



Facilitating creativity and conceptual understanding in lower-plant botany assignments: Canva's student perceptions

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ARTICLE INFO	ABSTRACT
Article history Received: 08 May 2026 Revised: 27 May 2026 Accepted: 02 July 2026	Understanding the multidimensional perceptions of ease-of-use, satisfaction, motivation, creative skills, and conceptual understanding is crucial for evaluating the effectiveness of the Canva platform in lower-plant botany courses. This study aims to describe students' perceptions of ease-of-use, satisfaction, and motivation in using Canva, and to explore their impact on creativity skills and conceptual understanding in Canva-assisted lower-plant botany course assignments. The study design was mixed-methods research involving 40 subjects. The research instrument included 25 closed-ended and 10 open-ended questionnaires for data collection, which were analyzed using a mixed-methods approach. The analysis revealed that all five indicators were in the very high category, with the highest percentage recorded for creativity skills (90.1%) and the lowest for conceptual understanding (87.2%). The qualitative analysis also confirmed students' positive responses to the five indicators. The study concluded that the majority of students experienced ease-of-use, satisfaction, and increased motivation when using Canva, which significantly enhanced their creativity and conceptual understanding when completing lower-plant botany assignments. It is recommended that future experimental studies utilize specific rubrics to evaluate the balance between visual creativity and conceptual accuracy.
Keywords: Conceptual understanding Creativity Lower-plant botany Motivation Satisfaction.	

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INTRODUCTION

Botany is defined as a branch of biology that focuses on the scientific study of plant organisms (Burke et al., 2022; Peruzzi, 2025). Botany's highly complex subject matter demands a high level of abstraction and spatial visualization from students (Kletečki et al., 2023; Swann & Pye, 2019). In higher education curricula, this discipline is studied specifically through lower-plant botany courses. Lower-plant botany courses encompass a comprehensive study of taxonomy, diversity, morphology, physiology, reproduction, genetics, and ecological relationships in lower plants, such as Bryophyta, Pteridophyta, Schizophyta, Thallophyta, Mycophyta, and Lichenophyta (Büdel & Friedl, 2024; Shipunov, 2021). To accommodate this complexity, teaching and learning activities in higher education are currently encouraged to implement a student-centered learning (SCL) approach (Kerimbayev et al., 2023; Otto et al., 2024; Tang, 2023).

The SCL approach is a teaching and learning method that prioritizes student needs, autonomy, and active involvement to construct an adaptive and meaningful learning ecosystem (Aithal & Aithal, 2025; Kerimbayev et al., 2023). This approach is based on the principle of "from students, by students, and for students," which empowers students to play an active role (Bhardwaj et al., 2025; Kerimbayev et al., 2023). In implementing SCL, the lower-plant botany course requires active student involvement through a series of structured, open-ended assignments, ranging from interactive presentations and leaflet designs on a particular plant species to collaborative research projects as preparation for writing a scientific article. This series of assignments is designed to strengthen 21st-century skills, including conceptual understanding and creativity (Adeoye & Jimoh, 2023; Syed & Siddiqui, 2025; Zainuri et al., 2022).

Conceptual understanding in lower-plant botany refers to mastery of basic biological concepts and principles, such as the essence of classification, the rationale for species grouping, and the methodological justification behind identification steps (Kong et al., 2022; Shipunov, 2021). Conceptual understanding plays a crucial role because it requires students to interpret the significance of the material they study and equips them with flexible problem-solving strategies (Elhilal, 2025; Prajoko et al., 2023). Furthermore, the flexibility of problem-solving strategies is an integral and inseparable indicator of creativity. In the context of lower-plant botany learning, student creativity can be observed from their ability to identify conceptual linkages, devise flexible solutions, and pose original questions that stimulate scientific inquiry (Nilimaa, 2023; Shipunov, 2021). The creativity used in visualizing the structure and diversity of lower plant botany is associated with improved memory retention and understanding of scientific concepts. This confirms that these two skills are integrally linked and simultaneously reinforce each other in completing course assignments. To facilitate this, lower-plant botany learning needs to adopt visual technology to support the SCL approach. One effective platform to address these needs is Canva.

Canva's educational visual platform provides an interactive digital space that facilitates students' synergy of visual acuity, creativity, and comprehensive conceptual understanding (Amalia et al., 2026; D. N. Rahma et al., 2024). Theoretically, the Canva platform supports creative visualization and conceptual understanding by integrating verbal and visual information simultaneously, in line with the dual coding principle. This principle effectively transforms complex abstract material into concrete representations, making it easier for students to digest and remember (Ramadhan et al., 2024). This feature significantly expands access to graphic design, enabling students without specialized graphic design skills to create accurate, aesthetically pleasing, and quick visual representations of lower plant botany without having to start from scratch (Oktaviyani & Putranta, 2025). Therefore, Canva is recognized as an educational platform that offers ease of use for students and educators.

Canva's ease-of-use has been widely adopted by several previous researchers, utilizing it as a comprehensive pedagogical instrument, ranging from its role as a co-regulated collaboration space (Pedrosa, 2024), an AI-based instructional and assessment guide (Viruel et al., 2025), to a visual interface media that has been proven to have a positive impact on concept visualization and the development of students' creativity skills (Ruiz-Rojas et al., 2024). In addition to Canva, various previous studies have confirmed that the use of this platform visual technologies, such as Adobe Creative Cloud (Alsswey, 2025; Hooper & Salazar-Gutierrez, 2025; Yoga et al., 2020), Figma (Borysova et al., 2024; Lakilaki et al., 2025), Visme (Pham & Li, 2023), and Augmented Reality (AR) (Chien et al., 2019), have been shown to facilitate students in simplifying complex information in academic assignments, positively impacting their retention and conceptual understanding.

Previous research indicates that most studies still focus on the general benefits of Canva, leaving a crucial research gap in disciplines with visual-spatial characteristics, such as lower-plant botany. The complex characteristics of lower plant botany, including morphology, phylogeny, and taxonomic hierarchy, make it difficult for students to master the material when learning relies solely on textual approaches in conventional textbooks. This spatial visualization is essential to facilitating students' understanding and explanation of each concept and structure in lower plant botany. Furthermore, the state-of-the-art literature on Canva-assisted learning still tends to separate research variables, either by examining general satisfaction exclusively or by measuring test scores without evaluating the multidimensional interaction between students' perceptions and learning experiences. This situation results in a lack of research that simultaneously evaluates how perceived technology acceptance, such as ease-of-use, satisfaction, and user motivation, interacts with perceived levels of creativity skills and conceptual understanding, particularly in completing lower-plant botany assignments. This absence of simultaneous evaluation hinders the development of a comprehensive understanding of how Canva's multidimensional platform affects both students' cognitive load and conceptual mastery in lower-plant botany courses.

