**The Effectiveness of PONTA Learning Model Based on Blended Learning in Vocational High School**

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**Abstract.** This study aims to determine the effectiveness of the PONTA learning model based on blended learning in vocational high schools. The model developed consists of 5 stages, namely: preparation, observation, negotiation, transfer, and apply. The trial design was conducted using a pretest-posttest group design. The test has been done on class XII students of SMK Negeri 3 Makassar and SMK 10 Makassar. Data analysis using (1) gain score index data analysis; (2) normality analysis; (3) homogeneity analysis. The results showed that the results of testing the effectiveness of the PONTA learning model based on blended learning at SMK 3 Makassar obtained an n-gain value of 0.40 in the medium category with 81.92% learning completeness in the high category. Whereas at SMK 10 Makassar, the n-gain value is 0.42 in the medium category with 83.24% learning completeness in the high category. Based on the results of the research, the blended learning-based PONTA learning model in vocational high schools is effective and suitable to be used to increase knowledge of environmental safety and health.

**1. Introduction The**

Revolution Industry 4.0 provides challenges and opportunities in all fields that require people to change the way they do their activities. These challenges and opportunities arise in line with developments in science and technology, especially in the field of information technology. Digitalization appears everywhere, from the digital economy, digital bureaucracy, to the education space which also requires digitalization. Even globally, humans can be said to live in uncertainty, if they are unable to respond to these changes [1].

The emergence of changes as referred to above, it has implications for changes in the world of education. The trend in the development of science and technology is also increasingly advanced. This means that educational institutions must undertake broad change efforts. Innovation towards learning is the most important part of efforts to make big changes [2]. One of the educational institutions that are expected to be able to provide answers to changes in the 4.0 era is vocational secondary education institutions.

Learning development in vocational education institutions or vocational high schools must remain goal-oriented as part of the national education system. Vocational high school is secondary education that prepares students especially to work in certain fields, can adapt to the work environment, can see job opportunities and can develop themselves at a later date. The objectives of the vocational high school are realized with a curriculum structure containing three programs, namely normative, adaptive, and productive programs [3].

The learning models above still need to be equipped in accordance with developments in information technology. The internet as an icon of information technology or cyberspace today must be utilized as well as possible, including in learning. Therefore, online learning or e-learning also needs to be applied in vocational high school. E-learning is an online learning model (distance learning) which is expected to be able to change conventional learning models which are considered to have various shortcomings. However, in its implementation the e-learning learning model has a series of limitations compared to face-to-face learning in class.

These limitations include; The lack of control is due to the lack of mastery of the concept of the method of using e-learning applications by both educators and their students, limited access to the internet network, the availability of learning modules and the lack of other infrastructure by students [4]. Blended learning can combine positive aspects of two learning environments, namely learning that is carried out in the classroom with learning with e-learning [5]. Blended learning can show better differences in terms of motivation, interest, and student learning outcomes compared to other methods, especially methods in direct learning, so that the blended learning method has become a trend and is widely used in leading universities in the world [6] . Therefore various compromises are offered as alternative solutions, namely by combining face-to-face learning models with e-learning-based learning models which are often referred to as blended learning.



**Figure 1**. Blended Learning Concept

Syntax PONTA Learning Model consists of five stages, namely: (1) Preparation; (2) Observation; (3) Negotiation; (4) Transformation; and (5) Application. The PONTA Learning Model syntax is designed to be continuously interrelated between the first stage and the next so that it provides direct experience for students.

**2. Research Method**

This research is an experimental study using the pretest-posttest group design model. The subjects of this study were 25 students of class XII at SMK Negeri 3 Makassar and SMK Negeri 10 Makassar for the academic year 2020/2021. The learning materials were environmental safety and health tested. The data collection technique based on knowledge test of environmental work safety and health. Data analysis was performed using the following analysis: (1) gain index data analysis, (2) normality test, (3) homogeneity test. Furthermore, the normality and homogeneity of the data were also tested. The trial design for the effectiveness of the PONTA learning model based on blended learning is as follows:

**Table 1.** One Group Pretest Posttest Design

|  |  |  |
| --- | --- | --- |
| Pretest | Treatment | Posttest |
| O1 | X | O2 |

Information:

O1 : Environmental safety and health pretest

X: Treatment given to students

O2 : Environmental safety and health posttest

**3. Result and Discussion**

3.1 Effectiveness of Blended Learning-based PONTA Learning Model

Test results of safety and health knowledge in Environmental work at SMK Negeri 3 Makassar obtained an average pretest score of 70.08 and an average posttest score of 81.92. Whereas at SMK Negeri 10 Makassar, the pretest average score was 71.12 and the posttest average score was 83.24. At SMK Negeri 3 Makassar, the completeness score was 81.92% with the high category and an average n-gain score of 0.40. Whereas at SMK Negeri 10 Makassar, the completeness score was 83.24% with the high category with a n-gain score of 0.42.

**Table 2.** The Results of Student

|  |  |
| --- | --- |
| SMK Negeri 3 Makassar | SMK Negeri 10 Makassar |
| Score | N-Gain | Score | N-Gain |
| Pretest | Posttest |  | Pretest | Posttest |  |
| 70.08 | 81.92 | 0.40 | 71.12 | 83.24 | 0.42 |
| Complete Percentage | 81.92% | Complete Percentage | 83.24% |
| Category |  | High | Category |  | High |



**Figure 2.** Graph of pretest-posttest results

3.2 Normality Test

Normality Test were taken to determine whether the data is normally distributed or not. This test used the Shapiro-Wilk test statistic by taking a significance level of 5%. Guidelines for decision making by taking a significance level of 5% is a significance value (sig) <0.05 means that the distribution is not normal. While the significance value (sig) ≥ 0.05 means normal distribution. Based on the results of the normality test of the student learning outcomes of SMK 3 Makassar, the significant value was 0.189 ≥ 0.05 and the SMK 10 Makassar obtained a significant value of 0.290 ≥ 0.05. This shows that the data is normally distributed.

**Table 3**. Test of Normality Data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Group | Statistic | df | Sig.  | Conclusion |
| SMK 3 Makassar | .148 | 25 | .189 | Normal |
| SMK 10 Makassar | .114 | 25 | .290 | Normal |

3.3 Homogeneity Test

Test are carried out with the aim of showing that two or more groups of sample data come from populations that have the same variance. Reading of the output data in the sig column. there are numbers that show a significance level of 0.05. If the sig obtained is> 0.05, then the variance of each sample is the same (homogeneous). Meanwhile, if the sig obtained is <0.05, then the variance of each sample is not the same (not homogeneous).

**Table 4**. Homogenity Test of Data

|  |  |  |  |
| --- | --- | --- | --- |
| Levene Statistic | df1 | df2 | Sig. |
| 1.189 | 1 | 48 | 0.273 |

Based on the calculation of the results of the homogeneity test above, it is found that the significance value is 0.020 ≥0.05, it can be concluded that the variance of each sample is the same (homogeneous).

1. **Conclusion**

Based on the results and discussion of the research, it can be concluded that the PONTA learning model based on blended learning in SMK is effectively used in increasing knowledge of environmental health and safety. The increase in student learning outcomes at SMK 3 Makassar is 0.40 in the medium category and SMK 10 Makassar is 0.42 in the medium category. This is in accordance with previous research that blended learning can improve learning outcomes and learning independence [7]. In addition, blended learning based learning can also increase student motivation [8].

1. **References**

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