



## The Effect of Illustrated Glossaries of Plant Life Material on Students' Learning Motivation

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### Abstract

The National Education Goals play an important role in realizing the nation's ideals through various learning resources and media accessible to students in schools. Strong learning motivation serves as a fundamental basis for developing students' potential to become faithful, morally upright, and responsible individuals. One way to enhance learning motivation is by providing engaging learning media, such as glossaries that help students better understand scientific terms. This study aims to examine the effect of illustrated glossaries on students' learning motivation in the topic of the plant world. A quasi experimental method with a pretest-posttest control group design was employed. Two classes participated in the study: an experimental group that used illustrated glossaries to assist in understanding scientific terms and a control group that did not use any glossary, both using the same biology textbook. Data were collected using a learning motivation questionnaire measuring eight indicators, including perseverance, persistence, interest, independent work, boredom with routine tasks, maintaining opinions, determination, and problem solving enthusiasm. The results indicate that the use of illustrated glossaries significantly increased students' learning motivation compared to those who did not use them. Motivation indicators in the experimental group ranged from high to very high categories. In conclusion, illustrated glossaries effectively enhance students' learning motivation in plant world material. It is recommended that illustrated glossaries be implemented across various educational levels and fields to support accurate and consistent scientific terminology, helping students keep pace with scientific advancements.

**Keywords:** biology learning; illustrated glossary; learning motivation; plant world; scientific terminology

### INTRODUCTION

The current National Education Goals play an important role in realizing the nation's ideals through various learning resources and media for students in schools. Learning that incorporates innovative, engaging, and meaningful media can significantly influence the achievement of learning objectives and educational goals. High motivation leads to improved learning outcomes in biology (Suprihatin, 2015; Sapriyah, 2019; Zubaidah, 2020). The achievement of educational goals depends on teachers, adequate facilities and infrastructure, as well as student input. Students construct their own learning experiences independently through learning media, while teachers act as facilitators who assist in problem solving (Jatmiko, 2015; Muhammad, 2016; Aprijal *et al.*, 2020). A questionnaire administered to students and interviews conducted with biology teachers at a public school in Teluk Kuantan, Riau revealed several issues including the low utilization of illustrated glossaries or biology dictionaries by students during the learning process, which was found to be 47%. This low usage contributed to student learning motivation falling into the moderate category (63%). Therefore, it is necessary to develop learning media that can

support and enhance student motivation through the use of illustrated glossaries (Aprijal *et al.*, 2020; Wini *et al.*, 2022; Anggraini *et al.*, 2024).

The term glossaries is the plural form of glossary, which is defined in the Indonesian dictionary as a concise dictionary or a list of words with explanations in a particular field. A glossary is a type of visual media that provides a comprehensive overview of vocabulary ranging from concrete to abstract terms encountered by students (Rusintya, 2016; Larasati, 2023). Mastery of vocabulary through this glossary is essential for students in the biology learning process. The use of an illustrated glossary as a dictionary offers abundant information, including word meanings, spellings, and pronunciations, which students seek as a reference for the concepts being studied (Septian & Burhendi, 2022; Sulistiyarini *et al.*, 2024). This uniqueness makes illustrated glossaries a primary data source for students in obtaining clear and concise definitions that avoid multiple interpretations, as well as understanding the context of term usage, thereby strengthening arguments during the study of plant material.

Illustrated glossaries are not limited to biology education, they can also be compiled and utilized by communities for various purposes. The use of glossaries is closely related to biology material, which contains numerous important terms that serve as fundamental concepts for students during the learning process. Generally, glossaries are essential in all science subjects due to the many technical terms and foreign language vocabulary that are often unfamiliar to students (Septian & Burhendi, 2022; Larasati, 2023). Moreover, science learning involves abstract and complex material, making auxiliary media such as glossaries necessary. Jayawardana, (2017) explains that the paradigm of science learning, particularly biology, is challenging for students to comprehend because it includes many Latin terms related to basic concepts, thus requiring a learning medium as a reference. Consequently, a glossary can provide students with valuable input to obtain understanding or concepts during the learning process. This is supported by previous research indicating that the use of glossaries can facilitate the learning process for students by 66.71% (Rusintya, 2016; Novita, 2017; Larasati, 2023). Typically, glossaries are placed at the end of textbooks to ensure they are easily accessible to students without disrupting the flow of concept comprehension or the integration of new knowledge.

