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GUIDED INQUIRY IMPLEMENTATION TO IMPROVE CRITICAL THINKING SKILLS IN SUB MATTER FACTORS THAT AFFFECT REACTION RATE IN SMAN 2 BANGKALAN

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Abstract

The aims of this research is to determine students' critical thinking skills through implementation of guided inquiry learning models in sub matter factors that affect reaction rate including the syntax implementation of guided inquiry learning models, student activities, students' critical thinking skills, and cognitive learning outcomes. This research was conducted in SMA Negeri 2 Bangkalan using the One Group Pretest Posttest Design to determine student's critical thinking skills and One Shot Case Study to determine students' cognitive learning outcomes. The data obtained were analyzed using quantitative analysis methods. It can be concluded that (1) Syntax implementation of the guided inquiry learning model at 3 meetings shows the average percentages at meetings 1, 2, and 3 respectively at 98.86%; 96.21%; 99.62%, which is included in the very good criteria. (2) Relevant student's activities that appear in the learning process in meetings 1, 2, and 3 respectively 96.30%; 98.52%; 97.78% and irrelevant activities that appear in meetings 1, 2 and 3 respectively 3.70%; 1.48%; 2.22%. (3) Students' critical thinking skills increase from the results of the pretest to the posttest which is measured using the N-Gain Score formula, which is 100% of students complete in components of critical thinking, those are interpretation, analysis, inference, and explanation with the average gain score in the high category. (4) Students' cognitive learning outcomes, show that 29 from 34 students completed or 85.29% and 5 students not completed or 14.71%.
Keywords: Guided Inquiry, Reaction Rate, Critical Thinking Skills, Learning Outcomes

INTRODUCTION

Chemistry is a group of sciences that included in the Natural Sciences which specializes in the structure and composition of substances, changes and energy that accompany these changes. Chemistry learning process emphasizes providing direct experience to develop skills and attitudes so that students are able to explore and understand the natural environment scientifically [1].

Chemistry deals with how to find out natural phenomena systematically, so that learning process is not just mastering a collection of knowledge in the form of facts, concepts, or principles, but also a process of discovery. According to the purpose of 2013 curriculum listed in *Permendikbud* Number 70 Year 2013 states that the 2013 curriculum aims to prepare Indonesian people have the ability to live as individuals and citizens who are faithful, productive, creative, innovative and affective and able to contribute in social life.

Based on the results of pre-research questionnaire that was conducted on September 19, 2019 in SMA Negeri 2 Bangkalan, 30 students showed that almost 97% of students considered chemistry is difficult subjects while the rest said otherwise

. In reality, chemistry learning process is more memorizing, this makes learning process is not accordance with direction of national education. Based on the purpose of 2013 curriculum and the direction of national education regarding chemistry subjects, certain abilities are needed to prepare someone to be able to contribute in the society. This is in line with *Permendikbud* Number 20 Year 2016 that concern in competency standards for education in high schools which must demonstrate the ability to think logically, critically, creatively, and innovatively in making decision [2].

Critical thinking skills are active, persistent, and careful consideration of a belief or form of knowledge that is taken for granted from the standpoint of the reasons that support it and the conclusions that form the tendency. [3]. In order to determine, explain, measure and evaluate critical thinking processes, it is very important to understand indicators of critical thinking skills. Facione formulates six components of critical thinking, namely interpretation, analysis, evaluation, inference, explanation and self regulation. This shows that to train critical thinking skills can be done using these six skills [4]. Critical thinking skills are closely related to the cognitive abilities of the students. It can be seen from the PISA survey, where

the characteristics of questions in PISA require critical thinking skills, because the questions is quite contextual, require reasoning, argumentation, and creativity in solving it. Based on the results of PISA survey in 2015 Indonesia is ranked in the 10 lowest countries. Indonesia ranks 64 out of 72 countries [5]. Same results were also shown from PISA survey in 2018 that Indonesia ranked 74 from 79 countries [6].

Reaction rate matter include in the 2013 curriculum class 11 in chemistry syllabus in Core Competence 3.6 about explaining the factors that affect the reaction rate using collision theory and Core Competence 4.7 designing, conducting, concluding and presenting the results of experiment about the factors that affect the reaction rate and reaction order. Critical thinking skills of students in reality are still low, especially in the sub matter factors that affect the rate of reaction. Based on the results of pre-research conducted on September 19, 2019 in SMA Negeri 2 Bangkalan, it was obtained the fact that 0% of students are able to interpret, 23% of students are able to analyze well and the rest is 77% of the students are not able to analyze properly and correctly, 0% of students are able to inference, and 0% of students are able to make explanations based on available data.

