Development of an Object Test of Natural Science Subject Base on Science Process Skills in Class IV SDN 101976 Bandar Kuala

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Abstract. This study aims to develop a KPS-based test for fourth grade students at SDN 101976 Bandar Kuala on Gaya material which has good qualifications (standard test) including validity, reliability, level of difficulty, discriminatory power and effectiveness of distractors. This type of research is development research , using the ADDIE model. The data analysis technique used is qualitative and quantitative. The average ideal percentage result is 98.1%. The results of the quantitative analysis of the quality of the KPS-based test questions are good. Analysis of 40 items in the small group test obtained 35 items (87.5%) were accepted and 5 items (12.5%) were rejected. The large group test obtained 34 valid items (97.1%), invalid questions 1 item invalid (2.9%). The reliability of the questions is included in the "very high" category with a value of 0.801. at the level of difficulty with the difficult category of 1 item (2.8%), moderate category 30 items (85.8%), easy category 4 items (11.4%) the distinguishing power of questions with good category 34 items (97.1%), with a sufficient category of 0 items (0%), with a poor category of 1 item (2.9%) the level of effectiveness of distractors with an effective category of 34 items (97.1%) and an ineffective category of 1 item questions (2.8%). From the data above, it can be accumulated that 34 items can be accepted (97.1%) and 1 item is rejected (2.8%).

Keywords: KPS-based test instrument, science

1 Introduction

Education for human life is very important and is an absolute necessity that must be fulfilled throughout life. Without education, it is absolutely impossible for a group of people to live and develop in line with their aspirations (aspirations) to progress, prosper and be happy according to their concept of life view. Education is also an aspect of life that is very basic for the development of a nation.

To achieve this goal, learning activities must be held. Learning is a process of changing behavior obtained from the five senses which will provide meaning through interactions between individuals and the environment. For this reason, a set of learning is very important, including learning science (Natural Sciences). Science is a subject that studies all events that occur in nature containing material about natural knowledge that is around us.

Various ways are carried out to improve the quality of our education, starting from completing facilities and infrastructure, improving the quality of education, improving the curriculum and so on. Science learning at school can be a vehicle for us to study the nature around us. Learning science studies symptoms through a series of processes known as scientific processes that are built on the basis of scientific attitudes and carried out by scientific work and the results are realized as scientific products composed of three components in the form of universally applicable concepts, principles and theories (Trianto, 2011:36).

Teachers also play an important role in improving student learning outcomes. Teachers as facilitators must be able to choose good learning resources for their students to use, and make appropriate test instruments for students to use. Teachers must be able to analyze the needs of learning resources based on the material, objectives, and learning indicators. Teachers must be able to analyze the needs of good learning resources for students to use.

In this case, the teacher must be able to have the knowledge and ability to conduct evaluations to identify the type of test and determine the appropriate instrument and can be used in learning activities. Evaluation can be done by using a measuring instrument in the form of a test instrument.

The preparation of a good measuring instrument can provide accurate information on the level of mastery of student competencies (Kunandar, 2014). The importance of making instruments, especially in the context of learning science, especially the results of the study of test items that have a tendency to assess student learning outcomes, both in daily tests, monthly tests and semester tests.

Science process skills are a very important aspect in science learning because it is through these process skills that an understanding of facts, concepts, laws and theories of physics is obtained (Bundu, 2006). According to Ergul et al. (2011) KPS are the skills possessed by scientists to acquire and develop scientific products. This is because KPS involves cognitive or intellectual, manual and social skills so that learning will be more meaningful (Adisendjaja, 2010).

The problems that occurred at SDN 101976 Bandar Kuala for fourth grade students showed that the test instruments used in evaluating learning in schools did not present scientific phenomena that could trigger science process skills in students at school. In addition, students are familiar with questions that refer to counts only. Students still find it difficult to understand material whose basic competencies are theoretical and broad in scope. In addition, the results of field studies conducted through interviews with educators show that educators only evaluate each chapter after learning, the questions are not purely the result of the educator's own thoughts but are taken from textbooks, worksheets used and some are from the internet. Educators rarely make grids when making questions so that the achievement that is measured is not clear, some educators already understand KPS but have not made questions that measure students' KPS.