The illustrated glossary of plant life serves as a printed medium that offers unique visual communication by combining text and colored images (Septian & Burhendi, 2022; Larasati, 2023; Sulistiyarini *et al.*, 2024). It contains 227 specific scientific terms related to plant life, which were compiled from three biology textbooks used by students. The compilation of these scientific terms in the glossary provides important benefits, such as enhancing the understanding of complex concepts and enriching new knowledge. Furthermore, this glossary actively and independently engages students in developing their vocabulary and conceptual understanding of plant material in everyday life. An illustrated glossary functions similarly to a general dictionary and assists students in comprehension, thereby motivating them to learn biology (Fadli *et al.*, 2017; Aprijal *et al.*, 2020; Sulistiyarini *et al.*, 2024). Motivation is the internal drive within learners to succeed in the learning process. Motivation influences learners to be more active and diligent in their studies, clarifies learning objectives, and improves learning outcomes. Learning outcomes include changes in knowledge, attitudes, abilities to remember and understand new concepts, as well as reading and writing skills (Muhammad, 2016; Septikasari & Frasandy, 2018; Sapriyah, 2019).

Student learning outcomes involve physiological and psychological factors influenced by learning motivation (Muhammad, 2016; Pardede & Manurung, 2016; Partono *et al.*, 2021). Furthermore, Karsono (2017) explains that students who achieve high learning outcomes are motivated by both intrinsic and extrinsic factors. These factors affect students' desire to succeed according to their expectations and future goals (Intania *et al.*, 2017; Sapriyah, 2019; Watoni, 2019). Intrinsic motivation refers to students engaging in learning activities with enthusiasm, interest, and enjoyment in acquiring knowledge, while extrinsic motivation involves students receiving rewards or praise for their achievements. Motivation can be measured by observing students' perseverance in facing tasks, tenacity in overcoming difficulties, interest, enjoyment of working independently, boredom with routine tasks, ability to defend opinions, reluctance to give up on their beliefs, and enjoyment in seeking and solving problems in daily life (Rahayu &

Adistana, 2018; Zubaidah, 2020; Partono *et al.*, 2021). This study aims to examine the effect of illustrated glossaries on students' learning motivation in the topic of plant world.

## METHOD

The research method employed was quasi experimental, involving two classes: one experimental class and one control class. This method was chosen because the researcher could not randomly assign individual students to different groups due to existing classroom arrangements and school regulations. Therefore, intact classes were used to maintain the natural learning setting while still allowing comparison between groups. The research design used was a pretest-posttest control group design. This design involves two groups selected randomly to ensure that both groups are comparable (Lestari *et al.*, 2021; Muflikhah & Kamal, 2024; Murtavia *et al.*, 2022). Both groups were given a pretest to measure their initial abilities before the treatment and a posttest to assess their progress after the treatment. The study was conducted at a public school in Teluk Kuantan, Riau, selected based on the ease of obtaining permission, availability of relevant data and informants, and the suitability of the student population to the research objectives. The population consisted of students who met the criteria and were representative of the overall student body.

The sample consisted of 67 students, divided into two classes: 33 students in the experimental class and 34 students in the control class. Random sampling was used to select the participants to reduce bias and improve the validity of the results. The main variable measured in this study was learning motivation, which was evaluated using a structured questionnaire. Data analysis involved examining changes in learning motivation based on eight specific indicators, which capture various aspects of student motivation such as perseverance, interest, and problem solving enthusiasm, as can be seen in Table 1. The results were analyzed to determine the effectiveness of the illustrated glossary as a learning medium in enhancing student motivation. This method allowed for a controlled comparison between groups, contributing to the reliability and validity of the findings.

