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ANALYSIS OF THE IMPLEMENTATION OF CONSTRUCTIVISTIC STUDENT WORKSHEETS IN THE GROUP INVESTIGATION (GI) MODEL TO STUDENT'S CONCEPTUAL KNOWLEDGE

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ABSTRACT

Constructivistic LKPD is a worksheet designed to give students the opportunity to express the ideas they have so as to encourage students to expand their knowledge regarding the problems given. This study aims to analyze how the students' conceptual knowledge using the constructivist student worksheets applied to the group investigation model. This research was conducted at SMA Dharma Pancasila Medan, this research is a quasi-experimental study where the sampling was carried out using purposive sampling, namely the sampling in the study was taken by consideration or certain criteria. The application of constructivist LKPD in the group investigation model was at the investigative stage. During the process of the investigation stage, a student skills assessment was carried out which consisted of seven indicators. The results of the student skills assessment showed a significant change in students' conceptual knowledge.

Keywords: LKPD; Conceptual; Knowledge

INTRODUCTION

Learning activities are a process of activities for teachers and students in a reciprocal relationship that takes place to achieve a certain goal. Natural science is a branch of science that plays a major role in life, especially in the field of science and technology which is growing rapidly at this time. Physics is a part of science (IPA) which is essentially a collection of knowledge, ways of thinking, and investigation. Physics is required to be able to face change, act on the basis of logical thinking, think critically, creatively, and innovatively. So that in finding the concept the teacher must try to create an attractive learning site for students so that students gain knowledge and skills that are useful for continuing the study of these students. Activities like this should be able to enable students to discover the concept of physics themselves and be able to explore their knowledge independently (Rahmatullah, Sahidu, & Ayub, 2017; Rahmatiah, Handayanto, & Kusairi, 2016) Learning is an interaction activity between a teacher and students in discussing a directed process to achieve predetermined goals (Ramadani, Yurnetti, & fatni Mufit, 2014). In addition, new learning builds on previous knowledge in an effort to understand information, learners must make connections between old knowledge and new information and must compare by asking, challenging and investigating, accepting or creating old information and beliefs for new information and beliefs. This is in accordance with constructivism learning. (Bhattacharjee, 2015; Ramadani, Silvia, Yurnetti, Fatni, 2014). Constructivism is a learning process where the brain stores information, processes it, and changes

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previous conceptions. Learning is not just a process of absorbing information, ideas, and skills because these materials will be constructed by the brain. The attitude obtained in constructivism is that knowledge is not only transmitted by teachers or parents, but inevitably it must be constructed and raised by students themselves so that they can respond to information in an educational environment (Joyce, Weil, & Calhoun, 2009).

Constructivism emphasizes the importance of knowledge, confidence, and skills that a person brings into the learning experience. The teacher only acts as a facilitator, not as a knowledge center in the classroom (Aina & Kola., 2017). Based on the theory of constructivism, knowledge is built by humans little by little and the results are extended through a limited context. Individuals connect and assimilate the knowledge, skills, experiences they already have with new knowledge, skills, experiences so that changes / developments occur (Sani, 2016; Ramadani, Yurnetti, & fatni Mufit, 2014). One learning model that provides students the opportunity to be directly involved in the development of a concept is the group investigation (GI) type of cooperative learning model. The cooperative learning model focuses on the formulation of a problem from a situation that occurs whether it is done before, during, or after problem solving. The GI type of cooperative learning model is a learning model that deals with things such as mastery, analysis, and synthesizing information (Rahmatullah, Sahidu, & Ayub, 2017). So that basically constructivism theory is in line with the objectives of learning physics, namely so that students have skills and are able to think logically. Of course, in this learning the teacher is required to be able to facilitate students so that these goals can be achieved. In obtaining and building concepts independently based on learning experiences carried out, it also shows the interrelation between the basic elements in a larger structure and all of them function together which is called conceptual knowledge. There are three types of conceptual knowledge, namely knowledge of classifications and categories, knowledge of principles and generalizations, and knowledge of theories, models and structures (Arends, 2008). So that it takes a different application of learning to get better student conceptual knowledge. LKPD is one of the instruments that is often used in learning physics as a tool in carrying out teaching and learning activities to achieve learning objectives and to assist students in developing the concepts being studied so that students are more active. The LKPD used by the teacher in learning still uses conventional LKPD with very minimal material and has not been able to develop student activities to its full potential. The learning activities contained in the LKPD mostly remove answers from the material that already exists at the beginning of the page so that students are passive in learning activities and during the learning process do not train students to think and cannot increase students' curiosity to find new information related to the material being studied.

