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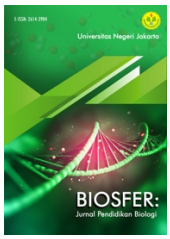

Practicality and effectivity of FIGMA-CTLLM on Poaceae diversity topic in developing critical thinking skills

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ABSTRACT

Creating creative, innovative, and effective learning to improve critical thinking skills along with the rapid development of ICT is a challenge for educators. Therefore, Figma CTL Learning Media (Figma-CTLLM) is a solution to the problem of answering the importance of developing learning media integrated with ICT while developing students' critical thinking skills. This study aims to describe the practicality of Figma-CTLLM on Poaceae diversity in developing critical thinking skills and to describe the effectiveness of Figma-CTLLM on the topic of Poaceae diversity seen from critical thinking skills and student responses. This type of research is Research and Development (R&D) research using the 4D model method (Define, Design, Develop and Disseminate). The research subjects consisted of 26 students. The research instruments were observation sheets to measure the implementation of Figma-CTLLM, CTS test questions sheets and questionnaires to determine student responses. The data analysis technique was quantitatively descriptive by calculating the percentage to describe the practicality and effectiveness of Figma-CTLLM implementation in developing CTS. The results of the analysis of the practicality test of Figma-CTLLM implementation in learning are in the category of very practical. The effectiveness test results were declared very effective by acquiring the average CTS measurement and the average student response assessment. Based on the study's results, the implementation of Figma-CTLLM in learning the diversity of Poaceae has met the criteria of practicality and effectiveness.

INTRODUCTION

The advancement of Information and Communication Technology (ICT) in the era of the Industrial Revolution 5.0 is very rapid and penetrates all fields including education (Boari et al., 2023; Gajewska & Walczyk, 2023; Purwono et al., 2023; Santi et al., 2023; Tikhonova & Raitskaya, 2023; Verawati et al., 2022; Yunus et al., 2022). Education is a fundamental thing that every individual must have in this modern life (Grinshkun, 2019; Pinheiro & Young, 2017; Pratiwi et al., 2023; Samsudin & Raharjo, 2023; Suyantiningsih et al., 2023; Yani et al., 2021). However, the fact is that Indonesia's education is low compared to other countries (Syaibah et al., 2023). According to WEF 2017, UNICEF 2021 and PISA 2018 data, Indonesia ranks 65th out of 130 in education, 63rd out of 191 in terms of education quality and 62nd out of 70 in terms of literacy due to low interest in learning (Firdaus et al., 2023; Ismawati et al., 2023; Wahyudi et al., 2022). The advancement of ICT as a result of this globalization phenomenon has become a boomerang for the majority of Indonesian students who do not use ICT for learning needs but focus on entertainment needs, which has an impact on decreasing interest in learning and critical thinking (Al Rashid et al., 2023; Ramdhayani, 2023; Xu & Hopkins, 2023). Another factor is the low competence of Indonesian educators, where data from the Ministry of Education and Culture 2021 shows that the average UKG results of Indonesian educators are <70 and are declared not to have met the competencies as educators (Mardhatillah & Surjanti, 2023; Maulina et al., 2020). With the low competence of these educators, the learning process becomes less creative, innovative and effective for students.

Creating creative, innovative and effective learning along with the rapid development of ICT is indeed an additional competency challenge for educators (Alifteria et al., 2023; Aryana et al., 2022; Astriani et al., 2020; Falcão et al., 2023; Gois et al., 2023; Mertha & Mahfud, 2022; Nurmalisa et al., 2023; Sung et al., 2022; Wahab et al., 2023). One of the steps to create creative, innovative and effective learning to develop students' Critical Thinking Skills (CTS) is to develop CTL (Contextual Teaching Learning) Learning Media (CTLLM) based on the local potential of the surrounding environment so that students are actively involved in a more interactive, meaningful and concrete learning process (Ariyani et al., 2022; Budiarti et al., 2022; Budiarto et al., 2020; Hwang et al., 2023; Manzoni et al., 2021; Na'imah et al., 2022; Qolbi & Azhar, 2022; Retnani & Zuhdi, 2019; Sabarudin et al., 2023; Sam et al., 2023; Wulandari, 2023). CTS is the ability to think rationally, reflectively and systematically, which is essential in developing a series of cognitive thinking processes (Darmayanti, 2023; Dulun & Lane, 2023; Hujjatusnaini et al., 2022; Ma & Liu, 2023; Pollarolo et al., 2023; Suciptaningsih et al., 2023). One of the local potentials that can be utilized to develop CTS is the diversity of Poaceae in the campus area. According to Azizah et al. (2023), the level of Poaceae diversity in Indonesia is high and needs to be studied. The Poaceae family is known as an actual grass with diversity including 12 subfamilies, 11,000 species and 600 to 770 genera (Carballo et al., 2019; Donnelly, 2022; Favaretto et al., 2018; Ghirardello et al., 2022; Hilty et al., 2021; Hodkinson, 2018; Jaber & Al-Abide, 2023; Lee et al., 2020; Maftuna, 2022; Majeed et al., 2022; Rocha et al., 2021; Soreng et al., 2022).