Table 1. Learning motivation indicators

| No | Indicator                                       | Description   |
|----|---|---|
| 1  | Diligent in facing tasks                        | Students demonstrate perseverance and patience in completing tasks while facing challenges.                               |
| 2  | Persistent in facing difficulties               | Students do not give up easily when encountering difficulties in learning, but continue to strive to find solutions.      |
| 3  | Showing interest                                | Students are interested in issues related to material that is relevant to everyday life.                                  |
| 4  | Enjoy working independently                     | Students enjoy doing assignments independently without relying on others.   |
| 5  | Quickly bored with routine tasks                | Students are enthusiastic about repetitive tasks.   |
| 6  | Can defend his opinion                          | Students are able to express and defend their opinions well to others.  |
| 7  | It's not easy to let go of what you believe in. | Students have strong convictions and are not easily influenced by things that contradict their beliefs.                   |
| 8  | Enjoy searching for and solving problems        | Students enjoy searching for and solving problems as a desire to learn and personal satisfaction in overcoming obstacles. |

(Sardiman, 2011)

The analysis of the results of the student learning motivation questionnaire was conducted by scoring each item on the questionnaire. Each response was assigned a numerical value based on a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The learning motivation questionnaire grid, which outlines the specific indicators and corresponding items, can be seen in Table 2.

Table 2. Learning motivation questionnaire grid

| No | Indicator                            | Number of Items | Item Numbers |
|----|--------------------------------------|-----------------|--------------|
| 1  | Persistence in completing tasks      | 5               | 1-5          |
| 2  | Resilience in facing difficulties    | 5               | 6-10         |
| 3  | Showing interest                     | 5               | 11-15        |
| 4  | Enjoyment in working independently   | 5               | 16-20        |
| 5  | Easily bored with routine tasks      | 5               | 21-25        |
| 6  | Ability to defend opinions           | 5               | 26-30        |
| 7  | Strong adherence to personal beliefs | 5               | 31-35        |
| 8  | Enjoyment in solving problems        | 5               | 36-40        |

(Sardiman, 2011)

Completion of the student learning motivation questionnaire was based on a predetermined scoring system, which consisted of eight indicators with a score range from 1 to 5 for each item. The detailed questionnaire scores and their corresponding indicators can be seen in Table 3. Each indicator reflects a specific aspect of learning motivation, allowing for a comprehensive assessment of students' motivational levels. The collected data were then used to evaluate and compare the motivation levels before and after the intervention in both the experimental and control groups.

Table 3. Learning motivation questionnaire scores

| Assessment Score | Answer         |
|------------------|----------------|
| 5                | Strongly agree |
| 4                | Agree          |
| 3                | Quite agree    |
| 2                | Disagree       |
| 1                | Disagree       |

The results of the student learning motivation questionnaire were analyzed through several systematic steps. First, each item in the questionnaire was grouped based on the specific aspect of motivation being observed. Using the established scoring guidelines, the score for each statement was calculated in accordance with its corresponding motivational indicator. Subsequently, the total score obtained for each aspect was converted into a percentage and categorized based on the established percentage criteria. The average percentage across all observed aspects was then calculated to determine the overall level of student learning motivation. This process allowed for the classification of motivation levels into categories such as low, moderate, high, or very high. The percentage of questionnaire scores was calculated using the following formula:

$$P = \left( \frac{K}{(l \times m)} \right) \times 100$$

The explanation of the formula is as follows: P represents the percentage of the questionnaire results, K is the total score obtained by the students, l indicates the number of students, and m is the maximum score for each item. The resulting percentages were then interpreted using predetermined criteria to assess the level of student motivation in the learning process. The criteria used to categorize the results are presented in Table 4.

Table 4. Criteria for student learning motivation percentage

| Percentage obtained (%) | Criteria  |
|-------------------------|-----------|
| $85 \leq p \leq 100$    | Very high |
| $70 \leq p < 85$        | High      |
| $55 \leq p < 70$        | Moderate  |
| $40 \leq p < 55$        | Low       |
| $0 \leq p < 40$         | Very low  |

(Riduwan, 2007)

A normality test is conducted to test whether the data is normally distributed or not. The normality test used is the Kolmogorov-Smirnov test with a significance level ( $\alpha$ ) of 0.05 (Usman, 2006). The conclusion of normality is drawn by comparing the  $D_n$  value or significance value (p-value) with the Kolmogorov-Smirnov table. Homogeneity testing is conducted to determine whether the data is homogeneously distributed or not and to determine the control class and experimental class. After homogeneity testing, it used independent sample *t*-test. The statistic test uses the help of software IBM SPSS Statistic 23.

