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Research Paper

Practicality of Problem-Based Physics Learning Tools with Video Assistance to Improve Problem-Solving Ability of Students

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Abstract: This study aims to produce problem-based physics learning tools with the help of videos that practically improve the problem-solving abilities of students. The research design used is a 4D model consisting of define, design, develop and disseminate. The learning tools developed are syllabus, lesson plan, student worksheets, videos, and problem solving ability questions. The finished learning tools were then tested in a limited way in class XI MIPA 7 SMAN 1 Mataram to find out the practicality of these devices. The results showed that the device, on average, received a positive response from students and teachers. This can be seen from the responses "agree" and "strongly agree" for each component of the questionnaire given by students and teachers. Based on these data, it can be concluded that problem-based physics learning tools with the help of videos, practically improve the problem-solving abilities of students.

Keywords: Learning tools, problem-based learning, problem solving.

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INTRODUCTION

Developments that occur in the order of life in the 21st century provide challenges for students as the nation's generation to develop the competencies needed today. Education is one way to prepare and develop student competencies, where students are equipped to be able to work together, be creative, communicate well, think critically and have the ability to solve problems (Gunawan et al., 2019). Problem solving is essentially a process of thinking or reasoning that is carried out to apply the knowledge gained in solving a problem (Susilawati et al., 2015). In addition, problem solving skills can direct students to seek ideas and find solutions that can be applied to a problem (Susilawati et al., 2019; Rahmawati, 2020). Physics is a branch of science that cannot be separated from the process of solving problems in natural phenomena that occur around them (Hikmawati et al., 2015). Therefore, innovation in learning is needed that is able to direct students to apply their knowledge to face the challenges of the 21st century. One learning model that can attract students to be actively involved in the learning process is problem-based learning (Susilawati et al., 2017; Susilawati et al., 2019).

The problem-based learning model is a series of activities that emphasize the scientific problem-solving process, where learning activities are centered on giving assignments or problems that are relevant and authentic, in order to help students achieve learning goals (Apriani et al., 2016). In addition, according to Al-Idrus et al. (2015), the problem-based learning model focuses students on the problems

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that exist in the life around them, so that students not only remember about the subject matter, but students are also able to master the material well. Problem-based learning can be done through discussion and question and answer activities about the problems given, so that students are able to build their own knowledge (Prabasari et al, 2021). Therefore, media is needed that can help students develop problem solving skills (Susilawati et al., 2019; Susilawati et al., 2020). One of the media that can be used is learning video (Rahman et al., 2021).

Video is a set of components or media capable of displaying both images and sound at the same time (Yunita et al, 2017). Video is a non-printed teaching material that is very rich in information and complete because it can reach students directly. The use of videos is very helpful for students to understand concepts in physics that are abstract and complex, and the videos provided can increase the motivation, interest, and curiosity of students during learning activities (Yelensi, 2020). In addition, the use of videos during learning activities in the midst of the COVID-19 pandemic can help teachers deliver material.

Based on the results of observations made at SMAN 1 Mataram, researchers found several problems including the lack of student activity during learning activities. This can be seen from the students who never asked or answered the teacher's questions about the material being taught. In addition, the low interest and motivation of students to learn physics. This can be seen from the lack of enthusiasm and attention of students when the teacher explains the material, and students often do not do the assignments given by the teacher. This is in line with the results of an interview that the researcher conducted with one of the physics teachers at SMAN 1 Mataram which stated that some students were not interested in studying physics. So, often students are not able to take part in physics learning activities properly. The teacher explains, this can be seen from the students' ability to solve physics problems which are still low. Furthermore, the teacher explained that online learning carried out during the pandemic caused teachers to find it difficult to carry out learning that could lead students to develop problem-solving skills. Therefore, researchers developed problem-based learning tools with the help of videos to improve the problem solving abilities of students. Learning tools developed in the form of syllabus, lesson plans, student worksheets, videos, and problem-solving skills.

Learning carried out using these learning devices is expected to help students understand physics material, especially in the midst of the COVID-19 pandemic. In addition, teachers can take advantage of existing technology in the delivery of material, especially learning videos. Therefore, researchers developed problem-based learning tools with the help of videos that practically improve the problem-solving abilities of students.

METHOD

This research is a development research that aims to produce and test the practicality of problem-based learning tools with the help of videos to improve students' problem solving abilities. The development used in this study is a 4D model consisting of define, design, develop, and disseminate (Sugiyono, 2017). The define stage is carried out through observations and interviews with teachers to obtain information related to the problems encountered during physics learning activities. The design stage aims to produce an initial draft of learning tools, where the learning tools developed consist of syllabus, lesson plans, student worksheets, problem-solving ability questions, and learning videos. At the develop stage, validation is carried out on the developed device. Furthermore, the valid learning tools were tested on a limited basis in class XI MIPA 7 SMAN 1 Mataram to determine the effectiveness and practicality of these devices. This research is limited only to the develop stage, where in this article only discusses the practicality of the device.

The data collection technique was carried out using a google form which was distributed to students. Furthermore, the responses from students will be grouped into positive and negative responses, so that the percentage of student satisfaction with the learning activities carried out will be seen. The data analysis technique used to measure the practicality of the learning tools developed is to use tabulation results from student comments on the learning carried out. The criteria consist of: 5 (strongly agree), 4 (agree), 3 (less agree), 2 (disagree), and 1 (strongly disagree) (Sugiyono, 2017).

