

Increasing Indonesian Vocational High School Students' Learning Outcomes through the Use of Animation Media: A Case Study

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Abstract

This study aims to determine the differences of students' learning outcomes towards the use of animation and conventional learning media. The learning material taught was the measurement tools of vernier caliper in vocational high school level. This research was quasi-experimental research with quantitative descriptive method. Data were obtained from 113 students of Automotive Engineering Department of State Vocational High School (SMKN) 1 Kamal Bangkalan and State Vocational High School (SMKN) 1 Arosbaya, Bangkalan, East Java, Indonesia that had two parallel classes of class-X Automotive Engineering Expertise Program, Automotive Light Vehicle Engineering Expertise. Two classes from both school were used as experimental group and received treatment by using animation learning media, while other two classes from both school were control group and received conventional learning media. The result of the research showed that there was a significant different on students' learning outcomes of the subject among experimental and control groups in favor of experimental group students. It is recommended that teachers might use animation media in the teaching and learning process in vocational high school.

Keywords: Animation learning media, Learning outcomes, Vocational high school, Automotive Engineering, Light Vehicle Engineering Department,

INTRODUCTION

Vocational high school is an educational institution whose output is expected to have competencies in accordance with its expertise competencies. To achieve this purpose, major components are required that consist of teacher readiness, supporting facilities, and infrastructure of learning activities and students' readiness to accept the learning process.

Using measuring tools is one of the competency subjects in the Light Vehicle Engineering Vocational High School in which this subject is considered difficult to understand by students because the material of measuring tools that consists of the function of measuring instruments, components of measuring instruments, the function of each measuring instrument, maintenance system of measuring instruments, and how to read a measuring instrument is very difficult to understand if there is no learning media. Thus, without appropriate learning media, the learning outcomes of students are far from being what is expected. Therefore, to overcome the existing problems, a learning media is created; one of which is animation media from differential, so that the animation media is expected to increase learning outcomes.

There are several meanings and terms regarding media. According to Gagne (1988), media cover all sources that are needed to communicate to students. They could be in the forms of hardware and software such as computers, televisions, OHP, video tapes, slides, books, films, models, images, transparencies, and others. Also, Sadiman (1986) confirms that media are all forms that show the transmission system (materials and equipment) available to deliver messages or information. Similarly, Degeng (1989) stated that learning media is a component of delivery strategy that can be loaded with messages to be conveyed to students and it could be people, tools, or materials.

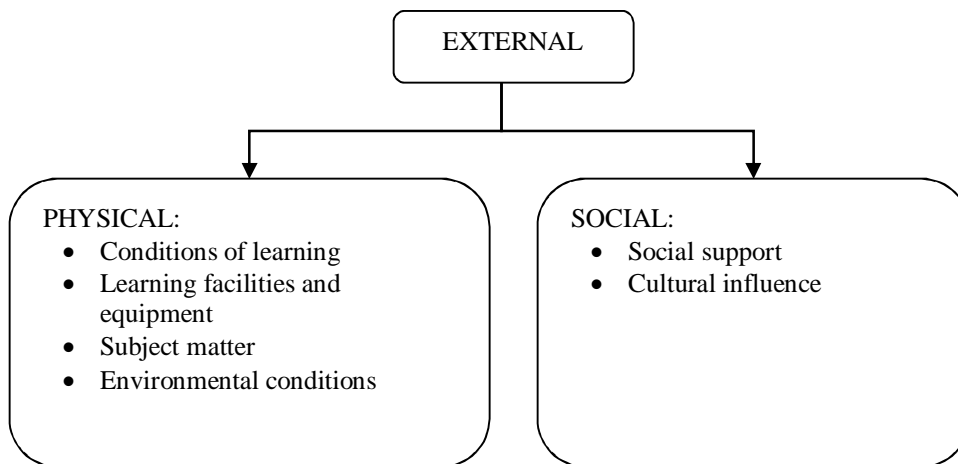
In addition, Arsyad (2002) stated that the development of science and technology has increasingly encouraged renewal efforts in the use of technological results in the teaching and learning process. The teachers are required to be able to use the tools that is provided by the school, and it is possible that the tools are in accordance with the development and demands of the times. Teachers can at least use learning tools/ media that are cheap and efficient even though it is simple. Therefore, the learning goals can be achieved.

