

Development of Student Activity Sheet (Worksheet) Based on Guided Inquiry to Improve Student's Critical Thinking Skills in Senior High School

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Abstract

This study aims to 1) produce good worksheets based on Guided Inquiry and fit to be used, 2) increase student's learning activities using worksheets based Guided Inquiry, 3) increase student's critical thinking skills using worksheets based Guided Inquiry. This study uses research and development (R & D) model of Borg and Gall. The population in this study were all students of first senior high school in Bintang Laut Teluk Dalam 2016/2017. Samples were taken by cluster random sampling of the class which consist of 28 students. Type of instrument used was test type and questionnaire type. Data analysis used N gain test. The results showed: 1) worksheet development had "very good" criteria and fit for use, 2) improving of learning activity average were 79.98%, 3) improving of student's critical thinking skills was 0.7 with a high gain.

Keywords: worksheet, guided inquiry, critical thinking

1. Introduction

Physics learning process is currently underway limited to provide declarative knowledge in using formulas to solve problems such as the has been modeled before. As a result, the ability of students in physics only limited to the ability on memorizing a bunch of facts presented the teacher does not lead to understanding concept. Another problem in the process learning physics today is less take advantage of the learning support facilities such as laboratory equipment and use instructional media.

One media that can be used is the student activity sheet (worksheet). Worksheet will provide benefits for teachers and students. Media is a communication tool that is channeling messages and can stimulate the thoughts, feelings, and abilities of students so as to encourage the teaching and learning process effective and efficient (Arsyad; 2012, Usman & Asnawir; 2002). At this time, the reality of education in the field, many teachers in every school that still use the worksheets in the form of worksheets conventional or worksheets that monotonous, namely worksheets that stay put, stay bought, instant, and without any effort to plan, prepare, and prepare their own (Prastowo, 2012).

This has resulted a monotonous learning and students will feel tired following the learning process. Therefore, to overcome the disadvantages of conventional worksheet needed development in learning physics. Development worksheet based were guided inquiry. Inquiry is one way that can goals physics among others, increasing mastery of the material and critical thinking.

Inquiry directed or usually called guided inquiry more the right to use to the students who are still not accustomed to inquire. Worksheet-based guided inquiry to improve critical thinking high school students associated with static fluid material. Worksheet-based guided inquiry can improve students' critical thinking skills because it is equipped with the questions that will attract more daring students are required to put forward ideas or looking for a solution to a problem that exists. Nurhamsyah Heru Prasetyo and Suparwoto (2014) states that the inquiry-based worksheet guided by both categories and eligible for use in the learning process. Mastery of the material and critical thinking of students after using guided inquiry-based worksheet increased by high interpretations.

Learning use worksheets that lead orguiding students to get the concepts of physics with experiments, summary (a summary), concluded a statement, watch for signs of fluid static, interpreting the results of experimental data, predict the outcome of an experiment and exercises the form of the application of a fluid concept. Availability worksheets based guided inquiry is one alternative learning from which to improve students' critical thinking skills. Critical thinking skills include: deduce, explain or reasoning, analysis, synthesis, generalization, summarize and evaluate or assess (Mc Gregor, 2007).

Development worksheet based guided inquiry learning is to develop tools that reflect the implementation of the K13, for analysis and presentation of which do define the basic concepts of the scientific method to learn to develop scientific thinking of students in finding concepts such as the ability to formulate the problem, formulate hypotheses, identify problems and solve the problem. Dahar (1986) stated that the worksheet is a worksheet that contains information and interaction from the teacher to the students to be able to do themselves a learning activity, by practice or application of the results of learning to achieve instructional goals. Worksheet compiled must meet certain requirements in order to become a good quality worksheets. The terms didaktif, construction and technical.

Worksheet-based guided inquiry to train students to work scientifically and can develop the ability to think critically and independently in order to solve the problem in question. According Bonnsetter (1998) guided inquiry is where students are given the opportunity to work formulating procedures, analyze the results and draw conclusions independently, whereas in the case of determining the topics, questions and supporting material, the teacher acts as a facilitator only. Guided inquiry can be used to enhance students' critical thinking skills and work on their own insyatif and encourage students to formulate their own hypothesis.

