J. Pijar MIPA, Vol. 17 No.2, March 2022: 148-155 ISSN 1907-1744 (Print)
DOI: 10.29303/jpm.v17i2.3272 ISSN 2460-1500 (Online)

IMPLEMENTATION OF THE GUIDED INQUIRY LEARNING MODEL TO TRAIN CRITICAL THINKING SKILLS IN SENIOR HIGH SCHOOL

Muti'atus Sholehatu Nurdiyah and Bertha Yonata*
Chemistry Education Study Program, Faculty Mathematics and Natural Science, Universitas Negeri Surabaya, Indonesia
*Email: berthayonata@unesa.ac.id

Received: December 24, 2021. Acceped: February 3, 2022. Published: March 5, 2022

Abstract: This research aimed to determine students' critical thinking skills by applying the guided inquiry learning model to the reaction rate material. This type of research is a pre-experimental design, with a One-Group Pretest-Posttest Design. This research was conducted on 36 students in class XI MIPA 6 SMA Negeri 1 Menganti Gresik who had not received material about reaction rates. The outcome of this study indicate that: (1) The application of the guided inquiry learning model at the first meeting got a percentage of 95%, at the second meeting 96% with a very good category; (2) Percentage of relevant activities is higher than irrelevant activities; (3) Students' critical thinking skills were successfully trained with an increase in the test as seen through the average N-gain value on the interpretation indicator of 0.86 (high), the inference indicator of 0.83 (high), the analysis indicator of 0.77 (high), and an explanation indicator of 0.80 (high); (4) Cognitive learning outcomes obtained by students showed an increase between pretest and posttest, with an average n-gain value of 0.84 in the high category and from the results of the paired sample t-test, Sig. (2-tailed) 0.000 < 0.005, so there is a significant difference; (5) Student responses to the applied learning model, namely guided inquiry, were very good with a percentage of 95%. This result indicates that the guided inquiry learning model can train the critical thinking skills of class XI students on the reaction rate material.

Keywords: *Guided Inquiry, Critical Thinking Skills, Reaction Rates.*

INTRODUCTION

The industrial revolution 4.0 is marked by digital technology that is increasing. It is a challenge for learning in the 21st century. Every individual has thinking skills and mastery of technology ready to compete and win an increasingly fierce competition with other countries. One of the skills that must be possessed is learning and innovation skills 4C, which consists of four aspects: critical thinking skills (critical thinking), communication, cooperation and collaboration, and creativity.

Based on data from The Learning Curve Pearson 2014, a world education ranking agency explained that Indonesia occupies the final position in the quality of education worldwide, in the 40th position with a ranking index and overall score of minus 1.84. It proves that the quality of education must be improved. Learning is a problem faced in the world of education. Students do not develop thinking skills. The learning process that has developed so far is the ability of students to memorize information. It makes students accustomed to learning facts by ignoring concepts [1].

Learning that builds its cognitive structure through data, theory, or facts observed by students is in science learning [2]. The purpose of learning chemistry is based on the 2016 Minister of Education and Culture Number 21 regarding the content standards of primary and secondary education. States that the level of secondary or high school education (Class X-XII SMA / MA / SMALB / PAKET C) explains that critical thinking skills are one of several needs. Student competencies are helpful in the future. Necessary thinking skills need to be trained gradually and continuously and not inherited from parents or congenital [3]. Almost all jobs require high-level skills such as critical thinking, reasoning, decision making, and problem-solving abilities [4].

Critical thinking skills (CTS) will create individuals who can solve problems and make decisions through the cognitive process [5]. The necessary thinking skills involved are interpretation, analysis, evaluation, inference, explanation, and self-regulation. This study uses four of the six indicators, namely Interpretation, Inference, Analysis, and Explanation. It is due to adjusting the syntax of the model used.

A critical thinking process is one of the high-level thinking that students must have because critical thinking can train students to analyze and solve science problems [6]. In addition, relevant research from Cahyani & Azizah proves that students' low critical thinking skills cause difficulties in understanding chemical concepts [7]. So, it is necessary to train critical thinking skills to students.

