

The Effectiveness of Genially-Based Interactive Media in Improving Fourth-Grade Elementary School Students' Understanding of Photosynthesis

Putri Rahmawati¹✉, Universitas PGRI Kanjuruhan Malang

Nury Yuniasih², Universitas PGRI Kanjuruhan Malang

Aris Sri Sunarti³, SDN Tanjungrejo 4

✉ putriirahmaawaatii1007@gmail.com

Abstract: This classroom action research aims to determine the effectiveness of Genially-based interactive media in improving fourth-grade elementary school students' conceptual understanding of photosynthesis. The study was conducted in two cycles, each consisting of planning, implementation, observation, and reflection stages. Data collection was conducted through achievement tests. Data analysis utilized the N-Gain calculation to determine improvements in students' conceptual understanding. The results indicate that the use of Genially media effectively enhances students' conceptual understanding. In Cycle I, the low N-Gain category accounted for 42.86%, the moderate category for 57.14%, and no students fell into the high category. In Cycle II, there was an improvement: the moderate category increased to 47.63% and the high category to 52.38%, while the low category was no longer present. These results indicate that Genially-based interactive media is effective for teaching photosynthesis in science education because it enhances student engagement and conceptual understanding more effectively

Keywords: interactive media, genially, conceptual understanding

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INTRODUCTION

Basic education is a crucial first step in developing students' thinking skills, attitudes, and abilities. In 21st-century education, teachers are expected to implement student-centered learning (Zulaicha, 2025). The evolution of education in the digital age has transformed the way learning takes place. The use of educational apps, simulations, and educational games makes the learning process more interactive, effective, and enjoyable for students (Sindi Septia Hasnida et al., 2023).

One of the subjects that has a strategic role in achieving these goals is Natural and Social Sciences (IPAS). In science learning, the focus is not only on emphasizing facts, but also on understanding concepts and scientific processes. Several topics in science are often considered difficult to learn. Science learning in elementary schools faces challenges in delivering abstract and complex concepts (Uno, 2024). Science conceptual understanding in Indonesia is still lower compared to other countries, which affects students' achievement in science learning (Deria & Wardani, 2022). One of the topics that is often considered difficult by students is the concept of photosynthesis because it involves abstract processes.

The use of technology in learning is currently very necessary because it can improve efficiency, accessibility, and effectiveness. (Nurhidayati, 2024). Other researchers also state that the use of technology in the classroom can help improve students' understanding and creativity (J. F. Rahmawati et al., 2024). However, in reality, there are still many teachers who are unable to use technology effectively in learning. In the learning process, technology greatly enables the growth of students' motivation because learning materials can be accessed anytime and anywhere when needed. Therefore, learning media are needed to help students understand concepts more easily. One of the learning media that can be utilized in teaching and learning is genially.

Genially contains various features such as posters, learning videos, quizzes, interactive games, and others that can be accessed online, making it easier for students to use (Indrawaty et al., 2025). This is in line with previous studies stating that Genially has many advantages, such as providing various easy-to-use templates, customizable animations and texts, as well as features and buttons that can be adjusted according to learning needs (Shalimar & Rukmana, 2024). Other researchers also mention that the use of Genially is effective in teaching science and social studies (IPAS) in elementary

schools, especially on photosynthesis material ([Rahmawati et al., 2025](#).) The use of interactive learning media also makes it easier for teachers to carry out the learning process. Nowadays, students tend to have low concentration levels and become easily bored if learning is conducted only through conventional methods. Therefore, Genially web-based learning media is highly effective to use.

Based on the results of the interviews, it was found that at SDN Tanjungrejo 4 in Malang City, fourth-grade classes still employ conventional teaching methods and rely on traditional teaching materials, primarily workbooks. This approach makes students passive and less actively engaged during lessons, resulting in low levels of conceptual understanding. When asked questions related to the process of photosynthesis, many students were unable to explain it coherently and clearly; in fact, there were misconceptions regarding the role of the sun and the plant parts involved in the photosynthesis process. In this regard, the teaching methods employed by teachers have a significant impact on the success of the learning process for elementary school students ([Fatma & Ichsan, 2022](#)).

