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The Utilization of Local Wisdom-based Interactive Digital Module to Improve Students' Critical Thinking Skills

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Jayanti Syahfitri*

[1]Department of Biology Education, Faculty of Teacher Training and Education,
Universitas Muhammadiyah Bengkulu, Bengkulu, Indonesia

Corresponding Email: *jayanti@umb.ac.id

Abstract

Local wisdom-based interactive digital module is an alternative teaching material developed to provide students with meaningful learning and experiences. This study aimed to investigate the effect of Local wisdom-based interactive digital module on students' critical thinking skills. This study applied a quasi-experimental non-equivalent control group design involving 74 students who were divided into two groups, namely the experimental group and the control group. Learning in the experimental class used local wisdom-based interactive digital module, while learning in the control class used conventional teaching materials such as publishers' printed books. The results of the prerequisite test analysis show that the data are normally distributed and homogeneous. Furthermore, the data were analyzed through an independent sample t-test, which explained that applying Local wisdom-based interactive digital module could significantly improve students' critical thinking skills for all indicators. Module with attractive display innovations equipped with pictures, videos, audiovisuals, and quizzes in presenting content and local wisdom can stimulate students' motivation, curiosity, and analytical and evaluation skills to train the use of students' critical thinking skills in learning.

Keywords: Biology, Critical thinking skills, Local wisdom-based interactive digital module

INTRODUCTION

One factor that determines student success in learning is the availability and use of teaching materials. Teaching materials are all arranged systematically, referring to the curriculum applied in schools with the aim that students can learn independently (Magdalena et al., 2020). Teaching materials are grouped into two types: printed teaching materials, such as modules, handouts, and worksheets, and non-printed teaching materials, such as videos, audio, and displays (Ritonga et al., 2022).

The facts show that in the learning process in schools, especially in Indonesia, the majority still use teaching materials in the form of textbooks, and biology learning is no exception. This is supported by several research results which reveal that the use of books and worksheets in learning is still irreplaceable, even though, in reality, textbooks are unable to visualize events, are not interactive, and are saturated (Sidiq & Najuah, 2020; Putri et al., 2022). In addition, the delivery of material through textbooks is not optimal and not conducive; students are still not independent and fully understand the material (Indariani et al., 2018), (Hayanum et al., 2022; Laili et al., 2019). Conventional learning like this should be done with innovation -innovation by the times so that students are more interested, active, and creative (Hutahaean et al., 2019; Pratita et al., 2021; Suarlin et al., 2022).

Innovative teaching materials can improve students' critical thinking skills (Rosida et al.,

2017). The availability and use of innovative teaching materials in the learning process is an important task for a teacher (Mahardika et al., 2022). Teachers must be able to determine what teaching materials are used to support learning in class according to the characteristics and needs of students (Hidayaturrohman et al., 2017). Today's students are a generation that is very close to technology, which makes it easier for them to seek information and knowledge. Behind that, we cannot deny that the progress of science and technology has caused the erosion of the cultural values of a region. This is certainly a challenge for teachers to convey learning material while instilling local cultural values in students according to the era.

Teaching materials that can be used by teachers, especially in learning biology, to answer these challenges are interactive digital modules based on local wisdom (Syahfitri & Mutahanah, 2022), which can familiarize students with using their critical thinking skills through local wisdom issues and events available in the module. Several studies explain that learning biology is still theoretical, ignores and pays little attention to the development of student's critical thinking skills, even though the information received by students cannot be said to be knowledge before analysis, synthesis, evaluation, and application in life (Norhasanah, 2018; Zubaidah, 2010).