The results that obtained indicating that students were not used to interpret, analyze, inference and explain which are the skills of critical thinking skills. Nevertheless, critical thinking skills can be trained on the matter. This was supported by Imamah's research which succeeded in increasing students' critical thinking skills with a percentage of 100% and obtained an N-gain in the high and medium categories in the reaction rate material. [7].

One thing that can be done to train students' critical thinking skills was applying learning model that is able to motivate students and guide students to think critically. The guided inquiry learning model is more student-centered, so the teacher only explain the outline of matter and becomes a facilitator during learning process. In student – centered learning, the teacher's role is to control all class activities, help students to find facts, concepts or principles for themselves [8].

Ilaah stated that the implementation of the inquiry learning model that was carried out was effective because there was increasing students' critical thinking skills scores with enough and high criteria [9]. This is also in line with research that was conducted by Nasution which states that there was a significant effect of the implementation of inquiry learning models to students' critical thinking skills [10].

Based on this description, the researcher proposes the research with the title " Implementation of Guided Inquiry Learning Model to Improve Students' Critical Thinking Skills on Sub Matter Factors That Affect Reaction Rate of Class XI SMA Negeri 2 Bangkalan"

METHOD

This type of research was quasi-experimental research using quantitative methods. This study used one group pretest posttest design to measure the students' critical thinking skills

$$O_1 - X - O_2$$

Information :

O_1 : test before applying guided inquiry learning models

X : treatment the implementation of the guided inquiry learning model

O_2 : test after applying guided inquiry learning models

This research also used one shot case study to measure students' cognitive learning outcomes

$$X - O_2$$

Information :

O_1 : test before applying guided inquiry learning models

X : treat the implementation of the guided inquiry learning model

O_2 : test after applying guided inquiry learning models

Implementation of inquiry learning model was observed through the observation sheet during the learning process according to the syntax of guided inquiry learning model. Observation has done in 3 times. Activities of the students in this research refer to the activities of the students during the learning process. The score for evaluating the syntax of this learning model was analyzed using the following formula:

$$\% \text{ Implementation} = \frac{score\ obtain}{maximum\ score} \text{ x } 100\%$$

The percentage of scoring results from each observer then averaged using the following formula:

$$\% \text{ average} = \frac{\% \ implementation}{number\ of\ observer}$$

The results obtained is described as the criteria for each syntax according to Table 1.

Table 1. Implementation Criteria

Percentage (%)	Criteria
0 – 20	Very Less
21 – 40	Less

Percentage (%)	Criteria
41 - 60	Enough
61 - 80	Good
81 - 100	Very Good

[11]

Student activities observation sheets was used to find out the activities of students. The data was analyzed by calculating the percentage of activities carried out by students during learning process using the following formula:

$$\% \text{ Activities} = \frac{\Sigma \, frequency \, of \, activity \, that \, appear}{\Sigma \, frequency \, of \, all \, activity} x100\%$$

The percentage of scoring results from each observer was then averaged using the following formula:

$$\% \text{ average} = \frac{\% \, activities}{number \, of \, observer}$$

Student activities was said supporting the implementation of guided inquiry learning models if the percentage of relevant activities was greater than the percentage of irrelevant activities.

Critical thinking skills were measured based on the ability of students to answer the questions that include components of critical thinking skills. Assessing critical thinking skills was used pretest and posstest. The test was given is in the form of essay test.

Analyzing critical thinking skills through the calculation of the value of N-gain score to find out how big is the difference between pretest and posttest scores.

$$\text{N gain score} = \frac{posttest \, score - pretest \, score}{maximum \, score - pretest \, score}$$

[12]

The score that obtained was converted into categories such as in Table 2.