Other researchers have noted that using Genially as an interactive medium can capture students' attention and encourage their active participation in the learning process ([Toyibatul et al., 2024](#)). Meanwhile, according to ([Hasanah, 2025](#)) the use of Genially can increase student engagement in quiz games, which not only enhances their understanding of the material but also improves overall learning outcomes. In other words, the use of interactive media can easily help teachers deliver more effective instruction.

Based on the above discussion, this study aims to improve fourth-grade elementary school students' understanding of photosynthesis using the Genially interactive platform. This aligns with findings from other researchers who note that Genially offers a variety of formats, including game-based activities such as quizzes, which can help foster student enthusiasm during the learning process ([Putri Hidayati et al., 2025](#)). This study is expected to foster innovation and creativity in technology-based learning and serve as a reference for educators in developing active and meaningful learning processes, so that learning objectives can be achieved to the fullest extent possible.

METHODS

This study employed a Classroom Action Research (CAR) approach and was conducted at SDN Tanjungrejo 4. According to Kemis in (Syae Purohman, 2018) Action research is a reflective process undertaken by an individual or group in a social or educational setting to improve existing practices, deepen understanding of those practices, and enhance the conditions under which they are carried out. Action research involves implementing specific interventions in the classroom during the learning process (Ningrum et al., 2021). The study subjects consisted of 21 fourth-grade students during the 2025–2026 school year. The study lasted approximately one month.

This study was designed using two action cycles. According to (Aliyyah et al., 2021) each cycle consists of four stages. The first stage is the planning stage, during which the researcher and teachers conduct interviews and discussions regarding material that is considered difficult and in need of improvement, and develop teaching materials—from lesson plans and media to assessment questions. The second stage is implementation, which involves conducting direct instruction by explaining the learning material from start to finish. The third stage is observation, where the researcher observes students' behavior during the learning process. Finally, the last stage is reflection, where the researcher records the observation results, evaluates them, analyzes the learning outcomes, and notes weaknesses to inform the design of the next cycle. All stages are carried out collaboratively between the researcher and those involved in the learning process to achieve optimal results.

The variable used in this study was the improvement in fourth-grade elementary school students' conceptual understanding of photosynthesis. To obtain accurate data, the data collection instrument used was a test consisting of three stages: a pretest, a posttest for cycle 1, and a posttest for cycle 2. The pretest was administered before the intervention to assess the students' initial abilities. Next, the cycle 1 posttest was administered after the implementation of the Genially media to determine the students' level of conceptual understanding following the initial intervention. Finally, the cycle 2 posttest was administered after the completion of the second cycle to observe further improvement and evaluate the overall effectiveness of the media's use.

Data analysis was conducted quantitatively using the N-Gain formula to determine students' level of conceptual understanding. After calculating the N-Gain, the

following criteria were obtained

Table 1. N-Gain Score Criteria

Normal gain values	Criteria
$0,7 \leq n \leq 1,0$	High
$0,3 \leq n \leq 0,7$	Medium
$0,0 \leq n \leq 0,3$	Low

Source: (Oktavia & Teja Prasasty, 2019)

The analysis examined the improvement from the pretest to the posttest in cycle 1 and the improvement from the pretest to the posttest in cycle 2. The indicators of success were as follows: if the average N-Gain score fell into the moderate or high category, there was an increase in conceptual understanding between cycles 1 and 2, and students demonstrated increased activity and engagement in learning.

RESULTS

Based on data from interviews and observations conducted prior to the classroom action research, it was found that misconceptions regarding the concept of photosynthesis still persisted. Students did not yet fully understand the material, and the lack of interactive teaching aids caused them to feel unmotivated during lessons, resulting in suboptimal learning outcomes.

1. Action Planning

During this planning phase, the researcher collaborated with teachers to design the materials needed to implement the interventions in cycles 1 and 2.