Several previous studies have confirmed the influence of using digital modules in improving students' critical thinking skills, including research by Sasea et al. (2023), with results showing that electronic modules influence students' critical thinking skills with a score of 72.40%. Furthermore, Hasanati et al. (2023) revealed that applying digital modules positively impacted critical thinking skills. Mahmudah et al. (2022), Safitri et al. (2020), and Seruni et al. (2020) explained that the use of digital modules can train critical thinking skills. Serevina et al. (2022) and Tarigan et al. (2021) also stated that digital modules are more effective in improving critical thinking skills than printed modules. Furthermore, research related to the influence of interactive digital modules based on local wisdom on higher-level thinking skills has also been carried out by Ali & Zaini (2023). However, no research has been found examining the effectiveness of Bengkulu Local Wisdom-based interactive digital modules to improve students' critical thinking skills.

Each student has different critical thinking skills depending on how often students are accustomed to using them. Therefore, this research is one of the efforts made to see how effective the application of interactive digital modules developed by researchers in the previous year is in improving students' critical thinking skills. The critical thinking skills described in this study are critical thinking skills, according to Facione (2015), which include six indicators: Interpretation, Analysis, Inference, Evaluation, Explanation, and Self Regulation. Thus, the

research aims to investigate the effect of Local wisdom-based interactive digital module on students' critical thinking skills.

METHOD

This study uses a quantitative method by applying a quasi-experimental non-equivalent control group design in the form of the pretest-posttest control group design (Santoso & Madiistriyatno, 2021), which is a type of research by taking random research sample groups which are then given an initial test (pretest) before learning to know the initial conditions (critical thinking skills) between the control class and the experimental class. Furthermore, a final test (post-test) after learning and treatment. The research participants involved were 74 students, of which 38 were in the experimental class and 36 in the control class. The research design can be seen in Table 1.

Table 1. Research Design

Class	Pretest	Treatment	Postest
Experiment	O1	X	O2
Control	O3	-	O4

Information:

O1 and O3 = Pretest

X = Treatment (Implementation of local wisdom-based interactive digital module)

O2 and O4 = Posttest

Data collection techniques were carried out by providing critical thinking test instruments in each class (experimental and control) before (pretest) and after learning (post-test). The instrument used in this study is the two-tier test instrument, which is valid and reliable and refers to the six indicators of critical thinking skills described in Table 2.

Table 2. Indicators and sub-indicators of critical thinking skills

No.	Critical Thinking Skill Indicators	Sub Indicators
1	Interpretation	1. Grouping information based on problems 2. Determining what is known and unknown 3. Identifying problems 4. Reviewing the information obtained
2	Analysis	1. Connecting problems with concepts and problem-solving strategies 2. Finding solutions to problem-solving 3. Creating problem-solving simulations
3	Inference	1. Creating the right conclusion based on problems 2. Attaching supportive evidence to solve the problem 3. Explaining logical reasons for solving the problem

No.	Critical Thinking Skill Indicators	Sub Indicators
4	Evaluation	- Reconfirm any information and supporting evidence in resolving the problem
5	Explanation	- The ability to make detailed explanations based on strong concepts, methods, and considerations
6	Self-Regulation	- The ability to control and convince oneself of one's abilities

(Adapted from Hasanah et al. (2019) and Seventika et al. (2017)

Data analysis techniques were carried out in two ways: prerequisite testing and hypothesis testing. The prerequisite test was carried out by homogeneity test (Levene test) and normality test (Kolmogorov-Smirnov test), which showed that the data were normally distributed and homogeneous. Furthermore, hypothesis testing was carried out using an independent sample t-test with the help of the SPSS application.

RESULTS AND DISCUSSION

The pretest and post-test data obtained were analyzed using descriptive statistics to see an overview of group data distribution on each indicator of critical thinking skills. The results are shown in Table 3.

