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Science E-Modules Learning Based on *Sasak* Local Wisdom to Enhance the Creative Disposition of Elementary School Students

Nanang Rahman✉[1], Sandra Wiranata[2], Haifaturrahmah[3] & Liswijaya[4]

[1,2,3,] Study Program of Primary School Teacher Education, Muhammadiyah Mataram University, Mataram, Indonesia

[4] Science Education Doctoral Study Program, Mataram University, Mataram, Indonesia

✉ nangrhm87@gmail.com

Abstract. Science learning in elementary schools is often perceived as abstract and theoretical. This perception makes it difficult for students to grasp scientific concepts, which may sometimes feel distant from their daily lives. Ideally, science instruction should adopt a contextual approach, allowing students to recognize the relevance of scientific knowledge in their environment. The purpose of this research is to develop a science e-module based on *Sasak* local wisdom to enhance the creative dispositions of elementary school students. The research design employs a development model encompassing validity, practicality, and effectiveness tests. The limited trial involved 15 students, while the field trial included 42 elementary school students. Validation results indicate that the e-module demonstrates excellent quality in terms of media aspects (80.75%) and material aspects aligned with the curriculum (72.93%). The limited trial revealed high practicality (89.78%), while the field trial showed an increase in post-test scores from 58.78% to 88.31%, with an N-gain score of 0.71. The e-module has proven effective in developing students' creative dispositions. This research contributes to the integration of local wisdom in digital learning resources by fostering culturally relevant science education while simultaneously enhancing students' creative dispositions and promoting cultural preservation through the embedding of *Sasak* values.

Keywords: Creative Disposition; Elementary School; Local Wisdom; *Sasak*; Science E-Modules.

1. Introduction

Education in the 21st century demands the development of critical and creative thinking skills as essential competencies for students (Tohani & Aulia, 2022). In science education, mastering concepts alone is insufficient to prepare students for future challenges. A relevant, contextual, and innovative approach is needed to make science learning more engaging and meaningful (Darling-Hammond et al., 2020). Science education in elementary schools is often perceived as abstract and theoretical. This perception makes it challenging for students to understand scientific concepts, which sometimes feel disconnected from their daily lives. In fact, science instruction should involve a contextual approach, enabling students to see the relevance of scientific knowledge to their environment. To achieve this, educational media are needed that can provide concrete, engaging, and relevant learning experiences connected to the real world. One effort that can be undertaken is integrating local wisdom values into the learning process. This approach not only enriches students' knowledge but also contributes to the preservation of local culture (Suprapto et al., 2021). The local wisdom of *Sasak* culture in Lombok is a rich cultural heritage imbued with values and practices relevant to scientific concepts, such as sustainable natural resource management and traditional technologies in daily life. Integrating *Sasak* culture into science education provides students with a concrete context, enabling them to understand the relevance of science to their everyday lives. This approach also offers an opportunity to foster students' awareness of the importance of preserving local cultural heritage amidst the currents of globalization.

The development of information and communication technology offers significant opportunities to create more innovative learning media, such as e-modules (Triwoelandari et al.,2023). Digital based e-modules enable the presentation of material in an interactive, engaging, and flexible manner, thereby enhancing students' motivation to learn (Alyusfitri et al., 2024). When e-modules are designed by integrating elements of local culture, students not only learn scientific concepts but also gain contextual and meaningful experiences. This medium also supports the development of students' creative dispositions, including the ability to think flexibly, exploratively, and innovatively in solving problems. The development of a science e-module based on the local wisdom of *Sasak* culture aims to improve the quality of science education in elementary schools while promoting the preservation of local culture. This e-module is expected to enhance students' creative dispositions by providing a learning experience that is relevant, engaging, and challenging. Creative dispositions play a critical role in education as they equip students to face the challenges of a modern world that is both complex and dynamic (Zielińska et al., 2023). Creative dispositions encompass openness to new ideas, the courage to experiment, and flexibility in thinking and action. In the context of learning, these dispositions encourage students to explore various approaches to understanding concepts, solving problems, and generating innovative solutions (Kesici, 2022). Students with creative dispositions are better able to connect lesson content with real-life contexts, making learning more relevant and meaningful. Through this approach, science education not only serves as a means for mastering scientific knowledge but also becomes a platform for shaping students' character and cultural identity.

