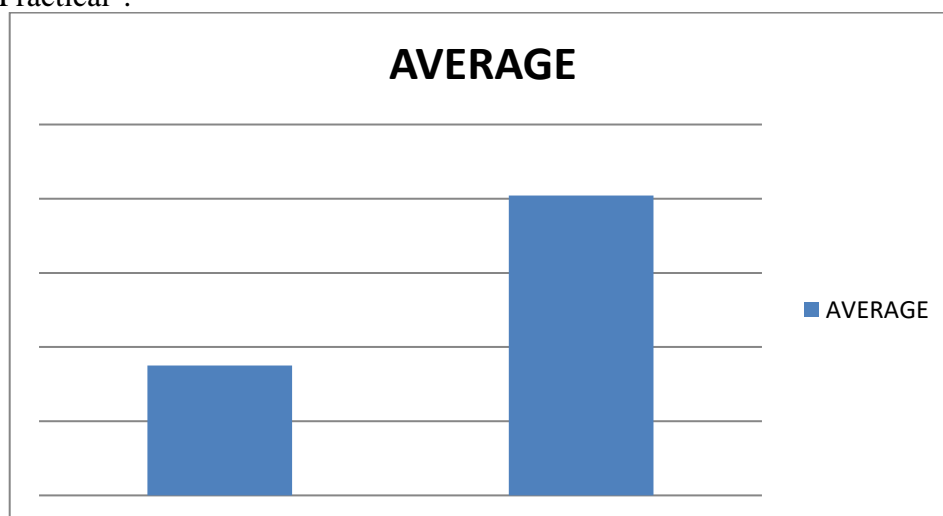


Figure 2. Comparison of the average scores of pretest and posttest results

Furthermore, the results of the T-Test test obtained $t_{count} > t_{table}$ or $5.812 > 1.714$. It can be interpreted that H_a is accepted and H_0 is rejected with a significant level = 0.05, meaning that

there is a significant influence between teaching aids on learning outcomes of Building Construction and Utilities. Meanwhile, the N-Gain test obtained a score of 36.6% in the quite effective category.

In this study the product produced was in the form of learning media based on teaching aids for foundation details, sloofs, columns, and beams. These props are made of wire, cement, sand, stone, and plywood. Where the form of this media for teaching aids is made based on predetermined sketches and sizes and has a scale of 1: 10. The use of this media is very practical and can be easily moved from one place to another.

The development model used in this research is the 4D development model which consists of 4 stages, namely Define, Design, Development, Dissemination by Thiagarajan, et.al. (1974) [4]. This research was conducted until the final stage, namely Dissemination. Maybe this research can be continued by using a control class and an experimental class.

Based on the assessment of material experts and media experts, learning media based on detailed foundation, sloof, column and beam props can be used to support the learning process and make it easier for students to understand learning. In line with the opinion of Zahwa & Syafi'I (2022) [11] the function of learning media is so that students can easily understand the information and messages conveyed, so that they can achieve learning goals well.

From the results of research on material validators with very valid categories, media validators are also included in very valid categories. Then with the results of the product practicality test by class XII DPIB students in the very practical category. The results of this study are also in line with research conducted by Vina Sofiana (2022) [6]. Furthermore, the results of the T-test are in line with research conducted by Nita Bunga Dinamik (2019) [12]. This research is also in line with the research of Luthfi Anarani Fauziyah (2017)[13]. The N-Gain results obtained a fairly effective medium. The conclusion of the relevant research results is that the resulting learning media based on teaching aids is valid, practical, and quite effective and has an effect on improving learning outcomes in Building Construction and Utilities.

CONCLUSION

Based on the results of the research and discussion, it can be concluded that the media produced is valid, practical and quite effective and has a significant effect on improving learning outcomes for Construction and Building Utilities at SMK Negeri 4 Pariaman.

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