So far, research that has developed learning media about the Poaceae diversity in Indonesia contextually is still very minimal. The lack of learning media development related to the Poaceae diversity causes the diversity of poaceae in indonesia to be rarely explored and studied, so that the potential of poaceae diversity is not used optimally. Besides that, for learning through CTLLM to follow the times of the digital era, it is crucial to integrate it with the technologies. We know that a lot of latest media design software can be used to develop digital-based learning media, one of which is Figma which is used to develop Figma-CTLLM. This is done to create creative, innovative, and effective learning, along with developing ICT and students' CTS. Figma is a web-based software for designing mobile, website and desktop applications with collaborative and real-time displays in developing interactive and responsive interface design. Figma has advantages such as a real-time display, interactive UI (User Interface) design with a collection of icons, animations and visuals that attract audiences suitable for developing learning media (Hariyadi et al., 2023; Howell et al., 2023; Jaya et al., 2023; Sato & Hazeyama, 2023; Surianto et al., 2023; Tepe, 2022; Wardhanie & Lebdaningrum, 2023; Zengeni et al., 2023). Some researchers have utilized Figma, such as Shafa et al. (2023) and Hidajatulloh et al. (2023) in developing makeup learning e-modules; Pangestu et al. (2023) in developing informatics learning media; Purwono et al. (2023) in web design; Ibrahim et al. (2023) in developing creative content. Using Figma for prototype design was carried out by Santoso et al. (2021) to develop e-learning modules and Sumantri et al. (2023) for student training. Figma is also used for UI/UX design by Saputra et al. (2023) on mobile apps; Pramudita et al. (2021) on informatics engineering studies; Gautama et al. (2023) on the attendance application prototype and Dafitri et al. (2023) on the UMKM website.

Based on several studies that have been conducted, the novelty of this research is the development of a learning media CTL model integrated with ICT in the form of Figma by utilizing local potential. Besides, the CTL model developed is used to empower critical thinking skills. Learning poaceae diversity that combines Figma-based digital learning media and uses CTL learning models is expected to encourage and stimulate student CTS, because with digital-based learning media that is presented contextually students can be involved in exploring Poaceae diversity directly and foster student curiosity through animations and Figma-based learning media displays. Therefore, the problem formulation in this study is about the practicality and effectiveness of Figma-based CTL model learning media on Poaceae diversity in developing critical thinking skills. The problem is detailed in the following research questions: RQ1) How is the practicality of Figma-based CTL learning media on Poaceae

diversity in developing critical thinking skills?; RQ2) How is the effectiveness of Figma-based CTL learning media on Poaceae diversity seen from critical thinking skills and student responses?

The research objectives to be achieved are: 1) to describe the practicality of Figma-based CTL learning media on the topic of Poaceae diversity in developing critical thinking skills; 2) to describe the effectiveness of Figma-based CTL learning media on the topic of Poaceae diversity in terms of critical thinking skills and student responses; 3) to describe the effectiveness of Figma-based CTL learning media on the topic of Poaceae diversity.

METHODS

Research Design

This type of research is a development research that aims to produce a product in the form of Figma-CTLLM learning media related to Poaceae diversity with a 4D model design Thiagarajan (1974), as shown in Figure 1.