One type of LKPD is a LKPD which helps students find a concept. This LKPD contains what students must do, then students are asked to observe the phenomenon of the results of the activity. Furthermore, students are given analytical questions that help to relate the phenomena they observe with the concepts they will build in their minds (Lase, Herbert, & Fauziyah, 2016; Umbaryati, 2015). In learning physics using the group investigation (GI) model, of course the use of Student Worksheets (LKPD) plays an important role in the

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process of finding a concept. This is in line with the fact that LKPD can be in the form of a guide for training in developing cognitive aspects as well as for the development of all aspects of learning in the form of experimental guides, LKPD aims to find concepts or principles and the application of concepts or principles (Prastowo, 2011). LKPD is a guide for students to carry out basic activities to maximize understanding according to indicators of achievement of learning outcomes. LKPD contains a set of activities that provide opportunities for students to expand their understanding of the material being studied in accordance with the learning to be achieved (Trianto, 2010) A text or reading is only in the form of information without anything that provokes students to think or interact with the text. For this reason, there is a need for innovation in the form of a LKPD format that can guide students to understand concepts, increase learning motivation and assist students in developing the concepts being studied. Constructivist LKPD is the right choice for physics lessons because it provides great opportunities for students to learn more conceptually. The constructivist LKPD is designed to provide opportunities for students to express the ideas they have so as to encourage students to expand their knowledge regarding the problems given. In the Kontruktivistik LKPD, promote the process of finding through study and experiment. Thus, the learning process is centered on students and the teacher acts as a facilitator and learning resource. Teachers associate subject matter with real life and let students discover for themselves so that students can digest and accept lessons easily (Meini, Hasanuddin, & Djufri, 2017). The application of constructivist LKPD in the type of GI cooperative learning takes place in the fourth phase, namely investigation. Constructivist LKPD which has its main character, namely the absence of a listed work procedure, so that in use, students solve the problems given to the LKPD based on the results of the concepts they have succeeded in finding and building. In addition, the assessment when students are carrying out their investigations with constructivist LKPD certainly has an assessment, namely an assessment of students' science skills. As long as students carry out investigations, there are seven assessment indicators used to assess their science skills, namely observing, formulating hypotheses, predicting, identifying and controlling variables, designing and conducting experiments, measuring and calculating, and collecting and processing data.

METHODS

This product design is related to constructivism-based student worksheets. The purpose of making constructivist LKPD is to provide opportunities for students to express the ideas they have so as to encourage students to expand their knowledge regarding the problems given. The constructivist LKPD has characteristics, namely first to present a phenomenon that is concrete, simple, and related to the concept to be studied, then students are invited to construct the knowledge they get from the results of observations so that they better understand the concepts being studied. The characteristics of constructivist LKPD are what make the appropriateness of using constructivist LKPD in the Group Investigation (GI) model to students' conceptual knowledge. Based on the objectives and characteristics described above, of course, in the process of making constructivist LKPD it must meet several of these criteria. This is because some of these criteria

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indicate which LKPD we will make. The process of making constructivist LKPD is as follows: (1) determining the material to be studied, (2) analyzing the basic competencies of the material to be studied in accordance with the syllabus, (3) determining the indicators and objectives of the experiments to be carried out, (4) determining the problems that will be will be submitted to students in the form of a problem description that is able to stimulate students' reasoning to explore their initial knowledge, (5) create a hypothesis column so that students can give their hypothesis based on the description of the problem that has been proposed, (6) provide a list of tools and materials which will be used during the experiment, (7) creating a work procedure column so that students can prove the hypothesis they have made. In this column, the students do not list the stages by stage, but students must be able to build their knowledge during the experimental process, (8) create a column of experimental data results so that students can write down their experimental data in tables and counts, (9) then make the column analyzes the data so that students can present the results of their data analysis based on the experimental data they have obtained, (10) and the last one provides several questions that can lead students to conclude the material that has been studied based on the experiments they have done. After determining the objectives of making constructivist LKPD, knowing the characteristics, and explaining how to make constructivist LKPD, of course, the next thing we have to do is how to apply constructivist LKPD and the assessments carried out during the learning process using constructivist LKPD.