Tabel 2. Comparison of Device Usage in Cycles 1 and 2

Device	Cycle 1	Cycle 2
Modul ajar	√	√
LKPD (PBL)	√	-
LKPD (PjBL)	-	√

Notes:

√ (done)

- (not done)

The teaching materials were used in cycles 1 and 2; materials 1 and 2 were identical. The difference lay in the activities in the worksheets, which were designed using different instructional models.

2. Implementation of the Action

At this stage, the measures developed during the planning phase are implemented in accordance with the established cycle. The following is a comparison of implementation in cycles 1 and 2

Tabel 3. Comparison of the Implementation of Cycle 1 and Cycle 2

Pelaksanaan tindakan	Cycle 1	Cycle 2
Duration	2 class periods	2 class periods
Activities	In-class	In-class and out-of-class
Instructional model	PBL (Problem Based Learning)	PjBL (Project Based Learning)
LKPD	Worksheets designed based on problem-based learning related to photosynthesis	Worksheets developed using a project-based approach
Problem prompts	Infographics	Direct observation

a. Cycle 1

The implementation of the intervention in cycle 1 took place over 2 class periods and consisted of in-class learning activities. In this cycle, the learning process utilized the PBL (Problem-Based Learning) model combined with case studies focused on global issues. Before the intervention, students took a pretest consisting of 20 multiple-choice questions aligned with the learning objective indicators. At the end of the lesson, a posttest for cycle 1 was administered. During this phase, students were given worksheets to analyze and find solutions to the presented problems, and the results were then presented in front of the class. This activity serves to train students' ability to understand concepts well. However,

some students have not yet achieved optimal results. The lack of understanding of the problems presented stems from their abstract nature and the fact that they are not yet fully connected to the students' experiences. Consequently, students face difficulties in linking the concept of photosynthesis to the situations presented in the LKPD.

b. Cycle 2

Cycle 2 was conducted over 2 class periods and included both in-class and out-of-class learning activities. This cycle utilized the PjBL (Project-Based Learning) model, which emphasizes project-based activities rooted in direct observation. The stimuli for Cycle 2 did not come from the internet but from the students' real-world environment. In this stage, students were invited to conduct direct observations of plants located indoors and outdoors. This activity served to observe differences in plant conditions in different locations and to identify influencing factors. At the end of Cycle 2, a post-test was administered consisting of 20 multiple-choice questions aligned with the learning indicators.

3. Action Research

The results of observations conducted in cycles 1 and 2 showed significant differences. These changes were evident in the increased student participation during learning activities, including discussions, answering questions, and completing assigned tasks. In addition, students began to show greater enthusiasm and more active engagement compared to the early stages of learning.

Based on the data obtained, improvements in student learning outcomes were analyzed using the N-Gain Score calculation. This analysis was used to determine the improvement in students' abilities after the implementation of instructional interventions in each cycle. Through the N-Gain Score analysis, changes in students' comprehension levels from the initial condition to after the implementation of instructional interventions can be identified. The data from these calculations were then used as a basis for assessing the effectiveness of the interventions implemented in this classroom action research. The following are the results of Cycle 1 and Cycle 2.

