

Traditional Surabaya food integrated into the discovery learning e-module: Improving critical thinking and motivation

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Abstract: The development of the 21st century in the Industrial Revolution 4.0 demands quality human resources with communication, collaboration, critical thinking, and creativity skills in supporting the implementation of the Merdeka Curriculum. This study aimed to analyze the effectiveness of e-module discovery learning integrated with Surabaya traditional food in improving students' critical thinking skills and learning motivation. The research participants were 34 students of class X SMA Negeri 3 Surabaya. Somebody assessed the effectiveness of the e-module based on improving critical thinking skills through pretest and post-test results and learning motivation using the ARCS motivation instrument. Critical thinking and motivation data was analyzed using quantitative descriptive methods, including averages, N-Gain, and T-tests. The results showed a significant increase in each indicator of students' critical thinking skills with a value ≥ 3.27 (very good category) and aspects of ARCS motivation with a value ≥ 3.13 (strong to very strong category). The T-test confirmed that the discovery learning e-module effectively improved critical thinking skills and learning motivation. Integrating local wisdom in learning is an innovative approach that supports the implementation of the Merdeka Curriculum through contextual, interactive, and meaningful learning experiences.

Keywords: critical thinking; discovery learning; e-module; motivation; upper secondary school

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Introduction

The development of the 21st century requires many qualified human resources who can adapt to the changing times. The current era of the Industrial Revolution 4.0 has brought many changes in everyday life, significantly impacting the world of education (Carayannis & Morawska-Jancelewicz, 2022). Four essential skills for the 21st century are communication, collaboration, critical thinking, and creativity. The implementation of the Merdeka Curriculum on the profile of Pancasila students, one of which is the ability to think critically (Saputro et al., 2023). Critical thinking skills include scientific activities such as asking and making questions, choosing the right choices, and making decisions in an experiment (Cone et al., 2016). Some factors that can influence critical thinking skills include the learning environment, learning experience, guidance and support from learning resources and setting the desired learning outcome targets (Persky et al., 2019).

Critical thinking is one of the important competencies for learners because it can help transfer knowledge and apply problem-solving skills (Rini et al., 2020). There are several fundamental indicators in critical thinking skills, according to Facione (2011), including interpretation, analysis, inference, explanation, evaluation, and self-regulation. We can see critical thinking through students' learning activities, both from the learning process in the classroom and during practice in the field (Fahruddin et al., 2022). Learning activities in Indonesia are still not maximized to encourage students' critical thinking skills. Critical thinking skills in the field of science in Indonesia have decreased in the 2018 PISA results, with a score of 396 to 383 in 2023, so it is ranked 66 out of 80 countries. The low critical thinking skills are in line with the research of Suarniati et al. (2018), which states that the majority of students in Indonesia perform poorly in critical thinking. Other research findings also show the same result, such as the study by Amin et al. (2017), which categorizes students' critical thinking as low in biology material. Research on biodiversity material also shows low category results (Santika et al., 2018). Learning with low critical thinking skills will impact learning outcomes in biology subjects (Muhfahroyin et al., 2023). Students have

the potential to think critically; this potential will be better if trained through learning strategies arranged for the achievement of students' critical thinking development (Heliawati et al., 2022). Scientific learning strategies like the discovery learning model can improve critical thinking skills.

The discovery learning model is one of the scientific learning strategies that can develop critical thinking skills through six stages, namely the stages of stimulation, problem statement, data collection, data processing, verification, and generalization (Yerimadesi et al., 2019). Through discovery learning, students can build knowledge based on information and data collected in an exploratory learning environment (De Jong & Van Joolingen, 1998). The discovery learning model is a series of learning activities that emphasize critical thinking and analysis to reach and find answers to the problems posed (Martaida et al., 2017). One of the objectives of discovery learning is to foster creativity and critical thinking skills, as outlined by Ausubel (1964).

