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Article

The Influence of Video-Assisted Problem Based Learning Models on Learning Outcomes on The Concept of Elasticity and Hooke's Law in High School

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ABSTRACT

This research aims to provide an overview of how the influence of learning using problem based learning models through blended learning assisted video on the concept of elasticity and Hooke law to the learning outcomes of students in high school 2021/2022, in class XI IPA odd semester 2021/2022 with one class as an experimental class. So that it can help improve student learning outcomes through blended learning with video assistance. Based on observations about the low learning outcomes of students using the WhatsApp application and Class room, so that researchers use problem based learning methods through video-assisted blended learning to improve student learning results on elasticity material and Hooke law. The method used in this study was pre-experimental with the design of One Groups Pretest-Posttest. Data collection of learning results is done based on the assessment of test results. Analysis of research data using, hypothesis tests and n-gain tests. Based on hypothesis testing, the calculated price of class XI IPA 2, 9.68 where for the table price for the three classes is Class XI IPA 2,779, H0 is accepted and H1 is rejected. This shows that learning uses a problem based model assisted by video. Judging from the average pretest and posttest grades of students from experimental classes, it can be concluded that there is an influence on problem based learning models through blended learning assisted video on students' learning outcomes on the concept of elasticity and Hooke law with n-gain high criteria.

INTRODUCTION

At the end of December 2019, the world was shocked by the news of a disease with pneumonia-like symptoms that were not yet clear. An acute respiratory tract infection affecting the lungs was found in Wuhan, Hubei Province, China. Since Jan. 3, China has regularly notified the World Health Organization and other countries and territories (such as

Hong Kong, and Taiwan) about pneumonia outbreaks. On February 12, 2020, WHO officially designated the disease as Coronavirus Disease (Agung Mahardini, 2020)

Coronavirus is a new type of virus that can spread through humans, attack respiratory diseases and cause death. Covid 19 can affect people of any age. Common symptoms of people infected with this virus are fever above 38o C, cough, and shortness of breath. The virus spreads to humans through animals and spreads rapidly until it reaches Indonesia. (W. Samudera 2020).

Covid 19 cases in Indonesia have been announced on March 2, 2020. The case happened to a mother and her child in Depok. The Indonesian government has enacted various policies to reduce the spread of the COVID-19 virus by implementing social distancing, physical distancing, and PSBB treatment (mass social restrictions) in various regions. The policy of limiting the spread of COVID-19 has impacted the whole world, especially education in Indonesia, Covid-19 cases have been affected all over the world, especially education in Indonesia. (Agung Mahardini 2020)

The Ministry of Education and Culture also took a policy to be able to learning from home for all educational institutions, so that learning adjustments that do not burden teachers and learners. Kemendikbud issued a Circular Letter of the Minister of Education and Culture No. 2 of 2020 on Prevention and Handling of Covid-19 in the Ministry of Education and circular Letter No. 3 of 2020 on the prevention of coronavirus or Covid-19 in the Education Unit. And also issued Circular Letter No. 4 of 2020 on the Implementation of Education Policy in the Emergency Period of The Spread of Coronavirus Disease (Covid-19) which contains, among others: (1) Learning from Home through online / distance learning is implemented to provide a meaningful learning experience for learners, without having to be burdened with the demands of deciding all for class increase or graduation; (2) Learning from home can be focused on life skills education, among others, the Covid-19 pandemic. (Alami 2020)

Online learning can be used as a distance learning solution, distance learning and online learning refers to learning that can be done through the internet called e-learning. Learning can be done using learning media applied through blended learning, and also this learning media makes it easy for educators or learners to do online learning.

Learning carried out online certainly has various challenges, including the interest in learning of learners who are students decreased because they do not do face-to-face learning. This is in accordance with the facts that occur in the field which shows that learning results at this time online are still low, judging from student learning results that have decreased below the KKM that has been determined from the subject. Based on the results of observations made by researchers before going down to research at the school, the problem that now often occurs in students due to online learning is the low learning outcomes of students, although learning has been done through the WhatsApp Application and Class room, where student learning results still look low, so it seems that students do not fully understand the concept given, Especially with physics lessons that most students who consider physics students difficult and difficult to understand, it will affect student learning outcomes, so it needs to get special attention for teachers, because learning outcomes are one of the factors that can support learning success. And there needs to be innovation from a teacher in choosing a model and learning media. so that based on the problems found in the field, researchers are very interested in conducting a focused study with the title The Influence of Problem Based Learning (PBL) Models Through Blended Learning Assisted Video On Student Learning Outcomes on Physics Concepts in High School.