Based on interview data with the chemistry teacher of SMA Negeri 1 Menganti Gresik, the teaching and learning process cannot eliminate direct learning. Every lesson in presenting material to students by the teacher is carried out using lectures. So far, learning on the reaction rate material is more conditioned for theoretical discussions. As a result, students have difficulty connecting it with everyday life. The students' pre-research results prove that SMAN 1 Menganti Gresik as many as 32 respondents from 24 respondents stated that they felt difficulty in the reaction rate material. In addition, it is shown that many students still do not understand the four indicators in CTS, namely interpretation, inference, analysis, and explanation. The average value of critical thinking skills obtained is still relatively low.

Developing CTS involves students as thinkers rather than someone who learns verbally. To encourage students' necessary thinking skills to achieve maximum or contextual results, both individually and in groups, it is highly recommended to use a learning model that produces work based on problem-solving in chemistry learning. CTS depends on the character behavior of students [8]. Students need learning models to develop thinking skills, one of which is a guided inquiry model.

The inquiry learning model has several levels and types. According to Arends, the stages of inquiry learning are divided into six stages, namely (1) getting attention and explaining the inquiry process; (2) presenting inquiry problems or inconsistent events; (3) asking students to formulate a hypothesis to explain problems or events; (4) students are supported to collect data to test hypotheses; (5) formulating explanations and conclusions; (6) reflect on problematic situations and the thought processes used to investigate them [9].

Learning that involves students finding and using various sources of information to expand their reasoning about the concepts being studied is a guided inquiry model. The purpose of the inquiry learning model is to encourage students to find their solutions to problems through critical and analytical thinking processes [10]. Supported by the results of previous research, namely, is guided inquiry learning model can be used to train necessary thinking skills by showing results that are in very good criteria [7]. In addition, it is strengthened by research on applying an online-based guided inquiry learning model in the sub-material of factors that affect the rate of reaction that can train students' CTS. It is proven that each component increases with an average of above 65% [11].

The researcher believes that applying a learning model is necessary to train students' CTS based on the previous explanation. Therefore, the researcher wishes to conduct a study entitled "Implementation of the Guided Inquiry Learning Model to Train Critical Thinking Skills of Class XI Students of SMA Negeri 1 Menganti Gresik on Reaction Rate."

RESEARCH METHOD

This study uses a pre-experimental type. It is carried out only in class XI MIPA 6 SMA Negeri 1 Menganti Gresik for the 2020/2021 academic year through the "One Group Pretest-Posttest Design" research design.

O_1 X O_2

Description:
O_1: Pretest
X: Treatment
O_2: Post-test

Three observers carried out the observation sheet to determine the syntactic performance of the teacher when researching the guided inquiry learning model. The criteria are attached in Table 1 below:

Table 1. Teacher Ability

Score	Criteria
0	Not implemented
1	Implemented but not coherently and incompletely Completely
2	Implemented but not coherent
3	Implemented coherently but incomplete
4	Carried out completely and coherently

The results of the percentage assessment of the implementation of the syntax are then analyzed using the following formula:

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

The next percentage is perceived into the implementation category of each syntax which refers to Table 2 as follows:

Table 2. Syntax Implementation Category

No	Percentage	Category
1	0% - 20%	Not very good
2	21% - 40%	Not good
3	41% - 60 %	Fairly good
4	61% - 80%	Good
5	81% - 100%	Very good

[12]

The percentage of implementation of the learning model is said to be successful in the good category if 61%.

