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THE EFFECT OF VIDEO BASED LABORATORY ON STUDENT ACHIEVEMENT IN DYNAMIC PARTICLE OF YEAR X SENIOR HIGH SCHOOL

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ABSTRACT

The aim of this research was to determine the effect of Video Based Laboratory on student achievement of Senior High School. The population was all of year X of SMA Negeri 1 Tanjung Morawa. The research method was quasi experiment.The results show that the mean value of pretest for experiment class is 40.70 and the control class is 39.14, after teaching and learning process we obtain the mean value of experiment class is 72.58 and mean value of control class is 59. Statistically it show a significant different between student achievement taught using Video Based Laboratory is higher than using conventional method, which is shown by the following statistical value : t calculation (6.98) is bigger than t table (1.67). So, there was effect of Video Based Laboratory on student achievement in dynamic particle of year X Senior High School.

***Keywords**: Dynamic particle, effect, video based laboratory*

INTRODUCTION

Physics is one part of the science that has certain characteristics. Physics was not just a collection of facts, theoretical concepts, and the law alone, but there was also a scientific process that must be developed in students a meaningful experience to be used as stock further development of the self (Alamsyah, 2011). Based on Curriculum Education Unit, one of the goals of Physics Science subjects at senior high school (SMA)/ Madrasah Aliyah (MA) is the learners are able to master the concepts and principles of physics and have the skills to develop the knowledge, confidence and attitudes in preparation for continue their education at a higher level and develop science and technology (Depdiknas, 2006). The purpose of learning process that emphasizes the students' learning experiences in forming his own knowledge so that learning becomes more meaningful. Learning can be more meaningful to students if students have learned what not just figure it out (Depdiknas, 2002). Thus it can be said that the process of learning physics expected in KTSP one using media technology, with the aim to cultivate the ability to think, work and behave and communicate scientific as one of the important aspects of life skills. To support the actualizing development of knowledge and attitudes confidence and develop science and technology, supporting of facilities and

infrastructure is required. Such as the availability of science laboratory space, equipment or adequate trial and the ability of the teacher to manage learning in the laboratory.

Based on a preliminary study of some teachers and students, the majority of teachers stated that their schools do not even have a lack of facilities and infrastructure that support the learning process for the realization of the ideal teaching science, especially physics. So that in every science learning, both students and teachers with all the limitations of measuring instruments owned, not able to collect accurate experimental data . Some students talked about their experiences when learning physics generally less interpret their lessons, and even tend to forget. They argue that because there is nothing they can absorb as a preparation for learning to the next level. So that some argue is learning at the level of the previous period of bleak. Base on the above explanation, it was cleared that all of these causes of learning objectives in developing the knowledge and attitude of confidence and develop science and technology students was not achieved (Alamsyah, 2011).

One way to overcome the limitations are learnt by applying Video Based Laboratory (VBL). According research of Louis, T and Métioui, A. (2012) that however, computer-assisted experimentation was often dedicated to the technical side of the data collecting and organization in form of tables and graphs. An emphasis on the technical precision of measurements, in spite of his rigor, risks of making us forget that its often necessary for the people to develop their qualitative reasoning as well as their quantitative counterpart. However, it was not a question of leaving out the mathematization of the properties in phenomena but to consider it when the essential elements of problem are qualitatively understood by the people. Louis, T and Métioui, A. (2012) said that there were two main reasons put forward by the researchers: alternative schemas which the peoples have already on the properties of motion and the emphasis put on the mathematization of its properties in teaching of kinematics. However, these schemas maybe different from scientific concepts. In certain cased, these schemas might interfere with learning, especially if the teacher have not taken them into account. Secondly, during laboratory activities, kinematics is often approached with supported of a mathematization to which the people are not accustomed.

VBL is a video-based learning laboratory, the data collection process by using video. Learning does not have to be implemented in special laboratory equipment and does not require a complete experiment. Teacher is present physics phenomenon video, then the video is taken from the data using certain free software, in this case the Tracker software, tobe collected, processed/analyzed by the students, then communicated under the supervision and guidance of teachers. Tracker is a free software Java-based project developed by the Open Source Physics. Tracker serve as props (modeling) to expand the video analysis in addition to

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the traditional application. Tracker can be run directly from the website or from data center BQ on Windows or Mac based computer with Java and Quick time Player installed. The program produced an interesting video analysis for many experimental two-dimensional motion (and sometimes three- dimensional), including projectile motion, oscillations, collisions, circular motion, and even Brownian motion. Because students can easily and free to download Tracker into each computer, so students can use it for standing alone projects or homework assignments. In some experiments, students produce digital video either live or recorded from the camera, local network, or the internet.