Research results show that discovery learning is effective in practicing critical thinking and problem-solving skills of students (Khabibah et al., 2017; Martaida et al., 2017; Nursakinah & Suyanta, 2023; Yuliati & Munfaridah, 2018). Discovery learning can also increase students' learning motivation and interest (Aldalur & Perez, 2023; Hayyun et al., 2024; Tanjung & Louise, 2024). Therefore, discovery learning is widely applied in biology learning, such as on the topics of inheritance of traits (Nusantari et al., 2021) and biodiversity (Perta et al., 2024). Discovery learning is suitable for the topics and encourages students to explore.

Biodiversity has a broad scope, with the object of study being the diversity of living organisms in specific habitats so that learners can explore their daily experiences and knowledge of the surrounding environment (Yli-Panula et al., 2018). Based on the learning outcomes in phase E of the Merdeka Curriculum, students have an important role in providing ideas on local issues related to understanding biodiversity and its role in the environment. Learners can learn how local wisdom can contribute to solving local issues and the sustainability of environmental conservation (Ilhami et al., 2019).

Local wisdom is a regional cultural wealth that contains ideologies, life policies, ways of life, and ideals of a society that are passed down from time to time, which characterize a region (Lukman et al., 2022). People often find traditional food to be a form of local wisdom. Traditional food is considered an intangible heritage that knows its production, including ideas, recipes, tips, and tricks that summarize meaningful processes (Kamaruzaman et al., 2022). Surabaya City is one of the tourist cities with various traditional foods that utilize local resources and local community products, thus becoming a regional identity and characteristic (Rindawati et al., 2023). Some of Surabaya's traditional foods that utilize local biodiversity are rujak cingur, gado-gado, pecel semanggi, lontong balap, and tahu tek. Research on local water clover wisdom conducted by Hidayat et al. (2024) has using as a learning resource for biodiversity materials. Rufiah et al. (2023) also utilized rujak cingur as a learning medium through E-worksheets to enhance critical thinking skills. This local wisdom can be integrated into contextual learning, making it more relevant to the student's learning environment (Sonia et al., 2024).

Contextual learning that connects material with the surrounding environment can motivate students to apply their knowledge in everyday life to make learning meaningful (Usmaldi & Amini, 2019). Learning by integrating local wisdom is one of the topics to increase students' learning activeness and motivation (Kang et al., 2023; Usman et al., 2024; Wang et al., 2020). If high motivation is high, it will obtain maximum learning outcomes; conversely, low motivation will obtain minimal learning outcomes (Tambunan et al., 2018). Students with strong learning motivation will have a high intensity of effort and effort to learn, so their critical thinking skills will be higher (Nugraha et al., 2017). Learning with a presentation of less interesting and less diverse material can cause students to have difficulty understanding the material presented, resulting in reduced learning motivation (Tugtekin & Dursun, 2022). Appropriate and engaging learning resources are needed to improve student's critical thinking skills and motivation during the learning process.

Learning using e-modules based on discovery learning can help students learn independently and increase their interest in learning, thus impacting student learning outcomes (Dari & Sudatha, 2022). Other studies also state that the developed electronic modules effectively train students' critical thinking skills (Rohmah et al., 2024). Other research findings also state that e-modules can increase learning motivation and improve student learning outcomes (Handayani et al., 2021). In addition, student learning motivation can be increased by integrating local wisdom because the cultural context close to students' lives can create a sense of relevance and interest in the material (Persichitte, 2018). Various studies have shown that the discovery learning model can train critical thinking skills, but these studies have not linked local wisdom, one of which is traditional Surabaya food. The novelty of this study integrates the local wisdom of traditional Surabaya food with discovery learning as a learning resource within the framework of an e-module to improve critical thinking skills. In addition, teachers can train students' learning motivation through integrated contextual learning of local wisdom that is close to students' daily lives. This study aimed to analyze the effectiveness of the e-module discovery learning integrated with traditional Surabaya food in improving critical thinking skills and students' learning motivation.

Method

This type of research includes a pre-experiment design with a one-group pretest and a post-test research design because there is no control group or comparison group (Farooq et al., 2016). The researchers conducted the study at SMA Negeri 3 Surabaya using class X students as the research sample. The research sample was 72 students from two classes determined through a simple random sampling method. Teachers implemented e-module discovery learning integrated with Surabaya traditional food in each class. The assessment declared the discovery learning e-module feasible, with a validity score of 3.81 (very valid) and reliability indicated by an agreement percentage of 66.67% - 100% (reliable).

