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DEVELOPMENT OF STUDENT LEARNING OUTCOMES TEST INSTRUMENTS OF 11th GRADE HIGH SCHOOL ON SOUND WAVE MATERIAL

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Abstract

Development of test instruments is the process of developing tools or procedures used in the framework of measurement and assessment activities. This study aims to develop well-qualified questions including validity, reliability, difficulty index, and differentiation. This research is a research and development with a development process using a 4D development model developed by Thiaragajan, et al (Trianto, 2009) covering four stages, i.e.: Define, Design, Development, and Disseminate, which in this study was only conducted up to 3D (development stage). The definition stage is performed student analysis, material analysis, and objective analysis. The design stage is the preparation of tests and the selection of test formats. The development stage consists of instrument preparation, expert validation, and product trials for students. The test instruments developed are assessed according to the indicators and aspects of validation so that they are declared valid by the validator. The reliability value of the test instrument developed is 0.66 which belongs to the category of moderate reliability. Furthermore, the level of difficulty obtained is 8 medium questions and 2 easy questions, and the differentiation obtained is 7 enough questions and 3 good questions. The developed test instruments are acceptable and eligible to be used as test results of students' learning results on sound wave materials in grade 11 of high school.

Keywords: test instruments, 4D models, validity, and reliability.

Education is a conscious and planned effort to realize the atmosphere of learning and learning process so that learners actively develop their potential to have religious-spiritual power, self-control, personality, intelligence, noble morals, as well as the necessary skills themselves, society, nation, and country. In education, at least three main components of learning are required. These components include learning objectives, learning activities, and evaluations.

In every learning, learning outcomes are a very important factor, because the learning outcomes achieved by students are a tool to measure the extent to which students can understand the material taught by the teacher. Learning outcomes are not only based on the numbers listed on the list of grades or products but also concern the process and attitude of students in each learning. Learning outcomes are also in the form of behavioral changes after students learn and can show attitudes as students.

Based on the evaluation of the learning outcomes of grade 11th students in this physics lesson are only able to reach the minimum completion criteria and

some must be remedial. In addition, this observation also obtained some facts that students often complain of dissatisfaction with the acquisition of learning outcomes. The acquisition of unsatisfactory learning outcomes is influenced by many factors. One of them is a measuring instrument of students' learning outcomes or a learning test instrument used to measure student learning outcomes.

Hadijah and Santih (2016) in their research "Development of Instrument Test Results of Cognitive Eye Learning Physics Lessons on The Subject of Momentum and Impulses in 11th Grade High School" stated that the study results test is conducted to measure learning outcomes i.e., the extent to which desired behavior changes in learning objectives have been achieved by students. In measuring learning outcomes, students are encouraged to show their maximum performance. From the maximum appearance shown in the answers to the test the results of learning can be known the mastery of students to the materials taught and studied

In carrying out the assessment, teachers need assessment instruments in the form of good questions to test cognitive, affective, and psychomotor abilities. Assessment is a very important activity in the study of physics. Assessments can provide constructive feedback for both teachers and students. The results of the assessment can also motivate students to perform better. Budiman and Jailani (2014).

Assessment instruments on physics learning are usually seen from the results of written exam tests conducted by teachers at the end of each learning material. This assessment is very important, so it requires the right instruments to produce accurate grades according to the student's actual abilities. The instrument used can be either a test or a direct assessment of the student's ability to solve the problem given.

A learning outcome test is a group of questions or assignments that must be answered or completed by students to measure students' learning progress. An assessment is a process of assigning or determining a value to an object based on a particular criterion. Assessment of learning outcomes is the process of scoring the learning outcomes achieved by students in essence is a behavior change. As a result

of learning in a broad sense, behavior covers cognitive, affective, and psychomotor fields. (Purwanto, 2014).

This study aims to know how the validation of the test instrument and how the feasibility of the test instrument developed. The giving of this value and meaning in the language used by Scriven (1967) is formative and summative. If formative and summative is a function of evaluation, then value and meaning are the results of activities carried out by the evaluation. (Arifin, 2009).