The student activity sheet was observed by three observers where this sheet was used to determine student activities during the learning activities. Then it was analyzed descriptive quantitative based on the average obtained from observations, with the following formula:

% Student activity

$$= \frac{\sum frequency\ of\ activity\ occurring}{\sum frequency\ of\ total\ activity\ appear} \text{ X } 100\%$$

The critical thinking skills test sheet determines students' necessary thinking skills through pretest and posttest with N-Gain scores as follows:

$$n - gain = \frac{score\ posttest - score\ pretest}{score\ maksimal - score\ pretest}$$

The N-Gain results obtained are classified in the following categories in Table 3:

Table 3. Criteria for N-Gain Value

Value Range	Category
G ≥ 0.7	High
0.3 ≤ G < 0.7	Medium
G < 0.3	Low

[13]

In this study, inquiry learning is categorized as increasing if the N-Gain score obtained is moderate to high. The learning outcomes of students' cognitive domains were carried out by analyzing the pretest and posttest results. The formula calculates the value of learning outcomes in the cognitive part of students:

$$\text{Student scores} = \frac{\sum Correct\ score\ obtained}{\sum CMaximum\ score} \times 100$$

Classical mastery was determined using the following formula:

$$\%\text{Classical completeness} = \frac{\sum Completed\ students}{\sum All\ students} \times 100\%$$

The pretest and posttest outcomes then calculated the value of n-gain to determine the increase in student learning outcomes in the cognitive domain. Furthermore, by calculating the gain value, student learning outcomes were also analyzed statistically with the normality test and t-test to determine the difference in the pretest-posttest scores. The T-test refers to the provision's hypothesis by statistics, namely H_o and H_1.

Student responses to the given learning were analyzed using student response questionnaires. The results of the responses obtained were analyzed using the Guttman scale criteria, according to Table 4 below:

Table 4. Guttman's scale criteria

Answer	Score
Positive (Yes)	1
Negative (No)	0

Next, the observations of student responses were analyzed using the following formula:

$$\%\ \text{Questionnaire score} = \frac{\sum Answer\ "Yes"}{\sum All\ students} \times 100$$

The learning model applied can be good if the student responses get positive results by ≥61%.

RESULT AND DISCUSSION

The research on the application of the guided inquiry learning model to train critical thinking skills on the reaction rate material carried out in class XI MIPA 6 SMA Negeri 1 Menganti Gresik for the 2021/2022 academic year for two meetings obtained the following results:

Implementation of the Guided Inquiry Learning

This observation aims to determine the implementation of the syntaxes used by the teacher when applying the learning model. Three observers carried out this observation by filling out the learning implementation sheet. The results of the research are in Figure 1.