The researchers implemented the e-module in two meetings according to the discovery learning syntax, which includes stimulation, problem statement, data collection, data processing, verification, and generalization. Learning begins with providing pictures or videos of traditional Surabaya food and trigger questions as stimuli. At the problem statement stage, students identify and seek the truth of the problems related to biodiversity in traditional Surabaya food. Furthermore, at the data collection stage, students collect information or data from the identification results. The data is then processed in an e-worksheet at the data processing stage to produce quality ideas. Each group presents the results of the e-worksheet and provides suggestions or questions to each other as a form of verification. At the final stage, namely generalization, students conclude the concept of biodiversity that contains local wisdom based on their learning experiences. The learning process using this e-module aims to understand the concept of biodiversity that contains local wisdom and improve critical thinking skills and students' learning motivation.

The research data were critical thinking skills and students' learning motivation. Critical thinking data was collected based on pretest and post-test with six indicators: interpretation, analysis, inference, explanation, evaluation, and self-regulation (Facione, 2011). The pretest and post-test questions are different, but the type is the same: essays. Each test consists of six questions adjusted to the indicators of critical thinking achievement. The pretest and post-test questions were tested based on expert judgment, with a validity of 3.7 (very valid) and a percentage of agreement of 66.67% - 100% (reliable). The assessment of each question uses a score of 1-4 with an average assessment of each critical thinking indicator of 0-1.74 (less good); 1.75-2.40 (reasonably good); 2.50-3.24 (good); 3.25-4.00 (very good) (Mardapi, 2017). The N-gain test results of ≥ 0.3 indicate improved critical thinking skills. Considering Sig, researchers analyzed the data using the SPSS T-test (paired-test) before and after applying the e-module discovery learning. ≤ 0.05 and $t_{\text{count}} < t_{\text{table}}$ as indicators of a significant difference. In other words, applying e-module discovery learning integrated with traditional food is efficacious in improving critical thinking skills.

Other research data on learning motivation was collected using the ARCS (Attention, Relevance, Confidence, Satisfaction) motivation questionnaire adapted according to Keller (2016). There are 20 statement items, and each ARCS aspect consists of five items. The motivation questionnaire has met the reliability test with the reliable category ($\alpha = 0.856$). The assessment of each item uses a four-point Likert scale with 1 (disagree) to 4 (strongly agree). The researcher interpreted the average of each aspect using learning motivation criteria: 1.00-1.75 (weak), 1.76-2.50 (moderate), 2.51-3.25 (strong), and 3.26-4.00 (very strong) (Widoyoko, 2012). The researchers conducted the analysis using the SPSS T-test (one sample test) after applying the discovery learning e-module, where Sig. ≤ 0.05 and $t_{\text{count}} < t_{\text{table}}$ indicated an influence on motivating student learning.

Results and Discussion

Profile of e-module discovery learning integrated with traditional Surabaya food

The discovery learning e-module is prepared with the help of Google Sites to look like a website that students can use easily. There are several parts of the e-module, namely, the initial part (cover, preface, table of contents, e-module identity); the content part (learning activities for biodiversity at the gene, species, ecosystem, benefits, conservation efforts, and biodiversity with local wisdom, as well as a summary of the material); the final part (evaluation, glossary, and bibliography).

The learning approach that connects the concept of biodiversity with Surabaya traditional food, as described in Table 1, provides an opportunity to integrate biological science with local wisdom. Learners identify genetic, species, and ecosystem variations through traditional food ingredients, such as rujak cingur, gado-gado, and pecel semanggi. In addition, they analyze the benefits of biodiversity in the ingredients of lontong balap and learn about efforts to conserve it through cultivation and resource management. An understanding of local wisdom is also developed by analyzing traditional serving techniques and using typical ingredients in foods such as tahu tek.