Then opened the Tracker video and specify the scale and terms of reference to obtain the data. Then check the video frame by frame and trail inclination objects with the mouse. Time based on the position data generated by these traces were analyzed by the above chart, and change the video display. Data can also be entered into a spreadsheet or other program. Thus, the application of this VBL is a form of low-cost learning. From result of video and data from the Tracker students can find out and explain the variable mass, acceleration, and a magnitude of force applied to the object and compare experimental results with theoretical calculations. With so eventually students not only memorize but understand the concept that there is the concept being taught. (Yuniarti,2011). According Louis, T and Métioui, A. (2012) that Concern to implementation of the VBL, the comments gathered during interviews with the pupils and the teacher show that these activities were advantageous to the pupils in their understanding of the different aspects of motion at constant speed. Some pupils appreciated the concrete character of activities which they prefered to lectures. A pupil even mentioned that he had made physics without realizing it. In the same vein, they could make links with mathematical notions such as the production and the interpretation of Cartesian coordinates as well as the calculus of the slope of a line. Moreover they familiarize themselves with the use of data collection and analysis softwares in the physics laboratory. Besides, it seems that the presentation format of motion phenomena as demonstrations did not prevent the pupils from considering these activities as laboratories. Video-based lab analysis can also beused to develop models for mechanical phenomena.

There are some concepts or definitions of educational media or instructional media. Rossi and Breidle in (Sanjaya, 2006) suggest that instructional media are all tools and materials that can be used to achieve educational goals, such as radio, television, books, newspapers, magazines, and so on. The example of instructional media is Video. Video in learning process as one of way to presented matter/phenomenon in physics. According to Beichner and Abbott, (1999) Video-based labs (VBL) are a powerful tool for improving student understanding of one of the most difficult and important topics in physics: graphs. This article describes common

student graphing difficulties, the history of VBL, techniques for improving student understanding of graphs, and software for acquiring and analyzing video data. As the same way said to Louis, T and Métioui, A. (2012) that Video-based labs (VBL) are a powerful tool for improving student understanding of one of the most difficult and important topics in physics: graphs. This article describes common student graphing difficulties, the history of VBL, techniques for improving student understanding of graphs, and software for acquiring and analyzing video data.

However, media is not only a tool or material, but also other things that enable students to acquire the knowledge. So, in this meaning, the media is not only a means of mediator such as TV, radio, slides, printed materials, but also includes a person or people as a source of learning. Media is also in the form of activities such as discussions, seminars, field trips, simulations, etc. that is conditioned to increase knowledge, insight, change the attitude of students, or to increase skills. According Beichner and Abbott (1999) that Students can also "draw" motion events using either painting programs or a programming language. So, besides its obvious use as a data-gathering and analysis tool, video-based lab Software can be used by students to Analyze previously recorded motion events or even simulated microworlds where the laws of motion are programmed into the system by either the students or their teacher. We contend that by seeing both the concrete motion event and the abstract graphical representation of that motion, students will be better able to make the cognitive links between the two and may confront some of their graphing misconceptions. As the student steps through the video, the position of the object in the video and the corresponding point on the graph are both highlighted. Tools for measuring slope and area from the graph and distances and angles on the video can also be used to make critical connections.

The use of computers in schools can generally be grouped into three activities namely computer as a tool as a computer tutor and the computer as tutee The use of computers as a tool in the activities carried out data recording and data processing in both laboratory research Role of the computer as a tutor is diverse from the face to face activities and independent learning activities While the role of the computer as tutee emphasizes providing students the experience of working as a controller for the creation of computer programs that can then be executed so that students understand what it does. It proved by Beichner, R. J. and Abbott, D.S. (1999) that It is important to realize that the purpose of VBL activities is not to eliminate labs or replace them with simulations. VBL provides students with a tool that can help in the study of prerecorded real-world or artificially produced events. Students can analyze lab and real-world phenomena, either as homework or in class. VBL can also supplement other hands-on experiences like MBL sonic ranger lab exercises, give students an opportunity to "play back" the motion to make sure they understand the critical aspects, and help focus their attention on

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those aspects of motion where known motion and graphing misconceptions exist. The versatile VBL approach is yet another tool that teachers can utilize to help their students learn the fundamental scientific skill of interpreting graphs and grasp one of the most difficult and important topics in physics.