In physics lessons that most students who consider physics lessons difficult and difficult to understand, it will affect the learning outcomes of students, need to get special attention for teachers. And there needs to be innovation from a teacher in choosing a model

and learning media that is in accordance with the learning process in the pandemic period. There are many media that can help the problem is the video learning media.

(Hadi 2017) Video learning is one of the media that has audio elements (sound) and visual motion (moving images). As a medium of learning, video acts as an introduction to information from teachers to students. This opinion is in line with(Hamdanillah, Harjono, and Susilawati 2017) stated that Video is one type of learning media that uses images, sounds, and some animations as illustrations of events from the material studied. Where video media can also be used to help teachers convey material during the current pandemic situation, so that the learning process is still carried out in accordance with the purpose of learning even at home, so that learning through video media can be carried out using a model that uses a problem based learning model. According to (Daryanto 2011) some advantages 1) Video can add a new dimension in learning, 2) Video can display a phenomenon that is difficult to see for real.

According to (Saefuddin and Berdiati 2016) that Problem Based Learning or problem-based learning is a learning approach that presents contextual problems so as to stimulate learners to learn. Another opinion from (Setiana, Rahayu, and, 2019) posits that Problem Based Learning (PBL) is learning that trains and develops the ability to solve an authentic problem of students' actual lives scientifically, which is organized systematically and findings are student-centered, and does not rely on teachers but teachers repeatedly provide direction and guidance to students so that students can solve problems provided by teachers. (M. Jafar Al-idrus, Hikmawati, and Wahyudi 2015) problem based learning model has been tested that the learning model affects students' learning outcomes in physics lessons in high school. The advantages of the problem-based learning model according to (Tyas 2017) include; 1) Problem Based Learning (PBL) can improve critical thinking skills, foster student initiative at work, motivate internal learning, 2). Students learn to solve a problem then students will apply their knowledge, 3) make students become independent and free learners, 4) problem solving can help students to develop new knowledge and encourage to conduct their own evaluation of both learning outcomes and learning processes. So that there are differences in learning outcomes that before using the problem based learning model and after using the problem based learning model. Where in this study the learning is carried out through blended learning self-evaluation of both learning outcomes and learning processes.

According to (Ramadhani 2020) blended learning is a learning process that can utilize a variety of technologies. With blended learning students can learn independently online with learning videos, there are learning videos students can learn independently at home or after the lesson hours to deepen the subject matter, Videos can provide a message that can be received more evenly by students, and Overcome the limitations of space and time, more realistic and can be repeated or stopped as needed. So that blended learning can help the learning process during the pandemic so that students continue to learn by utilizing existing technologies including learning videos. Based on opinions according to Helima (2017) namely: the advantages of blended learning are 1) students are free to learn the subject matter independently by utilizing the materials available online, 2) students can have discussions with teachers or other students outside of face-to-face hours, 3) learning activities conducted by students outside of face-to-face hours can be managed and controlled properly by teachers, 4) Teachers can add enrichment materials through internet facilities, 5) teachers can have students read materials or work on tests done before learning, 6) teachers can hold quizzes, and utilize test results effectively, 7) students can share files with other students. So in this study researchers use blended learning because in the school has held mixed or online and offline learning, students can freely search for material independently, students will not feel bored anymore to full online at home with the blended learning students can take turns

studying in direct schools, teachers can also use technology to facilitate the learning process through blended learning, to see the student's learning outcomes.

(Sudjana 2014) Learning outcomes are the abilities that learners have after receiving their learning experience. (Solihah 2016) says that: "Learning outcomes are the abilities that students have after experiencing a teaching and learning process and changes in those students in a better direction of cognitive, affective and psychomotor changes". (HAREFA 2020) states that learning outcomes are results that can be learned from students after experiencing the learning process. If so, each student's learning outcomes must vary depending on their ability to learn. The opinion is also in line with the opinion (Suprihatiningrum 2017) states that learning outcomes are abilities that students have as a result of learning actions and can be observed through student appearance. This opinion is also affirmed by (Dimyati and Mudjiono 2010) giving the opinion that learning outcomes are the result of an interaction of teaching.