1.1. Problem Statement

An ideal science education in elementary schools should be innovative, contextual, and relevant to students' everyday experiences. However, a major challenge for educators is the scarcity of learning media that combine scientific concepts with local cultural wisdom, especially within the context of *Sasak* culture (Wahyudiati, 2022). This gap arises due to the limited development of culturally relevant learning materials and the difficulty teachers face in connecting science concepts to students' lived experiences. However, science education often remains abstract and theoretical, making it difficult for students to grasp and less meaningful in their daily lives. If this problem is left unaddressed, it can lead to a decline in students' motivation to learn science, a weakening of their creative dispositions, and a growing disconnect between education and local culture. These challenges hinder students' ability to develop essential 21st-century skills, such as critical thinking and adaptability (Darling-Hammond et al., 2020). More urgently, the lack of integration between science learning and local culture risks eroding indigenous knowledge systems, potentially diminishing students' appreciation for their cultural heritage. The urgency of this research lies in its potential to bridge the gap between scientific knowledge and students' cultural contexts. By embedding local wisdom in science education, students will not only gain a deeper conceptual understanding but also develop a stronger motivation to engage with their cultural heritage (Hikmawati et al., 2021; Uge et al., 2019). Furthermore, nurturing creative dispositions through culturally contextualized learning will better prepare students to become adaptive, innovative, and critical thinkers in a rapidly evolving global landscape (Avcı & Yildiz Durak, 2023). In the long term, this research contributes to improving the quality of science education while simultaneously safeguarding local cultural knowledge amid the pressures of globalization.

1.2. Related Research

Research on the development of learning media based on local wisdom has shown positive impacts on student learning. Studies on digital modules incorporating local wisdom have been more effective in enhancing students' critical thinking compared to standard modules (Syahfitri, 2024). However, this research focuses on critical thinking dispositions and uses the learning context at the high school level, which differs from the current study that targets elementary school students and creative dispositions (Suparmin et al., 2024). The relevant research also found that science education based on local culture can enhance students' scientific literacy. However, its focus is more on scientific concept comprehension rather than the development of students' creativity (Kumar et al., 2024). Additionally, research has

developed a STEM based ethnoscience e-module to enhance 21st century skills (Juwantara et al., 2023). Other studies have also integrated local culture into learning to enhance students' analytical skills and complex thinking, but they did not incorporate e-module technology or target creative dispositions (Subroto & Jacky, 2024). Teachers and school management teams often face challenges in integrating local knowledge into the curriculum. These challenges include aligning local knowledge with standardized curriculum requirements and developing appropriate teaching strategies. However, successful integration can be achieved through community engagement and collaboration with local knowledge holders (Vaughn & de Beer, 2020). Research also shows that science learning sensitive to culture and language enhances students' scientific attitudes. However, this study does not involve e-modules or focus on the development of creativity (Ntuli, 2024). This research presents novelty by combining e-module technology based on *Sasak* local wisdom to enhance the creative dispositions of elementary school students. Therefore, this study not only contributes to culturally relevant technology-based learning but also strengthens students' creative skills, an approach that has rarely been explored in previous research. This marks a significant step forward in integrating local culture and technology into elementary education. This research presents novelty by integrating an e-module based on *Sasak* local wisdom to enhance the creative dispositions of elementary school students. Unlike previous studies that focus on literacy, analytical skills, or critical thinking, this study uniquely emphasizes creativity as a crucial 21st-century skill. Moreover, by utilizing digital learning media, this study offers an innovative, scalable approach to embedding cultural wisdom in science education. Thus, this research contributes not only to culturally relevant, technology-based learning but also to strengthening students' creative skills—an approach that has been underexplored in previous studies. This marks a significant step forward in integrating local culture and technology into elementary education.

