p-ISSN 2549-9947
e-ISSN 2614-1426
IJCER doi: 10.20885/ijcer.vol5.iss1.art1

Implementation of Guided Inquiry-Based on Blended Learning to Improve Students' Metacognitive Skills in Reaction Rate

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Received: February 11, 2021; Accepted: March 15, 2021; Published: April 10, 2021

ABSTRACT: The development of the educational paradigm in the 21st century emphasizes learning oriented to higher-order thinking skills, one of them is metacognitive skills. This study aims to improve the metacognitive skills of students through a guided inquiry learning model based on blended learning in reaction rate material. The research design used is One-Group Pretest-Posttest Design. The research was conducted in class XI MIPA 5 SMAN 2 Pamekasan. The data were obtained using the observation sheet instrument for the implementation of the learning model, the activities of the students, and the metacognitive skills test sheet. Data analysis was performed using the percentage, mean, n-gain, and paired t-test techniques. The results showed that 1) Guided inquiry learning model based on blended learning is carried out well with an average percentage of phase 1 of 94.88%, phase 2 of 100%, phase 3 of 97.92%, phase 4 of 98.44% and phase 5 of 96.88%, 2) The percentage of students' activities who are actively involved and relevant to guided inquiry learning model based on blended learning is 87.41%, 3) The metacognitive skills of students have increased in terms of the n-gain range, namely 0.53 - 0.62 with the medium category, dan 4) there is a significant difference in the results of metacognitive skills between before and after being given a guided inquiry learning model based on blended learning. The results showed that the guided inquiry learning model based on blended learning was effective in improving students' metacognitive skills.

Keywords: guided inquiry learning, blended learning, metacognitive skills, the reaction rate

INTRODUCTION

Education is one of the most important parts of the quality of human resources. Education in Indonesia is faced with challenges to produce human resources that are able to compete globally in the future. In line with the development of the educational paradigm in the 21st century, education in Indonesia emphasizes learning oriented to higher-order thinking skills. Metacognition is a skill that refers to higher-order thinking which plays an important role in shaping students to be more independent [1]. Metacognition is also a higher-order thinking activity because this activity is able to control the thinking process that takes place in oneself [2]. Flavell argues that although there is little empirical evidence, metacognition plays an important role in various areas of learning such as oral communication in information, oral persuasion, oral and reading comprehension, writing, language acquisition, attention, memory, problem solving, social cognition, and various types of self-control. and self-instruction [3]. Metacognitive skills have an important role in learning success, so it is important to learn metacognitive skills in order to determine how students are taught to apply cognitive resources through metacognitive control [4].

Metacognitive skills aim to improve the learning and understanding of students so that they can help students achieve their learning goals. Metacognitive skills are an important aspect of learning process because metacognitive skills are the ability to monitor and control oneself and look back at the learning process. Metacognitive skills according to Flavell refer to activities that control a person's thinking and learning such as planning skills, monitoring skills and evaluating skills [5]. Metacognition emphasizes individual awareness of their own thought processes so that individuals are aware of monitoring and controlling mental activities. If students have good metacognitive skills, they students will be independent in managing their own learning. Metacognitive skills play an important role in many cognitive activities such as understanding, communication, attention, memory, and problem-solving [6].

However, the results of the pre-research questionnaire were obtained from 31 students of class XII of SMAN 2 Pamekasan on July 30, 2020, as many as 58.33% of students did not determine their learning objectives first (planning skills), 66.67% did not review the material from the results obtained (monitoring skills), and 83.33% of students did not reflect or think whether they had achieved their learning goals (evaluating skills). Based on the results of the questionnaire, it can be concluded that metacognitive skills are still low. This is supported by previous research which revealed that students 'metacognitive skills were still low because classroom learning had not been accustomed to empowering students' metacognitive skills [7]. Low metacognitive skills also have an impact on students' less systematic thinking. This causes students to find it difficult to understand chemical concepts which result in low student learning outcomes. Students who have good metacognitive skills can achieve mastery learning outcomes easily [8]. This fact is reinforced by the results of a pre-research questionnaire from 31 students of class XII of SMAN 2 Pamekasan, as many as 51.6% said that chemical material is material that is difficult to understand.