This opinion is different from the opinion above (Alimuddin 2017) Stating that learning outcomes are one in the learning process in school, a teacher needs to know and learn several teaching methods. According to Aisyanah and Urniasari (2017) Learning outcomes are the result of an interaction of learning and teaching related to the achievement of goals. Good learning outcomes can be achieved by doing maximum learning activities by students in the teaching and learning process. Edy (2020) states that learning outcomes are an integral part of learning interactions, processes, and evaluations. Interaction between students and teachers to conduct the learning process and study evaluation so that the results are satisfactory.

According to (Purwanto 2011) Learning outcomes can be classified into three, namely learning outcomes in the realm of knowledge (cognitive), attitude (Affective) and Psychomotor. Cognitive learning outcomes are behavioral changes that occur in areas of cognition. Learning processes that relate cognitive or knowledge include activities from external stimulus receivers by sensory, storage and processing of the brain to information to the recall of information when needed to solve problems. Therefore, cognitive learning outcomes include six aspects or levels of the thought process ranging from the lowest level to the highest level. The six levels or aspects of cognitive learning outcomes are: Remembering (C1), Understanding (C2), Applying (C3), Analyzing (C4), Evaluating (C5), Creating (C6). Affective learning outcomes according to Purwanto (2011) is a different ability with reasoning (cognitive), the learning outcomes of the affective realm are more in the form of feelings, emotions, values, which are different from knowledge.

Psychomotor learning outcomes according to (Purwanto 2011) is an ability related to skills or the ability to act after receiving learning experience. This shows that psychomotor abilities include both physical and mental. Psychomotor learning outcomes are structured from the simplest to the highest or more complex. The most complex psychomotor learning outcomes can be achieved when a student has mastered the lowest psychomotor abilities.

METHODS

The purpose of this study to find out the influence of problem based learning models with video-assisted on students' learning outcomes on elasticity and Hooke’s law material, this study was conducted at one of the high schools in Gorontalo for 3 months.

Methods and Design of research

The research method used in this study is the Pre-experimental Method. An experimental method is a research method used to determine the effect of a given behavior on a subject under controlled conditions.

The designs used in this study are One Group pre-test and post-test design. In this design, there is a research design shown in the table.

Table 1. Research Design

Pre-Test	Treatment	*Post-test*
O_1	**x**	O_2

Information:

X : model Problem Based Learning

O_1 : Pre-test value (before Treatment)

O_2 : Post-test value (After Treatment)

The treatment in this study refers to the problem based learning model through blended learning assisted learning videos. To see the learning outcomes of before students and after being treated, namely by pre-test and post-test in the form of essay problems consisting of 14 numbers of questions related to elasticity material and Hooke law on the cognitive understanding of learners, namely C1 (knowledge), C2 (Understanding), C3 (applying), C4 (Analysis), C5 (evaluating), and C6 (creating).

In this study, sampling was done using sampling techniques using Cluster Random Sampling (random sampling) it was done because in this sample to be taken the class was the same or there was no special class, as well as class XI IPA teachers who teach natural science subjects in the classroom. There are some ways used to get a sample class, namely by using or removing lots from four classes to 1 class that will be sampled in this study.

Data Analysis Techniques

Data analysis techniques for this study are using, normality test, n-gain test, and hypothesis test. Data is analyzed descriptively using data analysis techniques.

Hypothesis Testing

Hypothesis testing is conducted to find out if there is an influence of video-assisted problem based learning models through blended learning on students' learning outcomes. Based on the data obtained in the study, tests of associative statistical hypotheses were conducted. Statistical hypothesis testing is used statistical test t. as for the formula used in the study, namely:

$$t = \frac{\bar{x} - \mu 0}{\frac{s}{\sqrt{n}}}$$

RESULTS AND DISCUSSION

The results of the study were conducted using a hypothesis test and n-gain test to find out the influence of the problem based learning model with video-assisted.

Results

1. Hypothesis

The hypothesis test aims to find out if there is an effect of video-assisted problem based learning models on experimental classes and replication classes on students' learning outcomes. For hypothesis testing in the experimental class, it can be seen in the table below:

Table 2. Hypothesis Testing Results

Class	T_{count}	T_{table}	Status
Experiment	9.34	2,779	H_0 Accepted

Based on the hypothesis testing table above, it is seen where in class XI IPA 2 $t_{count} \geq t_{table}$, This can be interpreted that the video-assisted problem based learning model affects student learning outcomes.

