



Effectiveness of the Nearpod Platform within the Discovery Learning Model to Enhance Students' Learning Motivation and Learning Outcomes on Reaction Rate Topic

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Abstract

This study aims to evaluate the effectiveness of nearpod platform integrated within the discovery learning model in enhancing students' motivation and learning outcomes in reaction rate material. The research employs a pre-experimental one-group pretest-posttest design. The subjects were 39 students of class XI KIMIA 3 at SMA Negeri 9 Makassar. Data were collected through pretests and posttests. The motivation and learning outcomes data were analyzed descriptively and inferentially. Descriptive analysis was performed using N-gain, which revealed an average N-gain of 0.35 (moderate) for motivation and 0.72 (high) for learning outcomes. Inferential analysis for the motivation data was conducted using the Wilcoxon Signed-Rank Test. The results indicated Z observed value = 2.04 and Z critical value of 1.65, that leading to the rejection of H_0 and acceptance of H_1 . inferential analysis for learning outcomes was performed using a one-sample t-test. The results showed t observed value = 21 and t critical value = 1.68, leading to the rejection of H_0 and acceptance of H_1 . Based on the data analysis, it can be concluded that the platform nearpod is effective in enhancing the motivation and learning outcomes of students.

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1. INTRODUCTION

The rapid advancement of the modern era has brought about various innovations, including in the field of education. Continuous improvements in educational systems are essential to maintain relevance and flexibility amid global change. In Indonesia, one such innovation is the introduction of the Merdeka Curriculum (Independent Curriculum), designed to establish a more student-centered and flexible learning environment. According to Baharuddin (2021), this curriculum aims to respond to educational challenges through innovation, adaptability, and a focus on students' needs. It emphasizes active learning, where teachers function as facilitators and students are engaged in constructing their own understanding.

As of August 2023, data from the Center for Curriculum and Learning at the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) show that nearly 70% of educational institutions across Indonesia have implemented the Merdeka Curriculum. Among these, 90% of implementations are at the senior high school (SMA) and vocational high school (SMK) levels. One such institution is SMA Negeri 9 Makassar, which has adopted learning models aligned with the new curriculum, such as discovery learning.

Based on the results of observations, the learning process at SMA Negeri 9 Makassar has adopted learning models recommended by the Merdeka Curriculum, such as the discovery learning model. The school is also equipped with adequate facilities and infrastructure, such as projectors and Wi-Fi access for

educators to support the learning process. However, findings indicate that student learning outcomes remain low, particularly in the material of reaction rates. On average, only around 20% of students per class achieve mastery in this material. One of the suspected causes of the low learning outcomes is the lack of learning motivation among class XI KIMIA students at SMA Negeri 9 Makassar.

This assumption is based on observations indicating that students tend to be passive during the learning process, complete assignments minimally, and demonstrate low academic performance—especially in the reaction rate topic. One of the contributing factors is the limited learning media used at the school, which primarily rely on printed textbooks and PowerPoint presentations. According to Pratiwi et al. (2021) that limited media can hinder student interactively and lead to monotonous learning and causes boredom among students, eventually leading to a decline in their learning motivation.

Motivation is a psychological response to an action or goal. It generally arises from within an individual but can be influenced by external stimuli or encouragement. Learning motivation is crucial as it is one of the determining factors in the success of the learning process. With sufficient motivation, students tend to be more enthusiastic, focused, and diligent in learning (Ruhmadi, 2017).

In addition to low motivation, another factor contributing to students' low achievement in the reaction rate topic is the microscopic nature of the content, which makes it inherently difficult to understand (Tiarasani et al., 2021). This topic is also prone to misconceptions due to its complexity. Misconceptions in reaction rates may lead to further misconceptions in subsequent chemistry material, such as chemical equilibrium (Jusniar et al., 2020). Therefore, it is important to deliver this material effectively to ensure a solid understanding of related concepts.

To address these challenges, the integration of interactive learning media is considered a promising solution. Interactive tools have the potential to increase student engagement and motivation, making the learning process more dynamic and meaningful. As suggested by Ndraha and Agnes (2023), the synergy between suitable media and appropriate learning models can result in more effective and efficient teaching.

One such interactive tool is Nearpod, a digital learning platform that allows teachers to create engaging, student-centered lessons. The Nearpod platform is equipped with numerous engaging and interactive features such as video, slide, PDF Viewer, collaborate board, matching pairs, nearpod 3D, report, open ended question, and simulation that can be utilized to support both online and offline learning (Nurmasita, et al., 2022; Rahayu, et al., 2022; Tarmuasely, 2023).