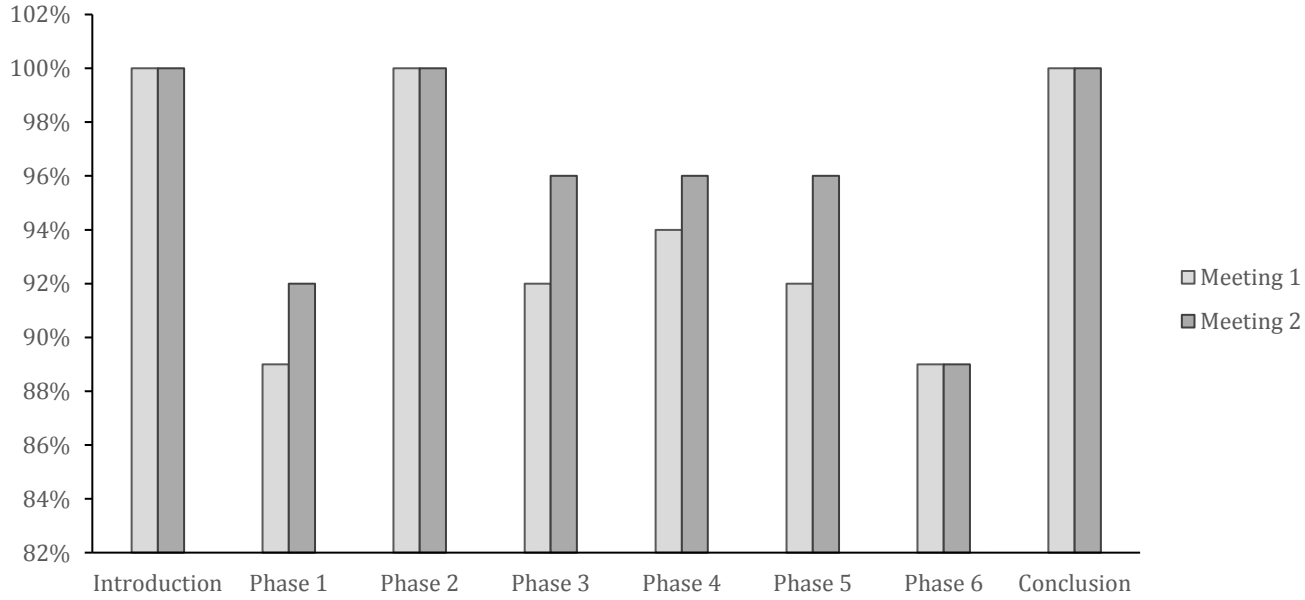

Figure 1. Percentage of Guided Inquiry Learning Implementation.

This observation was carried out in 2 meetings; there were 6 phases of guided inquiry in each session. As for the syntax of guided inquiry learning, (1) focusing students' attention; (2) Presenting a phenomenon; (3) helping students explain phenomena by formulating hypotheses; (4) support students to collect data; (5) formulation and conclusion; (6) reflect on problem situations and thought processes [9].

In the preliminary activity, the teacher opens the meeting by greeting. The teacher appoints one of the students present in the class to pray together and check student attendance. Next, the teacher links the students' understanding and the collision theory (apperception).

Phase 1 focuses on students' concerns and explains the inquiry learning process. In this phase, the teacher's role is to present the problem and define the inquiry procedure to students. The teacher conveys the learning objectives and explains the stages of delivering the material by applying the guided inquiry learning model. Next, the teacher presents a phenomenon related to one of the factors that affect the reaction rate.

Phase 2 presents a phenomenon. In this phase, the teacher divides into six groups. The teacher encourages students to collect information about phenomena that have been experienced or have been seen.

Phase 3 is to formulate a hypothesis to explain the phenomenon. The teacher conditions the students to develop the appropriate problem formulations, hypotheses, and variables based on the phenomena in the worksheets with the guidance and direction of the teacher. In this phase, critical thinking skills training on interpretation and inference components.

Phase 4 is to encourage students to collect data. There will be instructions for students to read and understand tools, materials, and experimental procedures in this phase. Then the students experimented according to the experimental process. Next, students observe and write down observational data based on experiments carried out in the space provided in the worksheet. In this phase, critical thinking skills trains on the interpretation component.

Phase 5 is the formulation and conclusion. After students conduct experiments and collect data, the next step is to analyze the data and then answer the questions presented in the worksheets. One of the students presented the results of their discussion. The next step is to conclude by the problem formulation and hypotheses while still receiving guidance and direction from the teacher. In this phase, critical thinking skills are training on interpretation, analysis, and inference components.

Phase 6 is to reflect on the problem situation and thought process. In this phase, students reflect on discussions with the phenomena that have been discussed previously. The teacher's role is limited to supporting and facilitating the learning process, guiding students to ask questions, investigate behavior, make explanations, use observational data and answer questions [14]. In addition, students communicate the factors that affect the rate of reactions in everyday life. A teacher comments on the progress of the discussion and reinforces it by applying reaction rates in life, straightening things that are not right, and making conclusions from the subject matter received that day. In this phase, critical thinking skills are trained on the explanatory component.

In the closing activity, the teacher instructs students to study the following material. The teacher provides motivation by appreciating the learning that has taken place, and finally, the teacher leads a prayer to close the lesson and continues by saying greetings.