Table 2. Gain Score Criteria

Nilai <g>	Kriteria
<g> < 0,3	Low
0,7 > <g> ≥ 0,3	Average
<g> ≥ 0,7	High

[12]

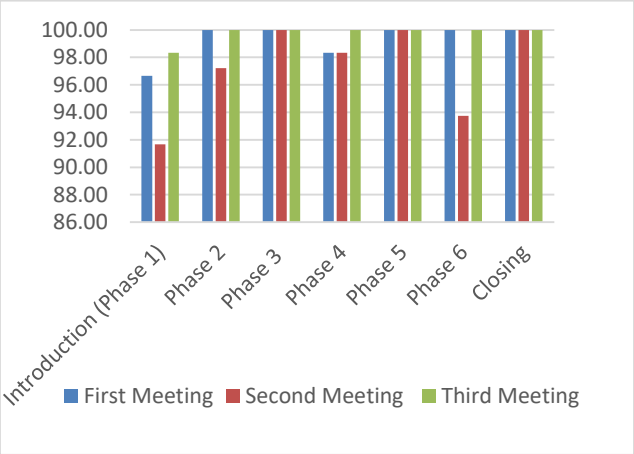
Cognitive learning outcomes were illustration the level of mastery of students towards the learning objectives. Learning outcomes of students' knowledge was obtained at posttest. Analysis of cognitive students' learning outcomes was done by analyzing the posttest on sub matter factors that affect reaction rate. Cognitive learning outcomes were obtained using the formula:

$$\text{Cognitive Learning Outcomes} = \frac{\Sigma \, right \, answer}{\Sigma \, all \, question} x \, 100$$

RESULT AND DISCUSSION

Implementation of Learning Model

Result of observation in implementation of guided inquiry learning model in 3 meetings was shown in Picture 1.



Picture 1 Percentage of implementation guided inquiry

Learning process was conducted 3 times to make students more active to find out concept based on phenomena that given by the teacher to train critical thinking. Teachers acts as a guidance and facilitator for students so that students are able to think critically in finding a concept of a phenomenon that is found in daily life. Students in inquiry learning act as a scientist doing mental processes themselves and conducting experiments [13].

Introduction covers the first phase that was focusing the attention of the students and explaining the inquiry process. In this phase teacher was preparing students to learn and explain the procedure of implementing inquiry model [14]. At this stage activities that carried out by the teacher including opened up learning process followed by checking the presence of students, giving apperception to students. Apperception aims to help students recalled the knowledge that was obtained/studied previously. Teacher provided motivation to students associated with examples in daily life related to the reaction rate. Motivation is given to students in order to make students are motivated to play an active role to find a concept of the phenomenon that presented [15]. Teacher then conveys the learning objectives that will be achieved by the students. Discussing learning objectives was very important so that students know what will be learned and expected to be achieved by students in learning activities. The average results of the implementation of phase 1 in first, second, and third meeting respectively 96.67% (Very Good); 91.67% (Very Good); 98.83% (Very good).

Phase 2 was presenting the inquiry problem The teacher presented problem situation or

phenomenon related to the matter that will be discussed to students [14]. The phenomena was presented by the teacher regarding the concentration, surface area, temperature and catalyst are available in students worksheet. Students were divided into 6 groups where each group consisted of 5-6 students. Teacher then guided the students to the group with the previously divided group then distributed the students worksheet to each student in the group. Then, problem was presented by teacher in the form of phenomena related to the matter has already corresponded to the characteristics of inquiry learning that in organizing teaching, teachers can presented interesting problems/phenomena that raised questions in the minds of students. The average results of the implementation in phase 2 in the first, second, and third meeting respectively 100% (Very good); 97.22% (Very Good), 100% (Very Good).

Phase 3 is asking students to formulate a hypotheses to explain the problem. The teacher helps students by asking about these problems and formulating hypotheses which will later be proven [14]. The teacher accommodates every opinion given by students to find the right problem formulation. In this activity the critical thinking skills that are train is interpretation component. Based on the right problem formulation, teacher then guides the students to develop the right hypotheses. As formulating a problem, the teacher also accommodates answers from students so that the right hypotheses is obtained. In this activity the critical thinking skills that are trained is inference component. After obtaining the right hypotheses, the teacher asks students to determine the experimental variables in accordance with the experiments that will be conducted. In this activity, the critical thinking skills that are trained is the interpretation component. The average results of the implementation in phase 3 in the first, second, and third meeting respectively 100% (Very Good); 97.22% (Very Good), 100% (Very Good).

Phase 4 was encouraging students to collect data to test hypotheses. In this phase, the teacher asked students how to collect data in order to prove the hypotheses [14]. In this phase the teacher acted as a facilitator and guided students to conduct experiments, directed students to write down observations in the observation table in students worksheet, guided students to analyze data observation that available in students worksheet. Teacher in this stage performed according to the principle of inquiry learning model. The principle was learning to think [16]. This was in line with phase 4 students were guided to find their experiences independently with guidance from the teacher. The average results of the implementation in phase 4 at the first, second, and third meeting respectively 98.33% (Very Good); 97.22% (Very Good); 100% (Very Good).