According to the research conducted by Pramesti et al. (2023) that Nearpod enhances student motivation through its interactive features, such as live quizzes, polls, and collaborative boards, which capture student interest and facilitate teacher-student interaction. Research by Perlawanan et al. (2023) also proves that the use of Nearpod in discovery learning environments significantly improves student learning outcomes by promoting active participation. Although previous studies have demonstrated the effectiveness of the Nearpod platform in enhancing student learning outcomes and motivation, there is limited research exploring its specific impact when integrated into the discovery learning model on reaction rate material. This study aims to fill this gap by investigating how Nearpod can enhance students' motivation and learning outcomes in this particular chemistry topic.

2. METHOD

The research model is pre-experimental design. This study is quantitative examination utilizes one-group pretest-posttest design. To see more clearly the research design is presented in Table 1.

Table 1. One group pretest posttest design

Pretest	Treatment	Posttest
O ₁	X	O ₂
O ₂		O ₄

The subjects of this study comprised all students of class XI KIMIA 3 at Jl. Karunrung Raya, No. 9 SMAN 9 Makassar, enrolled in the odd semester of the 2024/2025 academic year, totaling 39 students. This study employed two validated instruments: a multiple-choice test to measure students' chemistry learning outcomes and a questionnaire to assess their learning motivation. The data analysis techniques for motivation and learning outcomes were conducted using both descriptive and inferential methods. Descriptive data analysis was performed by calculating the N-gain scores for both

students' learning outcomes and motivation. Inferential analysis was conducted by first performing a normality test on the N-gain scores obtained. This was followed by hypothesis testing using a one-sample t-test for learning outcomes data and the wilcoxon signed-rank test for learning motivation data, with a significance level of 5%.

3. RESULT AND DISCUSSION

3.1. Result

The value of 0.3 was used as a reference point for determining the minimum threshold of effectiveness in students' learning motivation. The descriptive analysis of N-gain data on learning motivation are presented in Table 2.

Table 2. N-gain data of learning motivation

N-Gain	Criteria	Frequency	Percentage
$g \geq 0.70$	High	2	5.12%
$0.30 \leq g < 0.70$	Moderate	24	61.54%
$g < 0.30$	Low	13	33.34%

Table 2 shows that 26 students achieved N-gain score more than 0.3. The average N-gain score of all students is 0.35 (medium). Based on this result, it can be concluded that the Nearpod platform is effective in enhancing students' learning motivation. Furthermore, an inferential analysis was conducted to statistically examine the effectiveness of the Nearpod platform.

Inferential analysis was initiated by conducting a normality test to assess the distribution of the data. Since the data were not normally distributed, the one-sample Wilcoxon signed-rank test was employed to determine whether the median learning motivation score was significantly greater than the benchmark value of 0.3, using a 5% significance level. The results can be seen in Table 3.

Table 3. Result of Wilcoxon signed-rank test

Z_{count}	$Z_{table} (\alpha) = 0,05$	Conclusion
2.04	1.65	H_0 rejected H_1 accepted

Table 3 shows that the Z_{count} exceeds the critical Z_{table} , leading to the rejection of H_0 and the acceptance of the H_1 . This finding indicates that the Nearpod platform is effective in enhancing students' learning motivation.

The value of 0.3 was used as a reference point for determining the minimum threshold of effectiveness in students' learning outcomes. The descriptive analysis of

N-gain data on learning outcomes are presented in Table 4.

Table 4. N-gain data of learning outcomes

N-Gain	Criteria	Frequency	Percentage
$g \geq 0.70$	High	26	66.67%
$0.30 \leq g < 0.70$	Moderate	12	30.77%
$g < 0.30$	Low	1	2.56%

Table 4 shows that the Nearpod platform demonstrated effectiveness in enhancing the learning outcomes of nearly all research participants. The average N-gain score of all students is 0.72 (high). Based on this result, it can be concluded that the Nearpod platform is effective in enhancing students' learning outcomes. Furthermore, an inferential analysis was conducted to statistically examine the effectiveness of the Nearpod platform.

Inferential analysis was initiated by conducting a normality test to assess the distribution of the data. Since the data were normally distributed, a one-sample t-test was conducted to examine the effectiveness of the Nearpod platform in enhancing students' learning outcomes, using a specific comparison value of 0.3 at a 5% significance level. The results can be seen in Table 5.

Table 5. Result of One sample t-test

t_{count}	$t_{table} (\alpha) = 0,05$	Conclusion
21	1.68	H_0 rejected H_1 accepted

Table 5 shows that the t_{count} exceeds the critical t_{table} , leading to the rejection of H_0 and the acceptance of the H_1 . This finding indicates that the Nearpod platform is effective in enhancing students' learning outcomes.

In this study, descriptive analysis was conducted to measure the percentage for each indicator of learning motivation. The distribution percentage of each indicators are presented in Figure 1.