## RESULT AND DISCUSSION

Learning motivation data was obtained from a questionnaire consisting of 40 statements with 5 alternative answers, with the highest score being 5 and the lowest score being 1. There were 67 respondents, consisting of 33 students in the control class and 34 students in the experimental class. The motivation questionnaire was administered during the pretest and posttest, namely at the beginning and end of the learning process after all treatments were implemented. The results of the learning motivation questionnaire for the control and experimental classes can be seen in Table 5.

Table 5. Results of the learning motivation questionnaire for the control class and experimental class

| Class      | Percentage of Student Learning Motivation |          |              |           |
|------------|---|----------|--------------|-----------|
|            | Pretest (%)                               | Category | Posttest (%) | Category  |
| Control    | 61  | Moderate | 64           | Moderate  |
| Experiment | 65  | Moderate | 87           | Very High |

Table 5 presents the results of student learning motivation in both the control and experimental classes. In the control class, there was a slight increase in learning motivation, from 61% to 64%, both of which fall within the moderate category. This class relied solely on textbooks as the primary learning resource, without the support of illustrated glossaries. In contrast, the experimental class experienced a significant increase in learning motivation, from 65% in the moderate category to 87% in the very high category. This improvement occurred after the students were provided with an illustrated glossary designed to be visually engaging, in addition to using textbooks as the main learning material. The use of engaging learning media can serve as an active driving force that encourages students to be more motivated in the learning process (Wini et al., 2022; AJ et al., 2024; Nazilah et al., 2024). The assessment of learning motivation using a questionnaire consists of eight indicators: diligence in facing tasks, persistence in facing difficulties, showing interest, enjoying working independently, getting bored quickly with routine tasks, being able to maintain one's opinion, not easily giving up on what one believes in, and enjoying seeking and solving problems. The percentage results of the posttest assessment for each indicator in both the control and experimental classes are presented in Figure 1 below. The comparison shows that the experimental class consistently achieved higher scores across all indicators than the control class. This indicates that the use of illustrated glossaries had a positive impact on various dimensions of student motivation. The most significant improvement was observed in indicators related to interest and persistence, which are crucial for sustained engagement in science learning.