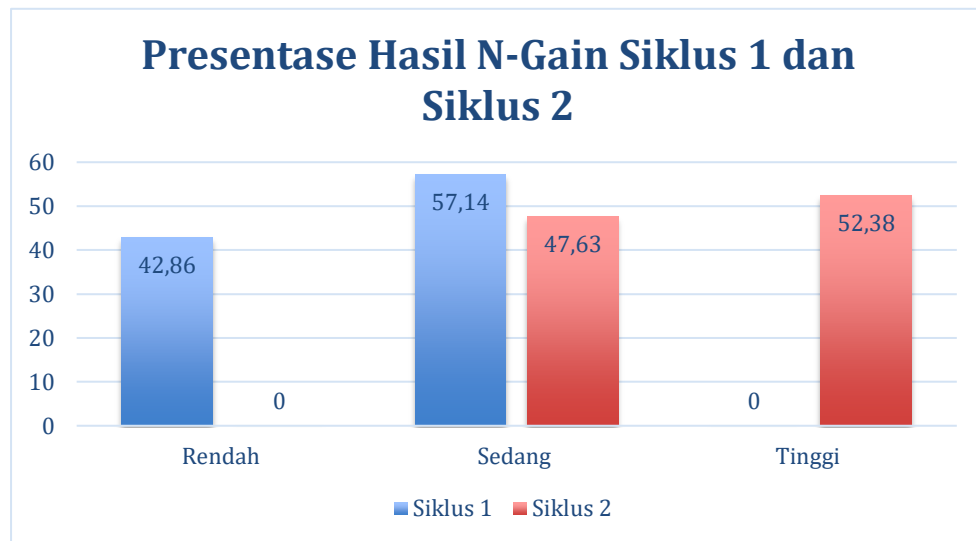


Figure 1. Comparison of N-Gain Results

As shown in Figure 1, the N-Gain results for Cycle 1 were in the moderate category at 57.14%, while the low category accounted for 42.86%, and no students had yet reached the high category. This indicates that the instructional interventions in Cycle 1 began to have an impact on improving conceptual understanding through the media used. However, this improvement was not yet optimal because there were still students in the low category.

In Cycle 2, there was a better improvement compared to Cycle 1. The percentage of students in the high category increased to 52.38%, while the moderate category stood at 47.63%, and there were no longer any students in the low category. These results indicate that the corrective actions implemented in Cycle 2 were able to enhance students' conceptual understanding and learning outcomes more effectively. The shift in the distribution of N-Gain categories from low to moderate and high indicates that the learning process implemented in this classroom action research was effective in improving students' abilities.

After reviewing the N-Gain results, an analysis of the N-Gain Score revealed changes in students' level of understanding from the baseline to after the implementation of the instructional intervention; the result of 0.7 falls into the "high" category. This indicates a significant improvement in students' conceptual understanding following the instruction. The results also show that students were able to understand the material better than before the intervention.

Achieving this high category also indicates that the use of Genially can help students improve their conceptual understanding. Genially is capable of boosting students' confidence in answering questions and providing a fun and more meaningful learning experience (Octavia Ningsih et al., 2026a). Additionally, genially serves as a platform for scaffolded prompt-based practice, which helps students understand concepts in a more systematic manner (Haliza et al., 2020).



Figure 2. Media interaktif *genially*

4. Reflection on Actions

a. Reflection on Action Cycle 1

Based on the results of Cycle 1, the use of the Genially interactive platform has begun to capture students' attention. The implementation of Cycle 1 utilized the PBL (Problem-Based Learning) model. Students were more enthusiastic and active in participating in the lessons than in previous sessions. However, the results obtained using N-Gain have not yet reached optimal levels. Students in the low category accounted for 42.86%, and those in the moderate category accounted for 57.14%. These results indicate that the learning process is not yet optimal. Some of the challenges identified include some students still being confused about using the platform, some students not staying focused during lessons, time management not being fully optimized, and other issues. Therefore, the planned improvements for Cycle 2 include providing simpler and more step-by-step explanations, as well as optimizing the use of genially's features to encourage students to be more active in the learning process.

b. Refleksi tindakan siklus 2

In Cycle 2, instruction was conducted using the PjBL (Project-Based Learning) model with the aid of genially. The implementation of interventions in cycle 2 showed greater improvement compared to cycle 1. Students were more active and enthusiastic in participating in the learning process. Through project-based activities and the use of genially, students were able to grasp concepts more concretely and understand the material more easily. Based on the N-gain results, there were no longer any students in the low category, while 47.63% were in the moderate category and 52.38% in the high category. This indicates that genially is capable of increasing students' active participation in the learning process. This aligns with the opinion of (Luthfiyah et al., 2025) who state that the use of genially creates opportunities for students to be more active through interactive activities such as quizzes, games, and concept simulations during the learning process.

DISCUSSION

The results of the study indicate that the use of the Genially interactive platform is effective in improving fourth-grade elementary school students' conceptual understanding of photosynthesis. This is consistent with the view that (Octavia Ningsih et al., 2026b) that the Genially interactive platform is capable of improving conceptual understanding and creating an interactive, student-centered learning environment. The researchers used N-Gain analysis to assess improvements in conceptual understanding.

