

Developing A Props of Fire Extinguishers Cutting to Enhance Student's Learning Outcomes of The K3 Studi at Muhammadiyah University Purworejo

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Abstract. This study aims at 1. Producing a prop of fire extinguisher cutting to enhance the student's learning outcomes, 2. Analyzing the worthiness of the developed props in vocational university, 3. Analyzing the effectiveness of the developed props in a vocational university. This study refers to the research procedure of design and development by 4 D (Four D) consisting of, 1. Define, 2. Design, 3. Develop, 4. Disseminate. The data was analyzed using T-Test. The results showed that: 1. The K3 learning outcomes in vocational university did not meet the expectation; 2. Learning of fire extinguishers cutting props to enhance the students' learning outcomes were developed, and; 3. the developed of fire extinguishers cutting props was effective to enhance the students' learning outcomes. The results of the t-test showed that there was a significant difference between the learning outcomes with the props and the learning outcomes without the props.

Keywords: Props, Cutting, Fire Extinguisher, Outcomes Learning

1. Introduction

Based on Health and Work Accident data presented by the BPJS employment agency shows that the level of work accidents is relatively high. Several indicators are the factors causing high work accidents, namely: 1) Inadequate facilities and infrastructure; 2) Less stringent regulations, and 3) human resources that are not yet competent.

Factors causing occupational accidents indicate that knowledge about Occupational Health and Safety in the workforce is still low. This shows that learning about occupational health and safety obtained at schools has not reached the expected competencies. In general, the aim of education is to provide an environment that allows students to develop their talents and abilities to the fullest (Suyitno, 2018c). Education has an important role in the formation of competent human resources. Education is not a process that is organized regularly, planned, and uses methods that are studied and based on rules that have been agreed upon by the organizing mechanism of a community of a community (the State), but rather is a part of life that has indeed been going on since humans existed (Omeri, 2015). That education is not an organized process but things that must exist from a life wherein all aspects of life there are indicators of education, in terms of community, socializing and everyday life. Or it can be concluded that education does not have to have a formal background. However, it does not rule out formal education which applies in daily life, namely experience-oriented education.

Vocational education is education that is oriented towards the development of processes and outcomes of learning (Suyitno, 2016). Many educational and business institutions and individuals are busy implementing and experimenting with various learning approaches that are seen as breakthroughs, but if viewed critically and clearly, there are still many factors that

influence learning in technology and vocational education institutions. Factors that influence learning are internal and external factors. Internal factors in students include learning motivation, initial ability, independent learning ability, access to information and mastery of English, and learning disparities. (Authority, Basuki; 2005). Of the various aspects that affect learning there are other aspects that affect the language and technology, which is increasingly day-to-day, increasingly experiencing innovations so that learning must also follow innovations that are in accordance with the integrity of the age, where later learning outcomes and the resulting output are able to compete in the era that is all about technology. External factors include lecturers, teaching materials, methods, media and technology, learning culture, classroom interaction, library and information, laboratory/practicum and final project, ICT-based learning and worldwide access, tutorials, expertise collaboration programs, and learning systems. (Authority, Basuki; 2005).

The appropriate balance of learning must also be prioritized where the factors that influence are no longer only from internal but also from external factors, so from the two factors that play an important role in learning must be balanced so that learning is right on the purpose of the learning itself. The purpose of learning is basically the ability of students to understand the contents, intentions, and feelings given by these training eyes. Learning (Yuwono, 2015). The most important thing in learning is that students are able to understand the purpose of the learning, which is emphasized in learning that is where the actors in learning really understand the learning, from the objectives, carried out learning, learning objectives, and the results of learning itself. In conclusion, motivation, in language learning, is the motor that stimulates acts for achieving the planned goals of the study, and motivation plays as determination in helping to concentrate on the desired goals until they are achieved (Kieu, 2018). In learning motivation to learn is also one of the factors that influence learning is successful or not. Where if students are motivated in the field studied will make students more interested in studying harder. However, if students are less motivated in the field studied, then there is less interest in learning. The initial ability and access to information of English students enter the influence of learning where later there will be a gap in accepting learning between students with one another.

But besides the influence of these factors, there are other factors that are very influential namely from outside or external. Of all the external factors that have been raised by Basuki Wibawa above, each has a large influence on the effectiveness and conducive learning. The use of technology, media, and learning aids by lecturers is more determined by the availability of these tools, not in accordance with the learning objectives. (Authority, Basuki; 2005). The success of vocational education cannot be separated from the role of media learning (Suyitno, 2018a). From this statement, it can be taken that there are many education providers who do not adjust the tools used in learning, or the tools used are determined because of the availability of aids or visual aids, so the learning that is carried out does not go according to plan. The development of science and technology is increasingly encouraging renewal efforts in the use of technological results in the learning process. To meet these needs, workers are required to be able to master technological developments (Mujahid et al., 2015). It is expected that after getting learning is able to master technology that is getting more and more sophisticated, increasingly sophisticated. So learning is required to apply technology in its implementation so that its exit can be accepted in the world of work that requires its workers to be able to operate the technology available in the world of work. And also after being deepened from the intention of the external factors above it all relates to learning facilities, where the use of technology and media that greatly influences learning that is conducive and in accordance with the field being studied.