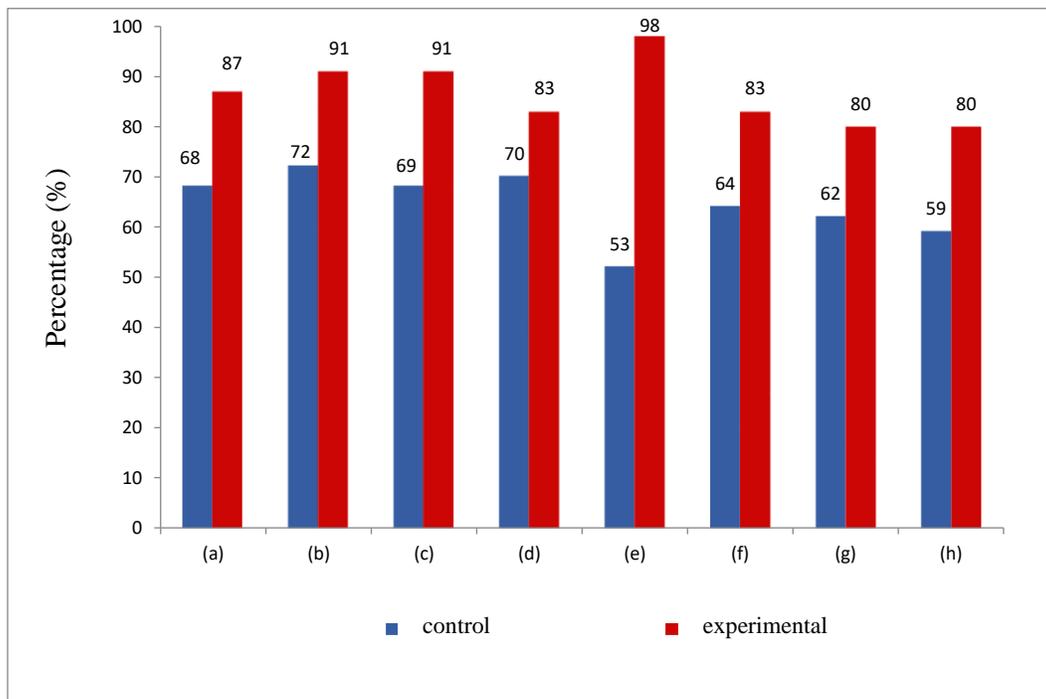


Figure 1. Percentage per indicator of student learning motivation in the control class and experimental class, namely: (a) persistent in facing tasks, (b) resilient in facing difficulties, (c) demonstrating interest, (d) enjoying independent work, (e) quickly bored with routine tasks, (f) maintaining opinions, (g) not easily giving up on beliefs, and (h) enjoying searching for and solving problems

Figure 1 shows differences in the percentage of each learning motivation indicator between the control and experimental classes. In the control class, the lowest percentage was observed in indicator (c), which relates to boredom with routine tasks, with a score of 53% categorized as low. This outcome may be attributed to the limited availability of learning media or resources. Incomplete media or inadequate learning resources can lead to poor and ineffective learning delivery, which in turn causes boredom (Maharcika *et al.*, 2021; Novianti & Syamsurizal, 2021; Sulistiyarini *et al.*, 2024). Therefore, it is essential to present learning materials in a more engaging manner, such as by combining images and text to support students' understanding. The findings of this study have meaningful implications for the field of education. The use of illustrated glossaries can motivate students to better understand scientific terms, particularly those related to plant life, a topic that involves numerous complex and abstract concepts. This approach may also increase students' confidence and strengthen their perception of biology as a relevant and credible subject. Demonstrated that the use of colorful, image-rich e-booklets on plant life successfully increased student enthusiasm for learning (Hanifah *et al.*, 2020; Fauziah *et al.*, 2023; Haka *et al.*, 2024).

Emphasizes that the selection of learning media must be adapted effectively to the abilities and needs of students to support the achievement of learning objectives. Interestingly, indicators (b) and (d) in the control class related to persistence in facing difficulties and enjoyment in working independently still showed relatively high percentages, at 72% and 70%, respectively. These results indicate that students maintained motivation in certain areas even in the absence of supportive tools such as illustrated glossaries, likely due to the teacher's guidance and structured task assignments. The high level of learning motivation in the experimental class 98% on the indicator related to boredom with routine tasks was attributed to the use of illustrated glossaries. These glossaries helped prevent students from feeling bored, as they encouraged creativity in addressing complex problems that required critical thinking and

innovative solutions (Rusintya, 2016; Septian & Burhendi, 2022; Sulistiyarini *et al.*, 2024). In contrast, the control class showed a low level of motivation on the same indicator, with a percentage of 53%. This was likely due to the absence of supporting media, such as illustrated glossaries, which could aid in understanding key concepts related to plant life. As a result, students in the control class tended to feel disengaged when repeatedly encountering unfamiliar terms without the support of appropriate visual learning tools.

Emphasizes that in order to foster learning motivation, the use of instructional media that creates a fun and engaging learning environment is essential (Muhammad, 2016; Meldasari *et al.*, 2018; Pramana *et al.*, 2020). Learning media, such as glossaries, support effective and efficient teaching and learning processes and enable students to develop their potential optimally. To assess whether there was a significant difference in learning motivation between the control and experimental classes, hypothesis testing was conducted (Septian & Burhendi, 2022; Larasati, 2023; Sulistiyarini *et al.*, 2024). Data analysis included normality testing using the Kolmogorov-Smirnov test, homogeneity of variance testing, and an independent sample *t*-test. The results of the normality test showed that the learning motivation scores were normally distributed, with a significance value of 0.070 in the control class and 0.200 in the experimental class, both exceeding the 0.05 threshold. The homogeneity of variance test yielded an *F*count of 1.03 and an *F*table value of 3.14 at a 5% significance level, indicating that *F*count < *F*table, thus the data met the assumption of homogeneity. Following this, an independent sample *t*-test was conducted to determine whether the use of illustrated glossaries had a statistically significant effect on student learning motivation. The results of the *t*-test are presented in Table 6.