Phase 5 was formulating an explanation and/ or conclusion. In this phase, the teacher closed the inquiry by asking students to form an overall conclusion [14]. This phase the teacher guided students to remember and collect information obtained from the beginning to make conclusions by paying attention to hypotheses that have been made previously. After all the components above have been done, the teacher guided the students to fill the conclusions in the students worksheet based on the experiment. The average results of the implementation in phase 5 in first, second, and third meeting respectively 100% (Very Good); 100% (Very Good); 100% (Very Good).

Phase 6 was reflect on the problems and thinking processes that used during the investigation. In this phase the teacher asked students to think about their thinking processes and reflect on the inquiry process [14]. In this phase the teacher guided the students to prepare the results that obtained through experiments to be presented in front of the class. The teacher acted as a leader in the discussion between students who present their results with students who will later ask questions. In this case the teacher straightens out the wrong explanation that was made by students. The average results of the implementation in phase 6 in first, second, and third meeting respectively 100% (Very Good); 93.75% (Very Good), 100% (Very Good).

Closing, the teacher given feedback to the group that has made a presentation and asked students to study the matter that will be discussed at the next meeting. The teacher ended the learning and asked the students to pray. The average results of the implementation in first, second, and third meeting respectively 100% (Very Good); 100% (Very Good); 100% (Very Good).

According to Piaget's theory of learning, children aged 11 years - adults have entered the formal operational stage of where they are able to think scientifically and solve problems abstractly. Piaget explained that cognitive development is largely determined by the manipulation of the child's active interaction with their environment. Piaget believed that physical experience and environmental manipulation were important for development change. Meanwhile, social interaction with pairs, especially arguing and discussing helped students to clarify thinking which is included more logical thinking [17].

Cognitive development theory strongly supports inquiry learning model because cognitive development is not an accumulation of separate pieces of information, but rather a process of constructing knowledge continuously, assimilating, and accommodating new information. Students are trained to build their own understanding by being faced with a problem and the solution they will find by themselves as taught to students in the inquiry learning model [15].

Learning activities was carried out in groups are strengthened by constructivism learning theory proposed by Vygotsky about the Zone Proximal Development (ZPD) where tasks that are too difficult for a child to master alone can be overcome with the help of more capable adults or pairs. In addition, the applied model is the guided inquiry learning model that is used to train students' critical thinking skills supported by Bruner's discovery learning theory that discovery learning will encourage learners to learn mostly through the active involvement of students by utilizing concepts, principles, and the teacher encourages students to have experience in conducting experiments that allows students to find principles independently. This corresponds to guided inquiry learning model where learning is based on inquiry to find a concept [15].

Students Activities

Observation of student activities has the objective to find out all activities of students during the learning process using guided inquiry learning model. Observation of the studentsactivities was done by 3 observers which each observer observed 2 groups. There were six groups consist of 5 to 6 students. The frequency of students activities appear was observed every 2 minutes during learning process. Activity 1 was paying attention to the teacher's explanation. The percentage of activity 1 in the first, second, and third meeting respectively 19,26%; 22,96%; 21,48%. The activity of paying attention to the teacher's explanation was seen in the introduction to phase 1 of the guided inquiry learning model that is focusing students' attention and explaining the inquiry process. At the beginning of the learning process, students paid attention to the teacher's explanation of the initial concept of the factors that affect the rate of reaction.

Activity 2 was asking the teacher. The percentage of activity 2 in the first, second, and third meeting respectively 1.48%; 2.22%; 2.22%. Activity 2 corresponded to phase 4 of the guided inquiry learning model that was encouraging students to collect and test hypotheses. Students in this phase were asked to conduct experiments to prove the hypotheses that has been made. Students are asked to read the procedure of the experiment before conducted the experiment. Students who did not understand the experiment procedure can ask to the teacher.

Activity 3 was giving opinion in class. The percentage of activity 3 in the first, second, and third meeting respectively 3.70%; 8.15%; 4.44%. Activity 3 corresponds to phase 1 of the guided inquiry learning model that focuses the attention of the students and explains the inquiry process. At this stage the teacher's activity is giving apperception and motivation to students.