To reach the goal, the quality of the learning process needs to be adjusted to knowledge and implementation as what is needed through educational innovation (Suyitno, 2018b). Learning objectives can be achieved through a variety of methods that adjust knowledge of innovation that continues to develop following the changing times. Stimulus forms can be used as media, including human relationships or interactions, reality, moving images or not, writing and sound recorded and then combined into one and make a film form. (Setyawan, Kurniawan, Automotive, & Purworejo, 2015). In practice, the implementation of learning really requires media in it. The media used are also many variations, with the aim of holding the media in learning that is nothing but to facilitate learning. At present, the use of instructional media is very important to support success in a teaching and learning activity (Setyawan et al., 2015). As has been found in the field that the media in learning has a big contribution to realizing successful learning where the results of maximum learning.

Competence will be achieved well if the media used in the learning process gives an interesting impression to students (Nurhidayatullah, 2015). Besides the media used must be in accordance with the learning being carried out, the media must also be able to give students a sense of interest so that students are encouraged to learn. Learning media follow the development of existing technologies such as the use of video learning, animation, interactive media, and so forth. (Saleh et al., 2012). Therefore the use of instructional media is very useful and expedites teaching and learning activities. The use of learning media is more time-efficient and effective. Assist in the process of understanding and mastering learning material. Attention and interest in learning light fire extinguishers are needed so that the results of the learning are as expected. Researchers used the media of cutting tools for lightweight fire extinguishers so that students would more easily understand the components of lightweight fire extinguishers, component functions, how to use, and how to work light fire extinguishers by using the media of cutting tools for lightweight fire extinguishers.

Based on the results of a preliminary study conducted by researchers in the occupational health and safety course at the University of Muhammadiyah Purworejo, it shows that the learning outcomes are still not optimal. Learning outcomes are influenced by several factors, namely the learning process, material that is easily accepted and the appropriate media. Therefore, researchers used the media of cutting tools for lightweight fire extinguishers so that students would more easily understand the components of lightweight fire extinguishers, component functions, how to use, and how to work light fire extinguishers by using the media of cutting tools for fire extinguishers light. Researchers will focus on the media of teaching aids cutting a lightweight fire extinguisher will help to learn so that the results of learning increases.

From the problems and description above, it attracts the attention of researchers to research the title "Development of Cutting Aids for Light Fire Extinguishers to Improve Learning Outcomes in Occupational Health and Safety Courses".

2. Method

This research method is research and development (RnD), with a 4D model consisting of four stages, namely: 1) Define, 2) Design, 3) Develop, and 4) Disseminate (spread). The research was located at the Muhammadiyah University of Purworejo and the implementation time was from December 2018 - August 2019. The population in this study was the Health and Safety course at Muhammadiyah University, Purworejo. The sampling technique in this study was cluster random sampling. Data collection techniques were carried out by distributing questionnaires and direct tests to correspondents who were examined with random or

unspecified choices. The purpose of this method is to retrieve data by the conditions in the field. To take data to find information on how learning has been going on.

Descriptive statistics are statistics used to analyze data by describing or describing data that has been collected as it is without intending to make conclusions that apply to the public or generalizations. (Sugiyono, 2015: 147). The data that has been collected is then processed based on the indicators studied, where then the data will be descriptive based on the results obtained from the field. Descriptive statistics include the presentation of data through tables, graphs, pie charts, pictograms, mode calculations, medians, mean (a measurement of central tendency), decile calculations, percentiles, calculation of data distribution through the calculation of averages and standard deviations, calculation of percentages (Sugiyono, 2015: 148). And the results of the data that have been obtained are presented in tabular form by the indicators that have been determined in this study.

With calculations like this:

$$\text{percentage (\%)} = \frac{\text{earned score}}{\text{maximum score}} \times 100\%$$

The data collected were analyzed with descriptive statistics which were revealed in the calculation of the percentage of the predetermined value scale category. After serving as a percentage, the next step is to describe and draw conclusions about each indicator and question. So that readers will more easily digest the results of these studies. Data analysis using the Homogeneity Test, Normality Test, and T-Test. Data analysis aims to determine differences in the control class and the experimental class.