2. N-gain

N-gain testing aims to see improvements in students' learning outcomes through pre-tests and post-tests. Can be seen in the table below

Table 3. Average Pre-test and Post-test scores

Class/Sample	Average value	
	Pre-test	*Post-test*
Experiment (XI IPA 2)	32.20	82.27

The average pre-test and post-test results between the experimental class gained the average pre-test grade of the experimental class which is 32.20 and the average post-test grade of the experiment is 82.27, where seen from the results of pre-test and post-test there is a change in learning results before getting treated and after getting treated. Where it can be seen in the bar diagram of pre-test and post-test value percentages.

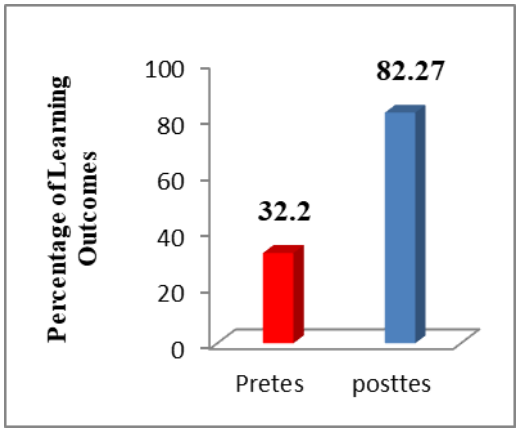

Figure 1. Pre-test and post-test results in experimental classes

Based on figure 1 above, differences in student learning outcomes before and after learning are seen to improve student learning outcomes, thus the use of video-assisted problem based learning models is seen to improve student learning outcomes.

Discussion

Research conducted at one of the schools at Gorontalo High School is to find out how the influence of problem based learning models through blended learning is assisted by video on elasticity and Hooke law materials. This learning was done during the pandemic, but in the current pandemic learning at one of the schools at Gorontalo High School some students have vaccinated, so there are already some students doing face-to-face and online learning or blended learning with video assistance using problem based learning models. This problem-based learning model is a problem-based learning model, so that students can solve problems independently or in groups in order to improve students' thinking knowledge. So that it can help improve student learning outcomes through blended learning with video assistance. Where learning videos can help students can learn from home by utilizing existing media, then with the learning video media, students can learn after the end of the lesson hours or students can open learning videos where and at any time to deepen the material in the learning video, so as to increase students' thinking knowledge and can help improve student learning outcomes by using problem based learning models. Learning activities were carried out four meetings for 5 weeks for experimental classes, with the clarity of time as much as two hours of lessons (3x30 Minutes), the first meeting discussed the material about the elasticity of objects, then the second meeting discussed the material about the magnitudes related to the elasticity of objects, then the third material Hooke law on elastic objects where discussing the forces acting on springs or spring constants and for the fourth material discussing legal materials. Hooke on the spring array. Where to discuss the arrangement of the arrays in the spring such as series and parallel arrays. Learning using problem based learning models through blended learning or offline-online mixed learning is assisted by learning videos.

In the current covid 19 pandemic period because learning is not all learners face-to-face, teachers can utilize learning models and media that are in accordance with the learning process in the current pandemic period, so in this study researchers used the Problem based learning model for experimental classes, replication 1 and replication 2 for experimental classes, replication 1 and replication 2 and assisted learning video media. Where this problem based learning model is a problem-based learning model, so that students can solve problems independently or in groups in order to increase students' thinking knowledge. This opinion is in line with the opinions of (Setiana, Rahayu, and Wasitohadi 2019) suggesting that Problem Based Learning (PBL) is learning that trains and develops the ability to solve an authentic problem of the student's actual life scientifically, which is organized systematically and findings are student-centered, and does not depend on the teacher but the teacher repeatedly provides direction and guidance to students so that students can solve problems. Given by the teacher. Another opinion from (Hasanah and Utami 2017) states that the problem based learning model is problem-oriented learning and solving it in the classroom. Sanjaya (2013),

Another opinion from (Muchib 2018) Problem Based Learning (PBL) is the curriculum and learning process. In its curriculum, it is designed problems that can require learners to gain important knowledge, which makes them proficient in solving problems, also have their own learning model as well as have the ability to participate in teams or groups. So that with the problem based learning model in this study, students are trained to be able to solve problems individually in groups given through experiments in LKPD in the learning process.

The purpose of this study is to find out how the influence of problem based learning models through blended learning video-assisted learning in experimental classes, replication 1 and replication 2 given to student learning outcomes then researchers conduct hypothesis tests, obtained i.e. $t_{count} \geq t_{table}$ to a degree $\alpha = 0.01$. So H_0 accepted and H_1 rejected, for hypothesis testing. In hypothesis testing, i.e. in the experimental class t_{count} 9.73 and t_{table} 2.77. With the hypothesis testing that seen from the three classes there is an influence of the problem based learning model through blended learning assisted video on student learning outcomes.

