DEVELOPMENT OF STUDENTS' WORKSHEET BASED GUIDED INQUIRY TO TRAIN SCIENCE PROCESS SKILL IN SIMPLE HARMONIC MOTION MATERIAL

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Abstract

This present research aims at analyzing validity, practicality, and effectiveness of Students' Worksheet based guided inquiry to train students' skill of science process in simple harmonic motion material. This research is developing research using ADDIE model and it is compiled using One Group Pretest Posttest. The data collection techniques used were observation, questionnaire, and test. The data were analyzed through the implementation of learning, students' activity, students' responses, and students' test result of science process skill. The result of this research shows that: (1) the developed Students' Worksheet is valid in terms of guidance criteria, eligibility of content, procedures, and questions. (2) The developed Students' Worksheet is practical in terms of average score of learning implementation, students' activity observation, and questionnaire of students' responses that showed felicitous criteria. (3) The developed Students' Worksheet is effective in terms of the result of knowledge test and the skill of science process which has reached the percentage of classical mastery over 75%.

Keywords: *Science Process Skill, Guided Inquiry, Students' Worksheet.*

INTRODUCTION

In 21st century prioritizes the science process skills. Scientific process skills teach students to learn, discover, apply, and develop science. The process can be obtained by students through learning that can trained the skills of the science process. The importance of teaching science process skills is to enable students to describe an object and event, ask questions, build knowledge, try their knowledge of scientific knowledge, and communicate ideas they have to others. (Abungu, Okere, and Wachanga, 2014).

Scientific process skills can be trained with one of the guided inquiry models. Guided inquiry-based learning is a teaching-learning activity that involves maximally all students' ability to search and investigate things (objects, people, or events) systematically, critically, logically and analytically so that their findings can be formulated on their own with confidence self. Learning with science's own process skills can be obtained through laboratory activities. In the study of physics, laboratory activities are important to know the extent of students' skill in science process skills. Through the laboratory activities will look at the ability of each individual student have in the experiment. Of course, to achieve learning objectives in laboratory activities, it is necessary teaching materials that support the learning of the student worksheet.

From the results of interviews conducted by researchers with physics teacher of Senior High School 1 Taman Sidoarjo, the student worksheets that exist in the school have not trained the ability of the science process the existing student worksheets only contain physics materials, so that students are not interested in doing it. The student worksheet does not lead the students to develop the skills of the science process. The student worksheet that will be developed by the researcher is the student worksheet to train the skill of science process. To determine the quality of the results of the development of the student worksheet required three criteria: validity, practicality, and effectiveness.

The student worksheets to be created are structured according to the science process skill indicators so that students can go through the stages of observing, asking questions, formulating hypotheses, planning experiments, conducting experiments, applying concepts, communicating and integrating with guided inquiry practice. Indirectly, students will perform the stages of science process skills because students work on student worksheets developed in accordance with indicators of science process skills.

Based on the results of a pre-research questionnaire conducted at Senior High School 1

Taman, as many as (73%) students stated that simple harmonic chapter physics material is difficult and less interesting. There have also been no experiments on simple harmonic motion materials. This is also in harmony with the results of pre-research questionnaire that only (15%) students who say that experiment of simple harmonic motion ever done. So students need a deeper level of understanding of simple harmonic motion materials. Some students also stated that in the process of learning still use the student worksheet which only have the physics learning formula that has been finished and given directly to the students, then provided sample of the problem and the students are told to do some questions, so the students feel less interested in studying physics. They require students' worksheets that include applications in everyday life to make physics material easier to understand because the average of them is not familiar with the application of physical materials in life.

Based on the description the problems, it is found that the implementation of the 2013 curriculum in schools has not been implemented maximally, teaching materials such as student worksheets less appropriate with learning objectives and less trained the skills of the process of science, the material taught especially simple harmonics chapter is still considered difficult by students , the applied learning model is still using the conventional learning model, so that the students are poorly trained in the science process skills, and the lack of laboratory activities undertaken in schools, the researcher conducts research under the title "Development of Students' Worksheet Based Guided Inquiry to Train Science Process Skill in Simple Harmonic Motion Material"

METHODS

The type of research is development students' worksheet based guided inquiry to trained students' science process skills to simple harmonic motion materials. The development model used is the ADDIE development model. The test of student worksheet developed was conducted on 30 students of Natural Science X grade of Senior High School 1 Taman Sidoarjo in the even semester of the academic year 2017/2018. The developed student worksheet was implemented using a *one-group pre-test post-test research design*. (Sugiyono, 2013)

The research instruments used in data collection are students 'concept knowledge test (*pre-test* and *post-test*), questionnaire, and observation sheet of students' science process skill. Student knowledge concept sheet to know the improvement of students 'concept knowledge related to simple harmonic motion material, student response questionnaire to know student response to student worksheet developed, and observation sheet used to know skill level of students' science process when doing student worksheet developed.

