



IMPLEMENTATION OF GUIDED INQUIRY IN PHYSICS LEARNING AT PURWOREJO'S SENIOR HIGH SCHOOL

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ABSTRACT

This study aimed to analyze the implementation of guided inquiry on physics learning. Subject of researches are 10 senior high school in Purworejo. And this research is limited on learning of magnetism in class XII. The research data obtained by observation, interview and documentation. Data analysis was conducted by descriptive qualitative. From interviews showed that the majority of teachers have not use a model guided inquiry. However, based on observations of learning, the teacher has actually done the stages model of guided inquiry. Barriers to learning that many teachers provide guidance and clarification, especially at the stage of testing hypotheses and drawing conclusions by reason the effectiveness of learning time. Assessment used by teachers so far with a test to measure students' cognitive abilities.

Keywords: guided inquiry, physics learning

INTRODUCTION

Basically the nature of teaching physics should regard physics as products, processes, attitudes, and applications in everyday life (Depdiknas, 2006). The fourth element is a characteristic of learning physics that can not be separated from one another. In the implementation of the process of learning physics, the fourth elements are expected to emerge in learning, so that students can experience the learning process as a whole, to understand natural phenomena through problem-solving activities, scientific method, and imitate the way scientists work in discovering new facts.

Electricity and magnetism is a vast area in physics and it is subdivided into several branches in science and technology. Several iterations and approaches are applied in education at different school levels. The concept of a magnetic field is a very important concept in physics curriculum. This concept was introduced to the students from elementary school until the senior high school and a concept that is very close to everyday life.

In general, the students looked at the concepts of magnetism as a difficult and abstract concepts. One of the indicators that can be seen is the national exam

scores. In physics national exam 2013 and 2014, magnetic is the concept with the lowest value in Indonesia.

Learning outcomes of students are influenced by many factors. One of them is how to teach concepts based on the characteristics of the concept (Saarelainen 2011; Sanjaya, 2014). Several other studies have revealed magnetic learning success is to provide activities that make abstract concepts into a "real" for students (Buck, et.al, 2007) and learning to optimize the thinking of students.

One model of learning that can optimize the process of learning and thinking skills is the inquiry model (Arends, 2006). Inquiry can be defined as the intentional process of diagnosing problems, critiquing experiments, and distinguishing alternatives, planning investigations, researching conjectures, searching for information, constructing models, debating with peers, and forming coherent arguments" (Linn et al., 2004).

Inquiry related knowledge and classroom experience must be combined with subject matter knowledge in ways that allow students to use scientific

reasoning and critical thinking to develop their understanding of science.

Many educators discuss the nature of the inquiry by making use of mostly two concepts such as open inquiry and guided inquiry (Hassard, in Berg et.al, 2003). Open inquiry is described as a student-centred approach. However, it was reported that this approach did not have a significant effect on improving students' academic achievements and developing their scientific process skills (Berg et al., 2003; Khishfe and Abd-El-Khalick, 2002). Different interpretations attributed to this concept by researchers restrict reform works about scientific inquiry to be understood by the teachers (Wallace and Kang, 2004).

According to Furtak (2006), scientific teaching stands somewhere between the boundaries of the traditional method, in which certain answers known by the teachers are transferred to the students and the open inquiry method, in which students construct their own problems and problem solutions. This version is called guided inquiry method which helps in integrating scientific and constructivist rationales together with the facts, principles and rules. In guided inquiry method, teachers and learners play a crucial role in asking questions, developing answers and structuring of materials and cases. The usage of guided inquiry method is very important in transition from lecturing method to other teaching methods which are less and more clearly structured for alternative solutions.

Guided inquiry activities help students to develop their individual responsibility, cognitive methods, report making, problem solving and understanding skills. According to National Research Council (NRC, 2000), guided inquiry environments can best facilitate focusing on learning the development of certain scientific concepts, but while students in the teachers' guidance focus their attention on to the content, they have less suitable means for discovering scientific thinking processes and gaining experience (Kai and Krajcik, 2006).

A significant proportion of the science education research carried out over the past 30 years has focused on identifying and documenting the ideas that students develop before being taught about a topic, or as a result of teaching, which differ from the accepted scientific ones (Saglam and Miller, 2006). This research programme has been stimulated by broadly constructivist views of learning in science, which sees the learner's task as "making sense" or "constructing meaning" from the various inputs to which they are exposed in everyday life or through formal instruction. And the knowledge of

researchers there is no research that revealed the implementation of guided inquiry in learning magnetism in high school.

Based on background problems above,. This research focus on "How the implementation of guided inquiry in physics learning at senior high schools Purworejo. Purpose of this research are to describe the implementation of guided inquiry in learning physics and know the constraints that arise during learning. This research is one of basic research about development of guided inquiry in physics learning.