Based on these facts, a learning model is needed so that students become accustomed to control the learning process, start to plan actions, determine the right strategy according to the problem at hand, monitor progress in learning and evaluate the strategies that have been determined in finding and mastering a concept. With metacognitive skills, students are able to build their own knowledge, determine strategies to use problem-solving, and be able to control learning outcomes. This is in line with Permendikbud Number 22 of 2016 concerning Basic and Secondary Education Process Standards which states that the learning process in educational units is held in an interactive, inspirational, fun, challenging, motivating students to participate actively, and provide sufficient space for the initiative, creativity, and independence according to the talents, interests and physical and psychological development of students [9]. One of learning models that involves the active role of students and is in accordance with the characteristics of metacognitive skills is guided inquiry learning model.

Inquiry learning is student-centered learning, so it can train the mental processes and metacognitive skills of students [10]. Inquiry learning can provide competency attainment and learning outcomes are influenced by aspects of knowledge, attitudes, and skills [11]. Guided inquiry is also a type of learning model, where students build their own knowledge about a concept. The inquiry learning model is an innovative learning model that is appropriate for use in science learning [12]. So that the guided inquiry learning model is very suitable when applied to the reaction rate material because it requires the active role of students to analyze the results of practicum with existing theories so that they can build their own understanding. The guided inquiry learning model consists of 5 phases, namely confronting the problem, collecting data-verification, collecting data-conducting experiments, organizing and formulating explanations, and analyzing the inquiry process [13].

In the guided inquiry learning model, students also need sufficient learning resources and with current technological advances, learning can be done by face-to-face learning combined with online learning. The purpose of learning technology is to help, trigger, and stimulate the student learning process and provide learning facilities or facilities [14]. One of online learning methods that can be used is blended learning. Based on previous research, an increase in learning independence from students was obtained through blended learning based learning [15]. Blended learning-based learning is one that combines online and offline learning. In online reaction rate learning activities using several online applications such as G-classroom, G-meet, and WhatsApp group. Several online activities are online learning process using G-meet, downloading worksheets and videos, uploading assignments, taking tests using G-classroom, and using WhatsApp groups for group discussion forums. Meanwhile, offline activities are face-to-face class activities. Blended-based learning supports student-centered learning and provides opportunities for students to develop their own abilities without leaving social interaction in the classroom so that with this system students play more active role in learning while the teacher is only a facilitator.

Based on this description, the purpose of this study is to improve students 'metacognitive skills on the material reaction rate through guided inquiry learning models based on blended learning in terms of model feasibility, learning activities, and students' metacognitive skills.

METHODS

This research is based on blended learning, which combines online and offline learning. In online learning, students use G-meet and get teaching materials through the G-Classroom and Whatsapp. Meanwhile, offline learning is carried out face-to-face in class. This type of research uses pre-experimental research that is only using one study group without a control group as a comparison. The target of this research is high school students of class XI MIPA 5 SMAN 2 Pamekasan, totaling 36 students. The research design used was the One-Group Pretest-Posttest. A design that provides a pretest before the learning process and posttest after the learning process. [16]. The design can be described as follows.

$$\mathbf{O_1\ X\ O_2}$$

FIGURE 1. *One-Group Pretest-Posttest* Design

Where:
O_1 = Pretest value of metacognitive skills (before the guided inquiry learning model is applied)
X = The application of the guided inquiry learning model
O_2 = Posttest value of metacognitive skills (after the guided inquiry learning model is applied)

The learning tools used include syllabus, lesson plan, and student worksheets. The research instrument used was a review and validation sheet, an observation sheet of learning model implementation, student activity observation, pretest and posttest question sheet for metacognitive skills, and metacognitive inventory questionnaire sheet. The instrument used was feasible at 80.45% in terms of content and construct validity, based on the validation results of 2 chemistry lecturer, Surabaya State University.

The data collection technique used the method of observation and skills tests. The observation technique is observing the implementation of the learning model and the activities of students. The test technique is to using metacognitive skills test question sheet in the form of an essay.