The developer adjusted five features in the e-module to match the six stages of discovery learning

(stimulation, problem statement, data collection, data processing, verification, and generalization) with six critical thinking indicators (interpretation, analysis, inference, explanation, evaluation, and self-regulation). Figure 1 shows that the bio-think feature gives learners a stimulus, such as an image or video, with a case study they must identify for further investigation. This feature can train interpretation and analysis thinking with learning according to the stimulation and problem statement stages. Other features in the e-module, such as bio explore, bio creative, bio talk, and bio finding, each train one indicator of critical thinking with learning according to the stages of discovery learning.

Table 1. Linkage of Surabaya traditional food in discovery e-module

Learning Activities in E-Modules	Relevance to the Material
<p>Learning Activity 1</p>  <p>(Rujak Cingur)</p>	<p>Learners identify the presence of gene diversity in rujak cingur. Variations in cayenne pepper and variations in cucumber indicate the presence of genetic variation in rujak cingur.</p>
<p>Learning Activity 2</p>  <p>(Gado-Gado)</p>	<p>Learners identify the presence of species diversity in gado-gado. tomato, potato, cucumber (one Solanaceae family), peanut and string bean (one Fabaceae family), and cayenne pepper and large red chili (one <i>Capsicum</i> genus) show the existence of species variation within the same genus or family in the hodgepodge.</p>
<p>Learning Activity 3</p>  <p>(Pecel Semanggi)</p>	<p>Learners identify ecosystem diversity in water clover plants. Water clover can thrive in humid environments such as rice fields and swamps that show a diversity of biotic and abiotic components.</p>
<p>Learning Activity 4</p>  <p>(Lontong Balap)</p>	<p>Learners identify the benefits of biodiversity used in lontong balap and its conservation efforts. There are several nutrients contained in the components of lontong balap such as bean sprouts (vitamins and iron), black-eyed pea (vegetable protein and vitamins), clams (animal protein, vitamins, and minerals). Conservation that can be done such as cultivating bean sprouts at home, catching shellfish by setting the right time so as not to interfere with breeding.</p>
<p>Learning Activity 5</p>  <p>(Tahu Tek)</p>	<p>Learners identify the relationship between local wisdom and biodiversity. The sales technique with a hereditary presentation of cutting tofu and rice roll to the sound of "tek tek", the use of local ingredients, and the distinctive shrimp paste indicate the existence of local wisdom in tahu tek.</p>

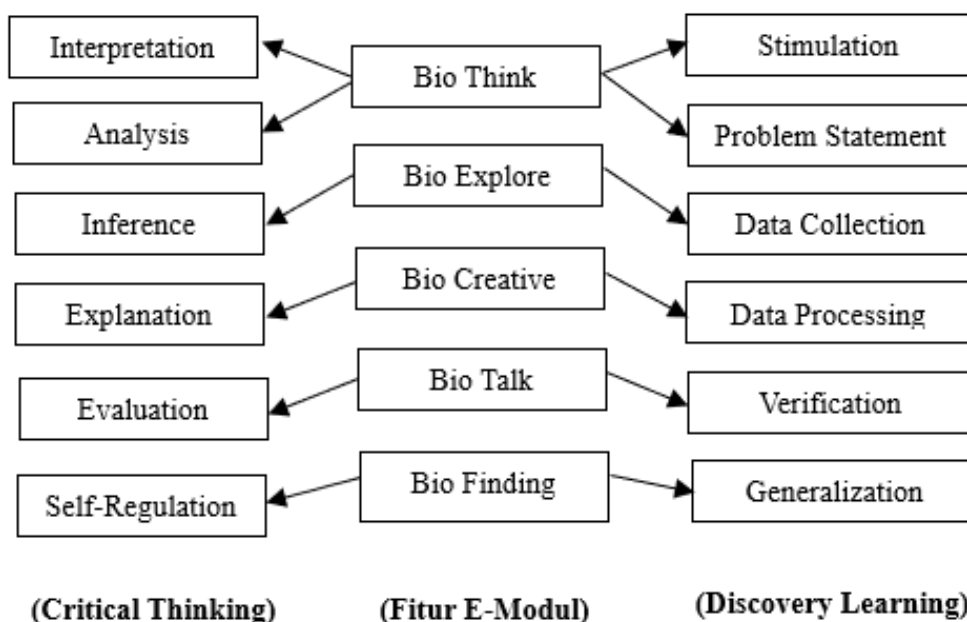


Figure 1. Relationship between discovery learning e-module and critical thinking

Effectiveness of discovery learning e-modules as integrated learning resources for Surabaya traditional food to improve critical thinking and learning motivation