Data from the application of the guided inquiry learning model in practicing CTS with a span of 2 consecutive meetings was calculated 95% at meeting 1 and 96% at meeting 2. The analysis results explain that teachers can carry out learning activities according to the phase of guided inquiry to train students' CTS. It is supported by Mukmainah's research which improves students' critical thinking skills related to the reaction rate material by applying the guided inquiry learning model [15]

Student Activities

Student activities were analyzed using student activity observation sheets observed by three observers every 3 minutes of student activity. This analysis aims to determine student activities during the learning process. The observed students' activities are then analyzed descriptively based on the average obtained according to Figure 2.

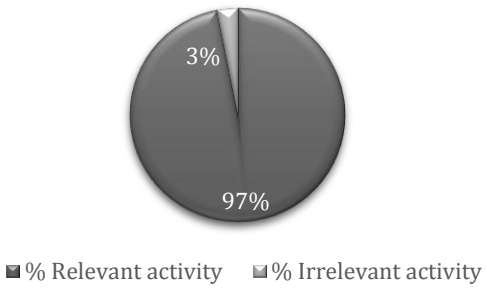

Figure 2. Graph of Student activity

Based on the graph in Figure 2, relevant student activities have a larger percentage than irrelevant activities. The results of previous studies support that relevant student activity appears to be higher based on the lesson plans prepared with the stages of the inquiry learning model [16].

Learning Outcomes in The Realm of Critical Thinking Skills

Critical thinking skills formulate six indicators. This study is only limited to 4 critical thinking indicators: interpretation, inference, analysis, and explanation. At the same time, the other two indicators are evaluation and self-regulation. After treatment, a pretest was conducted and then a posttest to assess critical thinking skills.

Critical thinking skills pretest-posttest values are presented in Figure 3. The outcome N-gain value of the CTS test can be seen in Table 5.

Table 5. Data Value of pretest and posttest KBK for each indicator

Indicator	Pre-test	Post-test	N-Gain
Interpretation	28.88	90.05	0.86
Inference	17.80	86.11	0.83
Analysis	9.55	79.51	0.77
Explanation	5.38	80.73	0.80

Interpretation is an activity to formulate questions from a problem, to understand, explain and give meaning to a problem. Interpretation skills are carried out by students, namely developing problems, determining variables, and making tables of observations. The pretest score and the interpretation phase results reached an average of 28.88%, and the posttest value was 90.05%, with an N-Gain value of 0.86 in the high category.

The inference is a skill to form hypotheses and infer consequences from the form of representation [5]. In this study, students can improve their formulating hypotheses and concluding skills. Based on the pretest results, this inference phase reached an average of 17.80%, and the posttest score was 86.11%, with an N-Gain value of 0.83 in the high category.

An analysis is a skill of deciphering a structure into components to know the organization. The analytical abilities trained are analyzing experimental data by answering questions in the worksheets. In the analysis stage, the average of pretest and posttest scores reached 9.55% and 79.51%, with an N-Gain value of 0.77 in the high category.

An explanation is a skill of expressing the results of one's reasoning in terms of conceptual, methodological, and contextual considerations [5]. In this worksheet, students can improve their reasoning skills by answering questions based on experimental results and connecting them with theory. Based on the pretest scores, the explanation stage reached an average of 5.38% and posttest scores of 80.73%, with an N-Gain value of 0.80 in the high category.

Based on table 3, it is evident that each critical thinking skills indicator has increased. Data on the average value of each indicator on critical thinking skills from 36 students showed an N-gain value of more than 0.7 with high criteria. Previous research explains that students' critical thinking skills have increased with medium and high criteria through the N-gain score [17] and Indahyana's research, which states that students' thinking skills have been successfully trained by increasing n-gain high category [18].