Analysis of the implementation of learning used scoring rules. The score is obtained in each phase then the score obtained is converted into a percentage of implementation.

$$\%\ \text{implementation} = \frac{\text{score obtained}}{\text{maximum score}} \times 100\% \qquad [17]$$

To analyze the activities of students by observing the activities of students during the learning process and then calculating the percentage

$$\%\ \text{student activity} = \frac{\Sigma\ \text{the frequency of activity that appears}}{\Sigma\ \text{overall activity frequency}} \times 100\% \qquad [18]$$

Student activities are carried out well if the percentage of relevant activities is greater than the percentage of irrelevant activities [18].

To analyze students' metacognitive skills,based on the results of the pretest-posttest metacognitive skills according to the criteria met and the value is calculated

$$\text{Metacognitive skills} = \frac{\Sigma\ \text{score obtained}}{\Sigma\ \text{maximum score}} \times 100 \qquad [17]$$

The improvement of students' metacognitive skills is determined based on the n-gain with the following formula

$$\langle g \rangle = \frac{\langle g \rangle}{\langle g \rangle maks} = \frac{Sf - Si}{100 - Si} \qquad [19]$$

Note :
Sf : Posttest Score
Si : Pretest Score

TABLE 1. Score gain criteria

Result	Category
g ≥ 0.7	High
0.3 ≤ g > 0.7	Medium
g < 0.3	Low

Students' metacognitive skills can be improved through the application of the guided incurred learning model if there is an increase in skills with moderate (0.7> g ≥ 0.3) or high (g ≥ 0.7) criteria. Furthermore, the normality test is carried out. Due to the data used between 9 s.d. 50 then the best normality test is to use the Shapiro-Wilk test [20]. After that, the t-test was also carried out to determine the difference in the results of the pretest and posttest.

RESULT AND DISCUSSION

Learning Model Implementation

In the blended learning-based guided inquiry learning process, online learning applications are needed as a medium for delivering learning information in overcoming the limitations of face-to-face time in class. Because blended learning-based learning is one that combines online and offline learning, when online meetings use the *G-Classroom* application media, *G-meet,* and also *Whatsapp Group*. Whereas the offline meeting was held face-to-face in class XI MIPA 5 SMAN 2 Pamekasan.

The results of implementation of the guided inquiry learning model based on blended learning on the reaction rate material for 2 meetings are presented in Figure 2.

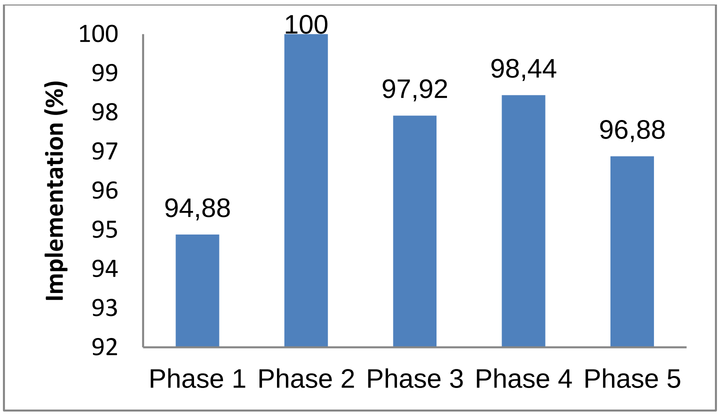
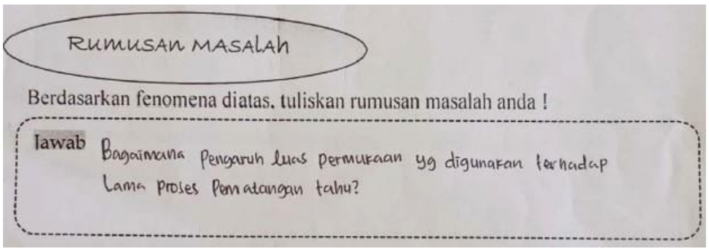


FIGURE 2. Percentage of Guided Inquiry Learning Model Implementation

Based on the data in Figure 2, the results show that the overall implementation of the blended learning based Guided Inquiry learning model has an average of ≥61% with very good criteria. This is in line with previous research which states that all phases of the guided inquiry learning model implemented in chemistry learning have been carried out very well [21], and other findings also state that the application of the guided inquiry learning model to train students' metacognitive skills on chemistry gets good criteria [22].