Therefore, this study introduces a novel approach that integrates the framework of students' perceptions of the Canva platform with the specific characteristics of lower-plant botany courses. This study adopted a multidimensional approach by evaluating Canva's use not only in terms of ease of use but also in relation to students' perceptions of satisfaction, motivation, creativity, and mastery of lower-plant botany concepts. This study underscores the urgency of shifting current pedagogical perspectives. Canva transcends mere assignment efficiency, driven by ease of use, satisfaction, and motivation to actively catalyze creativity in visualizing lower plant botany, directly fostering an in-depth conceptual understanding. To address this urgency, the primary research objective is: How do students perceive Canva in facilitating creativity and conceptual understanding during lower-plant botany assignments? Consequently, the main research problem is formulated into five specific research questions, as follows:

- RQ1. How do students perceive Canva's ease of use in completing lower plant botany assignments?
- RQ2. How do students' perceptions of their satisfaction with using Canva in completing lower plant botany assignments?
- RQ3. How do students' perceptions of their motivation toward using Canva in completing lower plant botany assignments?
- RQ4. How do students' perceptions of their creativity toward using Canva in completing lower plant botany assignments?
- RQ5. How do students' perceptions of their conceptual understanding of using Canva in completing lower plant botany assignments?

Based on this, the study aimed to describe students' perceptions of ease of use, satisfaction, and motivation to use Canva, and to explore its impact on creativity skills and conceptual understanding in Canva-assisted lower-plant botany course assignments.

METHODS

Research Design

The research design was a mixed-methods study that combined quantitative and qualitative approaches (Tashakkori & Teddlie, 1998). This design was chosen to gain a comprehensive understanding of students' perceptions of using Canva for lower-plant botany assignments. These perceptions were then measured using five main indicators: ease of use, satisfaction, motivation, creativity, and conceptual understanding.

Research Subjects

The study used 40 biology education students from the 2024 and 2025 intakes, as shown in Table 1. The subjects were selected using a purposive sampling technique based on two main criteria comprising active status as biology education students in a lower-plant botany course and systematic utilization of Canva for completing course assignments. Canva was selected as the research object based on its high adoption rate and the familiarity of biology education students with the platform, particularly as a supporting medium for completing lower-plant botany assignments. The outputs of the lower-plant botany course assignments included interactive presentation slide designs and plant species profile leaflets. All research subjects provided informed consent prior to participating in the study.

Table 1
Research subjects demographic

No	Class	Number of Participants
1	Biology Education students 2024	20
2	Biology Education students 2025	20
Total		40

Instrument

The study involved two instruments modified from a recent literature review to ensure its relevance in 21st-century learning, which collectively measured five key indicators, namely: ease-of-use of Canva (Marian et al., 2025), satisfaction with visual output (Weng et al., 2025), learning motivation (Annamalai et al., 2026), creativity and aesthetic expression skills (González-Zamar & Abad-Segura, 2021), and understanding of lower-plant botany concepts (Mayer, 2024). Click or tap here to enter text.. Both instruments included: 1) an online, closed-ended questionnaire containing 25 statements, with 5 items for each indicator, using a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5); 2) an open-ended questionnaire consisting of 10 in-depth interview questions, with 2 items for each indicator, designed to explore the rationale behind the data collection of the closed-ended questionnaire. Both instruments underwent expert review followed by rigorous validity and reliability testing to confirm their suitability for the study, yielding an Aiken's V of 0.995 and 96% agreement for the questionnaire, alongside an Aiken's V of 1 and 100% agreement for the interview.

Procedure

Data collection was conducted immediately after the task (immediate post-task), following the procedural flow illustrated in Figure 1. This procedure was carried out to ensure the accuracy of the subjects' perceptions and memories of using Canva in lower-plant botany assignments. The results from the questionnaire and interview forms were summarized in Microsoft Excel.

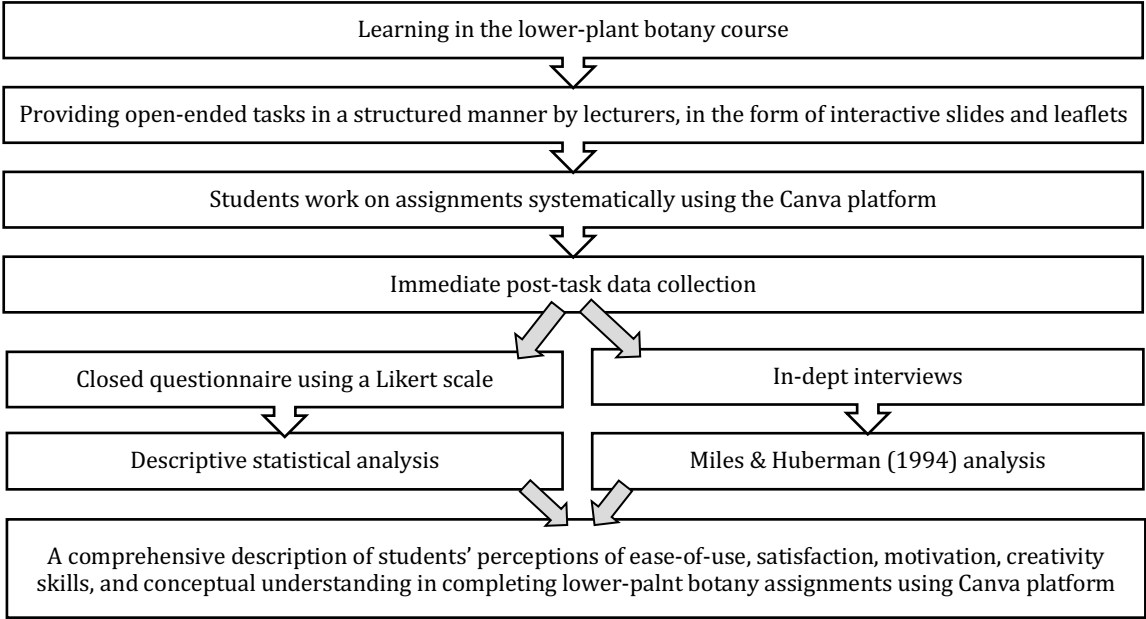


Figure 1. Data collection procedure

Data Analysis Techniques

The collected data were then analyzed by type using a mixed-methods approach. Quantitative data from the closed-ended questionnaires were analyzed using descriptive statistics to report percentages, means, standard deviations, and frequency distributions for each item and indicator. The final percentage results were then interpreted in Table 2.

Table 2.
Interpretation of the percentage results of closed questionnaires

Score (%)	Category	Interpretation
81-100	Very high	The response was very positive; usage of Canva greatly facilitated ease, satisfaction, motivation, creativity skills, and understanding of lower-plant botany concepts for students.
61-80	High	Positive response; usage of Canva has facilitated the indicators well.
41-60	Moderate	Neutral response; usage of Canva is quite facilitating, but the indicators have not been optimally explored.
21-40	Low	Negative response; usage of Canva is less facilitating and creates obstacles to the measured indicators.
0-20	Very low	The response was very negative; usage of Canva did not facilitate the measured indicators at all.