Table 6. Independent t-Test for learning motivation scores control class and experimental class

| <b>N</b> | <b>Df</b> | <b>Sig.</b> | <b>T- Count</b> | <b>T- Table</b> |
|----------|-----------|-------------|-----------------|-----------------|
| 67       | 65        | 0.000       | 13.51           | 1.997           |

Table 6 shows that the significance value (2-tailed) for learning motivation in the control and experimental classes is 0.000, which is less than the threshold of 0.05. This indicates a statistically significant difference between the two groups. The uniqueness of this study lies in the use of illustrated glossaries as a source of independent learning, which can enhance student motivation when presented in a visually engaging format that combines colorful images and concise, contextual explanations. Additionally, the calculated *t*-value of 13.51 exceeds the *t*-table value of 1.997, which further confirms a significant difference in learning motivation between students in the experimental and control classes after the implementation of the illustrated glossary. Students learn more deeply from a combination of words and pictures than from words alone, as multimedia materials optimize the use of both the verbal and visual channels in working memory (Gaffar, 2020; Novianti & Syamsurizal, 2021; Salema *et al.*, 2024).

Based on the research data, it can be concluded that there is a significant difference in student learning motivation between the experimental class that used illustrated glossaries and the control class that did not, particularly in the context of botany. Illustrated glossaries are therefore recommended as effective teaching aids that support conceptual understanding and foster learner autonomy. Their application can be expanded to higher levels of education and professional training to ensure clarity, consistency, and accessibility of scientific terminology. In addition to increasing learning motivation, the use of illustrated glossaries has broader impacts on the learning process. Students become more confident in understanding and using scientific terms, more active in classroom discussions, and more persistent in completing learning tasks. The availability of clear visual and textual references also reduces misconceptions and supports independent study habits. Over time, these impacts contribute to improved academic performance, stronger scientific reasoning skills, and enhanced scientific literacy. Furthermore, it is suggested that scientific terms be continually updated and aligned with current learning resources so that students are better prepared to adapt to ongoing developments in science and technology, thus promoting lifelong learning and scientific literacy (Muhammad, 2016; Andini *et al.*, 2023; Larasati, 2023).

## CONCLUSION

Based on the results of this study, it can be concluded that student learning motivation consists of eight indicators, with the highest percentage in the control class being 72% in the high category for persistence in facing difficulties, while the experimental class achieved the highest percentage of 98% in the very high category for quickly becoming bored with routine tasks. The use of an attractive illustrated glossary in the experimental class contributed significantly to this increase in motivation. Conversely, the control class showed a low percentage of 53% for the boredom indicator, caused by students' difficulty in understanding unfamiliar terms, which lowered their interest and increased fatigue during the learning process. The comparison between the experimental and control classes demonstrated a significant positive effect of the illustrated glossary media on student learning motivation regarding plant world material. The use of this glossary not only motivated students and boosted their confidence in understanding plant-related material but also enriched their vocabulary and developed important language skills, such as finding definitions, examples, synonyms, and antonyms. Additionally, students were able to interpret meanings according to the context of the learning materials. These findings also encourage educators and glossary developers to create interactive learning media that combine relevant terms and images to support the learning process. It is recommended that developers provide accurate linguistic information and promote the regular use of glossaries by explaining their benefits as effective learning aids across various educational levels and community settings. Globally, this study offers a solution to address students' difficulties in understanding complex scientific terminology, particularly in biology. Illustrated glossaries that are easily accessible and adaptable to different languages and cultures have the potential to improve science literacy and student motivation broadly. This approach supports inclusive education and aligns with international quality education goals, thereby fostering greater engagement in STEM learning and enhancing scientific understanding worldwide.

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