The first phase is the phase of confronting the problem and explaining the inquiry process. The first phase is the phase where the teacher performs apperception, provides motivation and communicates learning objectives to students using the *G-meet* application. In the apperception activity, the teacher asks questions about the relationship between the previous material, namely the collision theory with the reaction rate material. In motivating activities, the teacher gives problems in the form of phenomena that often occur in everyday life related to reaction rates for example, which cooks faster where fried potatoes are small or large potatoes and which greater where the possibility of a vehicle bumping into another vehicle with a full road and a quiet road. Other than that, more quickly rot fruit that is stored in the refrigerator or that is left open and whichever is faster, the car that goes on the toll road or the car that doesn't go on the toll road. This motivational activity, it's supported by Ausubel's theory which states that meaningful learning takes place if new information obtained by someone is linked to initial knowledge [23]. This phase is oriented towards metacognitive skills, namely *planning skills* through identifying activities to obtain information and think and write what is known and what is not known.

The second phase is the phase of collecting data-verification of the problem situation. In the second phase, students formulate problems based on the phenomena in the student worksheets. Figure 3 is the example result of the student's problem formulation in student worksheets related to the phenomenon of the process of maturation tofu with different sizes that are fried.


RUMUSAN MASALAH

Berdasarkan fenomena diatas, tuliskan rumusan masalah anda !

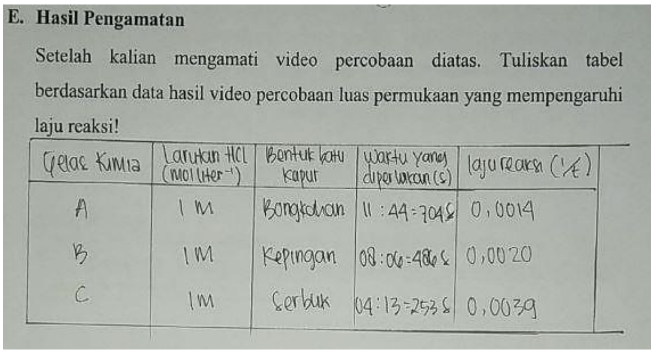
Jawab Bagaimana Pengaruh luas permukaan yg digunakan terhadap Lama proses Pematangan tahu?

FIGURE 3. Result of The Student's Problem Formulation

This phase is very important in lessons because it can arouse students' curiosity [24]. The teacher uploads the worksheet and students download it in the G-Classroom. This phase is oriented towards metacognitive skills, namely planning skills in writing what to do, compiling information and steps to solve problems.

The third phase is the phase of collecting data - conducting experiments. In this stage, students only experiment with video experiments given by the teacher and then on the worksheets and collect data from the video experiment regarding the factors that affect the reaction rate in the form of determining the hypothesis and what variables are used. Students discuss and record the results of observing the experimental video using *Whatsapp Group.* The activity of observing the experimental video was carried out in groups so that students actively participated in gaining experiences and conducting experiments that made them discover the principles and concepts themselves [23]. This phase is oriented towards metacognitive skills, *planning skills* through identifying activities to obtain information.

The fourth phase is the phase of organizing and formulating an explanation. In this phase, students organize the experimental video data, formulate an explanation and conclude the results of the experimental video in groups using *Whatsapp Group*. In the activity of organizing the experimental video data, students wrote their observations into an experimental table show in Figure 4.

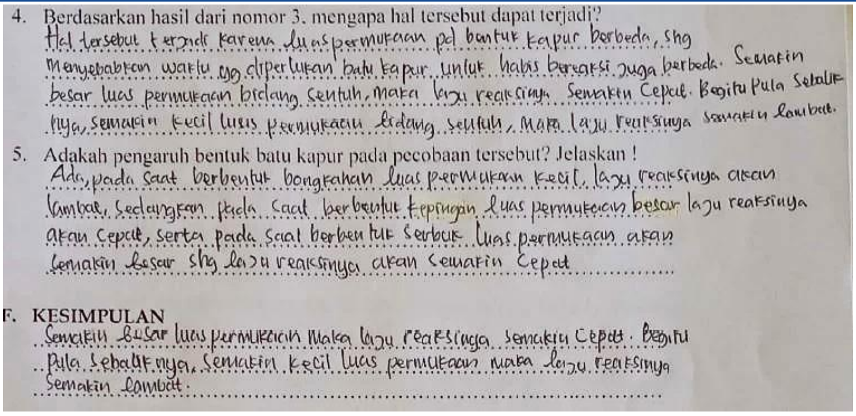

E. Hasil Pengamatan

Setelah kalian mengamati video percobaan diatas. Tuliskan tabel berdasarkan data hasil video percobaan luas permukaan yang mempengaruhi laju reaksi!