This condition spurred the author to conduct research by developing instruments based on science process skills according to the characteristics and needs of students.

2 Method

The assessment instrument is one part of the evaluation instrument, the evaluation instrument is one of the measuring tools used by educators in evaluating the learning process and the learning outcomes of students, Suharsimi Arikunto (in Martono, et al, 2016). The instrument is a tool that can be used to measure the level of competence achievement. Instruments are defined as tools that are selected and used in learning activities so that learning activities become systematic and facilitated (Trianto, 2011). According to Collegiate (in Arikunto, 2012) a test is a series of questions or exercises or other tools used to measure skills, knowledge, intelligence, and talents possessed by individuals or groups. The written test is a test in which the questions must be answered by students by providing written answers. According to Matondang (2009) the test is a systematic observation process to find out the behavior or abilities of students and describe it with a definite scale or categories. studies are carried out by asking experts for considerations, including studies of material, construction and language aspects. A qualitative study was conducted based on content validity. Content validity is divided into two, namely *face validity* and *logical validity* . Appearance validity is qualitative and judgmental because it comes from *expert judgment* .

Meanwhile, logical validity is quantitative, which is done by calculating how high the agreement of the experts is. This can be done by finding the Aiken'V content-validity coefficient or Lawshe's CVR content-validity ratio.

Validators are asked to rate whether an item is essential (i.e. necessary and very important for the measurement objectives concerned) in three levels of essentiality namely 'Essential', 'Useful but not essential', and 'Not required'. The *Content Validity Ratio* formula is formulated as:

$$CVR = \frac{n_e - \frac{N}{2}}{\frac{N}{2}} \qquad (1)$$

Mardapi (2008) states that there are nine steps that need to be taken in developing test results or learning achievement, namely: (1) compiling test specifications, (2) writing test questions, (3) studying test questions, (4) conducting test trials, (5) analyze the items, (6) improve the test, (7) assemble the test, (8) carry out the test, (9) interpret the test results. Science process skills which are skills that examine natural phenomena in certain ways to acquire knowledge and further develop that knowledge. Science process skills are a very important aspect in science learning because it is through these process skills that an understanding of facts, concepts, laws and theories in science learning is obtained. Process skills involve cognitive or intellectual, manual and social skills. The product development concept used by researchers is the concept of research and development or *Research and Development* (*R and D*). The concept used is the development of *Analysis, Design, Development, Implement and Evaluation* (ADDIE) by Robert Maribe Branc, namely, analyze, design, develop, implement, and evaluate . The *analyze phase* includes collecting information consisting of the methods used, field observations , selection of science materials, qualification of materials developed, preparation of test instruments based on science process skills and product assessment literature studies. The *design phase* (planning) includes the design of test instruments based on science process skills. The *develop stage* includes making test instruments based on science process skills.

Procedures are the methods used by researchers in carrying out research to find, develop and test the truth of a study. The type of research used is *Research and Development* . Research and development is the process of developing and validating educational products. The stages of the research procedure are as follows. The material in the research is style material, the selection of material is chosen based on the needs of students who still rarely get questions based on science process skills, especially with style material. The qualifications of the materials used in the research are indicators obtained from the basic competencies of style materials.

3 Result and Discussion

The initial stage of planning is determining the purpose of the test and determining the form of the test that is in accordance with the analysis. The design analysis stage is completed, followed by making a grid of questions that refer to the indicators of achievement of learning competencies. The grid is a matrix table containing the specifications of the test items that will be made as a reference for the author , so that whoever writes it will produce test items with relatively the same content and level of difficulty. The items that have been reviewed by the validators are processed using an index CVR. Category of item analysis results qualitatively . Based on the analysis of the items above, the KPS-based test instrument on Style material at the SDN 101976 Bandar Kuala school through a logical validation process (construct) by experts using the CVR index shows that the results of the analysis have 33 items accepted, 7 items revised. Writing test items is a step to describe test indicators into test items whose characteristics are in accordance with the details on the grid that has been made.