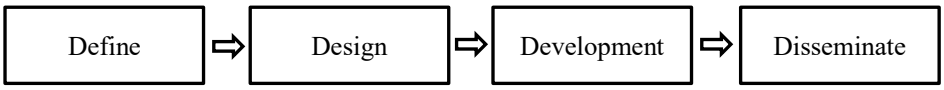

Figure 1. R&D research flow

Research Subject

The research subjects used were biology education students of PGRI Ronggolawe University class 2022 and 2023, with 26 students, as shown in Table 1. Sample selection was carried out directly to all Biology Education students in 2022 and 2023 class. This subject selection is intended for Biology Education students who take plant morphology lectures with Poaceae diversity material.

Table 1
Research subject

No	Class	Number of Subjects
1	Biology Education students 2022	12
2	Biology Education students 2023	14
	Total	**26**

Instrument

There are three kinds of research data collection instruments, including: 1) observation sheet to measure the implementation of learning through the implementation of Figma-CTLLM which refers to Arifin et al. (2023) and Destri et al. (2023) which has been modified into four aspects, namely ease of display, efficiency of learning time, presentation of material and usefulness; 2) CTS test questions that refer to Ennis (2011), Kubo (2023) and Nuriyah & Hayati (2023) into eight indicators used, namely focusing on questions (CTS-1), analyzing arguments (CTS-2), defining terms (CTS-3), identify assumptions (CTS-4), assess credibility (CTS-5), observe (CTS-6), infer and induce (CTS-7) and value judgments (CTS-8) which are then assessed according to rubrics referring to Nuriyah & Hayati (2023) and Ekselsa et al. (2023) which has been modified with a rating scale including pre-awareness (1), emerging (2), developing (3), and mastery (4); 3) a questionnaire to determine student responses to the implementation of Figma-CTLLM which refers to Fransisca & Yunus (2021) and Sriyanti (2023) which has been modified into six aspects, namely ease of use, CTL learning model, material presentation, practice questions, learning time efficiency and usefulness. The rating scale for the practicality and effectiveness of the learning response sheet uses a five-point Likert scale, starting from 1 = strongly disagree to 5 = strongly agree, referring to Ponsiglione et al. (2022).

Procedure

This research procedure is described in Figure 2, which refers to Fauzi & Maksum (2020). The research product developed has passed the validity test stage in previous studies and was declaredvery valid, so this study focuses on the practicality test and effectiveness test in developing CTS. The practicality test was conducted by the three observers during the learning process using Figma-CTLLM, while the effectiveness test was conducted after the Figma-CTLLM learning process, through the CTS test and student learning response questionnaire.

Data Analysis Techniques

The data analysis technique in this study was descriptive quantitative by calculating the percentage, which describes the level of practicality and effectiveness of learning responses through Figma-CTLLM in developing CTS. Data analysis of practicality, CTS rubric results in data and effectiveness of learning responses using Equation 1, which refers to Ulya et al. (2022).

$$NP = \frac{R}{SM} X\ 100\% \qquad \textit{Equation 1}$$

Description: NP = Percentage value expected
R = Raw score obtained
SM = Ideal maximum score

The results of the percentage of practicality are then categorized according to Table 2, which refers to Aziz (2019) which has been modified.

