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INSTAGRAM-BASED LEARNING MEDIA: IMPROVING STUDENT MOTIVATION AND LEARNING OUTCOMES IN REACTION RATE

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Abstract

This study aimed to determine the improvement of student motivation and learning outcomes in reaction rate using Instagram-based learning media. The quasi-experiment method was used in this study. Instruments in the form of questionnaires were used to assess student motivation, and pre-tests and post-tests were used to measure student learning outcomes. This research was conducted at a high school in Malang City, East Java, Indonesia. A total of 33 students participated in the experimental and 28 in the control classes. The learning process was carried out for three meetings using the Problem-Based Learning model with Instagram-based learning media as the independent variable. The results showed that the average N-gain value in the experimental class was 0.71. The control class was 0.55 with a significance value of 0.004, proving that using Instagram as a learning medium can improve students' understanding of reaction rate content and motivate them to learn more.

Keywords: *Motivation; Learning Outcomes; Reaction Rate; Problem-Based Learning; Instagram.*

A. Introduction

Chemistry is a primary subject at the senior high school (SMA, *Sekolah Menengah Atas*) level, especially for students majoring in Natural Sciences (IPA, *Ilmu Pengetahuan Alam*). Chemistry in learning is a subject with low motivation and student-learning outcomes. Most Indonesian students find chemistry complex to understand (Kirna, 2013). According to academic studies, reaction rate material is one of the chemical concepts that students find challenging to comprehend (Safitri et al., 2019; Purwanti, 2022). According to a preliminary study by Cahyani Azizah (2019), the reaction rate material is one of the chemical materials regarded as challenging to investigate. This view results in the absence of student learning motivation in chemistry subjects (Cahyani & Azizah, 2019).

Learning motivation is a person's encouragement or desire to carry out a learning activity to achieve optimal learning goals (Mulyaningsih, 2014; Tambak et al., 2023; Salma & Alsa, 2023). Motivation is divided into two, namely (1) Intrinsic motivation, any encouragement that comes from within the individual to carry out an activity, and (2) Extrinsic motivation, any encouragement that comes from outside the individual to carry out an activity (Ryan & Deci, 2020; Rahman & Shapie, 2023). Motivation plays a vital role in education because it motivates people internally and externally to engage in particular learning activities and can increase their enthusiasm for learning (Monika & Adman, 2017; Zuhriah et al., 2023). Motivation to learn is essential in motivating students to engage in learning activities. Students with high learning motivation are easier to accept lessons, and students' attitudes towards learning are more favorable (Budiariawan, 2019).

The motivation to learn dramatically affects the success of a study. Learning success is often driven by a strong desire to learn. Learning motivation will affect the learning outcomes to be obtained. The higher the learning outcomes, the more specific the motivation provided (Andriani & Rasto, 2019). Learning outcomes measure students' achievements after learning (Khasana et al., 2020). Learning outcomes are an essential indicator for teachers and students. Student learning outcomes for teachers can be

used as an evaluation of teaching success. In contrast, for students, it can be used to value student skills after participating in learning activities (Alhadi & Saputra, 2017). Students with high learning motivation tend to have high motivation (Triarisanti & Purnawarman, 2019).

Low student motivation and learning outcomes can be overcome using a learning model that requires students to be proactive and creative in problem-solving and to exercise critical thinking (Wahida et al., 2022; Pusvitasari, 2023). The PBL model is learning that starts with leaving problems behind. The issues presented are more related to the "real world". As a context in which students learn critical thinking skills and problem-solving. Based on research by Gulo (2022), Problem-based learning models can increase student motivation and learning outcomes in science learning (Gulo, 2022; Asmi et al. 2019) show that applying problem-based learning models improves cognitive learning outcomes. Another study by Dayeni et al. (2017) shows that problem-based learning models can improve student motivation and learning outcomes.

Student learning outcomes can be accompanied by using learning media and technology. Utilization of technology-based media is a strategy to boost student-learning outcomes and overcome low motivation. Technology has many new features that can make the learning process more enjoyable. The rapid development of technology is directly comparable to the development of social media, which is increasingly used by the public. Indonesian social media users are growing significantly every year. According to data published in We Are Social, Indonesia's active social media users reached 191 million in January 2022 (Mayasari, 2022; Nasih et al., 2023). The rapid development of technology and social media should be utilized in education as a learning tool, both inside and outside the classroom. The existence of innovative learning media can make the learning process more varied, especially in chemistry learning.