Inversely, qualitative data from interview responses were analyzed using an adapted and modified version of the Miles and Huberman data analysis model (Miles & Huberman, 1994), as shown in Figure 2. This process involved systematic steps to strengthen the statistical findings.

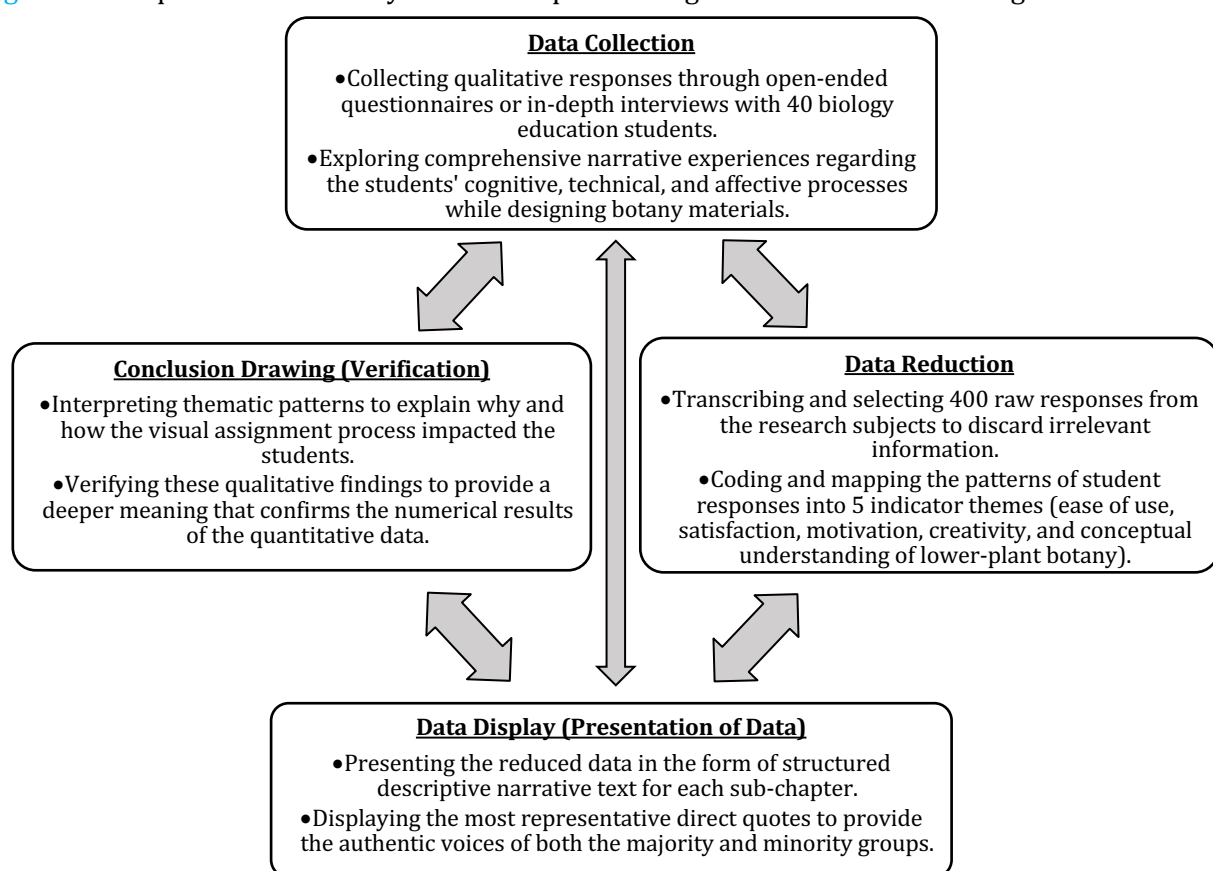


Figure 2. Modified Miles and Huberman data analysis model

RESULTS AND DISCUSSION

The research results were obtained based on quantitative descriptive analysis and in-depth qualitative research with 40 students. The findings were then classified into five main indicators, as follows.

Perceived Ease-of-use of Canva

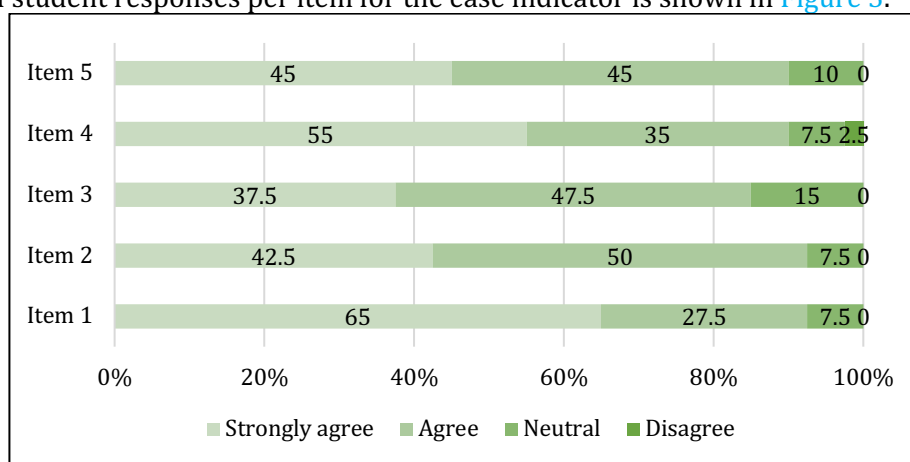
The analysis of the closed-ended questionnaire showed that the Canva platform was highly rated for ease of interface and user experience. This assessment is evidenced by the average ease indicator percentage, as shown in Table 3.

Table 3.

Percentage of ease-of-use indicators

No.	Item	Mean	SD	Percentage	Category
1	I found the Canva platform easy-to-use for my assignments.	4.58	0.64	91.50	Very high
2	The Canva interface made it easy for me to find the features I needed.	4.35	0.62	87.00	Very high
3	The installation process or access to Canva was not a barrier for me.	4.23	0.70	84.50	Very high
4	There are sufficient learning resources (tutorials/manuals) available to help me learn Canva.	4.43	0.75	88.50	Very high
5	I easily understood the basic functions of the Canva platform.	4.35	0.66	87.00	Very high
Average				87.70	Very high

Based on Table 3, the ease-of-use indicator achieved an average score of 87.7%, indicating a very high rating. The data percentages confirm a very positive response to Canva's ease of use for lower-plant botany assignments. The highest-scoring item was Item 1, with a score of 91.5% (very high). This achievement demonstrates that Canva's ease of use for assignments is very easy for students. The distribution of student responses per item for the ease indicator is shown in Figure 3.

**Figure 3.** Distribution of student responses on the ease-of-use indicator

Overall, the perception trend was very positive, with “Strongly Agree” and “Agree” responses dominating across all statements. The strongest affirmation was seen in Item 1, where 65% of students chose “Strongly Agree,” indicating that Canva's basic operations were very practical from the outset. This also demonstrates that the Canva platform facilitated students' lower-plant botany assignments. While the majority of responses were very positive, Item 3 recorded the highest percentage of “Neutral” responses at 15%. Furthermore, Item 4 was the only aspect that elicited a “Disagree” response at 2.5%.