Activity 4 was making groups. The percentage of activities in the first, second, and third meeting respectively 2.96%; 2.22%; 2.96%. Activity 4 corresponds to phase 2 of the guided inquiry learning model that presents the problem of inquiry. Activity 5 was doing irrelevant activities. The percentage in the first, second, and third meeting respectively 3,70%; 1.48%; 2.22%. Activity 5 corresponds to phase 4 of the guided inquiry learning model that is encouraging students to collect data to test hypotheses. This irrelevant activity sometimes appears when conducting experiments, in one group there is one student who does activities other than discussing and working on students worksheet.

Activity 6 was reading phenomena in students worksheet. The percentage of activities in the first, second, and third meeting respectively 2.96%; 2.22%; 2.96%. Activity 6 corresponds to phase 2 of the guided inquiry learning model presents the inquiry problem. Activity 7 was conducting group discussions. The percentage of activities in the first, second, and third meeting respectively 11.11%; 6.67%; 8.15%. Activity 7 corresponds with phase 3 of the guided inquiry learning model that was asks students to formulate hypotheses to explain the problem. The teacher asked students to make a problem statement based on the phenomenon in the students worksheet.

Activity 8 was formulating the problem formulation. The percentage of activity 8 in the first, second, and third meeting was 2.22%. Activity 8 corresponds to phase 3 of the guided inquiry learning model asks students to formulate hypotheses to explain the problem. The critical thinking skills component that was trained on students in activity 8 was interpretation.

Activity 9 was formulating a hypotheses. The percentage of activity 9 in the first, second, and third meeting was 2.22%. Activity 9 corresponds to phase 3 of the guided inquiry learning model that is asking students to formulate hypotheses to explain

the problem. The critical thinking skills component that was trained on students in activity 9 was inference. Activity 10 was identifying the experiment variables. The percentage of activity 10 in the first, second, and third meeting was 3.70%. Activity 9 corresponds to phase 3 of the guided inquiry learning model that was asking students to formulate hypotheses to explain the problem. Components of critical thinking skills that was trained on students in activity 10 was interpretation..

Activity 11 was conducting an experiment. The percentage of activity 11 in the first, second, and third meeting respectively 21.48%; 22.22%; 22.96%. This activity 11 corespond to phase 4 of the guided inquiry learning model encourages students to collect data to test hypotheses. Activity 12 was recording the results of the experiment. The percentage of activity 12 in the first, second, and third meeting was 3.70%. Activity 12 corresponds to phase 4 of the guided inquiry learning model encourages students to collect data to test hypotheses. Components of critical thinking skills that are trained on students in activity 12 was interpretation. The results of experiments that was obtained by students then put into the tables that have been provided and then changed in graphical form.

Activity 13 was analyzing the experimental data. The percentage of activity 13 in the first, second, and third meeting respectively was 8.89%. Activity 13 corresponds to phase 4 of the guided inquiry learning model encouraging students to collect data to test hypotheses. In this activity 13 the critical thinking skills component that is trained on students is analysis. Activity 14 was concluding observational data. The percentage of activity 14 in the first, second, and third meeting was 4.44%. Activity 14 corresponds to phase 5 of the guided inquiry learning model for formulating explanations and / or conclusions. The critical thinking skills component that was trained on students in activity 14 was inference.

Activity 15 was presenting the results of the discussion. The percentage of activity 15 in the first, second, and third meeting respectively 8.15%; 6.67%; 7.40%. Activity 15 corresponds to phase 6 of the guided inquiry learning model reflects the problems and thought processes used during the investigation. The critical thinking skills component that was trained on students in activity 15 was explanation. Teacher acted as a moderator between the groups that present the results of observation and correct the answer of the students.

The dominant activity obtained at meetings 1, 2 and 3 was activity 11 conducting experiments. Based on the results of this research it can be seen that in the first meeting the activities carried out by students are mostly still guided by the teacher so that assistance was needed and in meetings 2 and 3 the guidance of the teacher decreases little by little because the students have learned from their experience in meeting 1. All activity at this meeting in line with the opinion states that guided inquiry in the early stages of guidance is given more, and gradually reduced, in accordance with the development of learners' experiences [18].

Critical Thinking Skills

Facione formulated six components of critical thinking, those are interpretation, analysis, evaluation, inference, explanation and self regulation [4]. The critical thinking skills components that were trained in this research include the components of interpretation, inference, analysis and explanation. The tests were given in the form of pretest and posttest, where the pretest was given before the implementation of the guided inquiry learning model and the posttest was given after the implementation of the guided inquiry learning model. The average pretest and posttest results can be seen in Table 3.