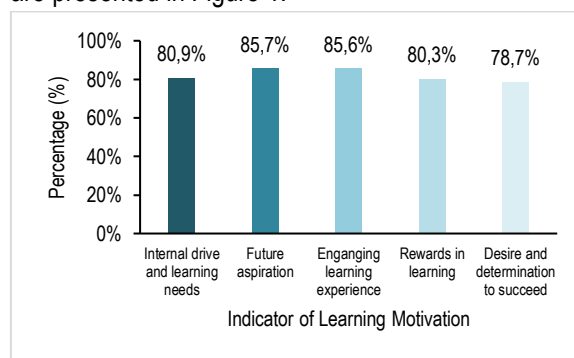


Figure 1. Percentage indicators of student's learning motivation

In this study, the indicators of students' learning motivation consist of the presence of internal drive and learning needs, future aspirations, recognition or rewards in learning, engaging learning experiences, and the desire and determination to succeed.

A descriptive analysis was also conducted to determine students' learning mastery, which was considered achieved if their learning outcomes exceeded a score of 75, as shown in Table 6.

Table 6. Data of students' learning mastery

Score	Category	Frequency	Percentage
≥75	Complete	28	71,80%
< 75	Not Complete	11	28,20%

Table 6 shows that 28 students achieved learning mastery, resulting in a class mastery percentage of 71.80%. Although this percentage has not met the minimum mastery standard of 80%, it is nearly three times higher compared to the percentage in the previous year.

In addition to analyzing motivation indicators, this study also examined students' learning outcomes of the reaction rate material through several specific indicators. The percentage distribution for each indicator of the reaction rate material can be seen in Table 7.

Table 7. Percentage indicators of the reaction rate

No.	Indicator	F	%	Categories
1	Explain the collision theory.	20	51.28	Not Complete
2	Define the reaction rate.	10	25.64	Not Complete
3	Analyze the reaction rate based on changes in concentration.	25	65.4	Not Complete
4	Determine the reaction rate.	7	17.95	Not Complete
5	Calculate the order of reaction.	34	81.17	Complete
6	Analyze the reaction order graph.	36	92.31	Complete
7	Calculate the rate constant.	20	51.28	Not Complete
8	Analyze the factors that influence the reaction rate.	32	82.05	Complete
9	Identify the concept of reaction rate in a daily life.	36	92.31%	Complete

Table 7 shows that four indicators were achieved, while five indicators were not. The lack of mastery in these indicators is attributed to the Nearpod platform's limited ability to effectively deliver each indicator, particularly those involving relatively complex calculations.

3.2. Discussion

This study aims to determine the effectiveness of the Nearpod platform in enhancing students' motivation and learning outcomes on the reaction rate material. The study was carried out over five meetings, which included one session for administering a pretest, three sessions for the learning process, and one session for administering a posttest. In the discovery learning, Nearpod platform is utilized in the syntax of stimulus, problem statement, data collection, and verification. The results of the inferential analysis indicate that the Nearpod platform is effective in enhancing students' learning motivation and students' learning outcomes.

The use of the Nearpod platform introduces a new learning environment for students previously reliant on PowerPoint and printed textbooks. Its engaging features have been shown to enhance students' learning motivation by providing an interactive and enjoyable experience. The ease of use and novelty of these features reduce student boredom and increase enthusiasm, ultimately improving learning motivation. This finding is in line with Septiyanti's (2023) who reported that Nearpod's features foster student engagement, as well as with Herawan and Nelson's (2022), who found that Nearpod effectively addresses low learning motivation caused by monotonous instructional methods.



Figure 2. Video feature on stimulus syntax

The video feature is utilized during stimulus syntax. The videos provided throughout the learning process are considered effective in reducing students' boredom. This feature also stimulates students to follow

the learning flow more actively. Additionally, the presence of the video feature in the Nearpod platform offers flexibility for students, allowing them to pause and replay the videos according to their own pace and preference.



Figure 3. Collaborate board on problem statement syntax

The collaborate board feature is utilized during problem statement syntax. The collaborate board feature provides students with the opportunity to express the questions they have formulated after the problem statement process without hesitation. This is in line with the study conducted by Perlawanan et al. (2023), which stated that the collaborate board feature offers students the chance to actively engage in writing problem formulations without feeling hesitant.