Qualitative findings confirmed this high perception score. Through analysis of interview data reduction, the majority of subjects identified four key features that were most helpful in completing lower-plant botany assignments. These four features were ready-to-use presentation templates, graphic elements, botanical illustrations, ease of editing and efficiency, and collaboration and flexibility features. One student (S13) stated.

“The features I found most helpful in completing my lower-plant botany assignment were the templates, elements, and presentation (transitions). Team collaboration, drag-and-drop editor, background removal, text, and uploads. These features made it easier for me to work on lower-plant botany slides, such as editing individual or group slides. The templates feature provides thousands of templates tailored to my topic. The elements feature makes my slides engaging, such as when I searched for mushroom images, and many mushroom elements appeared. The presentation (transitions) enhance the presentation when transitioning to the next slide. Team collaboration enables group work during assignments. The drag-and-drop editor makes it easy to move elements or text. Background removal allows for removing unwanted background images. Text makes it easier to create text, as slides inevitably contain text. Uploads allow for image uploads.”

This aligns with Pedroso et al. (2023), who state that Canva simplifies complex design tasks to foster a positive user experience, driving continuous usage. The template feature, especially for presentations (slides) and infographics, was considered most helpful because it allows students to start designing quickly, provides a ready-to-use structure, and produces a clean appearance without having to create from scratch. The availability of comprehensive elements, icons, and illustrations of plant structures also made it very easy to visualize dense botanical material. This feature clarified explanations, enabled labeling of plant parts, and eliminated the need for manual drawing. Students explained that features like the drag-and-drop editor made editing easier and more efficient, speeding up the arrangement of layouts, images, and text. Furthermore, the background remover feature helped create a cleaner, more professional-looking report by removing backgrounds from photos of lab specimens. Finally, the team collaboration feature was useful for group assignments, while the ability to upload your own images and download results in various formats added flexibility and practicality to assignments.

These quotes explain why overall ease of use was rated so highly, especially in Item 1. However, students also identified several technical challenges they frequently encountered when using the Canva application for assignments. The most common obstacle was the limited set of features, elements, and templates available in the premium versions. To overcome this, students sought alternatives by maximizing the use of free elements, uploading images from external sources, or asking friends with subscriptions for help; some students also opted to subscribe themselves.

Furthermore, many students encountered obstacles due to unstable or slow internet connections, which disrupted the design loading and auto-saving process. Students' solutions included finding a more stable network, closing other applications, or working on text sections first when the connection was inadequate. App performance issues (lag/slowness, especially when inserting multiple elements or specimen photos) were addressed by compressing image files before uploading or dividing the design into sections. Students also experienced difficulty arranging layouts to ensure dense botanical material looked neat and finding botanical illustrations or image elements that were scientifically accurate or appropriate for their needs. These solutions included using the grid and align features, modifying existing templates, or uploading their own reference images after removing the background. This intuitive accessibility democratizes content creation for students lacking advanced design skills (Handayani et al., 2025). Consequently, when these students encounter technical challenges, they readily overcome them by leveraging the platform's user-friendly interface to sustain their workflow.

Student Satisfaction Level through Canva Utilization

Satisfaction is an important indicator that evaluates the extent to which students feel the visual products they produce meet expectations. The results of descriptive statistics indicate that Canva utilization achieved a very high level of satisfaction. A breakdown of the scores obtained for each statement item is presented in Table 4.

Table 4.
Percentage of satisfaction indicators

No.	Item	Mean	SD	Percentage	Category
1	I am satisfied with the visual quality of my design assignment.	4.48	0.64	89.50	Very high
2	The final design meets the lecturer's learning objectives.	4.45	0.55	89.00	Very high
3	I received satisfactory feedback from my lecturer and colleagues regarding my product.	4.40	0.59	88.00	Very high
4	I am proud of the final product I created.	4.50	0.68	90.00	Very high
5	The final product I created was easy to present and easy for the audience to understand.	4.63	0.59	92.50	Very high
Average				89.80	Very high

Table 4 shows that the overall average satisfaction score was 89.9%, a very high level. Specifically, all items in the satisfaction indicator exceeded 88%. The highest score was recorded in item 5, where students felt the final product was very easy to present and understand for the audience (score 92.5%). Meanwhile, statement 3, regarding feedback from lecturers or peers, ranked lowest, although it still fell within the very high score. The following is a breakdown of the distribution of responses for each satisfaction item in Figure 4.

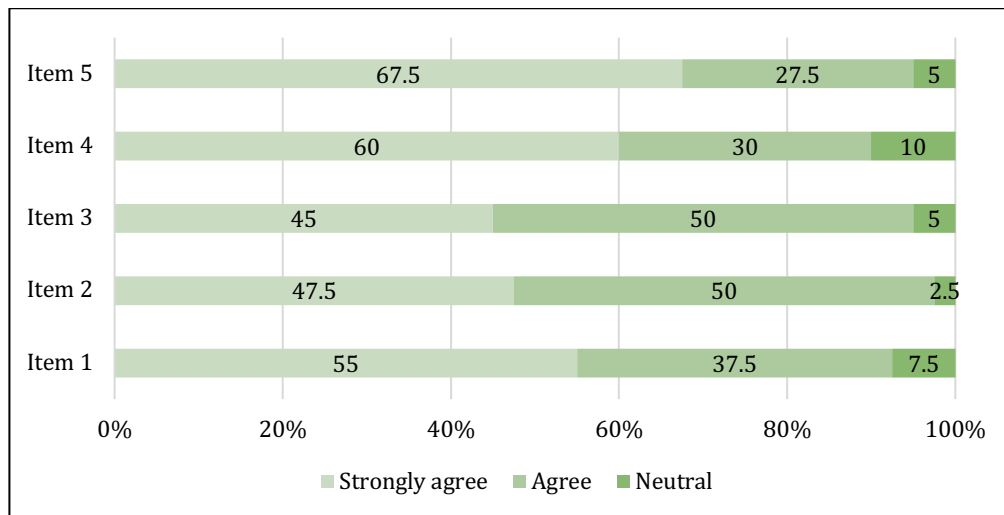


Figure 4. Distribution of student responses to satisfaction indicators

A closer analysis of the distribution of answer choices further confirms the findings (Figure 4). The findings show that no student responded negatively (disagree or strongly disagree) to any of the five statements. The highest satisfaction level was observed in Item 5, with 67.5% of students selecting the “strongly agree” option. However, Item 4 (pride in the final product) still had a small group of 10% who responded neutrally.