In cycle 1, the PBL (Problem-Based Learning) model was used with the assistance of Genially, which presents the material in an interactive and engaging visual format. The research findings indicate that the use of genially was able to increase students' attention and engagement in the learning process. In addition, genially was also able to motivate students to learn and ultimately led to effective learning outcomes (Putri Maharani, 2025). However, the results from cycle 1 indicate that the improvement in conceptual understanding is still not optimal. Based on the N-Gain score of 42.86%, students are still in the low category, and 57.14% are in the moderate category. In this cycle, there were still no students who reached the high category. This situation occurred because some students still had difficulty understanding the problems presented in the worksheets. The problems used were still abstract and not fully related to the students' real-life experiences,

so students faced obstacles in connecting the concept of photosynthesis to everyday situations. This finding is consistent with research (Wardani et al., 2021) which indicates that, conceptually, instructional media provide a better foundation for enhancing understanding of IPAS concepts. In addition, research conducted by (Baoknenok et al., 2025) shows that the use of Genially-based learning materials can improve the learning outcomes of elementary school students in each learning cycle. Other researchers note that the implementation of a problem-based learning model supported by the Genially platform has a significant positive impact on improving student learning outcomes (Amaliyah et al., 2026). The study also explains that interactive media can help improve students' attention and concentration during the learning process, thereby making learning activities more effective and optimal.

In cycle 2, improvements were made to the learning process using the PjBL (Project-Based Learning) model supported by Genially. Project-Based Learning is a learning model that allows educators to manage the learning process through project-based activities (Yolandasari et al., 2025). This model encourages students to produce work related to real life, both individually and in groups. Learning takes place not only in the classroom but also outside of it. In every activity, students gain hands-on practice and direct experience, which ultimately enhances their creativity and conceptual understanding (Prasetyo, 2019). The implementation in cycle 2 yielded better results compared to cycle 1. Based on the N-Gain results, 52.38% of students achieved the high category and 47.63% were in the moderate category. There were no students remaining in the low category. These results indicate that the instruction in cycle 2 was able to improve students' conceptual understanding more effectively. The use of Genially also had a more significant impact compared to the previous intervention. This is consistent with research (Muchamad Hidayatullah & Aripin, 2026) that genially not only increases student engagement but can also contribute to improved conceptual understanding and overall learning outcomes. In addition, other researchers have noted that

The improvement in N-Gain scores in Cycle 2 occurred because students began to get used to the implemented learning model, resulting in increased student engagement, participation, and understanding during the learning process. Additionally, teachers made improvements to the learning process based on reflections from Cycle 1, such as enhancing classroom management, providing clearer instructions, and maximizing

discussion and practice activities. The use of the Genially website as a learning medium is expected to serve as an alternative for educators to create enjoyable and meaningful learning experiences, thereby enhancing students' cognitive abilities, as evidenced by improved learning outcomes (Rajab et al., 2025). Furthermore, according to (Enstein et al., 2022) genially serves as a tool for educators to develop creative and innovative learning materials, such as presentations, educational games, and interactive instructional videos. Thus, it can be concluded that the interventions implemented in this study successfully improved conceptual understanding from Cycle 1 to Cycle 2.

CONCLUSION

A classroom action research study on Genially-based learning media showed improvements in learning and proved effective for implementation. The results from Cycle 1 to Cycle 2 showed a significant improvement. The results obtained using the N-Gain score fell into the high category, and in Cycle 1, improvement was already visible, although it was not yet optimal because some students were in the low category. However, after improvements were made in Cycle 2, a significant increase occurred, with no students remaining in the low category. Thus, it can be concluded that the use of Genially is effective for elementary school students and is capable of improving students' conceptual understanding. In addition to improving conceptual understanding, the use of the Genially interactive platform also enhances student engagement through its features. Students become more active in asking questions, participating in discussions, and actively following the lesson. Furthermore, students are able to operate digital games, thereby increasing their engagement with the assistance of the Genially platform.

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