METHODS

This research was conducted in Senior high school Purworejo. This study is documentary analysis and classified as descriptive research. Research analysis of document is a study of the information documented in the recording, text, or other forms (Arikunto, 2010). This analysis aims to describe implementation of guided inquiry in physics learning especially about magnetism concept.

Sources of data in the form of verbal answers through interviews or written answers through questionnaires. The subjects were teachers in the district high school class XII purworejo. The object of research is the implementation of guided inquiry model of physics includes (a) Planning activities undertaken by teachers. (b) Implementation of activities undertaken by teachers and students, (c) The evaluation carried out by the teacher, (d) Barriers that occur during learning. Data was collected by observation, interview, and documentation.

Steps in the analysis of data using the model of Miles and Huberman (Sugiyono, 2012: 91) that any activity in qualitative data analysis carried out continuously until complete, so the data is already saturated.

RESULTS AND DISCUSSION

Before the in-depth search on the implementation of guided inquiry, researchers conducted initial interviews with physics teachers class XII in 10 senior high schools. All of the teachers stated that not using guided inquiry. Table 1 showed learning activities that actually done in magnetic topic.

Table 1. Data from initial interview about learning activities in magnetic topic in 10 school

Initial activities	- Teachers always hold apersepsi to repeat the lessons that have been submitted - Teachers convey verbal learning goals
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Core activities	- Teachers convey the material was followed by several other learning methods, namely lectures, demonstrations, discussion and assignment
Closing activities	the teacher asked all the students to deduce the material that has been studied, give assignments and exercises to do at home, and provides the opportunity for students to ask if there is a concept that is not yet clear.

Although the teacher states that have not used the model guided inquiry but of observation have been found basically guided inquiry steps have been implemented. Researchers found there are 3 schools that many implementing guided inquiry. While 7 others school are more dominated lectures and assignments. After the depth interview, the researchers conducted observations of magnetic material physics learning course held over three meetings follow the school schedule during the months of November-Desember 2014. Researchers used 3 meeting to observe the planning, implementation, evaluation and the obstacles that arise from guided inquiry model.

Based on the observation data obtained with the implementation of guided inquiry learning science in the following table.

Table 2. Data from observation in 3 School which done guided inquiry in learning of magnetic topic

Guided inquiry steps	Finding during observation
Orientation	Teacher provide a coherent explanation by dividing the practical guide, explaining the purpose of working steps
Formulate the problem	Teacher has given the question that contains puzzles to students
Formulate hypotheses	teachers often provide provocation questions arise that will be resolved by students
Test the hypothesis	Several activities have been conducted as: a series of experimental activities, analyze mathematical equations.
Draw a conclusion.	Formulation of conclusions made by students with the help of a teacher. Students present the experimental results and conclusions

Some of the reasons why teachers does not use guided inquiry are because the learning time class XII dense and do not understand about the model. Teachers need to be well versed in inquiry, but unfortunately many of them do not get the opportunity to learn science

through inquiry during their grade school and college education. This finding is same with a survey from Abraham, et.al shows that 91% of universities in the United States use direct laboratory instruction in general chemistry (Barenjee, 2010). Similarly, almost half of surveyed high school chemistry teachers indicate that they do not use any inquiry laboratory exercises in their classroom (Deters, 2005).

Several constraints that occur in implementation guided inquiry in learning physics appear from the students. Many students do not understand the steps of the experiment. Another obstacle is the confusion students to formulate conclusions. The barriers according to the the opinion. This finding indicates that the inquiry learning in Purworejo's high school still needs considerable guidance from the teacher.

Although science teachers play an important role in the implementation of guided inquiry model, teachers' this model faces many difficulties during implementation. Our result is same with another research of Cheung (2007) that listed the obstacles emerged during the implementation of this inquiry model in a study with chemistry teachers as follows: insufficient time, teachers' beliefs, scarcity of effective research materials, pedagogical problems, management problems, crowded classes, security issues, fear of encouraging students to misunderstandings, students' complaints, fear of assessment, scarcity of teaching materials etc.

CONCLUSION

Based on the result and explanation above, it can be concluded that teachers are already planning a science learning with guided inquiry. However, at stages guided inquiry has not been fully carried out by teachers in teaching physics class XII. The learning process includes initial, core activities and closing activities. Initial activities carried out by teachers with open lessons, organized presence, giving apperception and mention learning objectives. Core activities ie orientation, formulating the problem, formulating a hypothesis, test the hypothesis and drawing conclusions. Cover the activities carried out by the teacher held a reflection of learning materials, providing evaluation questions and close the learning activities. Evaluations are conducted by teachers so far with the evaluation of the written test that includes only cognitive students.

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