At the time of the study researchers acted as facilitators in providing guidance for students in understanding the concept of elasticity and Hooke law assisted by video learning, then obtained data on the average learning outcome of students through tests that are for pre-test classes the experiment gets an average score of 32.20 after being given treatment or treatment in the form of learning using a video-assisted problem based learning model then obtained an average post-test result of 82.27. It was concluded from the average grade of the experiment that the average value of the post-test was higher than the average pre-test score. This is because with the learning video students can look back when and where the material by playing learning videos, so as to increase students' knowledge and understanding. So in line with research (Hasanah and Utami 2017) where student learning outcomes improved by using problem based learning models through blended learning with assisted video media.

N-gain testing to find out the improved scores of student learning outcomes such as experimental classes obtained a high-crying n-gain 0.74 analysis. Where seen in the n-gain test that there is an influence on the video-assisted problem based learning model.

Next in this study, researchers used the medium of learning videos. Where this learning video media can also support learners to be able to learn anytime and anywhere, in order to increase the knowledge of learners, as stated by (Pangestu, Mayub, and Rohadi 2019) suggest that Video is an audiovisual media that is able to present information in the form of text, moving images, and sounds. With its advantages as an audiovisual medium, video is able to show objects, places and events. Abstract physics concepts can be presented in video form. In line with the opinion of (Hamdanillah, Harjono, and Susilawati 2017) stated that Video is one type of learning media that uses images, sounds, and some animations as illustrations of

events from the material studied. This opinion is affirmed by (Yunita and Wijayanti 2017) Video media is a set of components or media that are able to display images as well as sounds at the same time. With the use of such media is expected to grow student activities. Where the model and medium of learning are exposed through blended learning.

Another opinion according to (Subagiyo 2019) states that blended learning is a model that combines positive aspects of face-to-face and online learning. Online learning ensures flexibility that cannot be guaranteed in face-to-face lessons that allow teachers and students to do more effective learning thereby improving students' learning outcomes. (Hima 2017) Blended learning is learning that combines or mixes face-to-face and online learning. And this opinion is affirmed by (Maulana and et al 2020) stating that blended learning is a learning process that is carried out face-to-face and online, and blended learning is also learning that can utilize a variety of technological media. With blended learning students can learn independently online. The advantages of blended learning according to (Maulana, Ma'ruf, and Tarmizi 2020), namely: 1) Learners are free to learn the subject matter independently by utilizing the materials available online, 2) Learners can communicate / discuss with educators or other learners that do not have to be done while in class (face-to-face), 3) Learning activities conducted by learners outside face-to-face hours can be managed and controlled properly by educators.

In obtaining data found some obstacles that were served during this study, some students who online still do not have a smartphone so they still borrow the same family members. Networking issues for online students that allow students to log out automatically while learning takes place on Google meet. The availability of quotas is small so that not all students who represent the results of their LKPD.

CONCLUSION

Based on the results of the study, it can be concluded that learning using the Problem based learning model through blended learning assisted by learning videos on student learning outcomes on the concept of elasticity and Hooke law in class XI IPA of Gorontalo City High School can improve student learning outcomes and have a positive impact on learning. This is indicated through hypothesis testing criteria where for experimental classes t_{count} 9.68 is greater than t_{table} 2.779, it can be concluded that the testing of the experimental class hypothesis is t_{count} Bigger than t_{table},, this can be interpreted that the problem based learning model through blended learning assisted learning video has a positive effect on student learning outcomes judging from student learning results by using problem based learning models. by blended learning with the help of video to be able to help the learning process during the pandemic so that students continue to learn after class hours or when and wherever students can open learning videos to deepen the material in the learning video. So that it can help improve student learning outcomes.

Suggestion

Based on the results of the study conducted, researchers explained some suggestions that may be constructive and also may be considered for future improvements:

1. Learning using a video-assisted problem based learning model is expected to help teachers to carry out learning activities and get attention from teachers because with this learning students' learning outcomes can increase as measured through tests.
2. Video-assisted learning in the covid 19 pandemic mass will be even more improved, especially in the field of learning.
3. Choosing the right media and the right learning model to combine to maximize learning activities and expected results in the learning process in the future.

4. There needs to be further research using video-assisted problem-based learning models in other materials.

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