Syntax learning model guided inquiry that will be applied in this study correspond to those proposed by Eggen and Khaucak (Trianto, 2008), includes presenting questions or issues, make hypotheses, designing experiments, conducted an experiment to obtain the data, collect and analyze data, and make conclusion. The objectives of this study were 1) Generate worksheets based guided inquiry who meet Worksheet good criteria and fit for use, 2) to increase students 'learning activities using worksheets based Guided Inquiry, 3) determine the increase of students' critical thinking skills by using worksheets based Guided Inquiry.

2. Research Methods

The research model used in carrying development are guided inquiry-based research and development or research development. The products developed in the form of student activities (worksheet) is based guided inquiry on the subject matter of a static fluid. The steps of this research is a modification of a ten-step development research developed by Borg and Gall (2007). The ten steps are: (1) A preliminary study and data collection (Research and information collecting), (2) Planning (planning), (3) development of an early draft (develop preliminary from product), (4) The field trials early (prelimary field testing), (5) Revision of the test results (main product revision), (6) the trial court (main product revision), (7) Completion of the product of field trials (operating product revision), (8) test field implementation (operational field testing), (9) Completion and final product (final product revision), and (10) dissemination and implementation.

Research and development is only until the ninth step of the research and development steps Borg & Gall, namely the improvement measures and the final product. Step ten is not used because the step is costly and quite a long time. The population in this study were all students of class X senior high school Bintang Laut Telukdalam academic year 2016/2017. The samples in this study were students of class X IPA2 taken by cluster random sampling. Worksheet tested before the first validated by expert lecturers namely two subject matter experts and design experts. Further assessment of worksheet by two teachers of physics. Then early trials of products tested on 3 class X IPA1 worksheet senior high school Bintang Laut Telukdalam. Further trials are limited worksheet group is tested on 6 class X IPA1 senior high school Bintang Laut Telukdalam. At the trial a large group of products tested on 28 students of class X IPA2 senior high school Bintang Laut Telukdalam to know the students' critical thinking skills.

The instruments used in the study of this development are: questionnaire, test questions, sheet validation and observation sheet. The data in this study with descriptive analysis, including feasibility analysis and data analysis test students' critical thinking. Methods of data collection in this research is by using questionnaires and sheets validation of weeks to determine the feasibility of worksheet of design experts and subject matter experts, as well as the responses of teachers and students, observation techniques to determine the students' learning activities and test descriptions to determine the increase critical thinking skills of students for use worksheet based guided inquiry. In the early stages before tested worksheet validated later revised. The criteria used is based on the eligibility criteria based on the National Education Standards Agency (BSNP) 3.26 to 4.00 then worksheet valid and does not need revision.

3. Results And Discussion

Guided inquiry-based worksheets that have been developed and then validated by subject matter experts and design experts based on the merits of content, language, and grafis. Validation results of the expert recaps the material can be seen in Table 1. Validation worksheet guided inquiry based on the subject matter of a static fluid conducted to determine the quality of assessment worksheets developed by subject matter experts. Validation of the results showed the highest ratings on the feasibility aspect of the presentation with the percentage of 87.58% and an average of 3.6 with the criteria very well. Design Expert ratings indicate the highest ratings on the design aspects of the skin by 95% and an average score of 3.8 with the criteria very well. Data recaps validation of expert design can be seen in table 2. Based on the acquisition value of teachers of physics the average value of the worksheets developed by 86.87% with an average score of 3.45 with very good criteria, then the product worksheet meet eligibility requirements for use in learning, so it does not need to be revised.

Results of the votes due to the content contained in the worksheets are in accordance with the needs of students and teaching materials. According to Suyanto and Slamet (2011) one of the components is a good worksheets or questions raised evaluations presented able to guide students perform data analysis and conceptualization. The test is done 3 times the first test a worksheet group / individual for 3 students, group trial is limited to 6 students and testing of a large group of 28 students at one time seeing an increase in students'

critical thinking skills.

Based on the assessment on the worksheetll group trial average acquisition value against worksheet developed is 87.4 with an excellent criterion the average percentage of student responses on the test individuals or worksheetll groups can be seen in Figure 1. Obtaining the highest percentage on six indicators and nine steps that use scientific work and scientific methods improve science skills and techniques presented in the worksheet modify the percentage of 100% and the criteria very well. Based on the ratings is limited by the number of test groups of 6 students gain an average value against worksheet developed was 86.1% with the criteria very well. The percentage of student assessment at the worksheetll group trial can be seen in Figure 2.