RESEARCH METHOD

This research is a quasi-experiment, the research is aimed to determine whether there isa difference due to the influence of something that is imposed on students as research subjects. The effect is increasing students' learning outcomes ofsubject topic with teaching models that have been defined can be seen from the results of the students' answers on tests of learning outcomes.

The instruments used to collect data from student learning outcomes in essay test form, with 20 questions and have been validated by validators with average score is 4.56 (valid). Data analysis of this research is after the student learning outcomes data collected from the experimental and control class, researcher made data tabulation to test the normality and homogeneity of data, and then the data were analyzed with the t test statistics.

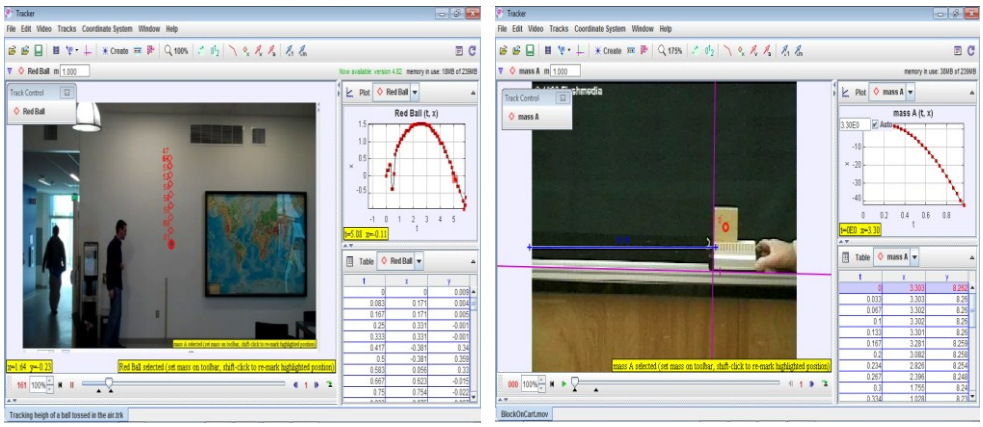

Figure 1. Analyzing the video with using *Tracker* Application.

RESULTS AND DISCUSSION

In the beginning of this research, experiment and control class were given pretest which aim to see initial learning ability of students in both of that classes. To observe the result of pre-test detailed of two classes can be seen in the following bar chart.

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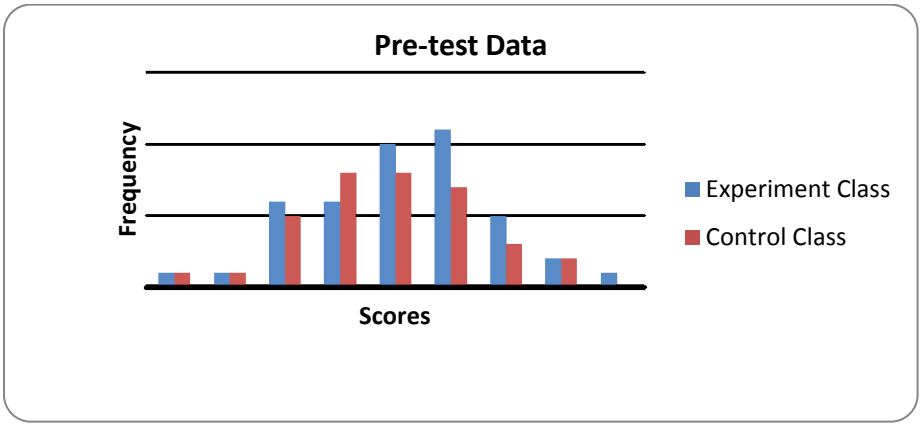