Moreover, Hamalik (1994) stated that the teacher should have sufficient knowledge and understanding of learning media which includes: (a) the media as a communication tool to make the teaching and learning process more effective; (b) media functions in order to achieve educational goals; (c) the ins and outs of the learning process; (d) the relationship between teaching methods and learning media; (e) the value or benefits of learning media in the teaching and learning process; (f) selection and use of learning media; (g) various types of learning media tools and techniques; (h) learning media in each subject, and (i) innovation efforts in learning media.

Furthermore, Mbulu (2001) explained that as a component of the learning system, the media have different functions to each component, namely component that is loaded with learning messages to convey to students. In the process of delivering this message, there is often a disruption that results in learning messages that are not received by students as intended by teachers.

Learning media continues to grow following the times, learning media can be formed and used in all fields of human life, both formal and non-formal. Learning media is a tool used to help transfer information to students, so there is no misinterpretation. By using learning media, the learning process will get benefits. Gay (1987) emphasized that there are three features possessed by learning media; they are: (1) the media has the ability to capture, store, and redisplay an object or event; (2) the media has the ability to redisplay objects or events in various ways adapted to the needs; and (3) the media has the ability to display objects or events that contain meaning.

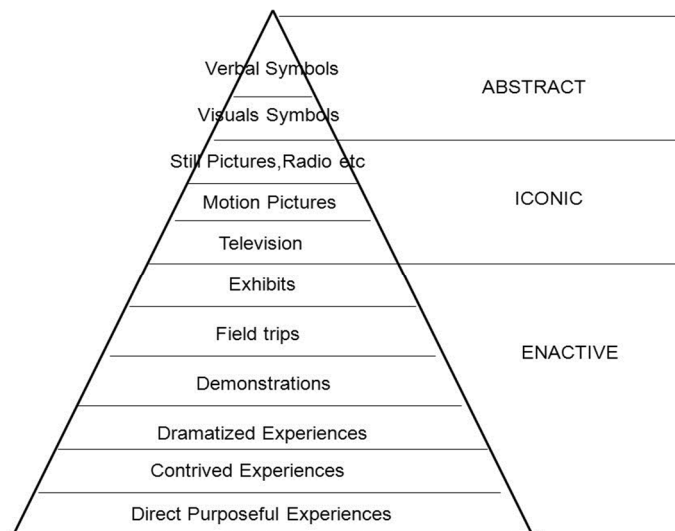
In line with this, Sukmadinata (2006) stated that learning media is a component in the curriculum provided by teachers to encourage students to learn. Learning media is an external factor that is physically influential on learning outcomes. External factors that influence learning outcomes can be described in picture 1.



Picture 1. Diagram of external factors that affect learning outcomes

Based on the above diagram, it can be explained that facilities and equipments are physical factors that can affect learning outcomes. The learning facilities and equipments can be aligned with learning media. This means that learning media has a contribution to the learning outcomes achieved by students.

Basically, the use of learning media is to visualize knowledge or concepts that are abstract to be concrete, so that it is easily understood by students. Learning process utilizing the media is closely related to provide real experiences to students. Regarding this, Dale (as cited in Sanjaya, 2006) describes the learning experience with the level of abstraction in learning as shown in picture 2.



Picture 2. Experience Cone of Edgar Dale

Sanjaya (2006) suggested that giving information in the form of concepts or knowledge by the teacher verbally would produce an abstract understanding. On the contrary, direct experience, in

this case is related to the use of media that will be able to produce concrete understanding for students. This will affect the absorption of students.

The use of learning media will be able to effectively support the achievement of learning outcomes if their use is in accordance with the learning patterns of students and learning goals. According to Brown, Lewin and Harclerod (as cited in Setyosari et al., 2005), some general principles in choosing and using learning media are as follows:

1. There is no best media, procedures, and experiences for learning.
2. The use of media is in accordance with the specific objectives of learning.
3. You must know thoroughly the suitability of the content and the specific objectives of the program/the media that consider the compatibility between its use and the method of learning.
4. Media selection does not depend on the selection and use of certain media.
5. Although the best media is available, if it cannot be used properly, it will have an adverse impact or the media is used in an unfavorable environment.
6. Experiences, preferences, interests and abilities of individuals and learning styles may affect the results of media use.
7. Learning resources and experiences are not things that are related to good or bad, but these learning resources and experiences are related to concrete or abstract matters.