The teacher measures students' critical thinking skills by having them work on pretest and post-test questions aligned with the six indicators of critical thinking. Based on Table 2, one can see that critical thinking skills before the application of e-modules showed a pretty good category in the indicators of interpretation (1.93), analysis (1.87), inference (1.88), and a poor category in explanation (1.72), evaluation (1.63), self-regulation (1.42). After the application of e-modules, there were significant changes in all critical thinking indicators in the excellent category. Some scored the highest average in the interpretation and inference indicator at 3.43 and the lowest in the self-regulation indicator at 3.27. The N-gain value on each indicator ranged from 0.70 to 0.73, showing a high increase, especially in the indicators of explanation, evaluation, and self-regulation, which increased from the category of poor to very good. The statistical test results show $t\text{-count} > t\text{-table}$ (2.00) and a significant Cohen's d value, with a $p\text{-value}$ of 0.000 on all indicators, which indicates a substantial difference between the scores before and after the implementation of the e-module. A reliability value 0.737, categorized as reliable, supports the data's reliability. Overall, the results of this study indicate that the discovery learning e-module integrated with Surabaya traditional food effectively improves students' critical thinking skills.

Table 2. Critical thinking skills of students before and after the application of e-module discovery learning integrated with Surabaya traditional food

Results	Critical Thinking Indicators					
	Interpretation	Analysis	Inference	Explanation	Evaluation	Self Regulation
Score	1.93	1.87	1.88	1.72	1.63	1.42
Pretest	(Fairly Good)	(Fairly Good)	(Fairly Good)	(Less Good)	(Less Good)	(Less Good)
Score	3.43	3.39	3.43	3.36	3.30	3.27
Posttest	(Very Good)	(Very Good)	(Very Good)	(Very Good)	(Very Good)	(Very Good)
N-gain	0.72	0.71	0.73	0.72	0.70	0.72
	(High)	(High)	(High)	(High)	(High)	(High)
t	17.518	15.865	16.206	16.967	15.301	16.984
Cohens'd	2.16	1.95	1.99	2.07	1.88	2.08
Sig	0.000	0.000	0.000	0.000	0.000	0.000
Reliability	0.737 (Reliable)					

In addition to critical thinking, the effectiveness of e-modules is determined based on learner motivation. Table 3 shows that the motivation category is very strong in three aspects, namely attention (3.37), relevance (3.45), and satisfaction (3.52), while the strong category is in one aspect, namely confidence (3.13). The satisfaction aspect has the highest score, reflecting students' high satisfaction with the e-module. Although the assessment classifies the attention aspect as very strong, one motivation item falls into the strong category (3.18), indicating that some learners are less focused. The relevance aspect also has one item in the strong category (3.15) related to the ability of learners to connect biodiversity material with everyday life. In contrast, in the confidence aspect, only one item is classified as very strong (3.42): the ease of learners carrying out e-worksheet activities. The statistical analysis of each aspect of learning motivation shows $\text{sig} < 0.05$ and $t\text{-count} > t\text{-table} (2.00)$, confirming a significant effect of applying e-modules in motivating students to learn. Cohen's d value also shows that the impact of the treatment on learning motivation is quite substantial ($d \geq 0.8$). The questionnaire instrument was also reliable ($\alpha = 0.810$), confirming the consistency of the measurement of learning motivation.