Constructivist LKPD is applied to the Group Investigation (GI) learning model. The use of the Group Investigation (GI) model to implement constructivist LKPD is not determined haphazardly. This is because the Group Investigation (GI) model is compatible with constructivist LKPD based on constructivist theory, which gives students the opportunity to learn based on their direct learning experience. Constructivist LKPD is applied to the Group Investigation model at the investigation stage. At this stage students search for information, analyze data and conclude.

The whole process has been fulfilled in the constructivist LKPD used. So that the use of constructivist LKPD is the right choice applied to this model. During the learning process using constructivist LKPD, of course, has an assessment of the process carried out, namely the assessment of student skills. As long as students carry out investigations with constructivist LKPD, there are seven assessment indicators used to assess their skills, namely observing, formulating hypotheses, predicting, identifying and controlling variables, designing and conducting experiments, measuring and calculating, and collecting and processing data. This skill assessment is outlined in the student skills assessment rubric which provides a descriptor for each assessment of each of these indicators. So that the descriptor can help in assessing and explaining the work of students in the group. After applying the constructivist LKPD to the group investigation model, we could also see the students' conceptual knowledge from the results of each of the observations made during the skills assessment process. In accordance with students' three conceptual knowledge, namely knowledge of classifications and categories, knowledge of principles and generalizations, and knowledge of theories, models, and structures can be obtained from the results of students observing, formulating

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hypotheses, predicting, identifying and controlling variables, designing and conducting experiments , measure and calculate, and collect and process data. So that the implementation of constructivist LKPD is related to students' conceptual knowledge.

RESULT & DISCUSSION

The results of the study are descriptions of the results of observations of students' skills assessed through group or team work. Students' skills are assessed using observation sheets based on certain criteria. The results of observing students' skills during the learning process are based on each indicator, namely the observing indicator, students are tasked with observing the initial activities of the investigation to be carried out. The results of the observations had a good change. This can be seen by the increasing percentage of the observed data. Of course this has a good impact for the next investigative step. Furthermore, in the skill indicators to formulate hypotheses, students are tasked with making provisional estimates of the problems presented by the teacher at LKPD.

The results of formulating hypotheses underwent a good change. This can be seen by the increasing percentage of the observed data. This has a good impact for the next investigative step. In predicting skill indicators, students are tasked with seeing the truth of the hypotheses they make. Of course this is influenced by the previous stages. The results of predicting at each meeting experienced a good change. This can be seen by the increasing percentage of the observed data. Of course this has a good impact for the next investigative step. Furthermore, in the skill indicators to identify and control variables, students are tasked with understanding what they will do, either in the form of the variables they will change or the variables that are fixed. At this stage students really need careful observation of the final result to be obtained. The results of identifying and controlling variables at each meeting experienced good changes. This can be seen by the increasing percentage of the observed data. Of course this has a good impact for the next investigative step. At the stage of designing and conducting experiments students are assigned to carry out investigative activities based on their initial observations. At this stage the characteristics of the constructivist LKPD will be evident because at this stage students actually design procedures based on the results of their knowledge, not based on what is available in the LKPD. This stage is also a very important part of the observations made. The results of designing and conducting experiments at each meeting experienced a good change. This can be seen by the increasing percentage of the observed data. Of course this has a good impact for the next investigative step. Furthermore, in measuring and counting indicators, students are assigned to read the results of the investigation carefully and be able to explain them in the form of quantitative data. At this stage careful results are needed to prove the hypothesis they propose. In addition, this is also the student's initial exercise in counting as stated on the learning outcomes instrument they have completed. The results of measuring and counting at each meeting experienced a good change. This can be seen by the increasing percentage of the observed data. Of course this has a good impact for the next investigative step. In the indicators of data collection and processing skills, students are tasked with processing and analyzing the data they have calculated. The explanation of the

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results of processing and analyzing the data they do is set forth in the form of an investigation report.