In line with this, Gerlach (as cited in Setyosari et al., 2005) argues that, the principle of media selection includes: 1) conformity; which is choosing a media that matches the material being studied in class, 2) the level of difficulty; the media chosen must consider the level of ability and maturity of students, 3) costs; media must certainly benefit to learning based on the cost. Ideally, media do not require large costs, but they give more benefits to the students, 3) availability, during the teaching, the teacher must check the availability of the media needed. If the required media is not available, the teacher must immediately look for substitute media, and 4) technical quality; the media used in class should be of high quality or adequate media.

In relation to the learning process in the class, Gerlach (as cited in Setyosari et al., 2005) suggested four steps to select the media that will be used. They are formulating specific goals, determining the area of objectives to be achieved (cognitive, affective, psychomotor), choosing a strategy that is in accordance with the specified learning area, and finally, selecting the appropriate media. Also, Gagne (1975) suggests that the success of learning depends on the teacher. The interaction of teachers and students behavior influences changes in students. The changes that occur in these students are as a result of involvement in class activities with teachers and other students. Arikunto (2003) suggested that learning that occurs in schools or specifically in classes, the teacher is the one who is responsible for the results. Thus, the teacher should be equipped with evaluation system that supports his task, which is evaluating the learning outcomes of students. In this case, the teacher is tasked to assess whether students have mastered the knowledge learned with the guidance of the teacher in accordance with the objectives.

According to Gagne (1975) and Bloom (1976), learning is a form of change in knowledge, skills, or value systems. Learning is expected to change behavior (which is a combination of cognitive, affective, and motoric changes) of students (Zaini et al., 2002), while Suhardjono (2003) argues that changes in question are relatively constant cognitive changes as a result of learning effects which are often referred as learning outcomes. Thus, the cognitive changes is expected from the learning outcomes of the subject.

One of the competencies that must be possessed and mastered well by the Light Vehicle Mechanical staff is about vernier caliper which is the completeness of the Light Vehicle Engineering unit. Thus, vernier caliper is one of the productive subjects (on Automotive Basic Work subjects/C2) which must be learned by students of the Automotive Engineering Expertise Program of Light Vehicle Engineering Expertise in accordance with the revised curriculum 2013, curriculum 2017. In addition to this, other three required subjects are engine, power train, and electrical.

Today the vernier caliper system has become the important part in several sectors. This time, the engine and chasis system in industries use the vernier caliper system. Light Vehicle Engineering of vernier caliper system becomes very dominant part for measurement in various completeness systems according to their usefulness. With the development of industry and the development of Vernier caliper system applications in various types or forms of Light Vehicle Engineering units, it requires adequate knowledge and understanding in vernier caliper technology, and this can begin with an understanding of the component of vernier caliper and knowledge of how to use them on a vernier caliper measuring instrument.

In reality, the implementation of learning productive subject, especially in vernier caliper subject, many students get difficulty to understand the components of vernier caliper and how to read vernier Caliper . The difficulty of understanding them is also experienced by the students when doing industrial internships. Hence, the students' achievement in Vernier caliper subjects both in school and in industry is still low.

In this experimental research, researchers will use learning media in the form of measuring instruments of Vernier Caliper ; they are learning media of Vernier caliper using animation and learning media Vernier caliper using conventional manner, and they will be applied in two different classes in the teaching and learning process.

By using vernier caliper animation learning media in the form of component system Vernier caliper that is readable, the researcher will find out which media is the most appropriate and suitable to improve student learning outcomes especially in the sub-subject of measuring instruments Vernier caliper at the Automotive Engineering Expertise Program in Light Vehicle Engineering Expertise of State Vocational High School 1 Kamal Bangkalan and State Vocational High School Arosbaya Bangkalan, East Java, Indonesia.

RESEARCH METHODS

This study examines the effect of the use of animation learning media and conventional learning media for students on the sub subject of reading measuring instruments Vernier Caliper . This experimental research was conducted in State Vocational High School 1 Kamal Bangkalan and State Vocational High School 1 Arosbaya Bangkalan, East Java, Indonesia which had two parallel classes for students Class-X Automotive Engineering Expertise Program in Automotive Light Vehicle Engineering Expertise.