This high level of quantitative satisfaction, particularly regarding the appropriateness of the presentation and visual quality (Items 1 and 5), was corroborated by in-depth qualitative data analysis. In open-ended interviews, the majority of students stated that their Canva designs were highly effective and that they demonstrated high confidence when presenting or submitting. Reasons for this included the clean, structured, professional, and modern appearance of the designs, as well as the use of engaging visual elements and layouts (e.g., clear specimen photos and colorful anatomical labels). This good design helped lecturers and colleagues grasp crucial points more quickly. Canva designs are effective at making dense botanical material more understandable and less monotonous, thanks to their clear, communicative visuals. The use of templates and flowcharts helps the audience grasp the material quickly, and the attractive design also conveys the impression that the assignment was thoughtfully and effectively executed. As one student (S39) expressed.

“I feel more satisfied with the design results in Canva than in a traditional paper format. This is because Canva’s interface is more visually appealing, with a wider variety of colors, images, and layouts, making the lower-plant botany material easier to understand. Furthermore, Canva makes assignments appear neater and less boring than paper writing, which tends to be monotonous. With an attractive design, the content also feels more lively and enjoyable to read or present.”

The finding is in line with Roselyn et al. (2025), that the structured guidance offered by Canva's templates boosted students' confidence and ownership of their work, enabling them to present their ideas with greater clarity and pride; students described Canva-based tasks as engaging and rewarding, attributing this to the platform's visual and interactive features. The majority of students expressed very or somewhat satisfaction with the aesthetic quality of Canva designs compared to traditional paper formats. They believe Canva is superior because it allows for a more visual, interactive, engaging, and less monotonous presentation of botanical material through a combination of colors, layouts, illustrations/images, diagrams, and unique elements. This aesthetic makes it easier for both creators and audiences to understand complex material, makes assignments feel more alive, and helps highlight biological details. Students also expressed satisfaction with their assignments because they were able to complete them quickly and produce neat, professional, and aesthetically pleasing work thanks to the availability of templates and design features that simplify element arrangement without requiring advanced design skills. The resulting designs were also useful to peers, increasing their satisfaction and confidence that the results met expectations. Students who used Canva gained more self-confidence and worked harder when they displayed their products for others to see, which motivated them to create rather than simply remember and memorize (Abdulla, 2024).

Despite their satisfaction with the visual aesthetics, for a small number of students who responded neutrally, qualitative data revealed that their hesitation was not due to the application's technical limitations, but rather to two reasons: 1) some students acknowledged that traditional papers were still superior for presenting highly detailed, in-depth, and academic/scientific explanations, while Canva was stronger at concise and visual presentations; 2) some students felt mixed feelings or some skepticism regarding academic standards or the appropriateness of the content, scientific terms, and scientific names. Students recognized that the final design's feasibility depended on a balance among good visuals, conceptual accuracy, scientific rigor, and structured content that was not overly cluttered. Nevertheless, this platform proved effective at facilitating visual enjoyment, thereby supporting the student learning experience.

Motivation Profile for Learning Lower-plant Botany Using Canva

Students' affective engagement in learning lower plant botany was evaluated using motivational indicators. Unlike the technical aspects of the previous indicators, the most prominent finding in this aspect was the emergence of proactive learning behaviors. Table 5 presents the descriptive statistics for the motivation indicators. Figure 5 shows the detailed distribution of responses for each motivation indicator item.

Table 5.
Percentage of motivation indicators

No.	Item	Mean	SD	Percentage	Category
1	I feel more motivated working on Canva graphic design assignments than on conventional assignments.	4.45	0.71	89.00	Very high
2	Canva graphic design assignments encourage me to actively seek out additional resources (images, references, tutorials).	4.50	0.68	90.00	Very high
3	Working on Canva design assignments increases my engagement in class discussions.	4.43	0.64	88.50	Very high
4	I'd like to try Canva graphic design projects in other courses.	4.43	0.71	88.50	Very high
5	I tend to be enthusiastic and eager when given Canva graphic design assignments.	4.30	0.76	86.00	Very high
Average				88.40	Very high

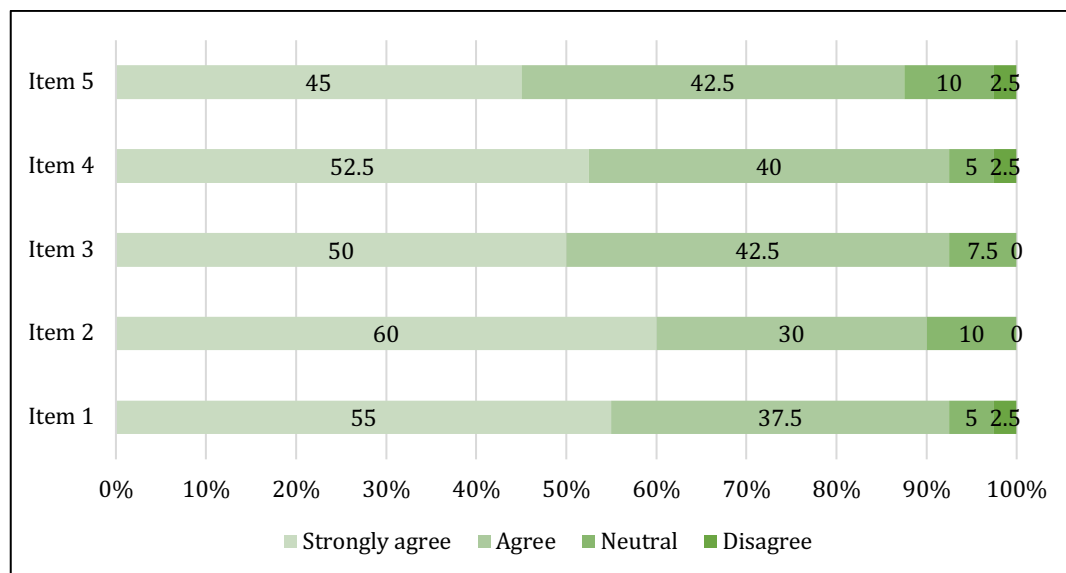


Figure 5. Distribution of student responses to motivation indicators

Overall, the transition from a conventional assignment format to Canva's visual design successfully sparked enthusiasm for learning lower-plant botany, with an average indicator score reaching 88.4% (Very High). Referring to the response distribution in Figure 5, the most significant effect of this visual assignment was captured in Item 2. Sixty percent of students explicitly stated that the design assignment motivated them to more actively seek additional sources or references outside the main module, selecting "Strongly Agree." This high level of independent initiative pushed the item's achievement to 90%, making it the highest-scoring item.

While this drive for independence dominates, the percentages in [Figure 5](#) also demonstrate realistic motivational dynamics. For Items 1, 4, and 5, which directly relate to personal interest in graphic design, a small group of 2.5% responded “Disagree,” followed by a “Neutral” group ranging from 5% to 10%. This varied pattern suggests that while students generally found it helpful, the level of enthusiasm for continuing to work on design projects reached a saturation point for some.

