



THE APPLICATION OF GUIDED INQUIRY LEARNING MODEL ASSISTED WITH CONSTRUCTIVISTIC WORKSHEET TO IMPROVE THE LEARNING RESULTS OF XI GRADE STUDENTS IN SMA NEGERI 13 SEMARANG

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Abstract

This study aims to improve the students' learning outcomes of science in SMA N 13 Semarang on Thermochemistry and Reaction Rate using guided inquiry learning assisted by constructivist worksheet. This research is a classroom action research consisting of two cycles. The subjects were students. Data collected through observation and tests. The results showed that the use of guiding inquiry learning model assisted by constructivist worksheet can improve student learning outcomes, covering the aspects of knowledge, attitude aspect (student activity) and skills aspects (performance practicum). Improved knowledge of students can be seen from the increase in the number of students who pass out of 27 students in the first cycle to 33 students in the second cycle of 37 students. Increased activity of students can be seen from the number of students with grades of 27 students completed the first cycle of 37 students in cycle II. Improved performance lab can be seen from the number of students to the value of the number of students 30 completed the first cycle to 35 students in the second cycle of 37 students.

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INTRODUCTION

The government develops curriculum, learning materials, learning model, and evaluation/scoring systems in national and international standards for the sake of improving Indonesia's education. One of the attempts is by updating 2013 Curriculum through Ministry of Education and Culture. According to Permendikbud Number 65 Year 2013 about standard process, learning model mainly used in 2013 Curriculum in inquiry-based learning, discovery learning model, project-based learning, and problem-based learning. SMA Negeri 13 is one of the school in Semarang which becomes the role of 2013 Curriculum' implementation. Based on the observation, the involvement of students in the learning process was still low. They tend to copy their friends' homework in a science subject, particularly in the material of thermochemical and reaction rate. These materials need many formulas to master; thereby the percentage of students who passed the minimum passing grade was low.

One of the suggested learning models in Curriculum 2013 was guided inquiry. Students, with teachers' guidance, will get the experience in discovering concepts with guided inquiry. The involvement of students in the learning process will help them develop scientific concepts that they have mastered to solve certain problem scientifically (Villagonzalo, 2014). This model is a learning model which demands students to solve the problem through investigation which can improve their skills and knowledge independently (Trna, Trnova & Sibor, 2012). This model can improve students' scientific skills and behavior that makes them think actively (Daphne et al., 2009).

The inquiry is one of the approaches in science learning based on constructivist built by Suchman (1962). It teaches students about the process of investigation and explaining phenomena in Universitas Lilinois, Urbana (Joyce & Weil, 2007). According to Crawford (2006: 618), inquiry learning is a sequence of learning activities emphasizing on thinking process in understanding natural phenomena and finding learning concepts for students. The thinking process happened through questions and answers between teachers and students. In the guided inquiry, teachers are only providing materials and problems to investigate by students; then, students can arrange their procedures to solve the problems (Colburn, 2000). Students are difficult to arrange or build their knowledge to the

learning materials. Based on this reason, the researcher considered that there should be a development to students' worksheet in constructivist basis to build students' knowledge and make them able to actively involved in the learning process. This students' worksheet can be used by students as their guide to do activity in learning process using guided inquiry model; thus, there will be reactions from students and teachers.

In the previous research, in the chapter of salt hydrolysis, guided inquiry gives positive impact to students' learning results and motivation. From this result, the implementation of guided inquiry model gives positive influence to students' scientific skills and learning outcome (Octadhia, 2011). Similar research proves that learning based on the syntax of guided inquiry got a good category. Students' psychomotor is generally in a good category with most dominant competence on cooperating in measuring temperature using a thermometer. Affective competence is generally good; saying that students became able to opine well, honestly, and cooperatively (Permatasari *et al.* 2014). Meanwhile, Kurniawati et al. (2016) state that the implementation of guided inquiry model with students' worksheet can improve their scientific skills and learning outcome in science fundamental law material.

These problems are in the learning process and able to be solved by Action Research. It is aimed to repair and enhance the learning process continuously. The cycles inside should reflect the enhancement. Based on these problems, the researcher did this research to improve students' knowledge, activity, and practicum in thermochemical and reaction rates material by applying guided inquiry model assisted with the constructivist worksheet.

METHOD

This research was done in SMA Negeri 13 Semarang in academic year 2016/2017. It is located in Jalan Rowosemanding, Mijen, and Semarang. This research was an action research done in two cycles, where every cycle included four steps: 1) planning 2) execution 3) observation, and 4) reflection (Arikunto, 2008). The first cycle was thermochemical material while the second was reaction rate. The subject

of this research was students of SMA Negeri 13 Semarang in academic year 2015/2016. The source of this research was teacher's data.

The methods of data collection were using observation, documentation, questionnaires, and tests. The data of this research was processed and analyzed in descriptive qualitative. The technique of qualitative analysis referred to the analysis of Teknik Miles and Huberman (Sugiyono, 2010). The data analysis was by the analysis model on three components they are data reduction, data delivery and conclusion, and verification.

The technique to validate data was using triangulation. Triangulation was done to validate data using help outside of the research or comparing the data to other research (Moleong, 2000). Triangulation in this research was data collection method by checking the source of the data in a different technique.