RESULT AND DISCUSSION

The feasibility of the student worksheet developed in terms of the three aspects of validity, practicality, and effectiveness.

1. The Validity of student worksheet developed

Results of student worksheets validation performed by the validator analyzed descriptively. Based on Figure 1 can be seen the percentage value of each aspect of validation. It can be seen that the highest score is in the guidance aspect and procedure with the percentage value of 93.75%, the content feasibility aspect is 87.50%, and the question aspect gets the value of 83.33%. Based on the results of these values, each aspect can be said to be valid because the percentage of each aspect reaches ≥61%.

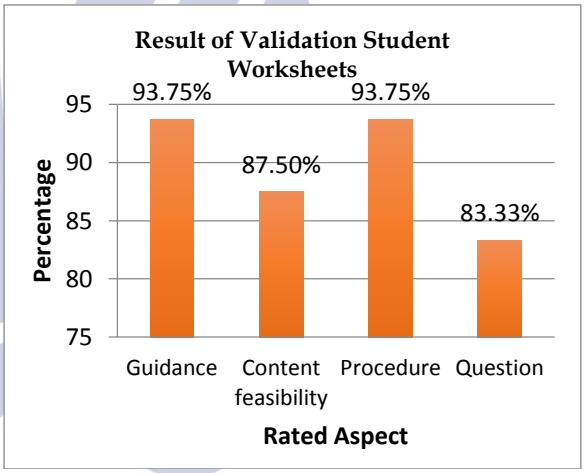

Figure 1. Graph of validation results of student worksheets

Aspects of questions get the lowest score than other aspects because the questions listed in the student worksheet less lead to the objective of the experiment as well as the experimental graph analysis. In terms of arrangement of sentences used, appearance, and animated images that already meet the requirements of preparation of a good student worksheet. In addition, this student worksheet can also be used to develop process skills, develop scientific attitudes and foster students' interest in the natural surroundings. (Darmodjo and Jenny R.E. Kaligis, 2002).

2. The practicality of student worksheet developed

In the aspect of practicality of student worksheets developed can be seen from the implementation of learning, student activity during the treatment of teaching and learning activities using

students worksheet based guided inquiry to trained students science process skills, as well as questionnaire student response to the student worksheet developed.

The implementation of the learning in this study was observed by two observers using the observation sheet. They are observes the teacher's actions during the teaching and learning process and provides an assessment of the learning activity sheet. The result of the assessment obtained reached the average percentage between 81% -100%. This indicates that the implementation of learning goes according to the assessment aspect that has been adapted to the guided inquiry instruction model syntax. In addition, the student worksheet that has been developed can be practically used for learning activities.

Student activity is a student activity while following the learning process. Student activity is also observed by two observers. Student activity is assessed by observers based on students' observation sheets. This student observation sheet was assessed with the aim of identifying students' involvement during the learning activities using the student worksheet developed. The observed results show that the average criterion mode of student activity observation is ≥61%. According to Riduwan (2015), student activity can be performed very well if the percentage obtained by every aspect ≥61%. This indicates that the teaching and learning activities conducted by using students worksheet based guided inquiry responded very well by students.

Student responses of the student worksheet can be found from the student response questionnaire in the form of a positive answer from the student worksheet that they have been working on. Here is a graph of student response questionnaire results.