One of the learning media innovations in chemistry learning is Instagram. Instagram is an innovative learning media that can be used by all students and is easily accessible because students already know how to

use Instagram properly. According to Mandja (in Khasana et al., 2020), the Instagram application can convey the material through photos and videos displayed in a more varied manner so that it can increase students' curiosity about the material they study at school. Instagram has quite complete features to support the learning process. Teachers can take advantage of the feed feature to convey material through images. Depending on the desired video duration, people can use features such as Instagram TV, Instagram stories, and reels for video delivery. Live features can be used to deliver material directly, such as face-to-face. The comment feature can be used by students if there is the material they want to ask. With the variety of features available on Instagram, this application can be used as a media innovation in learning (Ambarsari, 2021; Amaly et al., 2023).

Several studies have shown the use of Instagram's social media platform while studying. Khasana et al. (2020) Instagram learning media showed can improve students' mathematics learning outcomes (Khasana et al., 2020; Alghamdi & Achour, 2020; Nasir & Jamiludin, 2023). Suarsini et al. (2020) show that Instagram-based learning media are highly effective in motivating students and achieving learning success. This is consistent with Rohim & Yulianti's (2020) research, which shows that Instagram-enabled learning media can improve student motivation and learning outcomes in physics subjects (Rohim & Yulianti, 2020). Sinatrya and Aji (2020) argue that Instagram learning media influences student-learning outcomes (Sinatrya & Aji, 2020; Fithriani et al., 2021). Hargita (2019) conducted more study that demonstrates Instagram media can stimulate student activity in the learning process (Hargita, 2020; Sibuea et al., 2022). Therefore, from the explanation above, researchers want to determine the increase in motivation and student learning outcomes in reaction rates using Instagram-based learning media.

B. Method

In this study, a quasi-experimental method was used by comparing the motivation and learning outcomes of students in the experimental and

control classes after using Instagram-based learning media. This study was carried out at SMA Negeri 8 in Malang City during the odd semester of the 2022/2023 academic year. The sampling technique used was a random sample of six classes in the second year of science (Class XI IPA). The results selected science class 4, with 33 students, as the experimental class and science class 3, with 28 students, as the control class. Instagram-based learning media is used in the experimental class, while the control class uses PowerPoint learning media. The learning process in these two classes uses the Problem-based learning model. The following are the learning stages used in the experimental and control classes, presented in Table 1.

Table 1. Learning syntax of problem-based learning model in experiment class and control class

Experimental Class	Control Class
Phase 1: Orient students to the problem At this stage, the teacher presents problems related to the reaction rate material to students through Instagram media.	**Phase 1: Orient students to the problem** At this stage, the teacher presents problems related to the reaction rate material to students through PowerPoint media.
Phase 2: Organizing students for learning The teacher organizes students into several groups. The teacher helps students determine subtopics and investigative assignments related to the problems. Some assignments use Instagram as a medium for collecting assignments.	**Phase 2: Organizing students for learning** The teacher organizes students into several groups. The teacher helps students determine subtopics and investigative assignments related to the problems. Some assignments use PowerPoint as a medium for collecting assignments.
Phase 3: Guiding students in the investigation Teachers encourage students to understand problems, collect alternative solutions or information from relevant sources, and conduct experiments. Students can access learning materials presented on the Instagram account @chemsquad.kimia.	**Phase 3: Guiding students in the investigation** Teachers encourage students to understand problems, collect alternative solutions or information from relevant sources, and conduct experiments.

Experimental Class	Control Class
Phase 4: Develop and present the work The teacher directs students to present their work. In this activity, each student will present their work and conduct discussions as a forum for exchanging opinions. Teachers can use Instagram as a place to present student work.	**Phase 4: Develop and present the work** The teacher directs students to present their work. In this activity, each student will present their work and conduct discussions as a forum for exchanging opinions.
Phase 5: Analyze and evaluate the problem-solving process The teacher guides students to reflect on the learning stages that have been carried out.	**Phase 5: Analyze and evaluate the problem-solving process** The teacher guides students to reflect on the learning stages that have been carried out.