Appropriate research design to control research bias is caused by the selection of samples that are not randomly performed by individuals; nonequivalent control group design (Tuckman, 1999). The characteristics of nonequivalent control group design are the presence of pretest both in the experimental group and in the control group. The purpose of pretest is to find out whether the initial

conditions of the two groups are equivalent or not equivalent. To find out the initial state of the group can also use scores/values of other variables relevant to the treatment (Tuckman, 1999). If the initial condition of the group is not equivalent then the pretest score or score of other relevant variables is used for covariance analysis, so that the research bias because of the selection of samples that are not done randomly can be eliminated.

The population of the study was all students of Class-X Automotive Engineering Expertise Program, Automotive Light Vehicle Engineering Expertise at State Vocational High School 1 Kamal Bangkalan and State Vocational High School 1 Arosbaya Bangkalan Academic Year 2017/2018. The number of students was 113 students and they were divided into two parallel classes. Taking into account that both classes had relatively same knowledge of measuring instruments vernier caliper subject. One class was used as an experimental group and another class was as a control group. Students in two classes were used as the research subjects. Class-X TKR 1 received treatment by using animation learning media as an experimental class, and Class-X TKR 2 received conventional learning media as a control class. For the purposes of this study, only research subjects who met the requirements that the students were never absent during treatment, followed pre and post test activities, and did not interact each other such as borrowing books, discussing, and working together.

Number of students in class-X Automotive Engineering Expertise Program, Automotive Light Vehicle Engineering Expertise Academic Year 2017/2018 was 130 students that were divided into 2 classes as presented in Table 1 as follows.

Table 1. Population of Research Subjects

State Vocational High School (SMKN) 1 Kamal Bangkalan	Class-X TKR 1	34 students
	Class-X TKR 2	34 students
State Vocational High School (SMKN 1) 1 Arosbaya Bangkalan	Class-X TKR 1	20 students
	Class-X TKR 2	25 students
Total population		113 students

Information: TKR= Light Vehicle Engineering Expertise

Based on the selection of the class, the researcher determined the experimental group and the control group as follows:

- X-TKR 1 = Treatment classes that obtained animation learning media.
- X-TKR 2 = Treatment class that received conventional learning media.

This research used random sampling techniques. In Each school, the experimental group was students in class-X TKR 1 SMKN 1 Kamal Bangkalan (34 students) and students in class-X TKR 1 SMKN 1 Arosbaya Bangkalan (20 students), while the control group was students in class-X TKR 2 SMKN 1 Kamal Bangkalan (34 students) and students in class-X TKR 2 SMKN 1 Arosbaya Bangkalan (25 students).

Table 2. Research Subject Sample

No	School	Class	Total	Sampling technique	Class group
1	State Vocational High School (SMKN) 1 Kamal Bangkalan	X-TKR 1	34	Random Sampling	Experiment
		X-TKR 2	34		Control
2	State Vocational High School (SMKN 1) 1 Arosbaya Bangkalan	X-TKR 1	20		Experiment
		X-TKR 2	25		Control
Total			113		

Thus, the independent variable in this study was learning that uses animation learning media and conventional learning media. Through this learning activity, learning media were tested which one was better to improve the learning outcomes in measuring instruments vernier caliper subject.

Dependent variable are the observed factors and measured to determine the effect of independent variables (Tuckman, 1999). The dependent variable is a factor that will experience a change if manipulation can take the form of replacement, change, or variation of the independent variable, so the dependent variable is the variable that gets direct influence from the independent variable. Therefore, the dependent variable of this study was the result of learning subjects using measuring tools of vernier caliper . Learning outcomes in this study were measured using a reading instrument test of vernier caliper through animation media.

Learning outcomes were obtained from the pretest done before treatment using learning media and at the end of the teaching and learning process, post test was conducted. To guarantee the quality of the research instrument in the form of test questions, testing was carried out such as validity test, reliability test, difficulty level test and discrimination power test. Then the results were consulted with the supervisor or with the relevant experts.

RESULTS AND DISCUSSIONS

To find out students' learning outcomes, two activities were used, namely pre-test to measure students' initial abilities about stringing symbols on the subject, and post-test to measure student's final ability about vernier caliper components and reading the system in the Automotive Engineering Study Program. Students' learning outcomes in this study were measured using an instrument in the form of an objective test consisting of 20 items. From the trial data that was analyzed to determine the level of difficulty of the problem, where the calculation results can be grouped into questions number according to each category as follows: 1) easily categorized questions were 15 numbers; they are number 1, 4, 5, 6, 9, 11, 12, 14, 16, 18, 20, 22, 26, 27, 28. 2) questions categorized as fair were 13 numbers; they are: 2, 3, 7, 8, 10, 15, 19, 21, 24, 25, 29, 30, and 3) questions that are in difficult categories were 2 numbers; they are 13 and 23.