This situation was clarified in detail through qualitative analysis. Highly motivated students revealed that visual aesthetics boosted enthusiasm and creativity, supported by visual features and design freedom. The majority of students felt more enthusiastic and motivated to complete assignments using Canva’s visual design tools because the process was more creative, engaging, and less monotonous than writing a paper, and allowed for exploration of color, layout, and engaging visual elements. Using Canva facilitated comprehension of the dense material on lower-plant botany through visualizations (images, diagrams, and infographics) and engaging features, making assignments feel more lively, enjoyable, and aesthetically pleasing. Students stated that they appreciated the space to express their ideas creatively, create freely, and customize the design according to their imagination or preferences. As one student (S1) put it.

“Working on assignments using Canva tends to make me more enthusiastic than using a traditional format. This is because the process is more creative and less monotonous, allowing me to explore various designs, colors, and illustrations to present material on lower-plant botany in a more engaging way. Furthermore, the presence of visuals such as images and diagrams helps me better understand the material being studied.”

Furthermore, most students felt that designing botany assignments in Canva encouraged them to seek additional references beyond the lecture module, which they considered beneficial because it made learning more active and in-depth rather than simply copying material. Canva empowers students to actively participate in a creative journey and retrieve their existing knowledge. It promotes a positive learning environment through readily accessible features that affect students' concentration and engagement, making them more attentive in the learning process (Jamaludin & Sedek, [2023](#)). They cited the primary reason for seeking references as the demands of visual design, which required clearer, more accurate, more detailed, and more engaging images, illustrations, or photographs (such as botany anatomy, or microscopic images) than those available in the module or Canva. Students generally sought additional materials through scientific journals, Google Scholar, relevant articles, and books (including Google Books and botanical encyclopedias). Students noted that seeking references helped them compare, select, and adapt information, thus improving their overall understanding of the botany material and ensuring that the information and terminology used in the design were scientifically correct.

On the other hand, several students who provided neutral responses reported cognitive fatigue and felt somewhat overwhelmed or bored. This occurred especially when they focused too much on perfecting the design, spent long periods searching for matching elements or templates, adjusted the design to ensure it was neat, or when the time to complete the assignment was limited. They also mentioned the difficulty of finding appropriate, accurate, or high-quality images, and that finding appropriate references sometimes took extra time. As one student (S31) stated.

“Working on assignments with Canva makes me more enthusiastic because it feels like a creative activity, not just an academic task. I enjoy the process more, especially when choosing templates and arranging visual elements. However, on the other hand, if you spend too much time deciding on a design or feel like it has to be perfect, it can become a bit overwhelming and take up more time.”

The synthesis of these two data points confirms that using Canva is very effective as a motivator for students' literary investigations. Canva has a variety of pedagogical benefits, including the ability to make abstract concepts concrete, motivate students, help students recall prior knowledge, and minimize learning effort; it can also enhance the learning environment through accessible features that influence students' focus, memory, and attitude toward learning (Abdulla, [2024](#)). However, variations from conventional assignment methods are still needed to maintain their enthusiasm. Research by Xiong ([2025](#)) revealed that monotonous and inflexible teaching methodologies can induce student

apathy; teachers should therefore consider students' individual differences when designing instructional activities to more effectively enhance motivation and sustained engagement.

Exploring Visual Creativity Skills through the Use of Canva

The ability to construct lower-plant botany material into visual representations is one of the main outcomes of this assignment. Quantitative evaluation of this indicator shows very superior achievement, as evidenced by the average percentage of creativity achieved in [Table 6](#).

Table 6.

Percentage of creativity skills indicators

No.	Item	Mean	SD	Percentage	Category
1	The Canva graphic design assignment allowed me to express my creative ideas.	4.50	0.60	90.00	Very high
2	I felt free to choose colors, layouts, and visual elements in Canva.	4.53	0.60	90.50	Very high
3	I was able to create an aesthetically pleasing Canva design that aligns with the concept of lower-plant botany.	4.45	0.64	89.00	Very high
4	The process of creating the Canva graphic design improved my aesthetic skills (composition, typography, color).	4.50	0.64	90.00	Very high
5	I am satisfied with the level of creativity I demonstrated in the Canva graphic design assignment.	4.55	0.60	91.00	Very high
Average				90.10	Very high

Based on the calculations in [Table 6](#), the creativity skills indicator achieved the highest cumulative average score among all indicators, namely 90.1% (Very High criteria). Specifically, each element of creativity reached 89%. The highest achievement was recorded in Item 5 (91%), indicating that students felt pride and satisfaction with the level of creativity they conveyed in their final assignment. Meanwhile, freedom in managing basic visual elements such as color and layout (Item 2) ranked second, with the highest percentage at 90.5%. Figure 6 displays the detailed distribution of student responses for each item in the creativity skills indicator.

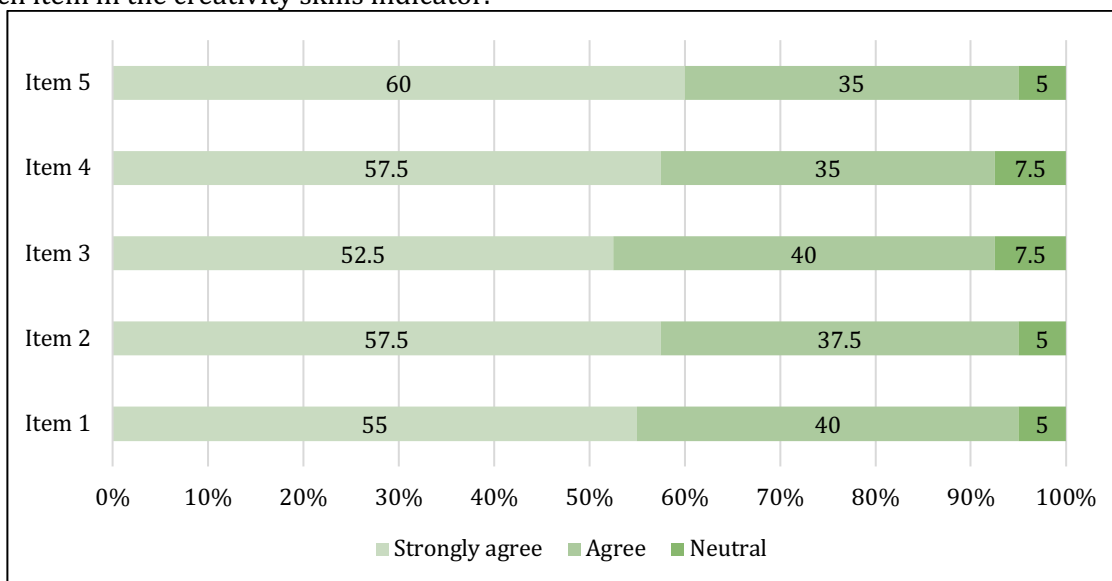


Figure 6. Distribution of student responses to creativity skills indicators

Completing the final summary in [Table 6](#), the distribution of individual attitudes in [Figure 6](#) shows a consistent pattern of agreement. The main finding from the graph is the absence of negative responses; not a single student selected the “Disagree” or “Strongly Disagree” option for any of the statements. The highest level of agreement was seen in Item 5, with 60% of students selecting the “Strongly Agree” category. Although 5% to 7.5% of responses were “Neutral,” this figure was very small and did not alter the positive pattern of creative ideas emerging.