Gelas Kimia	Larutan HCl (mol liter^{-1})	Bentuk batu kapur	Waktu yang diperlukan (s)	laju reaksi (1/t)
A	1 M	Bongkahan	11:44=704 s	0,0014
B	1 M	Kepingan	08:06=486 s	0,0020
C	1 M	Serbuk	04:13=253 s	0,0039

FIGURE 4. The results of student observations

While in the activity of formulating explanations, students answered several additional questions on the worksheets and concluded the results of the video experiments show in Figure 5.



4. Berdasarkan hasil dari nomor 3, mengapa hal tersebut dapat terjadi?
Hal tersebut terjadi karena luas permukaan pd bentuk kapur berbeda, shg menyebabkan waktu yg diperlukan batu kapur untuk habis bereaksi juga berbeda. Semakin besar luas permukaan bidang sentuh, maka laju reaksinya semakin cepat. Begitu pula sebaliknya, semakin kecil luas permukaan bidang sentuh, maka laju reaksinya semakin lambat.

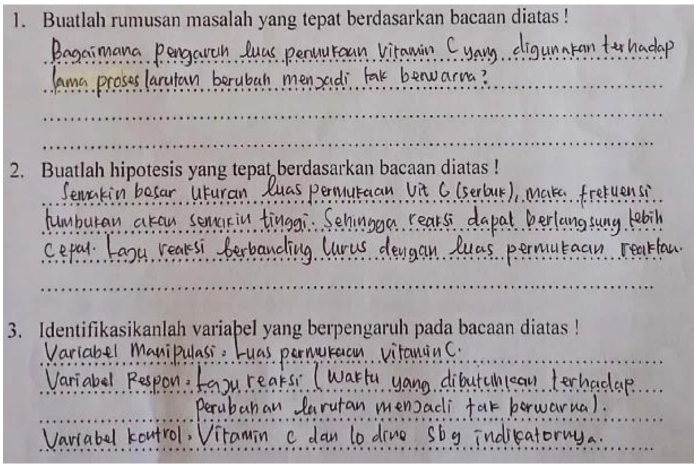
5. Adakah pengaruh bentuk batu kapur pada pecobaan tersebut? Jelaskan !
Ada, pada saat berbentuk bongkahan luas permukaan kecil, laju reaksinya akan lambat, sedangkan pada saat berbentuk kepingan luas permukaan besar laju reaksinya akan cepat, serta pada saat berbentuk serbuk luas permukaan akan semakin besar shg laju reaksinya akan semakin cepat

F. KESIMPULAN
Semakin besar luas permukaan maka laju reaksinya semakin cepat. Begitu pula sebaliknya, semakin kecil luas permukaan maka laju reaksinya semakin lambat.

FIGURE 5. The results of the students answered several questions and concluded

Furthermore, students present the results of the experimental video offline in front of the class, so that students are expected to be able to understand the concepts they have obtained in learning. This phase is oriented towards metacognitive skills, *monitoring skills* through reviewing the results of the experimental video, and solving additional problems.

The fifth phase is the phase of analyzing inquiry strategies and developing more effective inquiry. In this phase, the teacher guides students to work on evaluation test questions on the student worksheet, show in Figure 6.



1. Buatlah rumusan masalah yang tepat berdasarkan bacaan diatas !
Bagaimana pengaruh luas permukaan vitamin C yang digunakan terhadap lama proses larutan berubah menjadi tak berwarna?

2. Buatlah hipotesis yang tepat berdasarkan bacaan diatas !
Semakin besar ukuran luas permukaan Vit C (serbuk), maka frekuensi tumbukan akan semakin tinggi. Sehingga reaksi dapat berlangsung lebih cepat. Laju reaksi berbanding lurus dengan luas permukaan reaktan.