This research was started by distributing a learning motivation questionnaire and conducting a pre-test to determine initial students' motivation and ability in the reaction rate material. After the treatment, students were given the same motivational questionnaire and a post-test to assess the differences in motivation and student learning outcomes in the experimental and control classes.

This study's pre-test and post-test instruments consisted of 10 multiple-choice items about conceptual knowledge of the reaction rate material. The questionnaire instrument, 4 Likert scales, was used to measure student motivation in each statement given. Several aspects of the motivational questionnaire are (1) the attractiveness of students, (2) the ease of learning the reaction rate material, (3) the desire to get a good reaction rate value, and (4) the enthusiasm of students to learn the reaction rate material. Qualitative data analysis techniques were used to analyze the results of the questionnaire. In contrast, quantitative analysis test techniques with statistical tests were used to analyze the results of the pre-test and post-test.

C. Result and Discussion

The research was conducted in September 2022 in three sessions with an estimated time of 2 x 45 minutes. The procedure for collecting data

in experimental and control classes is the same, only different in using learning media. The Instagram account @chemsquad.kimia is the media used in this research. The presented content includes reaction rate material in infographics and videos. Each sub-material contains examples, everyday life problems, explanations, sample questions, and discussion. The following is a display of the Instagram account @chemsquad.kimia, which is used in the learning process and is presented in Figure 1.

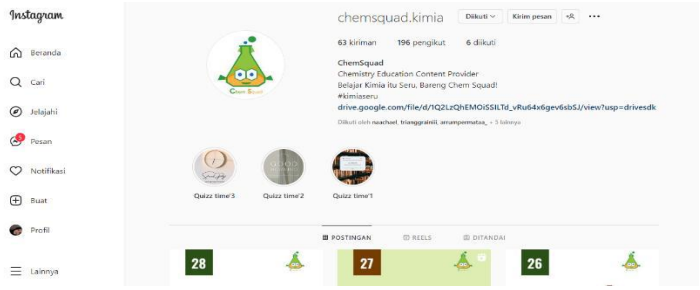

Figure 1. Instagram account @chemsquad.kimia

1. Result

The results of the motivation questionnaire showed a significant increase related to students' learning motivation after learning was carried out using Instagram social media with the PBL model. The results of the motivational questionnaire on aspects of student attractiveness in learning the reaction rate material are presented in Figure 2.

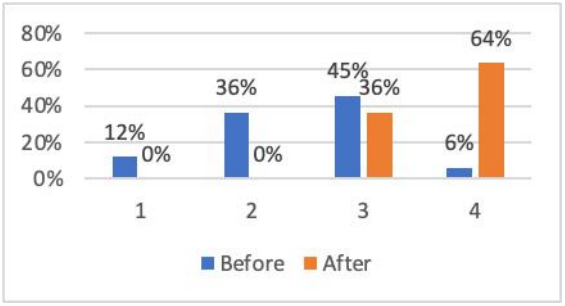

Figure 2. Interest in learning reaction rate material

The results of the ease of students in learning the reaction rate material are shown in Figure 3.

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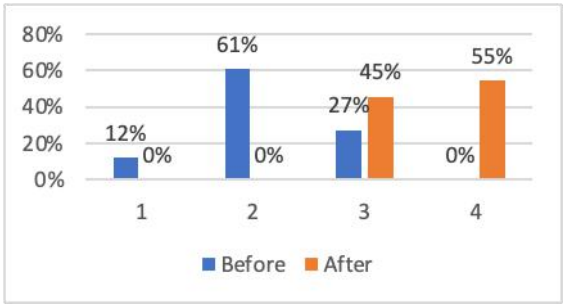

Figure 3. Ease of students in learning reaction rate material

The results of the motivational questionnaire on the desire to obtain a good reaction rate value are presented in Figure 4.