Based on the assessment test a large group with 28 students on average acquisition value against worksheet developed was 84.6% with the criteria very well. Percentage of students vote on a large group trial can be seen in Figure 3. In addition to the assessment test, student activity was also assessed by observation sheet.

Table 1. Validation Results recaps of Matter Experts

No	Aspects	The average	percentage	Criterion
1	Content of the material Eligibility	3.3	82.86	Very good
2	Eligibility presentation	3.6	87.58	Very good
3	Guided Inquiry Approach	3.4	86.25	excellent
4	Linguistic	3.1	78.1	good

Table 2. Validation Results From Experts Design Worksheet

No	Aspect	Average	Percentage	Criterion
1	Leather Design	3.8	95	very good
2	Tifografi Skin	3.6	93.75	very good
3	Content design Worksheet	3.5	82	Very good
4	Illustration of Contents worksheet	3.7	93.75	excellent

Once validated to produce good worksheetcriteria and fit for use conducted trials. The results of the trial described as follows Figure 1.

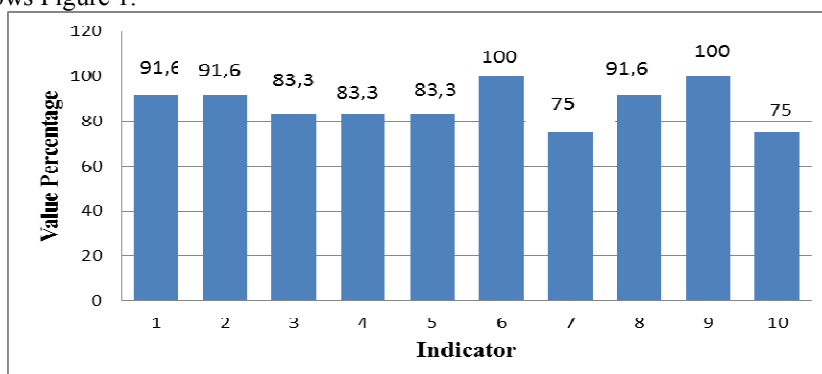


Figure 1. Acquisition Indicator Score Against Emperis On Individual Test

Based on the figure 1 above, the highest percentage gain in six and nine indicator which measures the use of scientific work and scientific methods improve science skills and techniques presented in the worksheet modify the percentage of 100% and criteria very good.

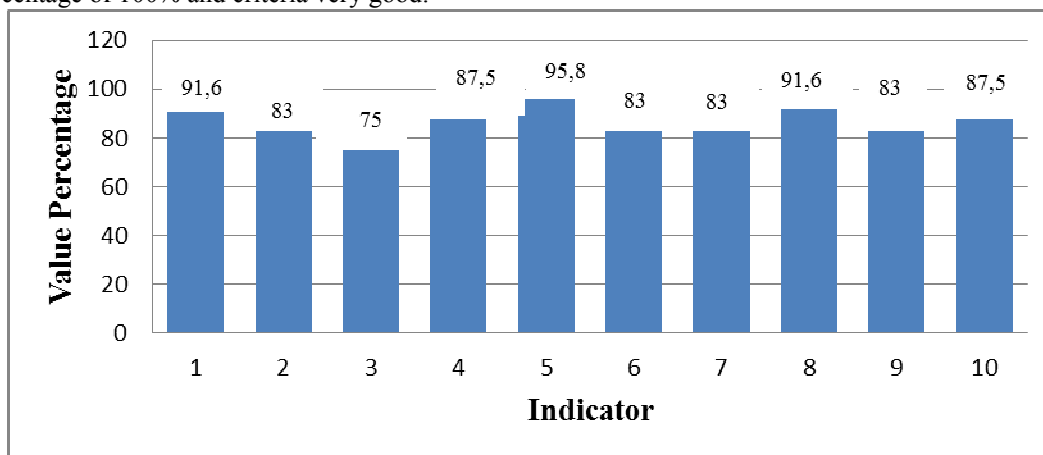


Figure2.Emperis Score Against Acquisition Indicator On Group Limited

Based on the figure 2 above results, the highest percentage gain on the indicator one and eight physical

appearance worksheet and capable of guiding and motivating to learn independently and solve problems presented in the worksheet with a percentage of 91.6% and a very good criteria.