1.3. Research Objectives

This research focuses on the development of a science e-module based on *Sasak* local cultural wisdom to enhance the creative dispositions of elementary school students. The aim of this study is to integrate *Sasak* cultural values into science learning through digital technology, with the expectation that it will make the learning material more relevant and engaging for students. The primary objective of this research is to answer key questions about how the validity, practicality, and effectiveness of the developed e-module can improve students' creative dispositions. The expected outcome of this study is the creation of a valid, practical, and effective science e-module based on *Sasak* local wisdom that can enhance students' creative dispositions. This research is expected to contribute not only to the development of science education but also to the preservation and introduction of *Sasak* culture to the younger generation through education.

2. Theoretical Framework

2.1. Science E-Modules

The use of science e-modules in learning offers great potential to integrate local wisdom values, which can enrich students' learning experiences while supporting the development of creative dispositions. Theoretically, the development of science-based e-modules can be grounded in the Cognitive Multimedia Theory, which emphasizes the importance of visual and verbal elements in enhancing students' understanding (Zoran et al., 2018). When e-module content incorporates elements of local wisdom, such as traditional practices or natural phenomena present in students' surroundings, science concepts can become more relevant and meaningful to them (Delimanugari, 2024). The integration of local wisdom into science e-modules is supported by a constructivist approach, where learning is designed to build new knowledge based on students' experiences. Studies show that context based learning can enhance student engagement because they feel a stronger connection to the material being studied (Abu-Rasheed et al., 2023). For example, e-modules can leverage local natural phenomena, such as farming traditions or traditional irrigation systems, to teach science concepts like ecosystems, hydrology, or physical principles. In this way, local wisdom

serves as a bridge between abstract science theory and the daily realities of students (Fang, 2020; Koirala, 2023).

In addition to enhancing the relevance of learning, locally-based science e-modules also support the development of creative dispositions, which include the ability to think flexibly, originally, and innovatively. Interactive elements in e-modules, such as simulations or problem-based case studies grounded in local issues, provide students with opportunities to explore creative solutions to challenges in their environment (Bachri et al., 2021). Students can use e-modules to design science-based solutions to environmental problems, such as plastic waste management or natural resource conservation, inspired by local community practices. Creative dispositions can also be developed through project-based learning strategies implemented in Science E-Modules. Studies show that digitally designed project-based activities, such as designing local irrigation models using simulations in e-modules, not only enhance students' understanding of science concepts but also encourage them to think creatively (Cheng et al., 2024). By integrating local wisdom into these activities, students are encouraged to connect modern scientific solutions with traditional knowledge, fostering a synergistic mindset between tradition and innovation (Delimanugari, 2024).

The integration of local wisdom into science e-modules is not without challenges. One of the obstacles is the availability of data or materials related to local wisdom that can be incorporated into the e-modules (Zhao & Ko, 2024). In addition, teachers need the skills to design modules that are relevant to the local context while still meeting national curriculum standards. Therefore, support from the education system, such as teacher training and the development of digital-based local materials, is essential to ensure effective implementation (Hwang et al., 2015). By integrating local wisdom and strategies that support creative dispositions, science e-modules not only serve as innovative learning tools but also act as means to preserve culture and prepare students for future challenges. Locally based e-modules, systematically designed through a development model, can be an effective approach to creating adaptive, contextual, and creative science learning (Juwantara et al., 2023).