Table 3. Pretest and Posttest Results of Critical Thinking Skills

No	Students	*Pretest*	*Post test*	*Gain Score*	Category
1	S 1	18.75	90.63	0.88	High
2	S 2	33.59	96.88	0.95	High
3	S 3	17.19	93.75	0.92	High
4	S 4	6.25	85.16	0.84	High
5	S 5	15.63	85.94	0.83	High
6	S 6	9.38	86.72	0.85	High
7	S 7	25.78	85.94	0.81	High
8	S 8	7.03	83.59	0.82	High
9	S 9	29.69	88.28	0.83	High
10	S 10	5.47	78.91	0.78	High
11	S 11	16.41	92.19	0.91	High
12	S 12	17.97	92.19	0.90	High
13	S 13	11.72	79.69	0.77	High
14	S 14	4.69	78.13	0.77	High
15	S 15	7.81	87.50	0.86	High
16	S 16	8.59	87.50	0.86	High
17	S 17	6.25	85.94	0.85	High

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No	Students	*Pretest*	*Post test*	*Gain Score*	Category
18	S 18	7.81	78.13	0.76	High
19	S 19	12.50	87.50	0.86	High
20	S 20	17.19	77.34	0.73	High
21	S 21	25.78	82.81	0.77	High
22	S 22	18.75	96.09	0.95	High
23	S 23	14.84	92.97	0.92	High
24	S 24	23.44	89.84	0.87	High
25	S 25	8.59	93.75	0.93	High
26	S 26	18.75	85.16	0.82	High
27	S 27	25.78	93.75	0.92	High
28	S 28	20.31	87.50	0.84	High
29	S 29	14.84	78.13	0.74	High
30	S 30	25.78	89.84	0.86	High
31	S 31	17.97	95.31	0.94	High
32	S 32	14.84	88.28	0.86	High
33	S 33	4.69	82.03	0.81	High
34	S 34	7.81	87.50	0.86	High

Information :
S = Student

Pretest was used to measure initial students' critical thinking skills. It consists of 16 questions. In the pretest all students scored below the minimun criteria which was <75. This was because students were still unable to connect the knowledge that has been obtained with new knowledge they got. Many students also did not answer because they were confused. In the process of teaching and learning activities, students were trained to be able to answer critical thinking skills through students worksheet. After learning process, students were able to answer the components of critical thinking skills so that the posttest scores increase. In the posttest, almost all students scored above minimun criteria ≥75. Based on Table 3 it can be seen that from 34 students, there were no students who received the low and medium categories. All students were in the high category. So it can be concluded that there were increasing of the critical thinking skills. This corresponds to research conducted by Duran which states that the implementation of IBL (Inquiy Based Learning) learning to students was able to increase students' critical thinking skills significantly [19].

Cognitive Learning Outcomes

Learning outcomes were the changes that occur in students both concerning cognitive, affective, and psychomotor aspects as a result of learning activities. In simple terms, what was meant by students' learning outcomes was the ability obtained by students after going through learning activities [16]. The posttest results of students' cognitive learning outcomes can be seen in Table 4.

Table 4. Posttest Cognitive Learning Outcomes

No	Students	*Post test*	Information
1	S 1	66,67	NC
2	S 2	83,3	C
3	S 3	83,3	C
4	S 4	83,3	C
5	S 5	75	C
6	S 6	83,3	C
7	S 7	83,3	C
8	S 8	83,3	C
9	S 9	83,3	C
10	S 10	83,3	C
11	S 11	83,3	C
12	S 12	83,3	C
13	S 13	41,6	NC
14	S 14	83,3	C
15	S 15	83,3	C
16	S 16	83,3	C
17	S 17	58,3	NC
18	S 18	83,3	C
19	S 19	83,3	C
20	S 20	83,3	C
21	S 21	75	C
22	S 22	83,3	C
23	S 23	83,3	C
24	S 24	66,67	NC
25	S 25	75	T
26	S 26	83,3	T
27	S 27	66,67	NC
28	S 28	83,3	C
29	S 29	75	C
30	S 30	75	C
31	S 31	83,3	C

No	Students	*Post test*	Information
32	S 32	83,3	C
33	S 33	75	C
34	S 34	83,3	C

Information :
S = Student
NC = Not Complete
C = Complete

Understanding the concept of sub matter factors that influence the rate of reaction include factors such as concentration, surface area, temperature and catalyst in students measured using the test questions in the form of multiple choice questions. Posttest questions on cognitive learning outcomes consisted of 12 questions with details of the questions using the concentration factor on the number of questions 1, 2 and 3. 2 questions about the surface area factor in the question numbers 4 and 5. 3 questions about the temperature factor in questions number questions 6, 7 and 8. 4 questions about catalyst factors in question numbers 9, 10, and 11. 1 question about the factors - factors that affect reaction rate. This posttest value was used to determine students' understanding of concepts after being treated using the guided inquiry learning model. Student learning outcomes were said t\ complete when students got a value of ≥70.