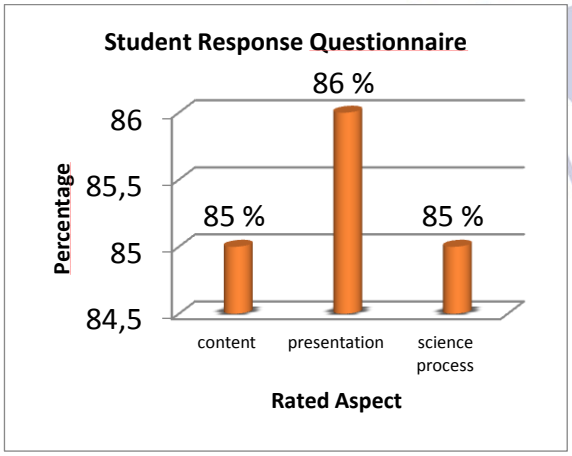

Figure 2. Graph of student response result questionnaire

Based on figure 2 it can be seen that the average result of questionnaire percentage of student responses is 85.33% which is included in criteria very well. This is in accordance with research conducted by Eka (2017) which suggests that Student Worksheets can foster morale within students and foster students' curiosity. From this criterion students' worksheet based guided inquiry to train students' science process skills can be said to be practical for use in teaching and learning activities.

3. The effectiveness of student worksheets developed

The effectiveness of the student worksheet developed can be seen through the assessment of knowledge tests and performance tests of science process skills. In the assessment of knowledge tests conducted *pretest* and *posttest*, while the assessment of the skills of the science process is only performed a performance test when students do in the student worksheet developed. The following is the result of the performance test of the students' science process skills will be analyzed using the mastery analysis in accordance with the minimum passing criteria applied in the studied school. This means that the average performance of students' science skill performance test scores on each aspect can be seen in the following graph.

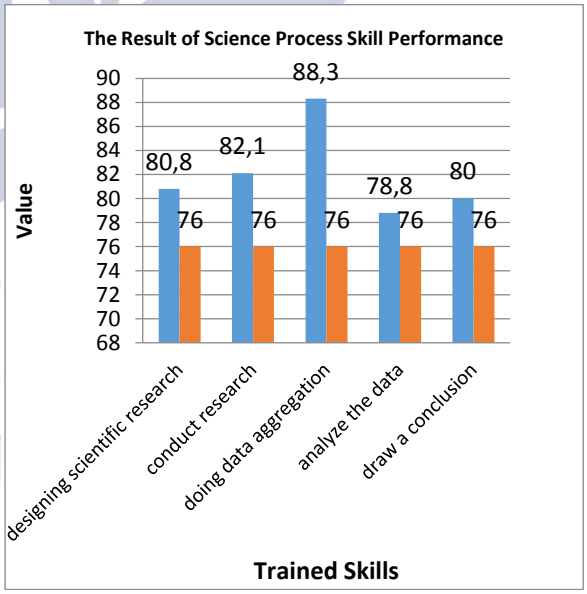

Figure 3. Graph of test result of science process skill performance

Based on the graphs shown in Figure 3 it can be seen that the value of the test of science process skill skills of the average student has reached the minimum passing criteria. All aspects of the trained science process skills have exceeded the minimum passing criteria. This shows that the science process skill has

been trained on the students. The graph shows, that the student worksheet developed can be effective in bringing about the skills of the science process. This is consistent with the research of the Feral Ogan-Bekiroglu and Arzu Aslan (2013) which suggest that guided inquiry learning can improve the skills of the science process.

Furthermore, the results of a knowledge test assessment related to simple harmonic motion metrics carried out by students with a total of 15 items with multiple choice questions indicate that the mean *post-test* > *pre-test*. After obtaining the value of *pre-test* and *post-test* is calculated the value of N-Gain in order to know the big of criteria of improvement of knowledge test about simple harmonic motion before given treatment and after given treatment. The average N-Gain value obtained is 0.6 which indicates the criteria of increasing the students' conceptual knowledge.

CONCLUSION

Students' worksheet based guided inquiry to trained students' science process skills eligible for use in physics learning on simple harmonic material sub simple swing material based on average validity percentage yield 89.58%, practicality student worksheet viewed from learning implementation 91.08 %, student activity observation 83.33%, and student response questionnaire 85%, and effectiveness of student worksheet in terms of the value of science knowledge and science process test reaches the final test value with the percentage of classical completeness of knowledge test is 78.22% and science process skill is 82.00%.

SUGGESTION

Note the time allocation that will be used for subsequent research so that learning using students' worksheet based guided inquiry to train students' science process skills can work effectively and efficiently.

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