3. Discussion

Research on the development of cutting aids for light fire extinguishers to improve learning outcomes in occupational health and safety courses is carried out by the four stages of the 4D method.

a. Define

At this defining stage, researchers analyzed various aspects that certainly relate to learning occupational health and safety courses. Aspects of the researchers' analysis include: 1) learning tools, 2) output of students who have learned occupational health and safety courses, 3) tasks in the occupational health and safety course.

b. Design

At the design stage, the initial design includes the material that will be used in learning, the design of media that is suitable with the material used, and the test that will be used as a measurement of learning that has been carried out.

c. Development

At the Development stage (development) carried out the development of the initial design of the media and tests that will be used. Based on input from media experts and material experts, it shows that the media and material used are valid, of course, with revisions suggested by media experts and material experts.

d. Disseminate

In the disseminated stage (dissemination) is carried out by socializing the development of media for cutting tools for light fire extinguishers to the second-semester students of the automotive engineering education study program at Muhamadiyah University, Purworejo.

By the mindset with the implementation of control and experimental methods in the application of the media cutting aids fire extinguishers get the following results:

1) Control Class

Table 1. Table of control class learning outcomes

Value	Frequency	Percentage
50-59	1	4%
60-69	13	52%
70-79	10	40%
80-89	1	4%
90-100	0	0%
Total	25	100%

Based on the results of learning the control class shows that the value obtained is still lacking. This is evidenced by a large number of frequency of respondents who get grades below 80. Data in table 1 shows that without the use of media in learning affects learning outcomes.

2) Experiment Class

Table 2. Table of learning outcomes of the experimental class

Value	Frequency	Percentage
50-59	0	0%
60-69	1	4%
70-79	2	8%
80-89	13	52%
90-100	9	36%
Total	25	100%

From the learning outcomes, the control class showed that the scores obtained were good. This is evidenced by a large number of frequency of respondents who get a value of 80 and above. Based on table 1 and table 2 shows that there are significant differences in learning outcomes, so the use of media in learning is very influential in learning outcomes.

3) Comparison of the learning outcomes of the control class and the experimental class

Table 3. Comparison of the control class and the experimental class

statistical indicators	Control Class	Experiment Class
total	1670.00	2120.00
Average	66,80	84.80
Highest score	80.00	100.00
lowest score	55.00	65.00
standard deviation	6,59	7,96
Mode	60.00	85.00
Median	65.00	85.00
N	25	25

Based on the results of the class learning dick and experimental classes show that there are significant differences in learning outcomes. This is reinforced by the t-test calculation in table 4. Learning outcomes data from the control class and the experimental class show that the use of media in learning influences learning outcomes. The learning outcomes obtained by the control class tend to be less than optimal because they do not use media in learning. Meanwhile, the experimental class learning outcomes get optimal results due to using media in learning.

4) Data Analysis

This data analysis aims to determine the difference between the control class and the experimental class. The calculation of data analysis used in this research is the homogeneity test, normality test, and T-test.

Table 4. Homogeneity Test Table

Levene Statistic	df1	df2	Sig.
.037	1	48	.847

Based on table 4 shows that the significance value of table 0.847. Data can be said to be homogeneous if the calculated significance value is greater than the significance value of the table (0.05). The significance value of the calculation shows that the data is homogeneous.

Table 5. Normality Test Table

Outcomes Learning		Kolmogrov Smirnov(a)		
		Statistik	df	Sig.
Class	Control	169	25	.064
	Experiment	152	25	.132

Based on table 5 shows that the significance value of the control class is 0.06 and the experimental class is 0.132. Data can be said to be normally distributed if the calculated significance value is greater than the significance value of 0.05. The significance value of the calculation shows that the data is normally distributed.

Table 6. T-test Test Table

	Paired Differences				t	df	Sig.(2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower Upper			
Pair 1 kontrol-eksperimen	-18.00000	11.08678	2.21736	-22.57640 13.42360	-8.118	24	.000

Based on the results of the calculation of the T-test test shows that there are significant differences between the control and experimental classes. This is evidenced by the results of the T-test to get the results of 0.00 which show that the calculated significance number is smaller than the significant requirement of 0.05. Based on the results contained in table 6 shows that the experimental class was accepted

4. Conclusions

Based on the results of the study obtained the following results: The development of cutting rings fire extinguishers is carried out based on an analysis of various aspects which are then designed based on the basic problems obtained in the defining process. At the development stage, media and material are consulted with media experts and material experts before applying to learn. the last stage was the socialization of cutting tools for light fire extinguishers to semester 2 students of occupational health and safety courses, automotive engineering education study program, Muhammadiyah University, Purworejo. The feasibility of the media is proven by the results of consultations with media experts and material experts. The effectiveness of the cutting tool of the fire extinguisher is evidenced by the difference in learning outcomes in the two classes that were targeted as research. This is confirmed by the results of the T-test which obtained 0.00 results, which indicate that there are differences in results between the control class and the experimental class.

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