2.2. *Sasak* Local Wisdom

The *Sasak* local wisdom, which reflects the values, traditions, and beliefs of the Lombok community, holds significant potential to be integrated into education. In the Contextual Teaching and Learning (CTL) approach, learning based on local wisdom serves as an effective tool to enhance the relevance of the material to students' daily lives (Hikmawati et al., 2021). Local values such as the "gawe beleq" tradition and "awiq-awiq" can be used as learning contexts that help students understand abstract concepts in a more concrete way. For example, the principle of mutual cooperation in *Sasak* tradition can be integrated into sociology or character education, encouraging students to internalize values of solidarity and collaboration. Additionally, *Sasak* local wisdom is also relevant in environment-based learning (Fadli, 2023). This approach aligns with the theory of Environmental Education, which emphasizes hands-on experiences in learning about ecological issues. Studies show that integrating local wisdom into environmental education can enhance students' awareness of the importance of natural resource conservation, which is highly relevant in addressing global challenges such as climate change.

In the context of cultural education, *Sasak* local wisdom, such as the "gendang beleq" tradition, serves as a rich source of material for introducing students to the values of history and cultural diversity. This tradition not only has educational value but also spiritual symbolism that teaches respect for nature and the history of ancestors (Munawir & Pradoko, 2021). Teachers can use the gendang beleq tradition to teach various subjects such as history, cultural arts, science, and language. The approach to education based on *Sasak* local wisdom also supports the development of students' creative dispositions. Through project-based tasks that incorporate local wisdom, students are encouraged to think creatively and critically as they explore culturally-based solutions to contemporary challenges. For example, students could design a waste management model based on the values of awiq-awiq, encouraging them to connect traditional knowledge with modern technology (Mutia et al.,

2023). This approach not only enhances students' understanding but also strengthens 21st century skills, such as collaboration and innovation. By working on projects that integrate local wisdom, students learn to collaborate with their peers and apply creative thinking to solve real-world problems, preparing them to be adaptable and innovative in the future (Tohri et al., 2022).

The application of *Sasak* local wisdom in education also has a positive impact on strengthening students' cultural identity. In the era of globalization, education based on local values can serve as a strategy to preserve cultural heritage while reinforcing pride in their identity. Culture acts as a framework of meaning that shapes the way people think and act. By studying local wisdom such as the Nyongkolan tradition or the ceremonial Gawe Beleq, students not only understand their culture but are also invited to absorb the noble values passed down by their ancestors (Johari & Sumardani, 2023); Mashami et al., 2023). However, to optimize the integration of *Sasak* local wisdom in education, systemic support from various parties is necessary. Teachers need to be equipped with training on how to design learning materials based on local wisdom that remain relevant to the national curriculum. Additionally, the use of digital technology, such as interactive videos or culture-based *Sasak* e-modules, can facilitate the implementation of local wisdom in learning. With the right strategy, education based on *Sasak* local wisdom can become an effective way to create contextual, adaptive, and meaningful learning for students.

2.3. Creative Disposition

Creative disposition is the tendency or attitude of an individual to think original, flexibly, and innovatively in various situations. Creative disposition is not only related to intellectual abilities but also involves a mental attitude that is open to new ideas and the courage to take risks (Kesici, 2022). In the context of education, creative disposition is one of the essential 21st-century skills that supports students' ability to solve complex problems and adapt to changes. Creativity involves three main elements: expertise, creative thinking skills, and intrinsic motivation (Yuan et al., 2019). These three elements must be developed through a learning approach that is relevant and contextual. Creative disposition has five indicators: *inquisitive*, which pertains to individuals' ability to discover and pursue interesting and meaningful questions within their creative field; *persistent*, referring to the ability to face challenges and perseverance, where persistence becomes an essential habit enabling individuals to transcend familiar ideas and generate new ones; *imaginative*, which is the ability to generate solutions and imaginative possibilities through intuition, allowing individuals to make new connections and generate thoughts and ideas that may not arise solely from analytical thinking; *collaborative*, representing the tendency to contribute to others' ideas and listen to ways to improve one's own ideas; and *discipline*, which balances the "daydreaming" and imaginative aspects of creativity, as there is a need for knowledge and skills to shape creative products and develop expertise (Lucas et al., 2014).

