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DEVELOPMENT OF STUDENT WORKSHEETS (LKPD) BASED ON A SCIENTIFIC APPROACH ASSISTED BY AMRITA OLABS VIRTUAL LABORATORY ON ELASTICITY MATERIAL AT SMAN 1 BILAH HULU

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Abstract

This development research aims to produce LKPD based on a scientific approach assisted by Amrita Olabs' virtual laboratory on elasticity material that is suitable for use in physics learning. This type of research is Research and Development (R & D) using Thiagarajan's 4D model which is limited to the development stage (Develop). The subjects in this study were material experts, media experts, teachers in the field of physics studies, and students of grade XI MIA 2 SMA Negeri 1 Bilah Hulu totaling 30 students. The instruments used in this study consisted of feasibility test questionnaires of material experts, and media experts, observation sheets, pretest, and posttest question instruments, and questionnaires of the responses of teachers in the field of study and students to LKPD based on a scientific approach assisted by Amrita Olabs' virtual laboratory. The results showed that LKPD based on a scientific approach assisted by the Amrita Olabs virtual laboratory developed was included in the category of very feasible to be used in the physics learning process based on the results of validation tests of material experts (92.85%) and media experts (93.18%). Teacher response to LKPD developed (98.21%) and student response (97.22%). Based on N-Gain calculations, LKPD based on a scientific approach assisted by Amrita Olabs virtual laboratory is in the medium category with a value of 0.69. With an average learning outcome of 79.50. Thus, it can be concluded that LKPD based on a scientific approach assisted by Amrita Olabs's virtual laboratory is feasible and effective to be used in physics learning.

Keywords: Development, LKPD, scientific approach, virtual laboratory, Amrita Olabs, elasticity

Science and Technology (IPTEK) plays an important role in the development of the 21st century. With the existence of science and technology, existing information and technology are increasingly open and spread throughout the world beyond the existing boundaries of time and space. Since the development of science and technology, the educational process has become more advanced. A lot has changed over time because of technology. Changes such as the way teachers teach, the way students learn, and learning materials are always updated. Usually, the learning process is face-to-face, but now learning can be done from each home, such as the Zoom application, google classroom, and other media that can be used and brought. Education plays an important role in the development of the times; all fields will not be separated from education. In the Indonesian education system, the applicable curriculum is the 2013 curriculum which emphasizes a scientific approach to the learning process. In line with Sucahyo's opinion (2021) that the demands of the 2013 curriculum where every learning uses a scientific approach. This approach involves science process skills, namely thinking skills used to build knowledge and applied to solve problems and

formulate results (Humairah et al., 2021).

Practicum is an important activity in learning physics. Students can better understand the physics concepts learned through practicum activities. In conducting practicum using virtual laboratories, guidelines such as Student Worksheets (LKPD) are needed. This is in line with the opinion of Anggraini et al. (2016) that LKPD is a sheet that must be done by students that contain material, summaries, and tasks done by students. LKPD is designed as a guide or guideline for teachers and students in conducting practicum so that teachers can act as mentors so that practicum runs well.

Based on the results of interviews that have been conducted with Physics teachers of SMA Negeri 1 Bilah Hulu that the teacher's obstacles in doing practicum are that many tools and materials are not available and damaged such as unavailability of springs, damage to multimeters, unavailability of resistors, etc., tools and materials are inadequate if doing practicum, so that students cannot do a practicum at school. In addition to conducting interviews with physics teachers, questionnaires were also given to students in classes XI MIA 1 and XI MIA 2 SMAN 1 Bilah Hulu, the result of the distribution of questionnaires was that as many as 90.8% of students could not do physics practicum at their homes. Teachers have not used virtual laboratories and have not implemented virtual laboratory-assisted LKPD in physics learning. And 92.3% of students prefer to learn using media because learning with the help of learning media is more interesting and easier to understand learning and lack of understanding of students in learning physics as much as 92.3%. In the use of media, teachers, and students only use WhatsApp, YouTube, and printed books as teaching materials. The low quality of physics learning is also determined by several factors, namely the availability of facilities, tools, and laboratory materials for conducting experiments (Ramadani & Nana, 2020). To realize the experimental process in the laboratory, teachers must pay attention to the availability of rooms, materials, and equipment. Therefore, one solution to overcome this problem is to utilize learning media in the form of virtual laboratories supported by Student Worksheets (LKPD) as learning tools that can direct students in doing practicum and as guidelines that contain material, summaries, instructions for the implementation of learning tasks that must be completed by students that refer to the basic competencies that must be achieved.