RESULT AND DISCUSSION

The planning of action in cycle I included designing learning instruments and scoring instrument. The learning instruments were syllabus and lesson plan. The syllabus was based on national regulation of Curriculum 2013. According to the syllabus, the researcher planned the activity in cycle I in six meetings (12 Learning Hours). The meeting was in 5 learning hours, and the evaluation of the cycle was in 2 learning hours. The learning process was designed using guided inquiry with constructivist worksheet.

The scoring instrument was arranged to measure students' activity and achievements. The scoring for students' achievement was in multiple-choice format while the scoring for students' behavior and activity was in questionnaire and observation. Meanwhile, the instrument to measure skills was using observation sheet. The existence of worksheet became one of the media for individuals or group which allowed students to develop conceptual understanding. Used students' worksheet contained materials or learning topic which supposed to be learned along with its learning steps. The activities of the students in the learning steps were discussion and practicum in the laboratory. Students' worksheet could improve students' interest

in their learning process which can improve their learning quality with positive impact.

In cycle I, guided inquiry model with worksheet was applied. Teacher acted as the facilitator and helped students during the process. In the process, scoring was done with observation to measure students' activeness and skills in the aspect of being proactive and practicum performance. At the end of the learning, every group presented their discussion; creating interactions between students and teachers or group. The interaction was giving opinions, suggestions, or questions. At the end of the cycle I, there was an evaluation test to measure students' knowledge and personality. During the learning process, some students were still less active in group discussion. They tend to wait for their friends to complete the discussion's tasks. Meanwhile, some students were shy in asking to their friends or teacher regarding the materials. The execution of the learning process with model guided inquiry in cycle I was good. The interaction between students, and students and teacher was good enough during the process.

Guided inquiry model is a learning model centered on students, where students are required to be more active in building their knowledge while teachers only act as facilitator and motivator. The implementation of guided inquiry model gave students chances to be more active in the learning process to develop the concept they have understood before. Besides, students were required to find their own concept under the tutelage of the teachers; therefore, students would understand the concept of thermochemical material. The used worksheet was constructivist worksheet which is functioned to chance/ minimize teacher's role in the learning process. The worksheet was given to ease students in finding the concept of thermochemical. The finding supports the result of Schwarz and Gwekwerere (2007), they indicates a significant increasing in post-test lesson plans that focused on engaging students in scientific inquiry and modeling.

Table 1. The Reflection of Students' Knowledge

No.	Aspect	Cycle 1	Cycle 2
1.	Average	77	81
2.	Highest Score	98	96
3.	Lowest Score	60	65
4.	Students who Passed	27 from 37	33 from 37

Based on Table 1, cycle 1 showed that students who passed were 27 students from 37. The passing grade was 75. The competence in cycle 1 was thermochemical which was full of formulas. Many students had low ability in counting though they mastered the materials. In cycle 2, reaction rates, 33 students passed from 37 overall.

Table 2. Students Reflection on Learning Results

No.	Aspects	Cycle 1	Cycle 2
1.	Average	77	86
2.	Highest Score	93	97
3.	Lowest Score	47	80
4.	Students who Passed	27 from 37	37

The scoring of students' activity was based on the observation in the class and laboratory. The indicators were:

1. Involved in group activity
2. Did and share the task
3. Sharing ideas
4. Observing the presentation
5. Listening comprehensively
6. Interaction between students
7. Interaction of teacher and students
8. Appreciation of others' opinion
9. Note everything in discussion
10. Communication in discussion

Based on Table 2, in cycle 1, only 10 students were less active. Some groups did not do the discussion, and only smart students who did the job well while the others copied it. In cycle 2, students were motivated to cooperate and discuss in group exercises. Teachers tend to guide and direct them in doing the discussion. The changes of group were also done by mixing smart students to passive students. In this cycle, there was an improvement; making students became more active in learning.

Table 3. The Reflection of Students Practicum Performance

No.	Aspects	Cycle 1	Cycle 2
1.	Average	81	86
2.	Highest Score	93	100
3.	Lowest Score	54	63
4.	Students who Passed	30 from 37	35 from 37

The scoring of practicum performance was according to the observation in the science laboratory. The scoring of the practicum included:

1. Preparing materials and tools
2. Formulating experiment prediction
3. Experimenting
4. Observing
5. Arranging the data of the experiment
6. Interpreting data
7. Concluding
8. Classification

In cycle 1, students who had minimum practicum score were 7 from 37 students. Students who had passing score were 20. They had difficulties in arranging and interpreting data in thermochemical. After the guidance to them, the number increased to 35 from 37 students.

CONCLUSION

The implementation of guided inquiry assisted with students' worksheet can improve students' passing score from 20 students passed to 35 students from 37 overall. The implementation of guided inquiry assisted with students' worksheet can also improve students' passing score from 27 students passed to 37 students. This learning model can also improve their practicum performance from 30 students passed to 35 passed.

Guided inquiry model can be used as an alternative science learning model since it can improve students' learning result, especially their activity. Students' are still unable to master the

competence with many formulas; thus, they need a development of learning model that can make them able to master it well.

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