Tabel 1. Item Quality Criteria

Information	Received	Revised	Rejected
Validity	Valid	Valid / Invalid	Invalid
Reliability	Reliability 0.70 (reliable) / < 0.70 (unreliable)		
Difficulty Level	$p < 0.3$ $0.3\ p\ 0.7$ $p > 0.7$	$p < 0.3$ $0.3\ p\ 0.7$ $p > 0.7$	$p < 0.3$ or $p > 0.7$
Distinguishing Power	$0.20 - 0.29$ $0.3 - 0.49$ $0.5 - 1.00$	$0.00 - 0.19$ $0.20 - 0.29$ $0.3 - 0.49$ $0.5 - 1.00$	< 0.00 $0.00 - 0.19$
Deceptive Effectiveness	All distractors work (5% of N)	0–1 distractors not working	1 -3 distractors don't work

The design of the test instrument assessment based on science process skills was carried out in the form of multiple choice questions. The relevance between test instruments and theory is to link test instruments based on science process skills based on indicators developed from basic competencies in style material. The instrument developed is a test instrument based on science process skills. The indicators developed are indicators of science process skills tests. The implementation stage of the science process skills -based test instrument that has been developed is then carried out using a trial to measure the science process skills of students at SDN 101976 Bandar Kuala Galang . The implementation of the test involved IV students of SDN 101976 Bandar Kuala Galang. Small group trials were conducted to test the limitations of the science process skills assessment instrument which was developed by testing field questions. The test design questions have two objectives, namely knowing the feasibility of the test items made and knowing the extent to which the test items can achieve the objectives. The small group test was conducted involving 30 fourth grade students at SDN 101976 Bandar Kuala Galang. The questions will be tested on 30 students in class IV, after the data is obtained and analyzed by testing the validity, reliability, discriminating power, level of difficulty, and effectiveness of distractors and revised again to obtain a better instrument. Extensive trials were carried out after revisions to the small group test questions. The trial implementation involved 60 fourth grade students at SDN 101976 Bandar Kuala Galang. The questions tested are questions that are already valid in the small group trial analysis, after the data is obtained, the results are analyzed by testing the validity, reliability, discriminating power , level of difficulty of the questions and the effectiveness of distractors . a really valid question data from the small group test results and the data from the large group test test on 60 fourth grade students at SDN 101976 Bandar Kuala Galang will be analyzed for items using classical theory, namely by conducting validity, reliability, difficulty level, and differentiating power of the questions. with revision. Evaluation of the test instrument developed was based on the suitability of the test instrument based on science process skills to measure students' science process skills , and the factors causing the discrepancy of the test instrument based on science process skills to the characteristics of the items obtained in the field. The evaluation aims to ensure that the science process skills-based test instrument is truly appropriate and can be used by science teachers to measure students' scientific process skills and compile valid items. The preparation of items that have become complex and then becomes a product of test instruments based on students' science process skills.

4 Conclusion

Conclusions that can be drawn on development research referring to the research objectives and discussion are as follows KPS - Based Test Instrument on the Style material at SDN 101976 Bandar Kuala was declared feasible and met the criteria as a valid and effective question with the content validation results having an average ideal score of 98.1 % which was included in the very appropriate category. The validity of the small group trial obtained 3 5 valid items and 5 invalid items, while the validity of the large group trial obtained 34 valid items and 1 invalid item. KPS - Based Test Instrument on the Gaya material at SDN 101976 Bandar Kuala at the time of the small

group trial was obtained at 0.894 which was categorized as having "Very High" reliability, while at the time of the large group trial, it was obtained at 0.80 1 was categorized as having "Very High" reliability. KPS - Based Test Instruments on Style material at SDN 101976 Bandar Kuala In the small group trial, the questions with good categories totaled 29 questions (72.5 %), questions with sufficient category amounted to 7 questions (17.5 %), questions with the bad category is 4 questions (10 %) Large group trials obtained questions with good categories totaling 34 items (97.1 %),

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