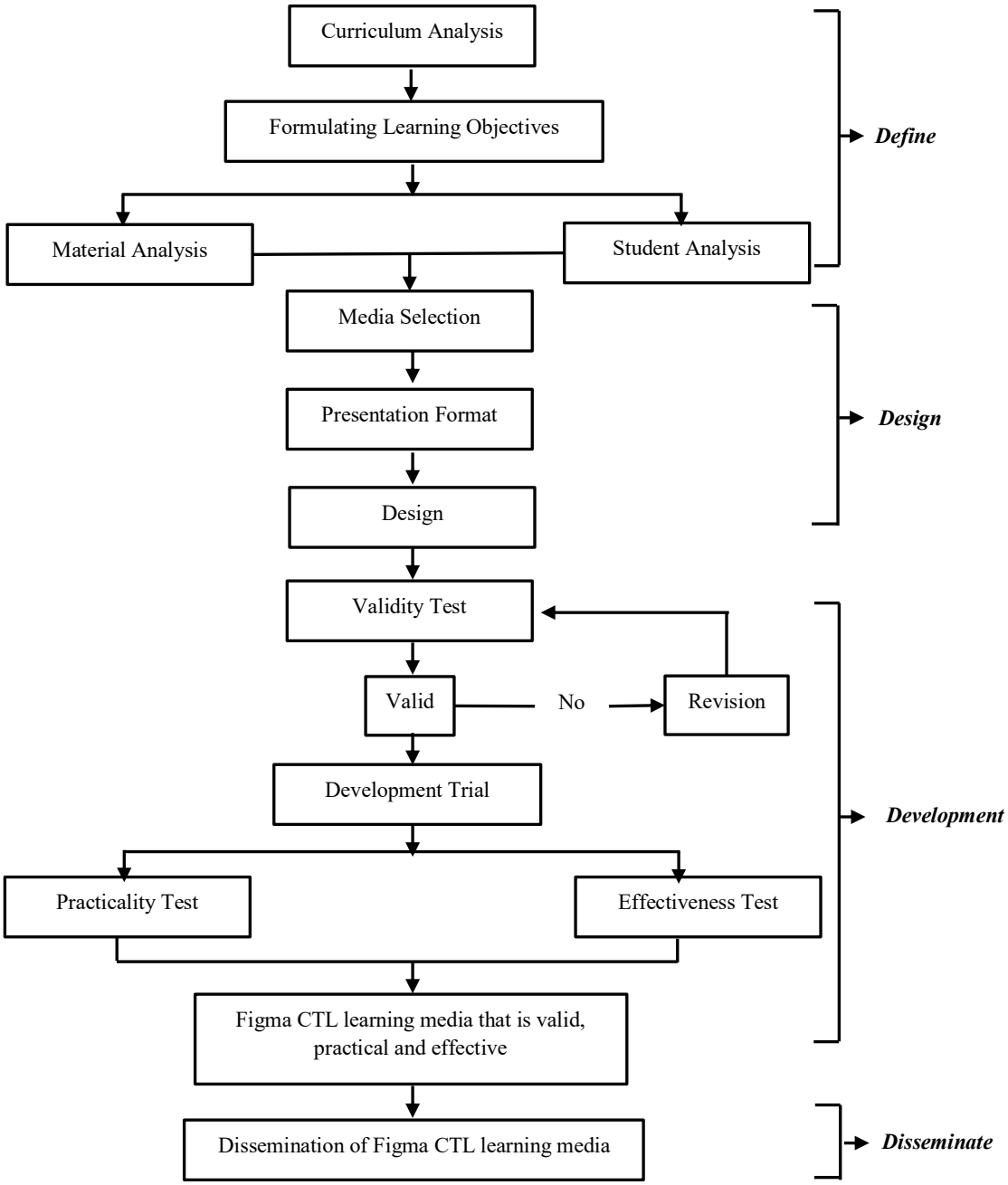

Figure 2. 4D development procedure

Table 2
Interpretation of the percentage of practicality

Interval (%)	Category
0-20	Very impractical
21-40	Not practical
41-60	Less practical
61-80	Practical
81-100	Very practical

The percentage of learning response effectiveness and the percentage of CTS are categorized according to Table 3, which refers to Sari et al. (2023), Imansari et al. (2023) and Sufajar & Qosyim (2022) has been modified.

Table 3
Interpretation of the percentage of effectiveness

Interval (%)	Criteria	Effectiveness Level
0-20	Very low critical thinking skills; very weak response	Very ineffective
21-40	Low critical thinking skills; weak response	Not effective
41-60	Quite high critical thinking skills; quite strong response	Less effective
61-80	High critical thinking skills; strong response	Effective
81-100	Very high critical thinking skills; very strong response	Very effective

RESULTS AND DISCUSSION

The results of the analysis of the practicality test related to learning the topic of Poaceae diversity through Figma-CTLLM by the three observers are presented in Table 4.

Table 4
Practicality test analysis results of learning through Figma-CTLLM

Aspect	Observer			Total (∑R)	$\overline{NP}$ (%)	Category
	I	II	III			
Ease of Display	4.50	5.00	4.00	13.50	90.00	Very practical
Efficiency of Learning Time	4.00	4.50	3.50	12.00	80.00	Practical
Presentation of Material	4.50	5.00	4.50	14.00	93.33	Very practical
Usability	4.50	4.75	4.00	13.25	88.33	Very practical
$\overline{X}$ Percentage					**87.92**	**Very practical**

Overall, the results of the practicality test obtained an average percentage value of 87.92% with a very practical category. This shows that all aspects of learning the topic of Poaceae diversity through Figma-CTLLM are very practical to implement. Three observers assessed this practicality from several aspects during learning. Regarding ease of display, the average percentage value from the three observers was 90%, with a very practical category. This shows that educators can easily access features to deliver material through Figma-CTLLM. Good educators are required to master learning media in delivering material (Yudono et al., 2024). Regarding learning time efficiency, the average percentage of the three observers was 80% with a practical category. This shows that educators deliver learning through Figma-CTLLM on time and do not exceed the specified time limit. In addition, it indicates that educators implement learning through Figma-CTLLM well. Learning success is determined by the efficient use of time when learning takes place (Magdalena et al., 2024).