This high level of freedom of visual expression was further elaborated through qualitative findings. Students emphasized that the design platform provided a high level of creative freedom with visual customization and flexibility. The majority of students felt they had considerable freedom to create using Canva, particularly in adjusting color combinations, image layouts, and font choices. Some students even described feeling “very free” or “as free as possible.” Students reported that the most

common creative process involves choosing a template, then adjusting the colors to match the botanical theme (often shades of green or natural colors), positioning images and text to ensure balance and a neutral feel, and choosing a clear, easy-to-read, and aesthetically pleasing font. One student (S9) provided an in-depth description of her creative process.

"I feel I have a lot of creative freedom when working on botanical assignments in Canva. I can adjust the colors, position images, and choose the font type to my liking, making the results more appealing and understandable. In the process, I usually start by choosing a template, then adjust the colors to match the botanical theme. After that, I add images of low plants and adjust their positioning to avoid overcrowding. Finally, I choose a simple or aesthetic font that matches the template to ensure readability."

The findings of Safira et al. (2025) and Tang et al. (2022) align with the idea that students can seamlessly access a vast array of design templates, images, graphics, and fonts in Canva to expand their creative expression and produce visually engaging, personalized academic work. This creative freedom makes the assignment process more relaxed and generates unique ideas. The majority of students feel their designs have their own unique (original) qualities, even though they still use Canva templates. This uniqueness was achieved through modifications such as changing color combinations, selecting illustrations/images, rearranging layouts, and adjusting fonts to suit their personal style and the botanical material being discussed. Design ideas were discovered through searching and combining various references, including Canva templates, online design examples, and social media. These ideas were then developed or modified to suit their visual style and understanding of the material. Some students emphasized their uniqueness by adding specific elements such as natural colors (green or brown), using numerous relevant images/illustrations, adding columns and arrows for neatness, or incorporating an organic color palette to make the plant structure appear "alive."

Despite feeling free to be creative, several students emphasized that they limited this freedom to ensure the results were neat, scientific, and not overdone, while maintaining the clarity of the botanical material. This is in line with key design principles for scientific infographics, including clarity, simplicity, and accuracy, which are essential for the effective communication of complex scientific data. Clarity is paramount to ensure the intended message is easily and immediately understood, requiring clean lines, clear fonts, and a logical flow of information that guides the viewer without ambiguity (Jeyaraman et al., 2025). On the other hand, Jaleniauskiene & Kasperuniene (2023) state that attractiveness of infographics lies in their capacity to deliver the maximum amount of content in the least amount of space while still being precise and clear, representing multimodal compositions that integrate visual information, language, colors, layout, and typography. This demonstrates that this assignment successfully facilitated the actualization of students' artistic ideas and creativity in the lower-plant botany course.

Understanding Lower-plant Botany Concepts through the Use of Canva

The final indicator evaluates the substantial impact of the visual assignment on the understanding of lower-plant botany concepts. The quantitative measurement results are presented in Table 7.

Table 7.
Percentage of concept understanding indicators

No.	Item	Mean	SD	Percentage	Category
1	By creating Canva graphic designs, I gained a better understanding of the structure and morphology of lower-plant botany.	4.43	0.64	88.50	Very high
2	Visualization through Canva graphic design helped me better remember lower-plant botany concepts.	4.35	0.62	87.00	Very high
3	The process of designing illustrations or infographics forced me to examine the material more deeply.	4.35	0.62	87.00	Very high
4	My Canva graphic designs were accurate in terms of scientific content (e.g., part labels, terms).	4.28	0.68	85.50	Very high
5	Canva graphic design assignments improved my ability to explain lower-plant botany concepts to others.	4.40	0.55	88.00	Very high
Average				87.20	Very high

Referring to Table 7, students' conceptual understanding fell into the Very High category with an overall average of 87.2%. Analysis of each item showed that Item 1 achieved the highest percentage

(88.5%). This achievement confirms that the Canva graphic design process directly helped students better understand the structure and morphology of lower-plant botany. Conversely, Item 4, which measures students' confidence in the accuracy of the scientific content and labeling of lower-plant botany terms in their designs, achieved the lowest score (85.5%). Further analysis of the response distribution in Figure 7 reveals a consistent distribution pattern.

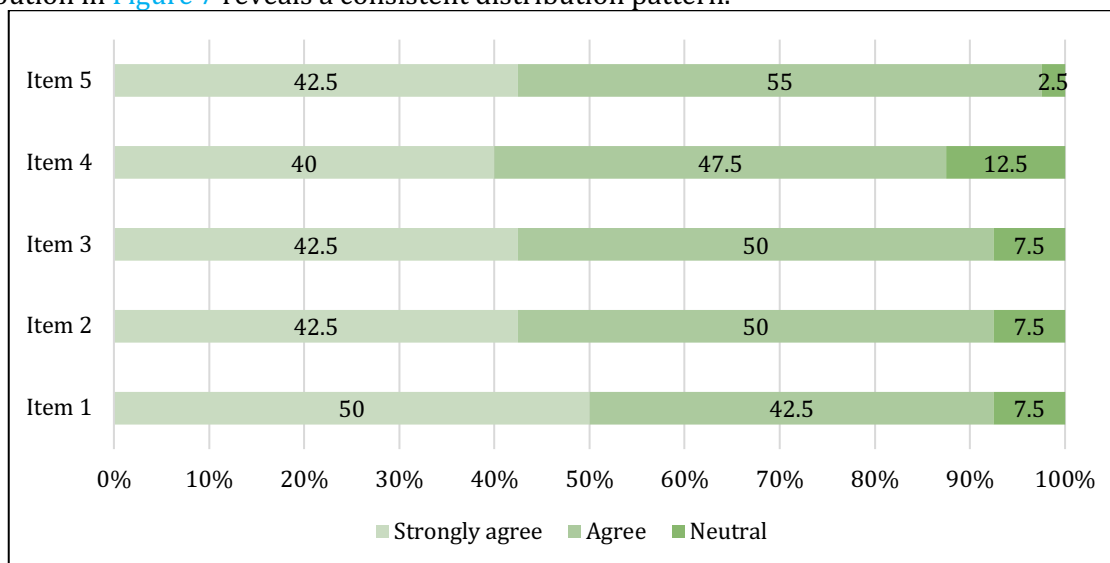


Figure 7. Distribution of student responses to indicators of conceptual understanding

The most fundamental finding was a 0% negative response across all items, with no students expressing disagreement (Figure 7). The strongest concentration of positive responses occurred in Item 1, where half of the students (50%) chose the “Strongly Agree” option. However, the distribution of Item 4 warrants special attention. This item, related to scientific accuracy, recorded the highest percentage of “Neutral” options among the items, at 12.5%.