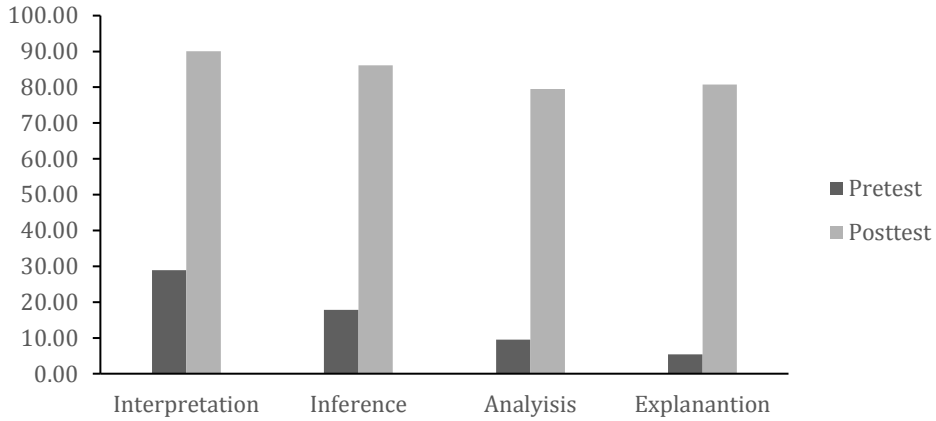

Figure 3. Pretest-Posttest Scores Critical Thinking Skill

Cognitive Domain Learning Outcomes

Cognitive domain learning outcomes tests were conducted to determine students' understanding and abilities of the material given. In this study, the material used to measure student learning outcomes is the reaction rate material. Learning outcomes in the cognitive domain aim to obtain information on students' abilities in mastering the material factors that affect the rate of reaction. On test given consists of 10 questions in the form of multiple choice. The pretest is given when students have not received the reaction rate material, while the posttest is given when students have received the reaction rate material. The two tests were carried out outside the allocation of learning time.

In the following, the comparison results of the average pretest-posttest scores are presented in Figure 4.

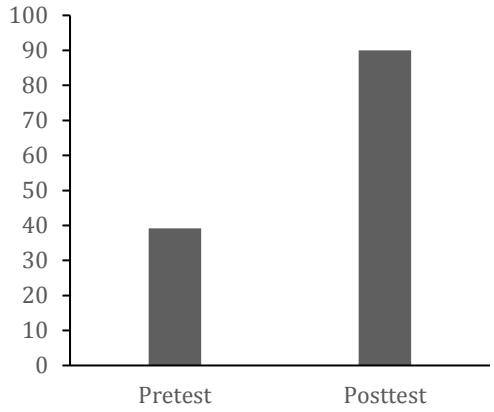

Figure 4. Average pretest and posttest scores

Based on Figure 4, a significant increase in students' cognitive domains can be seen from the average results. Classical completeness obtained is 89%, and the average value of N-Gain is 0.84 in the high category. The completeness of student learning outcomes is undoubtedly supported by implementing the guided inquiry learning model. An application of the inquiry learning model with the experimental method obtained the value of the cognitive domain with the achievement of the specified minimum value of 75. The completeness of student learning outcomes at first to third meetings is 81%, 100%, and 87% [19]. Hidayati's research also states that learning outcomes in the cognitive domain reach an average value of 85.00 with classical completeness of 94.12% [20]. It was reinforced by Basuki & Novita, who explained that implementing teaching and learning using a guided inquiry model could increase the average value of students' cognitive learning outcomes from 51.71 to 89.71 [21].

In addition to being tested by calculating the Gain value, the analysis of student learning outcomes in the cognitive domain was also calculated statistically using a statistical test paired sample t-test to know the difference between the average pretest scores and posttest. The normality test is done first before the T-test is conducted to determine whether the data used were usually distributed. From results of paired sample t-test were obtained by the Sig. (2-tailed) 0.000 < 0.005, which means that there are significant differences between the pretest and posttest, so H_o accepted.

The T-test value of *pretest* and *posttest* are presented in Table 6.

Table 6. Result of Paired Sample T-test

		t	df	Sig. (2-tailed)
Pair 1	Pretest - Postest	-15.780	35	.000

The outcome of the paired sample t-test, Sig. (2-tailed) 0.000 < 0.005 means H_0 is received, and there is a significant difference between the pretest-posttest. Thus, the guided inquiry learning model is adequate for CTS and can train cognitive learning outcomes on the reaction rate material.