The aspect of material presentation obtained an average percentage value from the three observers of 93.33% with a very practical category. This shows that educators convey learning materials through Figma-CTLLM, which can be easily understood and understood. In addition, educators also use communicative and interactive language so that students can easily understand it while learning through Figma-CTLLM. The use of communicative language during learning makes the material accessible for students to understand so that students are interested in applying the theory they learn in class (Fawaid & Damayanti, 2024). Regarding usefulness, the average percentage value of the three observers was 88.33%, with a very practical category. This shows educators can increase student enthusiasm and motivation through learning in Figma-CTLLM. Educators can also increase student knowledge and activeness through learning in Figma-CTLLM. In addition, it also shows that educators

can use Figma-CTLLM to add a variety of teaching materials for learning Poaceae diversity on campus. Santoso et al. (2024) explained that educators play an essential role in increasing students' enthusiasm and motivation in acquiring knowledge; educators can also use learning media to increase student activeness and involvement in the learning process.

Effectiveness of Figma-CTLLM Learning in Improving Critical Thinking Skills

The percentage of CTS measurement results through learning the topic of Poaceae diversity through Figma-CTLLM is presented in Figure 3.

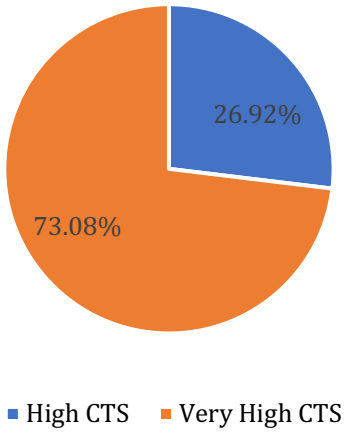

Figure 3. CTS measurement results through Figma-CTLLM learning

The results of the CTS measurement analysis to determine the effectiveness of learning the topic of Poaceae diversity through Figma-CTLLM are presented in Table 5.

Table 5
Analysis results of CTS measurement through Figma-CTLLM learning

Indicator	Total (∑R)	$\overline{NP}$ (%)	Criteria	Effectiveness Level
Focus on the Question (CTS-1)	71	68.27	High	Effective
Analyzing Arguments (CTS-2)	83	79.81	High	Effective
Defining Terms (CTS-3)	82	78.85	High	Effective
Identifying Assumptions (CTS-4)	99	95.19	Very high	Very effective
Judge the Credibility (CTS-5)	89	85.58	Very high	Very effective
Observing (CTS-6)	89	85.58	Very high	Very effective
Summarizing and Inducing (CTS-7)	83	79.81	High	Effective
Value Judgment (CTS-8)	90	86.54	Very high	Very effective
$\overline{X}$ Percentage		**82.45**	**Very high**	**Very effective**

Based on Figure 3, overall the results of the CTS measurement to determine the level of effectiveness of Figma-CTLLM learning are classified as very high. This is evidenced by 73.08% of research subjects who obtained very high CTS scores and only 26.92% of those who obtained high CTS scores. This is also reinforced by the results of the analysis of CTS measurement through the eight indicators in Table 5, which shows that overall, the average percentage value is 82.45% with a very effective category. The average percentage of the analysis results shows that Figma-CTLLM learning has proven to be very effective in increasing CTS to a very high level. The increase of CTS is due to the integration of both aspects between the CTL learning model and the development of figma-based digital learning media, so that students can be actively involved directly in observing, studying, and calculating the level of diversity of Poeaceae. In addition, the integration of the two aspects also fosters students' curiosity about the diversity of poaceae, they become enthusiastic and not easily bored in learning the material presented in Figma-CTLLM. Mahzumi et al. (2024) explained that one of the characteristics of learning effectiveness is the use of CTL model learning media by educators to improve CTS.