RESULT AND DISCUSSION

The practicality of the learning tools that have been developed were obtained from the teacher and student response questionnaires. The questionnaire contains statements related to the learning tools used.

The instrument used to measure the practicality of the learning tools that have been developed is based on the theory of the Likert scale. The Likert scale is a scale used by researchers to find out the responses of respondents by asking several questions/statements and respondents can choose answers according to their experiences (Sukardi, 2016). The Likert scale presents positive statements and negative statements which then responders will make answer choices according to the learning experiences they have gone through (Nazir, 2014). The average student responses are shown in Tables 1 and 2.

Table 1. Average Student Response Results to Learning

No	Statement	Average	Category
1	I am very happy to follow Physics lessons using the PBL model with the help of videos	4	Agree
2	Learning Physics using the PBL model with the help of videos becomes more interesting because it is able to combine various skills in the learning process	4	Agree
3	Learning Physics using the PBL model with the help of videos makes me understand the subject matter better	4	Agree
4	The media used by the teacher in this lesson really helped me in understanding the task at hand	4	Agree
5	In this lesson, the teacher really makes good use of the media	4	Agree
6	Learning Physics using the PBL model with the help of videos makes it easier for me to apply concepts in solving problems	4	Agree
7	Learning Physics using the PBL model with the help of videos makes me understand the concepts of elasticity better	4	Agree
8	Learning Physics using the PBL model with the help of videos helps me train and develop problem solving skills, especially in elasticity material	4	Agree
9	Learning Physics using the PBL model with the help of videos supports me to get new ideas in solving problems on elasticity material	4	Agree
10	Learning Physics using the PBL model with the help of videos helps me better understand the steps I need to take to solve the problem	4	Agree
11	Through learning Physics using the PBL model with the help of videos, it makes me aware of respecting other people's ideas and ideas	4	Agree

Table 2. Average Results of Teachers' Responses to Learning

No	Statement	Average	Category
1	Learning Physics using the PBL model with the help of videos fosters student interest in learning	4	Agree
2	Learning Physics using the PBL model with the help of videos makes it easier for students to understand the material given	4	Agree
3	Learning Physics using the PBL model with the help of videos makes students more active	4	Agree
4	Physics learning using the PBL model with the help of videos trains students' problem solving on elasticity material	5	Strongly agree
5	Learning Physics using the PBL model with the help of videos makes it easier for teachers to teach physics on elasticity material	5	Strongly agree
6	Learning Physics using the PBL model with the help of videos can explore students' abilities	5	Strongly agree
7	The media used makes learning more interesting	4	Agree
8	The media used is able to train students' physics problem solving skills	5	Strongly agree
9	The media used is able to facilitate learning activities	4	Agree
10	The material on the student worksheets is easy to understand	4	Agree
11	The questions given on the student worksheets are in accordance with the indicators of the students' physics problem solving ability	4	Agree
12	The stages of learning the PBL model with the help of videos provoke the curiosity of students	4	Agree

Based on the results of the study as shown in tables 1 and 2, the use of PBL-based learning tools with the help of videos received positive responses from students and teachers. This can be seen from the average results of the responses that give a "agree" response for each component of the questionnaire. Students responded "agree" that video-assisted problem-based learning to improve students' problem-solving skills on elasticity material can increase interest in learning and make students more active in learning. This happens because students are more motivated to learn using learning videos. Students also gave "agree" responses to the learning videos used. By using learning videos, students can further practice science process skills and scientific creativity. This is in line with research conducted by Al-Idrus et al. (2015) which states that the problems presented using video media can stimulate the enthusiasm of students in solving problems and actively conducting investigations. In addition, problem-based learning using problems in everyday life can train students' thinking skills and problem-solving skills, so the videos developed are very helpful for students in understanding the problems given and increase students' interest in conducting investigations (Susilawati et al., 2017).

In addition to student responses, teacher responses also greatly determine the practicality of the learning tools developed. On average, the results of the teacher's responses giving "agree" to the point "learning using the video-assisted PBL model can increase interest in learning, simplify the learning process, and make it easier for students to understand and solve problems on elasticity material. The educators also gave a "strongly agree" response to the point "the use of physics learning tools with video-assisted PBL models can help students practice problem-solving skills on elasticity material. The use of video media in learning is very helpful in delivering material, especially on elasticity material. Based on these results, it can be seen that the use of physics learning tools using the video-assisted PBL model is very practical in improving students' ability to solve problems on elasticity material. This is because teachers and students find it easy to carry out learning (Doyan et al., 2020). In addition, the use of video-assisted PBL models can improve students' problem-solving abilities, because video media can affect students' curiosity so that they are active in conducting investigations (Aldi et al., 2022).

CONCLUSION

Problem-based physics learning tools with the help of videos on elasticity material are very practical in improving students' problem-solving abilities. This is because teachers and students find it easy to carry out learning using these devices. In addition, the use of the PBL model with the help of video can improve students' problem solving abilities, because video media can affect students' curiosity so that they are active in conducting investigations.

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