Furthermore, a discrimination power test was conducted to classify the problem, the discrimination power of the problem was compared with the results of the discrimination power analysis. Therefore, it was known that 13 questions were classified as good, and there were 17 questions which included a fair classification, and those questions were improved. The questions which were

included as good classification with the total of 13 numbers, they were directly included in the data collection. After conducting the learning outcomes test, the data were collected using the test instruments.

The final test was given to the control group students and experimental groups after students got the materials by using animation and conventional learning media that was simultaneously done using different room for 60 minutes. Final test data were the data to reveal the students' level of knowledge of the subject after students had learned with different approaches. The test equipment and the rules used were the same as the initial test.

Students' learning outcomes of the experimental class (animation learning media) with 54 students showed an average value of 78.88, standard deviation of 5.10, median of 80.00, minimum score of 70.00, maximum score of 85.00, range of 15.00, and variance of 26.10. While the learning outcomes of control class students (conventional learning media) with a total of 66 students showed an average value of 76.96, a standard deviation of 4.10, a median of 75.00, a minimum score of 70.00, a maximum score of 85.00, a range of 15.00, and a variance of 16.83. Thus, the difference in the average number of student learning outcomes that used animation learning media with students' learning outcomes using conventional learning media was $78.88 - 76.96 = 1.92$.

Table 3. Frequency Distribution of Student Learning Outcomes in Experimental Classes and Control Classes

Treatment	N	Mean	Std. Deviation	Median	Minimum	Maximum	Range	Variance
Animation (low)	54	78.88	5.10	80.00	70.00	85.00	15.00	26.10
Conventional (low)	66	76.96	4.10	75.00	70.00	85.00	15.00	16.83

Based on table 3 above, it can be described that the learning outcomes of students in the experimental class who were taught by using animation learning and control students who were taught using conventional learning media were different based on the analysis tests. The result indicated that the average of students' learning outcomes in the experimental class (using animation learning media) was higher than student' learning outcomes in the control class (using conventional learning media).

The hypothesis that was tested in this study as follows:

- H_1 : There was a significant effect of the students' learning outcomes on the subjects between groups of students who used animation learning media and groups of students who used conventional learning media.
- H_0 : There was no significant effect of the students' learning outcomes on the subjects between groups of students who used animation learning media and groups of students who used conventional learning media.

Hypothesis

$$H_1 : \mu_{k1} \neq \mu_{k2}$$

$$H_0 : \mu_{k1} = \mu_{k2}$$

The differences of students' learning outcomes between those who used animation learning media compared to those who used conventional learning media were as follows:

Table 4. Results Summary of ANOVA

Source of Variants	Df	Means Square	F _{ratio}	Probability
Instructional Media	1	178.483	9.160	0,003
Achievement motivation	1	213.680	10.967	0.001
Interaction	1	0,303	0,016	0,901

From the results of variance analysis in Table 4, it shows that: H_0 was rejected, $F_{ratio} = 9.160$ with probability 0,003. Since the probability value is far below the significance level of 0.05, it can be concluded that H_0 was rejected. This means that there were differences in learning outcomes of the subjects that were significant between groups of students who were taught using animation learning media compared to groups of students who were taught using conventional learning media. Therefore, based on the results of the hypothesis test, the group of students who were taught using animation media was better than the group of students who were taught using conventional media. Theoretically, as stated by Bloom (1976), initial abilities that are a prerequisite make it easy for students to learn assignments or a new set of specific tasks. Besides, Degeng (2000) suggests that media are integral part of the teaching and learning process, and the main goal of any media used is to facilitate learning.

CONCLUSION

Based on the result of the research, it is found that the students who were taught using animation learning media had higher learning outcomes compared to students who were taught using conventional learning media. Therefore, it can be concluded that that learning the subjects using animation media had a significant effect on the learning result in the State Vocational High School (SMKN) 1 Kamal Bangkalan and State Vocational High School (SMKN 1) 1 Arosbaya Bangkalan, East Java, Indonesia.

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