Table 5 on the indicator of focus on questions (CTS-1) obtained an average percentage of 68.27% with an effective category. This shows that students can determine the main problem and the

correctness of the arguments presented appropriately. Purwasila et al. (2024) explained that the low level of students' CTS is caused by students' inability to determine the focus of the problem in the question presented. As a result, it is evident from the students' answers that they need to follow the question. In this case, CTS includes the ability to understand information and identify logical

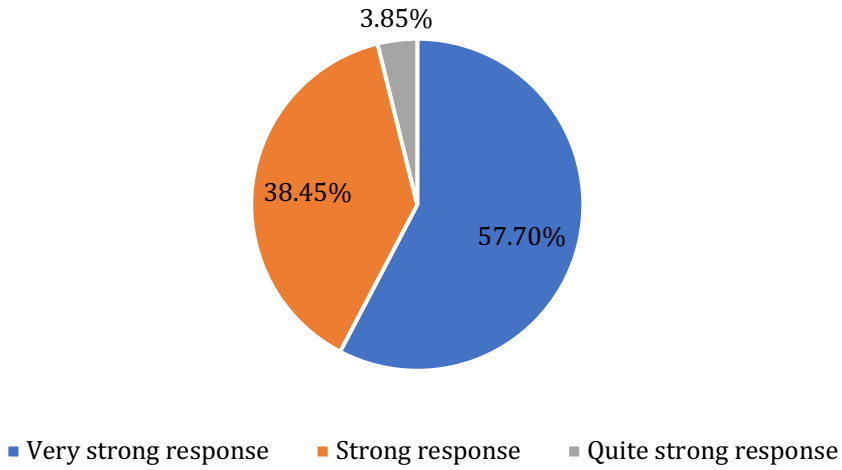

Figure 4. Students' responses through Figma-CTLLM learning

relationships between the information (Selpiana & Munawir, 2024). In the indicator of analyzing arguments (CTS-2), the average percentage is 79.81% with an effective category. This shows that students can conclude arguments quickly and provide reasons that support the arguments presented appropriately. CTS ability can be equipped by examining the argument's truth based on scientific fact and knowledge (Sofiani et al., 2024). In the indicator of defining terms (CTS-3), the average percentage of 78.85% was obtained in the effective category. This shows that students can determine the right solution to overcome the problems presented and can provide the right reasons. Kadwa & Alshenqeeti (2024) explain that effective learning involves skills that form CTS. CTS can be developed through discussion and critical reflection (Firdaus et al., 2024).

Table 5 on the indicator of identifying assumptions (CTS-4) obtained an average percentage of 95.19% with a very effective category. This shows students can choose according to the problem format presented. In assessing credibility (CTS-5), the average percentage is 85.58%, which is a very effective category. This shows students can determine the parts that can be considered and can provide reasons according to the argumentation text and its interpretation appropriately. Assessing credibility is defined as assessing a conclusion based on the relevance of the information possessed to the problem presented (Hariri et al., 2024). The average percentage in the observation indicator (CTS-6) is 85.58%, which is a very effective category. This shows students can compare conclusions according to the statements presented appropriately. The average percentage of the inferring and inducing indicator (CTS-7) is 79.81%, an effective category. This shows students can determine an appropriate conclusion and provide appropriate reasons. The average percentage of the value judgment indicator (CTS-8) is 86.54%, which is a very effective category. This shows students can appropriately formulate alternative solutions according to the problem. Nuryadi et al. (2024) explained that CTS includes thinking skills in analyzing assumptions, solving problems, evaluating arguments, supporting conclusions and anticipating probability. In addition, learning that aligns the central issue of the problem can also significantly improve students' CTS (Rohmad, 2024).

Student Response to Figma-CTLLM Learning Effectiveness

The percentage of student response assessment scores related to learning the topic of Poaceae diversity through Figma-CTLLM is presented in Figure 4. The results of the effectiveness test analysis through student responses related to learning the topic of Poaceae diversity through Figma-CTLLM are presented for each aspect in Table 6.