The problem based learning approach has been proven effective in enhancing students' creative disposition. This learning model encourages students to confront real-world challenges, seek creative solutions, and think critically. Research findings indicate that students engaged in problem-based projects show significant improvements in their creativity compared to traditional teaching methods (Ulger, 2018). Additionally, project-based learning provides students with the opportunity to integrate various disciplines in creating innovative solutions, strengthening their ability to think across disciplines. In learning, creative disposition can also be enhanced through the integration of digital technology. The use of technologies such as simulations, gamification, and digital learning platforms encourages students' creative exploration by providing an environment that supports experimentation without the fear of failure (Bereczki & Kárpáti, 2021). STEM based learning applications designed interactively can help students understand scientific concepts while encouraging them to find creative solutions to complex problems. Research findings show that students who learn with interactive media are more motivated to think creatively compared to those who use conventional media (Yustina et al., 2020).

Creative disposition is also rooted in cultural approaches. In societies with rich local cultures, traditional values can serve as a source of inspiration that fosters creativity. Research has shown that integrating local wisdom into learning helps students develop creative thinking by connecting traditional values with modern solutions (Irhasyuarna et al., 2022). For example, in the context of Indonesian society, students can be encouraged to explore traditional technologies such as local irrigation systems or indigenous architectural designs as inspiration for creating innovative solutions in the field of environmental sustainability. In addition to cultural approaches, the development of creative disposition also requires strengthening emotional and motivational aspects. Creativity is not solely the result of intellectual ability, but is also influenced by social and emotional factors (Rubenstein et al., 2018). Students supported in a collaborative learning environment tend to exhibit higher creativity because they feel valued and motivated to express their ideas. An environment that fosters the development of creative disposition is one that allows students to experiment, provides positive feedback, and encourages collaboration among individuals (Ayyildiz & Yilmaz, 2021).

However, the development of creative disposition requires support from the education system. Teachers play a crucial role as facilitators who create a learning environment that supports creative exploration. Teacher training in designing teaching strategies that encourage creativity is essential. Furthermore, educational policies that integrate creativity as one of the indicators of successful learning can promote the systemic development of creative disposition (Revenko et al., 2024). Thus, creative disposition not only becomes a part of individual skills but also evolves into a learning culture ingrained in the education system.

3. Method

3.1. Research Design

The type of research conducted is mix methode, with a research development methodology. In this development research, the researcher will use the R&D (Research and Development) method. Development research is a method or phase of the process frequently used in research to validate and develop or refine an existing product, ensuring its accountability (Gall et al., 2007). The stages begin with the development of a science e-module based on *Sasak* local wisdom, followed by the validation of the developed e-module and revisions based on feedback from validators. Subsequently, a limited trial is conducted with a subset of classes VA students to assess the practicality of the science e-module. Finally, a field trial is conducted in classes VA and VB to evaluate its effectiveness in fostering students' creative dispositions.

3.2. Participant

The trial subjects in this research consist of 2 validators who will validate the e-module product. One validator is from the University of Muhammadiyah Mataram, and the other is from Mataram University, both with expertise in science education and holding doctoral degrees. The limited trial was conducted with a subset of Grade VA students, consisting of 6 male and 9 female students, to assess the practicality of the developed science e-module. The field trial involved all students from classes VA and VB at SDN 2 Sedau, with a total of 42 students, comprising 20 male and 22 female students. The students who participated in the limited trial and field trial were aged between 11 and 12 years.

3.3. Data Collection

To collect research data, this study follows three main stages: expert trial (validation), small group trial, and field trial, to evaluate and develop the e-module based on *Sasak* local wisdom. In the expert trial phase, the researcher meets with content and media experts to obtain validation for the developed e-module. The researcher explains the purpose of the validation, provides the questionnaires along with the e-module, and then collects the completed questionnaires from the experts to ensure the quality of the content and learning media. The validation instrument consists of subject matter and media validation. The validation instrument for the e-module in science is presented in Table 1.