RESEARCH METHODS

This research was carried out at SMAN 1 Bilah Hulu class XI MIA 2 for the research method used, namely the Research and Development (R&D) research method or development research. The development model used in this study is 4D which is limited to 3D, namely define, design, and development, for the implementation as follows.

1. Definition (Define)

The definition is the initial stage consisting of 4 components, namely early-end analysis to find out problems and needs in learning. The second is student analysis to find out the characteristics of students through the design and development of learning materials. Third, concept analysis is to identify, detail, and mathematically formulate relevant concepts to be taught. And the purpose of learning is to know the expected behavior changes after learning.

2. Design

At this stage LKPD is designed according to needs which includes several stages, namely 1) Material selection, the material used is elasticity, 2) media selection, the media used is the Amrita Olabs virtual laboratory, 3) Format viewer, to design material content adapted to the 2013 curriculum used, 4) Preparation of questionnaire instruments, compiling instruments to be given to validators, teachers, and educators, and 5) Initial draft, draft LKPD before validation by experts.

3. Development

At this stage, validation by material experts and media experts to find out if the product developed is feasible. The result is in the form of suggestions and inputs that can be used as improvements to the LKPD to be developed. Then LKPD is given to teachers in the field of study to find out the teacher's response to LKPD. At this stage, learning is carried out using valid LKPD. Then the researchers conducted a limited test in class XI MIA 2 by providing pretest-posttest questions and response questionnaires to determine the effectiveness of LKPD and students' responses to the developed LKPD.

RESULT AND DISCUSSION

Result

The product produced in this study is a Student Worksheet (LKPD) based on a scientific approach assisted by Amrita Olabs laboratory on elasticity material. The resulting LKPD has been feasible according to the results of validation by material experts who obtained an average of 92.85% with very feasible criteria. As well as validation from media experts, which is 93.18% with very feasible criteria.

Table 1. Data Validated by Material Experts

Assessed Aspects	Average Aspect	Criterion
Feasibility of presenting the material	91,67%	Very decent
Language	100%	Very decent
Sum		52
Percentage		92,85%
Category		Excellent

Table 2 Data Validated by Media Experts

Assessed Aspects	Average Aspect	Criterion
Eligibility of contents	93,75%	Very decent
Components of learning based on scientific approaches	90%	Very decent
Use of *Amrita Olabs virtual laboratory*	100%	Very decent
Percentage		93,18%
Category		Excellent

After conducting field trials, it is known that the LKPD developed received a good response from teachers and students, by the results of the teacher response questionnaire of 98.21% with very good criteria and the results of the student fiber response questionnaire of 97.22% with very good criteria. From the results of the Pretest-posttest of the learner fiber, it is also known that the LKPD developed is effective, this is shown that the N-gain index of 0.3g 0.69 is in the medium category.