Table 3. Descriptive Statistics Pret-test and Post-test

Indicators	Class	N	Min.		Max.		Mean		SD	
			Pre	Post	Pre	Post	Pre	Post	Pre	Post
Interpretation	Experiment	38	15	65	65	95	40.4	80.7	11.1	7.4
	Control	36	15	45	55	90	30.6	71.8	8.9	8.9
Analysis	Experiment	38	25	65	65	95	41.6	80	9.0	6.8
	Control	38	15	45	55	85	31.9	71	9.0	8.2
Inference	Experiment	38	25	75	60	95	42.3	82.9	9.4	5.8
	Control	36	15	45	50	85	29.9	72.3	8.6	7.9
Evaluation	Experiment	38	25	65	60	90	42.9	79.9	9.42	5.8
	Control	36	15	45	50	85	31.3	73	7.96	7.9
Explanation	Experiment	38	25	75	60	95	42.9	83.3	9.4	5.96
	Control	36	20	65	55	90	32.5	76.3	9.3	6.4
Self Regulation	Experiment	38	25	75	60	95	42.6	82.2	9.2	5.4
	Control	36	20	65	50	85	35.1	75.1	9.1	5.8

Table 3 explains that the average pretest score for the critical thinking skills of the experimental class for each indicator is 40.4 – 42.9, while the average pretest score obtained in the control class is 29.9 – 35.1. This shows that the highest average score is in the experimental class. Furthermore, the post-test average score for the critical thinking skills of the experimental class for each indicator is 79.9 – 83.3, while the post-test average score for the control class is 71-76.3. When comparing the pretest and post-test average scores, it can be seen that there is an increase in the average score for each class, but the experimental class has a higher average

score than the control class. The detailed differences in the average scores obtained by the experimental and control classes are presented in Figure 1.

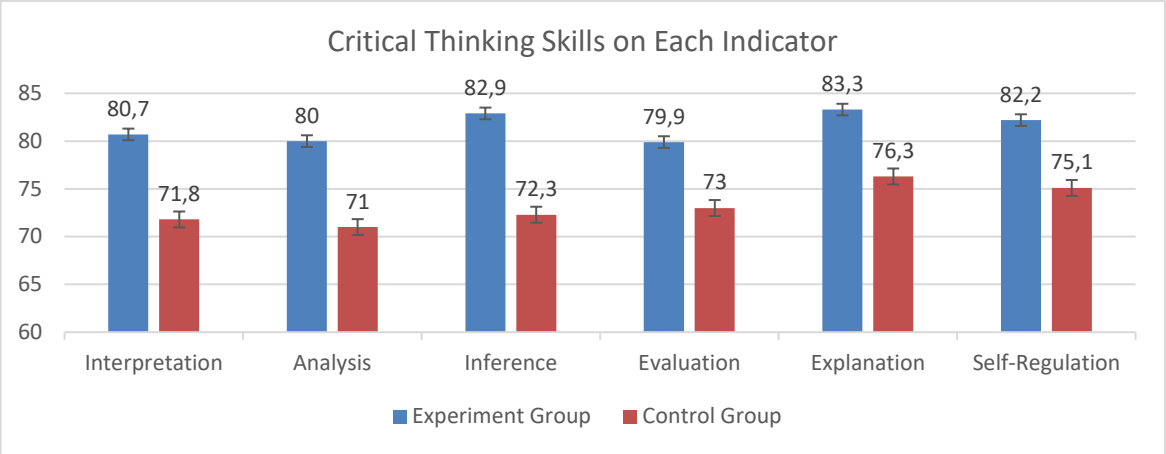

Figure 1. Average Score of Critical Thinking Skills in Experimental and Control Classes

Figure 1 describes the highest average score of critical thinking skills in the experimental and control classes, namely in the explanation indicator (experiment = 83.3 and control = 76.3), while the lowest average score of critical thinking skills for both classes, namely in the analysis indicator (experiment = 80 and control class = 71). After that, to prove the research hypothesis, the data that has been obtained is analyzed by an independent sample t-test shown in Table 4.