RESEARCH METHODS

This type of research is research and development to develop test instruments of physics study results on sound wave materials of 11th-grade Natural Sciences High School. This research and development are a process to develop and validate the products to be used in education.

The development model used refers to the 4D model by Thiagarajan, et al (Trianto, 2009) i.e.: Design, Define, Development, and Disseminate. In this study, development was limited to the third stage (only up to 3D). The definition stage consists of student analysis, materials, and objectives. The design stage consists of material selection, format selection, and test preparation. The development phase consists of expert validation and small group trials.

In the data processing is carried out data analysis that includes validity, reliability, difficulty index, differentiation, and feasibility of the learning results test instrument developed.

RESULT AND DISCUSSION

Description of The Development Stage

a. Define

This stage is done to establish and define the terms of development. At this stage, several analyses are conducted, namely student analysis, materials, and development objectives. The goal is to establish and determine development requirements that include learning objectives and restrictions on learning materials.

b. Design

The design stage aims to design the instruments of the learning results developed. This stage is important in the research because at this stage will be

developed learning devices tailored to the need to achieve the learning objectives of sound waves by paying attention to the indicators in the sound wave material.

c. Development

At this stage, the final form of the test instrument is produced, after going through revisions based on expert input, simulation, and test result data. This stage is the validation, and repair, stage of the process to determine that the test instrument is valid for testing. Then after the trial of the instrument that has been developed, it will then be evaluated based on the test results, to see if the instrument that has been developed is feasible or not to be used.

Discussion of Research Results

a. Validity

To obtain better learning outcomes, the test instruments provided must be valid and viable or that have been developed and tested for feasibility. Validation has a sense of the accuracy of a measuring instrument in performing the function of measurement. Validation is done to find out if the questions are worth using or not worth using.

Based on validation results from several experts, the developed test instruments meet the valid category.

Table 1. Percentage score by the validator

Validator	Percentage Score	Criteria
1st Validator	87,8 %	Valid
2nd Validator	89,5 %	Valid
3rd Validator	89,5 %	Valid

b. Reliability

Reliability is done to see how reliable/ consistent the instrument developed. From the results of the calculation of reliability data of the test instrument developed, the reliability value obtained is 0.66. With a value of 0.66, the reliability level of this test instrument falls into the category of moderate reliability degree.

c. Difficulty index

The data obtained for the difficulty index of the questions in this test instrument, there are 2 questions with easy categories, and 8 questions with

moderate categories. Thus, the questions in the test instrument are quite propositional.

d. Differentiation

The data obtained for differentiation in the test instrument, there are 3 questions with good categories and 7 questions with enough categories.

e. Feasibility

After the instrument is tested on students, it is also given a questionnaire response to the test instrument developed for teachers and students. From the results of the questionnaire, the response of teachers to the test instrument is very good with a percentage of 90% and the response of students is also very good with an average of above 85%. Thus, based on predetermined criteria, the test instruments developed fall into the category worthy of use.

Hadijah and Santih (2016) stated in their research that effectiveness criteria are met if students achieve greater or equal completion with 80% meaning that out of 19 students at least 16 students must reach the KKM limit is 75. Thus, based on the trials that have been conducted then effectiveness criteria were achieved by the number of students who achieved the completion of 16 students with a percentage of 84%. Criteria the next effectiveness is the student's response, effectiveness criteria are met if 80% of students positively respond to several aspects of the question.

CONCLUSION

Based on research, it can be concluded that the test instrument was developed with a 4D development model (by Thiagarajan) i.e.: Define, Design, Development, and Disseminate, which in this study, researchers only reached the stage of development because the researchers think that the stage of spread can be done after the study. Based on validation results by several experts, this test instrument developed shows valid results and received a very good response from teachers in the field of study and students this categorizes the test instruments developed worthy to be used as a test of student learning results in the sound wave materials of 11th-grade high school.

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