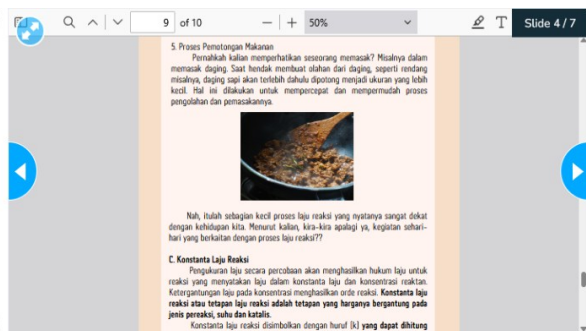


Figure 4. PDF Viewer feature on data collection syntax

The PDF Viewer is utilized during data collection syntax. PDF Viewer feature provided by Nearpod platform enables students to explore information related to the topic studied that day. The ease of access and the bright, colorful design of the material increase students' interest during data collection activities. This is in line with research conducted by Ningsih et al. (2023), who stated that Nearpod's simple layout with harmonious colors can attract students' attention and minimize boredom.

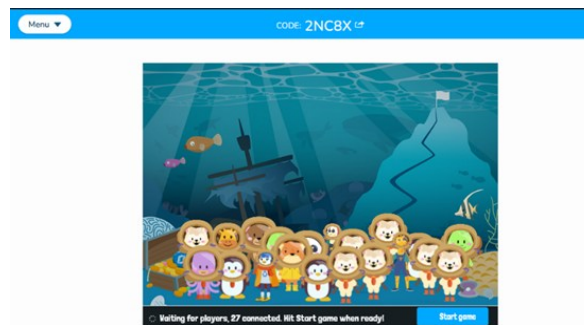


Figure 5. Time to climb feature on verification syntax

The time to climb feature is utilized on verification syntax. This feature presented questions with engaging music and provided immediate feedback in the form of positive affirmations such as "Nice try," "Nice," and "Good job." This feedback fostered students' enjoyment and self-confidence, contributing to increased learning motivation. This is in line with research conducted by Simorangkir et al. (2021) that positive affirmations and praise can enhance students' motivation, self-confidence, and self-concept. At the end of the quiz, a leaderboard is displayed showing the students who answered the most questions correctly in the shortest amount of time. This feature increases their enthusiasm, as they are motivated to compete for the top rank.

Student success in learning is not only influenced by the learning model, but is influenced by internal and external motivation (Kupang, et.al., 2022). Good learning motivation is one of the factors that influence learning outcomes (Nuridayanti, 2022; Mu'in, 2024). When students' learning motivation increases, their academic performance tends to improve as well (Daing, et. al, 2022). This is in line with the statement by Kifli (2021), who noted that learning outcomes are influenced by internal factors such as emotions, motivation, and study habits.

External stimuli in the form of engaging instructional activities as a extrinsic motivation can trigger intrinsic motivation within students, thereby enhancing their overall learning motivation. The increase in motivation subsequently encourages students to engage more actively in the learning process. This active participation, facilitated by the use of the Nearpod platform, has shown a positive effect on students' academic achievement. The diverse and engaging features of the Nearpod platform are able to capture

students' attention, thereby fostering greater interaction and participation during the learning process.

This finding is in line with research conducted by Sianaga and Saronom (2020), which emphasized that active engagement in the learning process contributes significantly to improved learning outcomes. A similar finding was also reported by Musa and Jehad (2022) and Naumoska, et.al. (2022), who stated that the presence of Nearpod can encourage student participation in interactions with teachers, resulting in positive student responses that have a beneficial effect during learning.

Nearpod offers a range of interactive features that make learning more engaging and easier to understand for students (Oktaviani & Diah, 2023). Nearpod is a flexible platform that enables students to access learning materials at any time, including after formal school sessions have concluded (Helnanelis & Ahya, 2023). The implementation of the Nearpod platform improved students' academic performance from 20% to 71.80% which represents a threefold increase compared to the average scores achieved by students in the previous academic year, although five learning indicators had not been completed. The incomplete indicators were due to several topics involving more complex calculations, which required better delivery through advanced features available only in the paid version of the Nearpod platform. In addition, the internet connection was slightly unstable during the lesson. As stated by Pathuddin et.al. (2023) that platform Nearpod has certain limitations, such as the unavailability of some features in the free version and its heavy reliance on a stable internet connection.

Based on the explanation above, the Nearpod platform has been proven to enhance students' learning motivation. The increase in learning motivation is one of the factors that can influence students' learning outcomes by encouraging them to be more active in the classroom, resulting in greater interaction during the learning process. Interaction and active participation during the learning process ultimately lead to an improvement in students' academic achievement.

4. CONCLUSION

Based on the results of the data analysis and discussion, it can be concluded that the Nearpod platform was effective in enhancing both the learning motivation and academic performance of class XI KIMIA 3 students

at SMA Negeri 9 Makassar in the topic of reaction rate. However, a key limitation of this study is that the implementation of Nearpod was restricted to the reaction rate topic only; therefore, the findings cannot be generalized to other chemistry topics. Future research is recommended to further investigate the effectiveness of the Nearpod platform across a broader range of chemistry subjects, particularly those that are less reliant on symbolic or formula-based content..

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