Table 6
The results of the effectiveness test analysis of student responses related to learning through Figma-CTLLM

Aspect	Total (∑R)	$\overline{NP}$ (%)	Category	Effectiveness Level
Ease of Use	112.50	86.54	Very strong	Very effective
CTL Learning Model	113.33	87.18	Very strong	Very effective
Presentation of Material	113.33	87.18	Very strong	Very effective
Practice Questions	109	83.85	Very strong	Very effective
Effectiveness of Learning Time	109	83.85	Very strong	Very effective
Usability	115.67	88.97	Very strong	Very effective
$\overline{X}$ Percentage		**86.26**	**Very strong**	**Very effective**

Based on Figure 4, overall student responses related to learning the topic of Poaceae diversity through Figma-CTLLM are very strong. This is evidenced by 57.70% of research subjects who responded very strongly, 38.45% of research subjects who responded strongly and only 3,85% of research subjects who reacted quite strongly. This is also reinforced by the analysis of student responses in Table 6 to measure the effectiveness of Figma-CTLLM learning, which obtained an average percentage value of 86.26% with a very effective category. The average percentage of the analysis results shows that Figma-CTLLM learning is proven to be very effective and applied through very strong and very good student responses. Evaluating student responses is a crucial step in determining the level of effectiveness in learning because it can determine the positive effects of learning outcomes and identify obstacles that students may face during learning (Anurogo et al., 2024). In the aspect of ease of use, the average percentage is 86.54%, which is a very effective category. This shows that students can easily access the features and learning materials in Figma-CTLLM. The ease of use of learning media can increase student understanding in receiving material; it can also affect student confidence in the media used as a learning tool (Auna et al., 2024). In the aspect of the CTL learning model, an average percentage of 87.18% was obtained with a very effective category; this shows that the CTL learning model applied makes students earnestly listen to the material being studied. In addition, the applied CTL learning model also makes students more active in finding solutions to problems and helps them better understand the Poaceae diversity material. Hanisyah & Munahefi (2024) state that CTL model learning requires students to participate actively so that they can construct their understanding through direct experience.

Table 6 on the aspect of the material presentation obtained an average percentage of 87.18% with a very effective category; this shows that the delivery of material and access to learning through Figma-CTLLM is very structured and engaging, besides the size and type of font presented by Figma-CTLLM is clear, comfortable and easy to read with a combination of colours and an attractive background. Using exciting learning media can affect students' enthusiasm for learning, so they stay energized quickly (Nasyriyah, 2024). In the aspect of question practice, the average percentage is 83.85%, which is a very effective category. This shows that the practice questions presented in Figma-CTLLM learning are easy to understand and challenge students to solve them. In the aspect of the effectiveness of learning time, an average percentage of 83.85% was obtained with a very effective category; this shows that students are not bored with learning material through Figma-CTLLM and that students can also learn independently through Figma-CTLLM if there are no friends or accompanying lecturers. In the aspect of usefulness, the average percentage is 88.97%, which is a very effective category. This shows that the delivery of material in Figma-CTLLM helps add insight and is easily applied in everyday life. Effective learning media does help improve student understanding (Wahyuni et al., 2024). In addition, learning through Figma-CTLLM can also add insight to students and can generate student learning motivation. Ibrahim (2023) stated that one of the indicators of learning effectiveness is educators who can always motivate their students.

The practicality and effectiveness of Figma-CTLLM in developing CTS prove that the learning media developed can be applied as an alternative learning media for students at school. The students proved to really enjoy learning using Figma-CTLLM through the material presented and the learning animation in it so that it is easier to understand the poaceae diversity material. In addition, Figma-CTTLM also contains learning evaluations that can measure the extent of students' ability to understand the Poaceae diversity material presented. Figma-CTTLM is an online-based learning media, so the development and application of Figma-CTTLM in schools requires a stable internet network. Thus, in applying Figma-CTTLM, educators are advised to provide a stable internet network so that learning is not hampered and runs smoothly.

CONCLUSION

Based on the study results, the level of practicality of Figma-CTLLM learning is very practical, with an average acquisition of practicality test results of 87.92%. The level of effectiveness of Figma-CTLLM learning is also stated to be very effective, with the acquisition of an average measurement of critical thinking skills of 82.45% through indicators of focusing on questions, analyzing arguments, defining terms, identifying assumptions, assessing credibility, observing, concluding and inducing, value assessment and the acquisition of an average student response assessment of 86.26%. This shows that Figma-CTLLM learning is very practical and effective in improving critical thinking skills. The research results on the implementation of Figma-CTLLM are expected to contribute to the world of education, especially biology learning as an alternative learning media that integrates with IT to improve critical thinking skills.

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