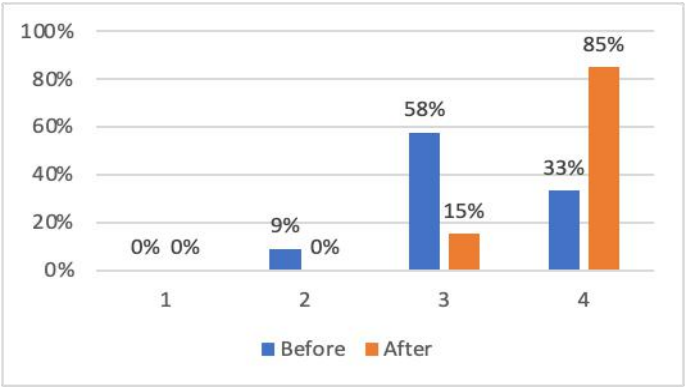

Figure 4. Desire to obtain a good reaction rate value

The results of the students' enthusiasm in studying the reaction rate material are shown in Figure 5.

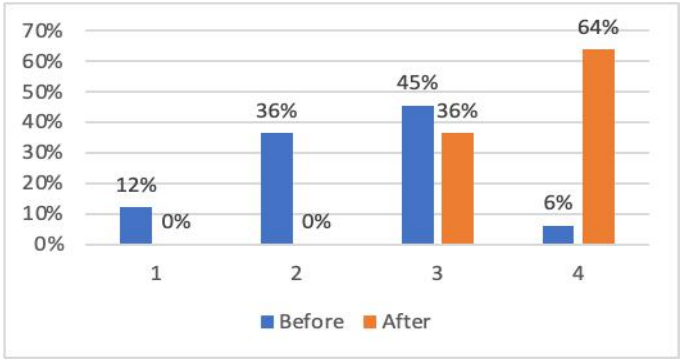

Figure 5. Enthusiasm in studying the reaction rate material

The pre-test and post-test scores, which were examined using statistical tests, provide evidence of the impact of Instagram media on student learning outcomes. Before testing the hypothesis, a prerequisite analysis test must be completed. The normality and homogeneity tests were run as part of the analysis prerequisites. Using the SPSS 26 for Windows program, the normality test was conducted using pre-test and post-test data from the control and experimental classes.

Table 2. The normality test result

Kolmogorov-Smirnov normality test		
Class	**Df**	**Significance**
Pre Test Experimental	33	0.000
Post Test Experimental	33	0.010
Pre Test Control	28	0.001
Post Test Control	28	0.005

Table 3. The homogeneity test result

	Levene Statistic	**Significance**
According to Mean	0.913	0.437
According to Median	0.662	0.577
Based on the Median and with adjusted df	0.662	0.577
Based on trimmed mean	0.832	0.479

Based on these data, the significance value obtained is > 0.05, indicating that the data are homogeneous. The Mann-Whitney test is the chosen hypothesis test. Table 4 shows the results of hypothesis testing using the SPSS 26 for Windows program.

Table 4. The mann-whitney test result

Mann-Whitney U	267.500
Asymp. Sig. (2-tailed)	0.004

The N-gain test was used to observe the improvement in learning outcomes between the control and experiment. The SPSS 26 for Windows application was used to perform the N-gain test. Table 5 displays the results of the N-gain test for the control and experimental classes.

Table 5. The N-Gain test result

Class	Score	*N-Gain*
Experiment	Min	0.43
	Max	1.00
	$\bar{x}$	0.71
	Std. Deviation	0.17
Control	Min	0.29
	Max	1.00
	$\bar{x}$	0.55
	Std. Deviation	0.18

2. Discussion

a. Student Motivation

The results of the motivation questionnaire showed a significant increase related to students' learning motivation after learning was carried out using Instagram social media with the PBL model. Figure 2 shows a significant increase from 6% to 64% after using Instagram media for learning. According to this data, using Instagram for learning can make students more appealing to the reaction rate content. It is in line with research conducted by Salehudin et al. (2019), which shows that the use of Instagram media in learning can increase the attractiveness and enthusiasm of students in learning (Salehudin, 2019).

Most students perceive the tough-to-understand reaction rate to be complex material. However, after learning about Instagram social media, students found the reaction rate material easier to understand. In addition, this sense of interest can later affect learning outcomes. In addition, this sense of interest can later affect learning outcomes. The use of Instagram social media in learning attracts students who are considered less attractive to be more attractive. Moreover, on Instagram, pictures, videos, and a mix of sounds add to students' learning attractiveness (Nugroho & Ruwanto, 2017). It is in line with the results of the motivational questionnaire on the ease of students in learning the reaction rate material, as shown in Figure 3.