The results of collecting and processing data at each meeting experienced a good change. This can be seen by the increasing percentage of the observed data. Of course this has a good impact for the next investigative step. The results of observing student skills that have been described above indicate that the process of student skills during the learning process affects student learning outcomes because in the learning process students are directly involved in finding the concepts being learned.

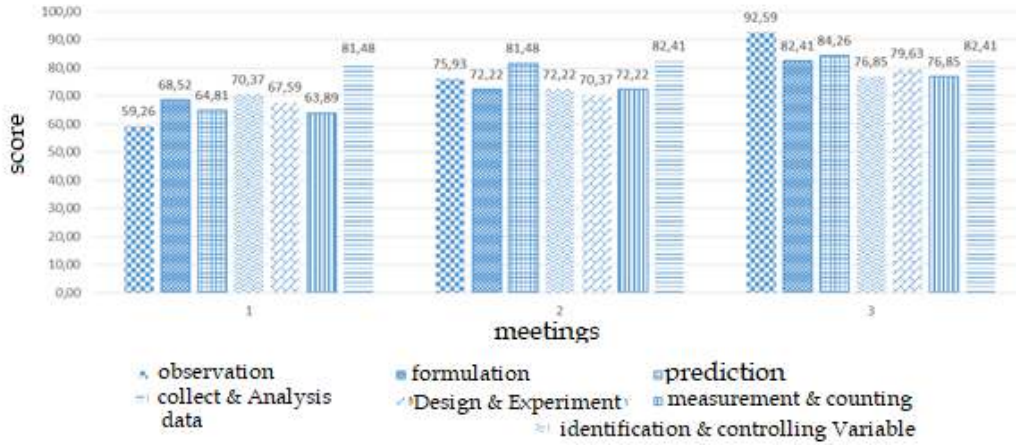

Figure 1. Student Skills

Figure 1 shows the results of observations made when students were carrying out experiments using the Constructivist LKPD. Based on the graph above, the information we can get is to describe the average assessment of students' skills at each meeting. At each meeting the average score of each indicator for the assessment of student skills was explained. The value shown on the graph is an explanation of the results of the assessment carried out at each meeting. So that we can see that each indicator has a change in value that increases from the first meeting to the third meeting. Of course this is a good result in the learning process because the purpose of using constructivist LKPD is realized in the skills of students during implementation so that students are truly able to find and build knowledge independently. This of course relates to students' conceptual knowledge because based on the constructivist LKPD steps students are able to classify information and knowledge, observe, and relate to all of them.

This constructivist LKPD has shortcomings, namely it provides a description of the problem that is quite difficult for students to understand because according to the student researchers have not imagined the problems given if they have not conducted the experiment, because the description of the problem should come when doing the experiment then there are problems that might make students understand more about the problem. that will be solved by a group. Then in the conclusion column there are less deep questions that lead students to come to conclusions, because the questions are still simple questions and are still questions that mention numbers, the questions should be questions that ask a concept to form a more mature concept. The constructivist LKPD made by this researcher has not been validated by the expert or tested before it is applied to the class to be studied, so that this LKPD

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cannot be said to be valid or suitable for use. The results of this study are supported by research that has been carried out by several researchers, namely (Ramadani, Yurnetti, & Mufit, 2014) which shows that the implementation of LKS with a constructivist approach has a significant effect on student learning outcomes in three areas of assessment. (Meini, Hasanuddin, & Djufri, 2017) state that constructivist-based worksheets help students to build their own knowledge and train science skills. The results of the study (Lase, Herbert, & Fauziyah, 2016) state that constructivism-based worksheets are able to develop students' creative thinking skills.

CONCLUSION

From this research it can be concluded that constructivist student worksheets can clearly help the learning process for significant learning outcomes. By using constructivist LKPD helps students to be able to find their own concepts by looking at the results of observations that increase with each meeting.

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