Based on Table 4, there are 5 students included in the category of incomplete because the value obtained is less than minimun criteria that is <70 namely S 1, S 13, S 17, S 24, and S 27. S 13 gets the lowest value of 41.60 which is quite far from minimun criteria. Critical thinking skills outcomes of S 13, especially in the component of analyst and inference get a not too satisfying value that is 75. This was one of the reasons S 13 cognitive posttest score got the lowest value because the analysis and explanation components were components that were closely related to cognitive learning outcomes because in the component The students were asked to answer questions based on the concepts of the reaction rate factors that they lready have.

The cause of students not completing cognitive learning outcome are students are less able to relate what has been learned in the phenomena in students worksheet when training critical thinking skills with the questions that provided in cognitive posttest. Teachers also did not provide some exercises to students because teachers only focus on training the components of critical thinking skills so that students have difficulty answering cognitive learning outcomes tests. Based on the results obtained it can be said that the guided inquiry learning model can achieve classical completeness of student learning outcomes where the average posttest score of student learning outcomes is 83.30 with data on 29 students completing or 85.30% and 5 students not completing 14.70. This is in line with Qureshi's research which states that the implementation of inquiry learning models can increase grades in chemistry subjects as well as increase students' confidence [21]. It is also streghtened that there is improvement in learning outcomes that obtained by the students because the implementation of guided inquiry [22].

CLOSING

Conclusion

The conclusions of this study are:

1. Implementation of Learning Models.
   The implementation of the guided inquiry learning model to hone students' critical thinking skills on sub Matterfactors that influence the reaction rate of class XI of SMA Negeri 2 Bangkalan to improve critical thinking skills on the reaction rate matter obtained a percentage of 98.86% at meeting 1 and 96.21% at meeting 2, and 99.62% at meeting 3. This shows that the learning carried out during the three meetings was included in the very good criteria.
2. Students Activities
   Student activities that appear in learning process the process of teaching and learning activities using guided inquiry learning models to improve students' critical thinking skills on sub Matter factors that influence the reaction rate of class XI SMA Negeri 2 Bangkalan at meeting 1, 2, and 3 respectively was 96.30%; 98.52% and 97.78%. While the irrelevant activities at meetings 1, 2 and 3 respectively was 3.70%; 1.48% and 2.22%. Based on the average percentage of each meeting, it can be concluded that the activities of students in teaching and learning activities are in accordance with the syntax of the guided inquiry learning model. That is because the percentage of relevant activities is greater than the percentage of irrelevant activities.
3. Critical Thinking Skills
   Critical thinking skills in being trained are measured using a critical thinking skills test sheet on the subject matter of the reaction rate. The results obtained are the interpretation

component as much as 100% of students complete in working on the posttest questions, and as many as 100% get a score gain with high high criteria. In the analysis component, 100% of students completed in working on the posttest questions, and 97.05% received a score gain with the criteria of High and as much as 2.95% gained a score with a moderate criteria. In the inference component, students complete their work on posttest questions by 100%, and as many as 91.14 get a score gain with criteria High and as much as 8.86% get a score gain with criteria being. In the explanation component of students completing in completing the posttest questions as much as 100%, and as much as 94.11% gained a score with a High criteria and as much as 5.89% gained a score with a moderate criteria. Skills successfully trained and improvement seen based on the score gain criteria.

4. Cognitive Learning Outcomes
   Student learning outcomes through the imlementation of guided inquiry learning models to train students' critical thinking skills in the Sub Matter Factors that Affect Reaction Rate are said to be complete if the students get a minimun criteria value of ≥ 75. Obtained student learning outcomes ie as many as 31 students completed or 85.29% and 5 students were incomplete or 14.71%.