Table 3 Study Field Teacher Responses

Assessed Aspects	Average Aspect	Criterion
LKPD Display	100%	Very decent
Eligibility of contents	91,67%	Very decent
Components of learning based on scientific approaches	100%	Very decent
Language	100%	Very decent
Sum		55
Percentage		98,21%
Category		Excellent

Figure 1 Student Response Diagram

N-Gain Value	Interpretation	Frequency	Average N-gain
g > 0,7	Tall	12	0,69
0,3 g 0,69≤≤	Keep	18	
g < 0,3	Low	0	
Sum		30	

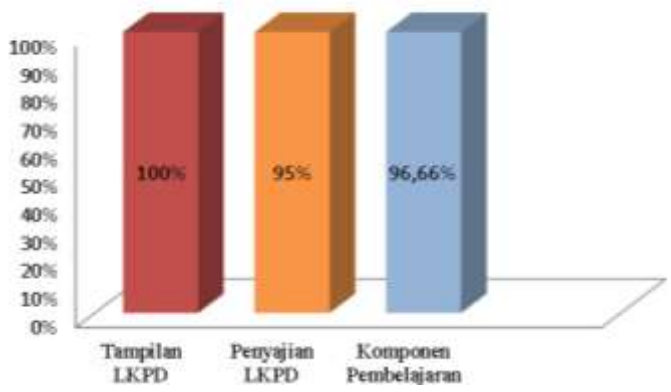

Table 4 N-gain values

Discussion

Based on data from the results of the study the LKPD developed is feasible by the assessment of 92.85% in the category of very feasible from material experts by covering 3 aspects with 14 indicators and the assessment from media experts, which is 93.18% included in the very feasible category with 3 aspects and 14 indicators. The results obtained are in line with Manurung's (2021) research that the LKPD based on the scientific approach developed is concluded to be suitable for use in learning based on the results of feasibility tests from material experts reaching 89%. In addition, Rambe's (2022) research shows that the LKPD developed is feasible with a percentage reaching 95.45%.

The teacher's response to LKPD was based on a scientific approach assisted by Amrita Olabs on elasticity material assessed with a percentage of 98.21% which was included in the very good category. Thus, LKPD based on a scientific approach assisted by Amrita Olabs's virtual laboratory which was developed is very good. The response of students to the LKPD scientific approach assisted by Amrita Olabs virtual laboratory was 97.22% and was included in the very good category.

Based on the results of the study, it was found that the display of LKPD attracted and increased students' reading interest in LKPD, in terms of presenting LKPD, students gave a positive response to the completeness of LKPD content. The results of this study are in line with research that has been conducted by Suarti et al, (2020) that students' responses to LKPD based on scientific approaches reached 82% and were included in the good category. In addition, Rambe's research (2022) shows that the LKPD developed reached a percentage of 91.07% and was categorized as very good based on teacher assessment. Based on the results of research obtained and supported by previous research, it can be concluded that the developed LKPD is very well used in physics learning.

To determine the effectiveness of the product, a pretest and posttest are carried out, and use N-gain in data analysis. The N-gain obtained of 0.69 is included in the medium category, where 18 students have medium criteria and 12 students have high criteria. While the average score of the students' pretest is 34.50 and the students' posttest is 79.50. So it can be known that the value of students has increased. Tanjung & Aritonang's research (2021) shows that the LKPD developed has an effective category used in learning based on the N-gain test with pretest and post-test values reaching 0.6 with moderate criteria. Based on the results of previous research and research, it can be concluded that the developed LKPD is effectively used in physics learning.

Based on the discussion above, it can be concluded that the LKPD developed is feasible and effective to use.

CONCLUSION AND ADVICE

Based on the results of the study obtained as follows: (1). The development of LKPD based on a scientific approach assisted by Amrita Olabs virtual laboratory on Elasticity material that has been developed through the stages of defining, designing, and developing is concluded to be feasible to use, based on the feasibility test validation from material experts, which is 92.85% and based on media expert validation, which is 93.18% (2). The effectiveness of LKPD based on a scientific approach assisted by Amrita Olabs' virtual laboratory on elasticity material that has been developed is included in the medium category with an N-gain value of 0.69. and (3). The response of teachers and students to LKPD based on a scientific approach assisted by the Amrita Olabs virtual laboratory which was developed was included in the very good category, based on the response of teachers in the field of study, which was 98.21% and the response of students was 97.22%.

It is recommended for researchers to further add broader physics material and virtual laboratories to each material.

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