Student Responses

Analysis of student responses refers to the results of the questionnaires that students have answered. Questionnaires are addressed to students at the end of the lesson, which contains questions about learning activities carried out for two meetings.

The questionnaire was compiled based on the Guttman scale. The outcome of the average percentage of student responses is presented in Figure 5.

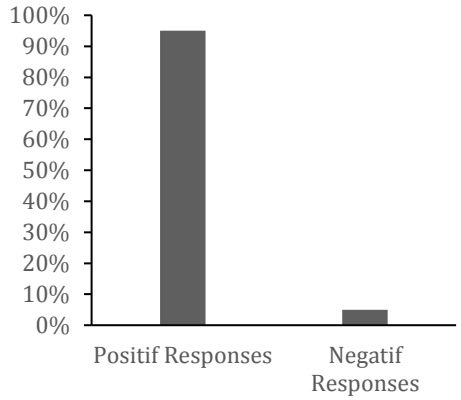

Figure 5. The average percentage of student responses

Based on Figure 5, 95% of students gave positive responses, so the conclusions obtained regarding the applied learning model can be very good. This statement is by Nurmawati opinion, which states that student responses are positive if the average percentage of responses obtained is 61% [22]. It is also reinforced by the analysis of previous research by Agustin that students give a good answer to guided inquiry learning with an average percentage of 81.38% and is classified as very good [23].

CONCLUSION

This study concludes that implementing the guided inquiry learning model was very well executed, and the percentage of relevant student activities is higher. Students' critical thinking skills have increased, which can be seen through the results of N-Gain with high criteria. Learning outcomes in the cognitive domain obtained an average value of n-gain of 0.84 in the high category, and the results of the paired sample t-test showed a significant difference. Students also gave a positive response with very good criteria.

REFERENCES

[1] Rahmawati, Y., Ramadhani, S. F., & Afrizal. (2020). Developing Students' Critical Thinking: A STEAM Project for Chemistry

Learning. *Universal Journal of Educational Research, 8(1),* 72-82.

[2] Parwati, G.A.P.U, dll. (2020). Penerapan Model Pembelajaran Inkuiri Terbimbing untuk Meningkatkan Kemampuan Berpikir Kritis dan Sikap Ilmiah Siswa SMA. *Jurnal Pendidikan Fisika Undiksha*, *10*(1), 49-60.

[3] Sarjono. (2017). Internalisasi Berpikir Kritis dalam Pembelajaran Fisika. *Jurnal Madaniyah, 7*(2), 343-353.

[4] Permendikbud. (2016). *Peraturan Mendikbud No.21 Th. 2016 Mengenai Standar Isi dikdasmen.* Peraturan Mendikbud.

[5] Facione. (2011). *Critical Thinking: What It Is and Why It Counts*. Hermosa Beach: Measured Reasons LLC.

[6] Seranica, C., Purwoko, A. A., & Hakim, a. A. (2018). Influence of Guided Inquiry Learning Model to Critical Thinking Skill. *IOSR Journal of Research & Method in Education, 12*(4), 407-422.

[7] Cahyani, N. I., & Azizah, U. (2019). Penerapan Model Pembelajaran Inkuiri Terbimbing untuk Melatihkan Keterampilan Berpikir Kritis pada Materi Laju Reaksi Kelas XI SMA. *UNESA Journal of Chemistry Education*. *8*(3), 320-326.

[8] Afrizona, R., Ratnawulan, & Fauzi, d. A. (2012). Peningkatan Perilaku Berkarakter dan Keterampilan Berpikir Kritis Siswa Kelas IX MTsN Model Padang pada Mata Pelajaran Ipa-Fisika Menggunakan Model Problem Based Instruction. *Jurnal Penelitian Pembelajaran Fisika*, *1*(1), 1-16.

[9] Arends, R. I. (2012*). Learning to Teach 9th ed.* New York: Mc Graw Hill.