Figure 3 shows a significant increase after using Instagram media from 0% to 55%, where students strongly agreed that complex reaction rate

material could be easier to understand by using Instagram media. It is in line with research conducted by Dewi et al. (2021), which shows that the material presented on Instagram can make it easier for students to learn independently and can improve student understanding because the explanations are short and easy for students to understand (Dewi et al., 2021). Because students find it easier to understand the reaction rate material, encourage pupils to feel confident in their ability to understand and apply it. Instagram media presents material and provides several examples of questions to increase students' understanding of the reaction rate material. Students will want to obtain the best chemical value for the reaction rate material in class. It is in line with the results of the motivational questionnaire on the desire to obtain a good reaction rate value presented in Figure 4.

From Figure 4, it can be seen that there was a significant increase after using Instagram media from 33% to 85%, where students wanted to get the best reaction rate material scores in class so that students might better themselves if they felt they had failed the reaction rate material exam. Students' enthusiasm for learning the reaction rate material can also rise with the usage of Instagram media. It is consistent with the findings of the motivating questionnaire on students' enthusiasm in studying the reaction rate material shown in Figure 5.

Figure 5 shows a significant increase from 0% to 67% after using Instagram media. It demonstrates that learning about reaction rates through Instagram media piques students' interest and enthusiasm. It aligns with research conducted by Mahzum et al. (2020), which shows that 100% of students experience increased enthusiasm for learning because students feel happy with learning using social media Instagram. Due to the utilization of interactive and innovative learning media, students are enthusiastic about learning about reaction rates (Mahzum et al., 2020). In Instagram media, the material is presented in written form and the form of pictures and videos. Instagram has several features that can support the learning process, such as the Feed feature, which can be used to deliver material and collect assignments; Live, which can be used to facilitate interaction to monitor

students' learning needs; Instagram TV, which can be used to deliver material in the form of videos or animations with a duration of 1 to 30 minutes (Veygid et al., 2020).

b. Student Learning Outcomes

From Table 2 about the normality test result, a significance value of 0.05 was determined based on the findings of the conducted normality test. It can be deduced that the data is not regularly distributed based on the normality test's decision-making criteria. With this, non-parametric statistics will further process the data (Mann-Whitney test). The homogeneity test, which determines whether the research sample comes from a homogenous population, is the next prerequisite analysis test performed.

From Table 3 about the homogeneity test result, the significance value obtained is > 0.05, indicating that the data are homogeneous. The Mann-Whitney test is the chosen hypothesis test. From Table 4, The Mann-Whitney test results for student learning outcomes reveal a 2-tailed significance value of 0.004, which denotes that the result is less than 0.05. It can be deduced that the H0 hypothesis is rejected, and the Ha hypothesis is accepted based on the Mann-Whitney test's decision-making criteria. It demonstrates that classes utilizing Instagram learning media versus PowerPoint learning media have different learning outcomes.

The N-gain test was used to observe the improvement in learning outcomes between the control and experiment. According to Table 5, the average N-gain value in the experimental class is 0.71, with a minimum value of 0.43 and a maximum value of 1.00. Meanwhile, the average N-gain value in the control class is 0.55, with a minimum value of 0.29 and a maximum value of 1.00, indicating that the experimental class's N-gain value is higher than the control class's. It indicates that compared to classes that use PowerPoint media-based PBL learning models, student-learning results are more elevated in classes that utilize Instagram media-based PBL learning models. Because Instagram media is an audio-visual medium, it can be concluded that Instagram social media can enhance student-learning results

in the reaction rate content. It is consistent with the study by Purnama (2017), which demonstrates that Instagram is a valuable tool for boosting students' interest and involvement in learning activities (Purnama, 2017). Another study by Yayah et al. (2021) shows that Instagram can stimulate students' enthusiasm for their studies.

D. Conclusion

Based on the research data above, it is proven that Instagram-based learning media has more influence on student motivation and learning outcomes. The statement above can be seen from the results of the Pre-test and Post-test, which experienced significant changes, and the student learning motivation questionnaire, which received perfect responses. This research is one of the contributions to the world of education, along with the development of advances in technology and social media. Therefore, using Instagram to support learning can increase student motivation and learning outcomes regarding reaction rates. Researchers hope that this Instagram-based learning media is not only for reaction rate material but can be developed for other chemical materials.

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