3. Identifikasikanlah variabel yang berpengaruh pada bacaan diatas !
Variabel Manipulasi : Luas permukaan vitamin C.
Variabel Respon : laju reaksi (waktu yang dibutuhkan terhadap perubahan larutan menjadi tak berwarna).
Variabel kontrol : Vitamin C dan Iodine sbg indikatornya.

FIGURE 6. Students' answers in answering evaluation questions

Besides that teacher too reflects on the phenomena that have been given at the beginning of online learning, reflects on the inquiry process, gives awards, and delivers the next material. All activities in the fifth phase are carried out offline in class. This phase is oriented towards metacognitive skills, namely evaluating skills through the activity of conducting learning assessments through tests, checking learning objectives and reflecting on the learning strategies used, and identifying which strategies are the best.

The average percentage and the criteria for the implementation of each phase of the guided inquiry learning model show that all phases of learning have been carried out very well.

Students Activities

Student activities are all activities during the learning process which are observed by 3 observers. Where each student observer observes 2 groups. Observers observe online activities during online learning using *G-meet* and when students discuss using *Whatsapp Group*. Meanwhile, during offline learning, observers observe student activity in class. Student activity is measured based on the behavior that appears every 2 minutes which is adjusted to the syntax of the guided inquiry learning model. Activities inthe guided inquiry learning model include relevant activities and irrelevant activities to learning activities. Relevant activities are the embodiment of metacognitive skills activities from the syntax of the guided inquiry learning model, including writing important information from short explanations, asking questions about concepts that haven't been understood, observing phenomena in student worksheets, determining problem formulations, hypotheses, and variables, discussion with groups, organizing video data experiments, do practice questions on worksheets, write conclusions, and present the results of experimental data. Meanwhile, irrelevant activities are activities other than relevant activities in learning activities.

Student activities affect learning outcomes because by working and engaging in learning activities students gain knowledge, understanding, and skills [25]. The percentage of student activity is presented in Figure 7

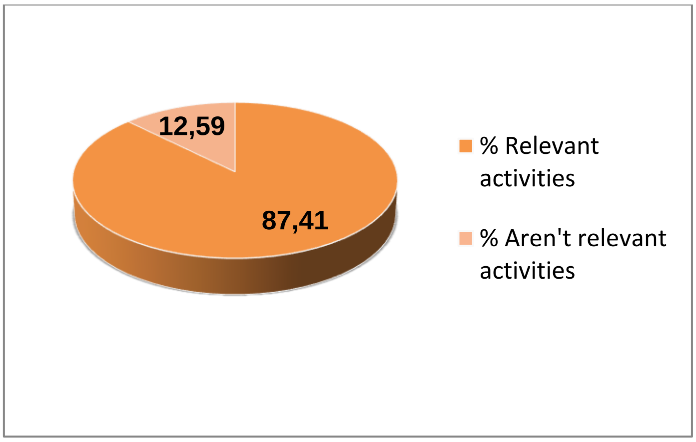


FIGURE 7. Percentage of Student Activity

Based on these results, it shows that the percentage of relevant student's activity is greater than the percentage of irrelevant student's activity using the guided inquiry learning model, meaning that students are actively involved in material learning activities, the factors that affect the rate of reaction both online and offline.

Metacognitive Skills

To find out the metacognitive skills of students, the pretest (beginning of learning) and posttest (end of learning) questions were given regarding the factors that affect the reaction rate. The test is conducted individually and online which has been uploaded to the *G-Classroom*. This metacognitive skills test is in the form of an essay consisting of 12 questions that are used to measure indicators of metacognitive skills. A total of 12 questions include concentration factors, surface area, temperature, and catalyst. Each of these factors was given 3 questions consisting of planning indicators planning skils, monitoring skills, and evaluating skills. The score if answered correctly is 3 while blank or wrong answers are given a value of 0. So that students get an overview of the use of metacognitive skills when working on problems in the form of solving a problem.