The results showed that educators can integrate Surabaya traditional food as a learning resource for biodiversity material. Surabaya traditional foods such as rujak cingur, gado-gado, lontong balap, pecel semanggi, and tahu tek reflect a rich biodiversity, ranging from vegetable to animal ingredients used, thus providing opportunities for learners to understand the concept of biodiversity in a contextual and applicable manner. Through a culture-based approach, educators invite learners to recognize the diversity of biological resources that support people's lives and help them understand the local values, such as sustainability and traditional wisdom in utilizing natural resources (Sotero et al., 2020). This approach enriches the learning experience and fosters awareness of the importance of preserving local wisdom as part of environmental and cultural sustainability (Al-Mansoori & Hamdan, 2023). By exploring the biological aspects of traditional foods, such as the diversity of food ingredients and processing, learners are more motivated to actively participate in learning through observation, analysis, and problem-solving.

Learner motivation can be improved by integrating local wisdom, such as Surabaya traditional food, because the cultural context close to the learners' lives can create a sense of relevance and interest in the material (Persichitte, 2018). Integrating Surabaya traditional food into the developed e-module can motivate students' learning, as evidenced by the success of each aspect. The biodiversity material presented in this e-module is closely related to student's daily lives, thus increasing the relevance of learning and their understanding of the benefits of the concepts taught. This finding aligns with Ami & Yuliana (2020) research, which shows that integrating local elements in learning can create meaningful learning experiences and encourage students' motivation to learn. In addition, Sriyati et al. (2021) revealed that local potential has an excellent opportunity to be integrated into biology learning, thus helping students understand biology relevant to everyday life. The activities in the e-worksheet are designed to be simple and easy to understand and also contribute to increasing students' confidence in understanding the material and completing tasks independently. Lestari and Fitriani (2016) state that learning based on local potential positively impacts material understanding. Integrating Surabaya traditional food as a learning resource through e-module teaching materials also successfully improved students' critical thinking skills through the discovery learning approach.

Table 3. Learning motivation of students after the application of e-module discovery learning integrated with Surabaya traditional food

Motivation Item	Score	Mean	T	Cohens'd	Sig
Attention					
There is something new for learners.	3.55 (VS)				
There is a variety of attention-grabbing components.	3.28 (VS)				
Learning materials are interesting for students.	3.28 (VS)	3.37 (VS)	63.927	7.81	0.00
The e-module features are interesting and diverse for learners.	3.55 (VS)				
Learners are focused during learning.	3.18 (S)				
Relevance					
There is an explanation of local wisdom according to the learners' daily life knowledge.	3.45 (VS)				
Learners can relate biodiversity material to their lives.	3.15 (S)				
The application of e-modules is beneficial for students.	3.45 (VS)	3.45 (VS)	59.262	7.17	0.00
The sentences used are in accordance with the material discussed.	3.45 (VS)				
Relevant and close to learners' lives.	3.75 (VS)				

Motivation Item	Score	Mean	T	Cohens'd	Sig
Confidence					
Learners believe that they will succeed in the test after studying the e-module.	2.99 (S)	3.13 (S)	43.514	5.31	0.00
The explanation of the stages in the e-module makes it easier for students to learn.	3.15 (S)				
Learners are confident after reading the material.	2.96 (S)				
The integrated material on Surabaya's traditional food was easier to understand than expected.	3.13 (S)				
Activities on e-worksheet are easy to do.	3.42 (VS)				
Satisfaction					
Learners are happy and want to know more about the integrated material of Surabaya traditional food.	3.31 (VS)	3.52 (VS)	61.323	7.49	0.00
It is a pleasure to learn about e-modules.	3.45 (VS)				
Happy learners successfully complete the e-module.	3.54 (VS)				
Learners are comfortable working in the groups.	3.52 (VS)				
Learners feel satisfied after learning the material.	3.78 (VS)				
Reliability	0.810 (Reliable)				
Description: S = Strong, VS = Very Strong					

The discovery learning approach is closely related to developing critical thinking skills. It encourages learners to actively explore information, identify problems, and find solutions through a structured but flexible learning process (Martaida et al., 2017). The theory of constructivism initiated by Jean Piaget and Lev Vygotsky is the primary basis of discovery learning (Hariyanto et al., 2022). The discovery learning process encourages learners to observe, analyze, and make conclusions. Vygotsky emphasized the importance of social interaction and teacher support (scaffolding), which helps learners develop critical thinking skills through discussion and collaboration (Le & Nguyen, 2024). In the e-module, learners are given a stimulus in the form of images, videos, or sparking questions by the teacher to identify a problem, which is investigated further by collecting relevant information from trusted sources. After processing information and presenting ideas in writing on the e-worksheet, learners conduct class discussions through presentations and receive feedback to evaluate the investigation before concluding the concept of biodiversity with local wisdom.