Suggestion

1. Researchers need to pay attention to the allocation of time so that teaching and learning activities are more effective, especially if teaching and learning activities are carried out in the morning because when in the morning many students were late
2. In the critical thinking skills of inference, the average posttest score is low, for further researchers need to pay more attention and guide students in working on inference especially in making hypotheses
3. The process of providing guidance to the guided inquiry learning model in this research is needed more careful planning so that all students get the same guidance because researchers sometimes focus too much on one or two groups.
4. Teachers must further enhance students' understanding of each conceptual factor affecting the rate of reaction by giving examples of questions to be used as student training so that later all students are thoroughly completed in the posttest of cognitive learning outcomes.

REFERENCES

1. Mulyasa. (2005). *Menjadi Guru Profesional*. Bandung: PT. Remaja Rosdakarya.
2. Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 20 Tahun 2016 tentang Standar Kompetensi Lulusan Pendidikan Dasar Dan Menengah.
3. Fisher, Alec. (2008). *Berpikir Kritis Sebuah Pengantar*. Jakarta: Erlangga.
4. Facione, P.A. (2011). *Critical Thinking: What It Is and Why It Counts.* Hermosa Beach: Measured Reasons LLC.
5. OECD. (2016). *PISA 2015 Results in Focus*. New York: Columbia University.
6. OECD. (2019). *PISA 2018 Insight and Interpretation.* New York: Columbia University.
7. Imamah, Nur dan Nasrudin, H. (2015). Penerapan Model Pembelajaran Inkuiri Untuk Melatihkan Keterampilan Berpikir Kritis Peserta didik Pada Materi Laju Reaksi di Kelas XI SMAN 1 Sreseh Sampang. *UNESA Journal of Chemical Education,* 4(2), 212-217
8. Nur, M. dan Wikandari, P. R. (2008). *Pengajaran. Berpusat Kepada Siswa dan Pendekatan Konstruktivis dalam Pengajaran.* Surabaya: UNESA.
9. Ilaah, Yony Faidlul dan Bertha Yonata. (2015). Keterampilan Berpikir Kritis Peserta didik SMA Kemala Bhayangkari 1 Surabaya Pada Materi Laju Reaksi Melalui Penerapan Model Pembelajaran Inkuiri. *UNESA Journal of Chemical Education,* 1(1), 78-83.
10. Nasution, Khairun Nisak. Edi Syahputra., dan Mulyono. (2018). The Effect of Guided Inquiry Learning Based on Deli Malay Culture Context Towards Students' Mathematical Critical Thinking. *American Journal of Educational Research,* 6(10), 1414-1420.
11. Riduwan. (2015). *Skala Pengukuran Variabel–Variabel Pendidikan*. Bandung: Alfabeta.

12. Hake, Richard. R. (2002). "Analyzing Change / Gain Score". Departement of Physics Indiana University. (Online) (http;//www.physics.indiana.edu/~sdi/ AnalyzingChange-Gain.Sf). Diakses pada tanggal 28 Mei 2019.

13. Hamalik, Oemar. (2011). *Proses Belajar Mengajar*. Jakarta: Bumi Aksara.
14. Arends, Richard I. (2013). *Learning To Teach "Belajar Untuk Mengajar".* Yogyakarta: Pustaka Pelajar.

15. Nur, Mohamad. (2000). *Strategi-Strategi Belajar*. Surabaya: UPRES Unesa.

16. Sanjaya, Wina. (2012). *Strategi Pembelajaran Berorientasi Standar Proses Pendidikan Edisi 1*. Jakarta: Kencana Prenadamedia Group.

17. Slavin, Robert. E. (2006). *Cooperative Learning (Teori, Riset, Praktik).* Bandung: Nusa Media.

18. Sound, R.B., dan Trowbridge, L.W. (1973). *Teaching Science by Inquiry in the Secondary School Second Edition*. Ohio: Charles E. Merril Publishing Company.

19. Duran, Meltem dan Dökme, İlbilge. (2016). The Effect Of The Inquiry-Based Learning Approach On Student's Critical Thinking Skills. *Eurasia Journal of Mathematics, Science & Technology Education,* 12(12), 2887-2908.
20. Ahmad Susanto. (2013). *Teori Belajar dan Pembelajaran di Sekolah Dasar*. Jakarta: Kencana Prenadamedia Group.

21. Qureshi, Sheila dkk. (2017). Inquiry –Based Chemistry Education in a High-Context Culture: a Qatari Case Study. *International Journal of Science and Mathematics Education,* 15(6), 1017-1038.

22. Almuntasheri, S., Gillies, & Wright. (2016). The Effectiveeness of aGuided Inquiry – based Teachers' ProfessionL Development Programme on Saudi Students Understanding of Density. *Journal of Science Education Internatinal,* 27, 16-39