The purpose of giving the pretest is to determine the initial metacognitive abilities of students before being given treatment, while the posttest is to determine the metacognitive abilities of students after the implementation of the guided inquiry learning model on the factors that affect the reaction rate. The pretest and posttest were conducted outside of chemistry class hours and were conducted online. Time to work on questions is given for 90 minutes. Given this time, students can solve questions according to the time given by the teacher so that students collect answer sheets on time. The results of the students' pretest and posttest answers are presented in Figure 8.

Berdasarkan tabel diatas, tuliskan informasi apa saja yang anda dapatkan! Maksimal 3 informasi yang kalian dapatkan *

1.Konsentasi larutan
2.Waktu
3.Laju reaksi

Bagaimana hubungan konsentrasi dengan laju reaksi berdasarkan tabel diatas? *

Berbanding lurus

Tuliskan kesimpulan berdasarkan tabel diatas! *

Semakin tinggi konsentrasi suatu larutan maka semakin sedikit waktu yang diperlukan dan semakin besar/tinggi laju reaksinya

(a)

Berdasarkan fenomena tersebut, tuliskan informasi apa yang kalian dapat ! tuliskan maksimal 3 *

HCL 0,5M+Na2S2O3:45detik
HCL 1M+Na2S2O3:30detik
HCL 2M+Na2S2O3:15detik

Bagaimana hubungan konsentrasi dengan laju reaksi jika dikaitkan dengan teori tumbukan sehingga didapatkan suatu kesimpulan? *

Konsentrasi zat-zat yang bereaksi
Semakin besar konsentrasi pereaksi, maka jumlah partikel zat pereaksi semakin besar peluangnya untuk terjadi reaksi, maka reaksi akan semakin cepat.
Semakin besar konsentrasi, semakin cepat laju reaksinya dan sebaliknya

Tuliskan alasan dari simpulan yang telah kalian ambil! *

Dapat diperoleh kesimpulan yaitu Semakin besar konsentrasi reaktanmaka akan semakin banyak jumlah partikel dalam suatu zat sehingga partikel-partikel yang saling bertumbukan akan semakin banyak dan reaksi berlangsung lebih cepat.

(b)

FIGURE 8. Student's (a) pretest and (b) posttest answers

Based on the results of the pretest and posttest research, the metacognitive skills of students during 2 class meetings obtained data in Figure 9.

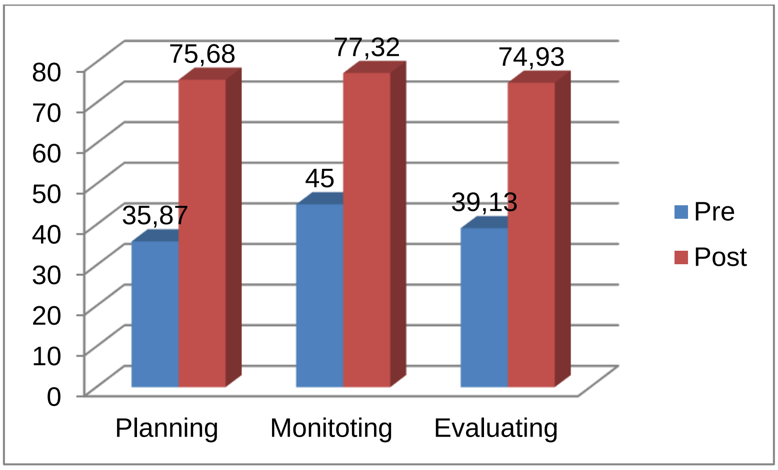


FIGURE 9. The Average Value of Student's Metacognitive Skills

Based on Figure 9, obtained that students' metacognitive skills have increased in all indicators of metacognitive skills. This increase is due to the application of the guided inquiry learning model which emphasizes the activeness of students in learning activities.

In *planning skills* there was an increase because students have been trained to identify problems to get information, think and write what is known and unknown, compile information and steps to solve problems. In *monitoring skills* there was an increase because students have been trained to review the results of experiments that have been carried out and solve additional problems. In evaluating skills there was an increase because students have been trained to carry out learning assessments through tests, double-check learning objectives whether all have been achieved and reflect on the learning strategies used and identify which strategies are the best. The findings of this study are in accordance with the findings of previous studies that in learning chemistry students have increased in each indicator in planning skills, monitoring skills, and evaluating skills [26]. The results of this study are also supported by research others who say that its metacognitive skills trained to be in the very good category [22].