Independent exploration allows learners to use a discovery learning approach in the context of e-modules. To interact directly with the material, observe phenomena, and analyze and evaluate the data presented. Thus strengthening their critical thinking ability (Susanti et al., 2023). This process trains learners to think logically and systematically and increases their confidence in solving complex problems independently, which is the core of critical thinking skills (Yayuk et al., 2020). Analyzing, evaluating, drawing conclusions, and providing explanations after using e-modules on crossing material based on discovery learning. Another study by Fadilah et al. (2024) related to integrating local wisdom as a learning resource in modules showed increased critical thinking skills before and after applying each indicator of interpretation, analysis, inference, explanation, evaluation, and self-regulation. As a learning resource, applying the developed e-module can also motivate learning by providing material close to students' lives.

In research, Komikesari et al. (2020) stated that e-modules can increase student learning motivation. The e-module developed also presents learning media, such as videos that motivate students to learn. Learning media, such as videos, can increase students' enthusiasm for learning (van Alten et al., 2019). The use of the discovery learning model also increases students' enthusiasm. In learning, it demands the activeness of students so that it can increase student learning motivation (Seruni et al., 2020). E-modules with discovery learning models are suitable because they increase student learning motivation (Dari & Sudatha, 2022). Other research findings also state that e-modules can increase learning motivation and improve student learning outcomes (Handayani et al., 2021). Thus, the e-module developed can attract students' attention and make it easier for them to understand the content of the subject matter so that their critical thinking skills can also increase.

The study results showed that students' critical thinking skills were very good. However, the self-regulation indicator scored the lowest compared to other indicators due to students' lack of self-confidence in placing themselves and concluding the concept of biodiversity. In line with these findings, the self-confidence aspect shows the lowest learning motivation, where students still lack confidence in doing tests even though they have read the material and completed various learning activities. Decreased self-confidence in learning is closely related to the self-regulation process (de la Fuente et al., 2021). The self-regulation indicator refers to students' ability to control themselves and their existence

when solving problems (Rahmadayanti et al., 2022). Based on the study's results, researchers recommend emphasizing the strengthening of self-regulation in similar future studies. Training students' synthesis abilities in linking various concepts and ensuring a deep understanding of the material can improve self-regulation indicators. Both aspects can support increased student confidence in learning. In addition, this study focuses on applying e-modules to improve critical thinking skills and learning motivation but has not explored aspects of digital literacy. Digital literacy is an essential skill of the 21st century that aligns with the Independent Curriculum principles. Technology-based e-modules can improve students' digital literacy (Herawati & Muhtadi, 2018; Sanova et al., 2022). Therefore, future research can examine students' digital literacy level and its influence on the effectiveness of e-modules in learning.

Conclusion

Based on the study results, integrating Surabaya traditional food as a learning resource in e-module discovery learning improved students' critical thinking skills and learning motivation. There was an increase in each indicator of students' critical thinking skills after the application of e-modules, which had very good categories. The questionnaire results of students' learning motivation showed each aspect of ARCS motivation with strong to very strong categories. This finding indicates that local wisdom-based learning is not only culturally relevant but can significantly impact the development of 21st-century competencies, such as critical thinking and independent learning. This Surabaya traditional food integrated e-module is an innovative solution that supports the implementation of the independent curriculum by providing contextual, interactive, and meaningful learning experiences.

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Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Author Contributions

R. R. Dewi: methodology, analysis, original manuscript authoring, reviewing, and editing; **W. Wisanti:** reviewing and editing, and **Y. Yuliani:** reviewing and editing.

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