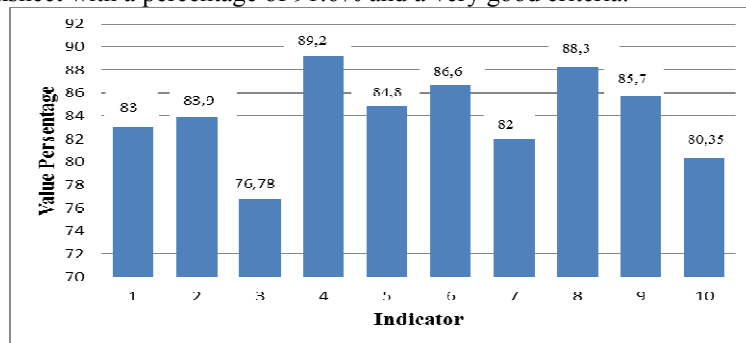


Figure 3. Acquisition Indicator Score Against emperis At Large Group

To see the improvement of student learning activities are used observation sheet with through observation by Observer. The resulting increase in activity learn from each meeting shown in Figure 4.

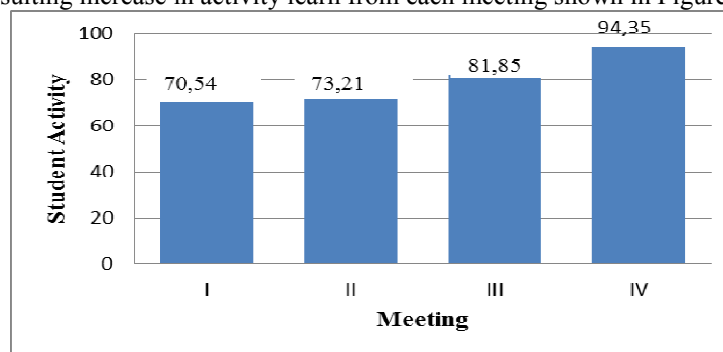


Figure4. The mean activity of students at each meeting

The students' critical thinking skills are viewed by using the description given shaped test every meeting. Increasing students' critical thinking skills can be seen in Figure 5.

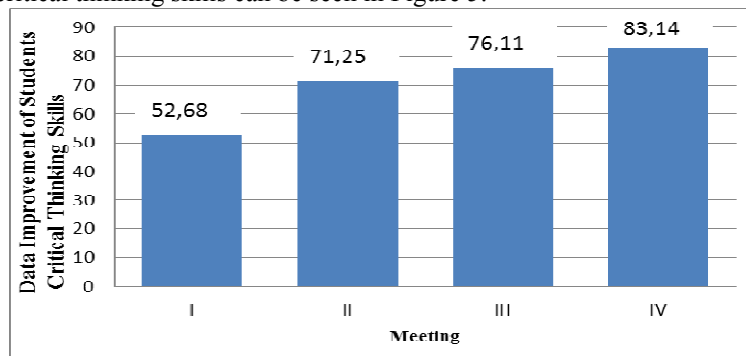


Figure 5. Data Acquisition Value Critical Thinking Skills Students

5. Conclusion

Based on data analysis and discussion of the results, researcher can conclude: (1) Quality of worksheet product development based guided inquiry in a static fluid material compiled by researchers has filled the eligibility of standard BSNP as a learning medium with an average overall rating of 3.4. Based on the results of the assessment are given by 2 physics lecturer as expert design and materials, it was obtained the percentage value namely 91.25% and 84.66%, which means that the Worksheet was valid and no need to be revised and fit for use. (2) increase of students learning activities used worksheet based on guided inquiry was significant (3) increase of students critical thinking skills of each meeting used worksheets based on guided inquiry with an index gain was of 0.7 which mean it was in high criteria.

Based on the results of the study, researcher suggested to: (1) teachers; student activity worksheet based on guided inquiry is expected to be used as a variation in physics learning on matter of static fluid subject, (2) Other researchers; the results of this study can be used as a reference for the next similar studies in different material as personal documentation to be used in the worksheets, and use worksheets based on guided inquiry with superior print quality so that the result is also maximum.

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