Furthermore, the pretest and posttest values that have been obtained are tested for normality first, because the data used is between 9 s.d. 50 then the best normality test is to use Shapiro-Wilk test [20]. The purpose of the normality test is to assess the distribution of data in a group of data, whether the distribution of data is normally distributed or not. The results of the normality test are showed in the Table 2.

TABLE 2. The results of the pretest and posttest data normality test

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Skor Pretest	0.117	36	0.006	0.943	36	0.063
Skor Postest	0.113	36	0.200	0.969	36	0.399

Based on Table 2, the results of the normality test, the pre-test score shows sig 0.063, and the post-test shows a sig value of 0.399 which indicates that the pretest and posttest scores have sig > 0.05, so the results of the research data are normally distributed.

After that, the calculation of the n-gain index value is carried out, from the results of the pretest and posttest values of students' metacognitive skills, and the results are obtained in Figure 10.

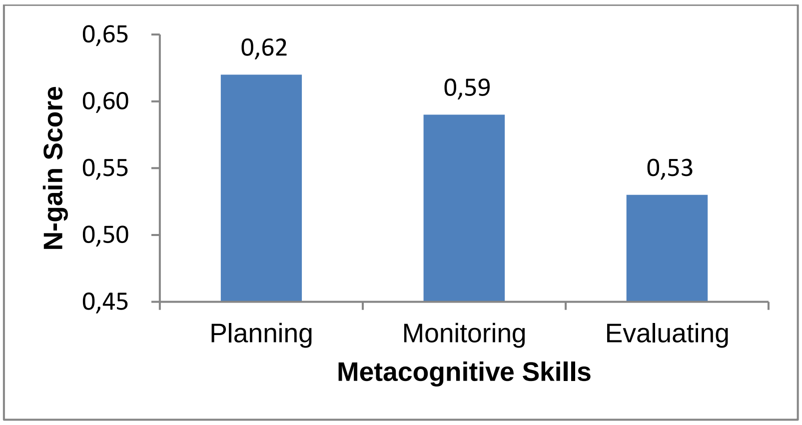


FIGURE 10. N-gain results on metacognitive skills

Based on the results of Figure 10, it is known that, after getting the material the factors that affect the rate of reaction using the guided inquiry learning model, the pretest-posttest value of metacognitive skills increases. The increase in students' metacognitive skills indicators is calculated with an n-gain score which has a range of 0.53 - 0.62 which is included in the medium category. This proves that the results of the n-gain show that with the application of the guided inquiry learning model on the reaction rate material, students' metacognitive skills have been trained during the learning process to do practice questions and experiments in worksheets and students are able to understand and answer the questions given so that metacognitive skills students increase. These results are in line with the results of previous studies which state that the average n-gain of 0.63 is in the medium criteria, which means that learning is effective in improving learning outcomes [27].

Furthermore, the data were tested using a paired sample t-test to determine the difference in the effect of guided inquiry learning models on the pretest and post-test results of students' metacognitive skills. The results of the paired sample t-test are presented in Table 3.

TABLE 3. The results of the paired sample t-test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre-Test - Post-Test	-35.80000	8.69371	1.44895	-38.74153	-32.85847	-24.708	35	0.000

Based on Table 3, the Sig. (2-tailed) value is 0.000, which indicates that 0.000 <0.05; it can be concluded that the results of the pretest and posttest using the guided inquiry learning model experienced a significant difference.

CONCLUSION

The guided inquiry learning model based on blended learning can be used to improve the metacognitive skills of students in the material reaction rate, indicated by the implementation of the guided inquiry learning model using online dan offline an average percentage of implementation of phase 1 of 94.88%, phase 2 of 100%, phase 3 of 97.92%, phase 4 of 98.44 % and phase 5 of 96.88%. Student activities who are actively involved with the percentage of relevant activities are 87.41% and the percentage of irrelevant activities is 12.59%. Students' metacognitive skills improved in terms of the n-gain range, namely 0.53 - 0.62 in the medium category. There is a significant difference between the results of the pretest and posttest guided inquiry as evidenced by the Sig. (2-tailed) value of 0.000.

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