Interview data were used to clarify these quantitative findings. The high level of understanding in Item 1 was confirmed by students' statements that the process of searching for and placing images in Canva encouraged them to focus on plant details and accuracy. Some students explained that the process of arranging images and labeling plant parts in Canva significantly aided their understanding and retention of the material. This was because students were forced to be more thorough and actively process information, moving beyond simply memorizing text to a visual understanding of the structure, position, and relationships between parts. Furthermore, labeling and arranging parts required precise positioning and naming of each structure, leading to a deeper understanding of the location and function of various components. This process reflects active learning, with students reporting significantly improved comprehension of the material when labeling the morphological structures of lower plants, such as sori in ferns or rhizoids in mosses. Other helpful examples mentioned included labeling vascular bundles (xylem and phloem), root and stem structures in pteridophytes, fungi (hyphae, spores), and the parts of Chlorophyceae and Chrysophyceae in algae. Student (S9) stated.

“Yes, when discussing the botanical structures of lower plants in Canva, the process of labeling and arranging the images helped me better understand the material. For example, when studying the structures of Chlorophyceae and Chrysophyceae, I found it easier to remember the important parts because I had to adjust the position of the labels on the images. I understand that Chlorophyceae have chloroplasts for photosynthesis, while Chrysophyceae have different cell structures and pigment characteristics. Furthermore, they also have different flagella, both in number and shape, further highlighting the differences between them.”

Students also experienced an increase in the ease of remembering the material. The majority of students stated that Canva design assignments made botanical material easier to remember because they presented it visually (images, colors, labels, infographics), which made the information more engaging and more quickly associated with concepts than simply reading text. The process of visually organizing and processing the material also strengthened memory. This memory enhancement directly aligns with the Cognitive Theory of Multimedia Learning by Mayer (2024), which posits that humans

possess separate processing channels for visual and verbal inputs. By actively selecting, mentally organizing, and integrating these dual structures within working memory, students successfully anchor new knowledge into long-term retention.

On the other hand, the emergence of a neutral percentage in Item 4 was not due to application failure, but rather to students' internal doubts about the validity of the literature they used. Some students expressed concerns about the validity of the visuals and terminology they obtained from online sources, particularly the risk of mislabeling structures, naming inaccuracies, and spelling errors. Specific botanical terminology and the lack of detailed descriptions in Canva illustrations also contributed to these doubts. Qualitative data revealed the following perspective from one student (S21).

"In my experience using Canva, visual design assignments do help make botany material more memorable because the information is presented with a combination of images and text, making it more engaging and easier to understand than simply reading. However, I also feel unsure or worried that the images or scientific terms I use are inaccurate, especially when using internet references. So I usually try to double-check with books or other reliable sources to ensure the information remains accurate."

To address these concerns, students consistently cross-check using books, course modules, or other reliable sources, compare multiple image references, and ensure terminology aligns with the course material before finalizing. This thorough behavior exemplifies effective self-regulated learning, where accurate metacognition and progress evaluation empower student autonomy and deeper understanding (Faza & Lestari, 2025). Furthermore, several students mentioned that receiving corrections from their lecturers and utilizing Canva's flexible re-editing features significantly helped them refine their designs. This willingness to integrate corrections aligns with the established literature, which states that teacher feedback delivery remains essential for facilitating genuine learning improvement, particularly when students are motivated to act on it (Gan et al., 2021). Ultimately, this synergy between independent visual organization and crucial lecturer validation effectively improves the retention and understanding of lower-plant botany structures.

Students' use of Canva to support assignments set by lecturers has proven effective in facilitating the SCL learning approach. Through the Canva platform, students are given full autonomy to independently represent their knowledge, successfully shifting the lecturer's role from merely a transmitter of information to a facilitator and validator (Aleksieva, 2025). In the context of science education, designing visual communication instruments facilitates active student engagement in evaluating information and honing higher-order thinking skills, which are the essence of the SCL approach (Zhang & Jenkinson, 2024). This integration of visual technology has been proven not only to free students from the rigidity of conventional methods but also to provide a framework that stimulates essential creativity in solving academic problems (Matsiola et al., 2024). This is empirically demonstrated by the analysis of the five research indicators, which were in the very high category, with the highest percentage recorded for the creativity skills indicator and the lowest for conceptual understanding. Furthermore, the qualitative analysis results also confirmed positive student responses to these five indicators, simultaneously validating the successful implementation of SCL assisted by visual technology.

Operationally, the successful implementation of SCL assisted by visual technology is manifested through the characteristics of the course assignments. The assignment to design a leaflet on lower plant species, along with interactive presentation materials (slides), is an open-ended assignment given by lecturers to students in lower-plant botany courses as part of SCL implementation. Open-ended assignments have been shown to foster creativity by encouraging students to think differently, take risks, and experiment with various ideas (Nieminen et al., 2022). The process of designing the visual elements in these assignments has been shown not only to cultivate creativity but also to actively stimulate students' meaning-making abilities and their conceptual understanding of levels of biological organization (Thyberg et al., 2024). Through this freedom to explore graphic elements, students can simultaneously integrate the fluency of their ideas with the accuracy of mastering lower-plant botany concepts (Zhang & Jenkinson, 2024).

Beyond simply facilitating cognitive processes and creativity, the successful integration of these ideas is empirically supported by the user experience dimension. Findings indicate that students' perceived ease-of-use of Canva motivated them to complete a series of assignments given by lecturers in lower-plant botany courses and left them satisfied upon completion. More specifically, Canva's

interactive interface stimulates students' intrinsic motivation by providing engaging, relevant learning experiences and encouraging them to complete assignments creatively (Rahma et al., 2025). Furthermore, Canva's intuitive design reduces cognitive load, allowing students to fully concentrate on the content rather than the app's navigation. This supports conceptual mastery and understanding of the lower-plant botany material itself and helps students achieve optimal learning outcomes (Rahma et al., 2025). Furthermore, students' extrinsic motivation and creative mindset are enhanced by Canva's ease of use, through features that facilitate the presentation of material. Ultimately, the synergy between student expectations and Canva's performance in producing high-quality assignments has direct implications for user satisfaction.

CONCLUSION

The study concluded that most students experienced ease, satisfaction, and increased motivation when using Canva to complete assignments in the lower-plant botany course. Students also experienced a relatively high impact on their creativity skills and conceptual understanding in the lower-plant botany course assignments using Canva. This research contributes to expanding the literature on Canva's specific use in learning lower-plant botany. Consequently, visual design integration has proven effective in facilitating SCL and reducing students' cognitive load. These outcomes imply that science educators should systematically adopt digital design platforms to optimize active learning in visually demanding biological courses. Furthermore, it is recommended to conduct experimental research using a rubric instrument that specifically assesses the balance between design creativity and conceptual accuracy in lower-plant botany.

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