Figure 2. Bar Chart of Pre-test Data in Experimental and Control Class

In the end of learning process, the classes, experiment class and control class, were given posttest to see the final learning ability of students in both of the classes. Result of posttest in experiment and control class can be seen in the following bar chart below:

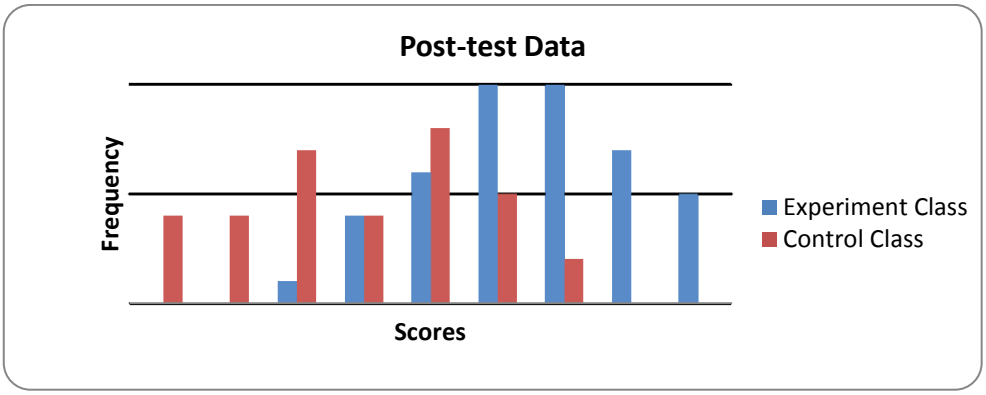

Figure 3. Bar Chart of Post-test Data in Experimental and Control Class

From pretest and posttest result data in experiment and control class, the author obtained the average value, standard deviation and variance are as follows:

Table 1. Average Value, Standard Deviation, Variance in Control and Experiment Class

Result	Experiment Class		Control Class	
	Pretest Mark	Postest Mark	Pretest Mark	Postest Mark
Average	40.70	72.58	39.14	59
Standard Deviation	8.42	7.82	8.09	9.38
Variance	70.90	61.15	65.42	87.98

Testing hypothesis for pretest data using t test two side. From calculation result got that $t_{count} < t_{table} (0.82 < 1.99)$. Based on this result, result we can conclude that experiment and control class have same initial ability.The result of calculation t test, in the one side it is

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obtained $t_{count} > t_{table} (6.98 > 1.67)$ In significant level α = 0.05 and*dk* = 76 obtained t_{table} = 1.67. The testing criteria is H_a accepted if $t > t_{1-\alpha}$ (6.98 >1.67). For $t_{calculate}$arrive at area H_a so H_a is accepted and H_0 rejected. So it can be concluded that there is effect of Video Based Laboratory on Students' Learning Outcomes in Dynamic Particle of Year X SMAN 1 Tanjung Morawa. Briefly, the calculation result of testing hypothesis listed in the table 2 below.

Table 2. Conclusion of t test calculation

	Class	Average	t_{count}	t_{table}	Conclusion
Pretest Data	Experiment	40.70	0.82	1.99	Both of classes have same initial ability.
	Control	39.14			
Posttest Data	Experiment	72.58	6.98	1.67	There was significant effect
	Control	59.00			

Based on data analysis and discussion of research results, obtained general conclusion that application of Video Based Laboratory in Dynamic Particle topic have sufficient criteria on student learning outcomes in cognitive and activity domains. As the same as in Louis and Métioui (2012) show that as a result, these conclusions have a speculative character and are to be considered in the light of the exploratory aim of our study. This research adopts the perspective that the usage of computer science in the physics laboratory is revolutionizing the education of this discipline.

CONCLUSION

Based on research questions that presented earlier, we can conclude some of the following : Result of student learning outcomes with using Video Based Laboratory in Dynamic Particle of Year X in SMA Negeri 1 Tanjung Morawa are 40.70 in pretest and 72.58 in posttest, while control class have average score 39.14 in pretest and 59 in posttest. Result of observation showed that attitude and activity of students in experiment class more active than control class, showed that Video Based Laboratory also effect in activity of students. There was significant effect of Video Based Laboratory in Dynamic Particle of Year X SMA Negeri 1 Tanjung Morawa.

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