Table 4. The results of the independent sample t-test for each indicator of critical thinking skills

Aspect	Indicators	*Independent Sampel t-test*			Conclusion	Information
		T	F	Sig. (2-tailed)		
Critical Thinking Skill	Interpretation	3.85	0.88	.000	Accept H_1	Significant
	Analysis	5.18	1.83	.000	Accept H_1	Significant
	Inference	6.24	1.42	.000	Accept H_1	Significant
	Evaluation	4.35	1.54	.000	Accept H_1	Significant
	Explanation	4.91	0.11	.000	Accept H_1	Significant
	Self-Regulation	5.45	0.91	.000	Accept H_1	Significant

Based on Table 4, it is known that the results of the independent sample t-test for the six critical thinking indicators obtained a value of 0.000, which is less than 0.05 (0.000 < 0.05), which means H0 is rejected, and H1 is accepted. This explains that using interactive digital modules based on local wisdom can significantly improve students' critical thinking skills in biology learning compared to conventional textbooks.

The findings above explain that the local wisdom-based interactive digital module that has been developed is effective in improving students' critical thinking skills compared to the use of textbook teaching materials. This is due to the attractive characteristics of digital

modules, which are easy to access, making it easier for students to learn independently in understanding biological material and local wisdom events through videos and pictures. Interactive modules equipped with text, images, audio, video, and quiz materials can train aspects of student skills, such as critical thinking skills (Naj'iyah et al., 2020). Through the videos contained in the module, students gain affirmation of text material, and students have concrete experiences when reading, discussing, and practicing. This happens because the video can accurately describe a process or event and be watched repeatedly. The existence of videos in modules that present audiovisuals has also proven effective in increasing students' focus (Winatha et al., 2018). In addition, digital video makes learning more interesting and relevant to students' characteristics so that it can improve students' critical thinking skills. The presence of interactive images in digital modules can provide new insights and improve skills in understanding the material. Interactive images make increasing students' understanding of a case or material easier, especially local wisdom material (Rodyah, 2023). Integrating local wisdom in biology lessons can be an effort to solve environmental problems (Dewi et al., 2021). In addition, learning media that integrates technology with local wisdom can improve critical thinking skills through direct experience in the form of animation and the characteristics of digital teaching materials (Angraeni et al., 2021). Majid et al. (2020) added that visualization of the material linked to real situations will make it easier for students to master concepts, solve problems, and improve their critical thinking skills, and material packaged in interactive multimedia will make learning more effective for achieving learning goals and be able to create an innovative and dynamic learning environment.

Interactive digital modules are a form of teaching materials that facilitate students to interact directly with modules; students can listen to material in the form of text or learning videos, students can work on discussions and quizzes directly so that learning occurs in two directions and makes learning not boring (Bakri, 2021). Interactive digital modules can provide interesting and fun learning to increase student interest in learning, influencing learning success, including thinking skills (Saputro & Febriani, 2023). The growth of student motivation and interest in learning will influence learning outcomes and students' critical thinking skills (Puspitasari, 2019). Students who already have motivation and interest in learning will automatically have high curiosity, so indirectly, critical thinking skills will begin to be empowered to answer all curiosity questions students have (Wulandari et al., 2021). This shows that one effort that can be made to develop students' critical thinking skills is through digital media innovation (Jannah & Atmojo, 2022). Endaryati et al. (2021) stated that digital media

innovation effectively solves 21st-century learning. According to Ridho et al. (2021), students tend to be less enthusiastic about learning that only emphasizes text.

CONCLUSION

The local wisdom-based interactive digital module has proven effective in improving students' critical thinking skills on interpretation, analysis, inference, evaluation, explanation, and self-regulation indicators. The attractive and practical characteristics of the module encourage students to learn in a fun way. The existence of a digital-based module is very relevant to the current needs of students who are so close to technology. Through this module, students can learn biology material and local wisdom more concretely; the images and videos in the module provide opportunities for students to relate their knowledge and experience. Not only that, the use of digital-based modules also makes it easy for teachers to convey abstract biology material and local wisdom, which are generally not known to students, so the development and use of local wisdom-based digital modules are highly recommended in learning, including other subjects.

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