[10] Sanjaya, W. (2012). *Strategi Pembelajaran Berorientasi Standar Proses Pendidikan*. Bandung: Kencana.

[11] Ishma, E. F., & Novita, D. (2020). Implementasi LKPD Inkuiri Terbimbing Online untuk Melatihkan Keterampilan Berpikir Kritis Materi Faktor Laju Reaksi. *Chemistry Education Paractice , 4*(1), 11-18.

[12] Ridwan. (2015). *Skala Pengukuran Variabel-Variabel Penelitian.* Bandung: Alfabeta.

[13] Asni, Wildan, & Hadisaputra, S. (2020). Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Hasil Belajar Kimia Siswa Materi Pokok Hidrokarbon pada Kelas XI PMIPA SMAN 1 Woha Tahun Ajaran 2019/2020. *Chemistry Education Practice, 3* (1), 18-22.

[14] R.Dewita, & Y.Ahda. (2019). Development of Guided Inquiry-based Worksheets on Colloidal Material for Chemistry Learning Grade XI in Senior High School. *International Journal of Progressive Sciences and Technologies,* 142-147.

[15] Mukmainah, S. A., & Yonata, B. (2020). Penerapan Model Pembelajaran Inkuiri Terbimbing untuk Meningkatkan Keterampilan Berpikir Kritis Peserta Didik pada Materi Laju Reaksi di SMAN 1 Rengel. *UNESA Journal of Chemistry Education*, *9*(1),133-139.

[16] Andriani, D. W., & Yonata, B. (2018). Melatihkan High Order Thinking Skills Peserta Didik melalui Implementasi Model Pembelajaran Inkuiri pada Materi Kesetimbangan Kimia. *Unesa Journal of Chemical Education, 7*(3), 333-339.

[17] Imama, N., & Nasrudin, H. (2015). Penerapan Model Pembelajaran Inkuiri untuk Melatihkan Keterampilan Berpikir Kritis Siswa pada Materi Laju Reaksi di Kelas XI SMAN 1 Sreseh Sampang. *UNESA Journal of Chemical Education, 4*(2), 212-217.

[18] Indahyana, A., & Nasrudin, H. (2021). Analysis of Critical Thinking Skills In Reaction Rate Using Guided Inquiry With Web-Assisted Courses. *Chemistry Education Practice, 4*(3), 215-225.

[19] Nurkhasanah, I. O., & Yonata, B. (2017). Ketampilan Proses Sains Siswa Kelas XI MAN 2 Gresik pada Materi Laju Reaksi melalui Model Pembelajaran Inkuiri dengan Metode Eksperimen. *UNESA Journal of Chemistry Education, 6*(1), 43-50.

[20] Hidayati, N., & Yonata, B. (2019). Penerapan Model Pembelajaran Inkuiri Terbimbing untuk Melatihkan Keterampilan Proses Sains Peserta Didik pada Materi Kesetimbangan Kimia Kelas XI SMAN Ngoro Jombang. *Unesa Journal of Chemical Education*, *8*(2), 148-155.

[21] Basuki, B. B., & Novita, D. (2019). Penerapan Model Pembelajaran Guided Inquiry dengan Pendekatan Nested untuk Melatihkan Keterampilan Berpikir Kritis Siswa Kelas XI SMA pada Materi Laju Reaksi. *UNESA Journal of Chemistry Education*, *8*(2), 250-258.

[22] Nurmawati, L., & Novita, D. (2022). Application of A Guided Inquiry Learning Model Assisted by A Student Worksheet to

Improve High School Students' Analytical Skills. *Jurnal Pijar Mipa, 17*(1), 106 – 111

[23] Agustin, R., & Supardi, Z. (2014). Penerapan Model Pembelajaran Inkuiri Terbimbing untuk Melatihkan Kemampuan Keterampilan Berpikir Kritis Siswa Kelas XI SMAN 1 Kalianget. *Jurnal Inovasi Pendidikan Fisika (JIPF), 3*(2), 14-19.