Tabel 1. Instrument Validation

Component	Assessment Aspect
1. Instrument validation for subject matter experts	
A. Content alignment with the curriculum	• The material aligns with the basic competencies in the curriculum • Learning objectives are clear and appropriate • Examples and exercises are relevant to the material • Scientific concepts are accurate and meet standards
B. Integration of *Sasak* local wisdom	• The material effectively integrates *Sasak* local wisdom • Examples based on local wisdom support scientific understanding • Concepts based on local wisdom are relevant to students' lives
C. Comprehensibility and engagement of the material	• The language used is clear and easy to understand • The material is engaging and involves students in learning • There are activities that encourage students' exploration and creativity
2. Instrument validation for media experts	
A. Visual design	• Color, layout, and overall visual aesthetics are appealing • Illustrations and images support material comprehension • Text size and readability are appropriate
B. Navigation and Interactivity	• Navigation is easy and intuitive • The e-module includes engaging interactive features • Instructions for using interactive features are clear
C. Media and Technology Quality	• The e-module is compatible with various devices • The e-module is responsive and easily accessible • The e-module system is stable and secure

The next stage is the limited trial in Class VA of SDN 2 Sedau, conducted in a small class setting where learning materials are prepared, and the research objectives are explained to the students. The students are introduced to the e-module, asked to read the provided material, and complete a questionnaire to give initial feedback on the learning device. The final stage is the field trial in Classes VA and VB, conducted in a larger class setting to gather more representative data. The researcher prepares the class, the learning materials, and pre-test and post-test questionnaires for creative disposition. After the students are taught using the e-module, they are asked to complete the questionnaire to measure the effectiveness of the learning tool. These three stages are systematically designed to ensure the validity, practicality, and effectiveness of the e-module based on local wisdom before it is more widely implemented.

3.4. Data Analysis

The evaluation of the *Sasak* local wisdom-based science e-module is based on its validity, effectiveness, and practicality. The validity of the e-module is assessed by validators who are experts in the fields of media and science learning content. The data from their assessments are then analyzed using descriptive analysis. The validation test scores will be analyzed and used as a benchmark for the validity of the *Sasak*-based e-module, and its validity will be categorized according to the product validity categorization table. The validation phase of the e-module will be considered complete if the average quantitative results at this stage reach at least the "valid" category.

In this study, the practicality data is obtained through a questionnaire filled out by students after using the learning e-module. To calculate the students' responses, a percentage is determined based on the data provided by the students. The e-module is considered practical if the results from the students' response questionnaire meet the minimum criteria for the "practical" category. For the effectiveness analysis, it can be done by comparing the pretest and posttest scores of the creative disposition questionnaire, which includes five

indicators: inquisitive, persistent, imaginative, collaborative, and disciplined. This aims to measure the improvement in learning outcomes of the students in class V of SDN 2 Sedau. The improvement can be measured using the N-gain formula, which calculates the degree of improvement in the students' knowledge based on their pretest and posttest scores. The N-gain score will indicate the level of improvement, with higher N-gain values representing greater effectiveness of the e-module in improving students' creative disposition (Hake, 1998).

3.5. Validity and Realibility

To ensure that the research instrument meets validity and reliability aspects, an instrument feasibility test was conducted. The validity of the science e-module instrument was assessed through expert judgment, where experts evaluated the alignment of components with the assessment criteria. Meanwhile, the validity of the practicality questionnaire and creative disposition questionnaire was empirically tested on sixth-grade elementary school students. In this study, empirical validity testing was conducted for the practicality and creative disposition questionnaires using Pearson's Correlation. This test measures the relationship between each questionnaire item and the total questionnaire score to ensure that each item truly assesses the intended aspect. If the Pearson correlation coefficient (r) ≥ 0.30, the item is considered valid, whereas items with $r < 0.30$ are deemed less representative and need to be revised or removed. Furthermore, reliability testing was carried out using Cronbach's Alpha to measure the internal consistency of the questionnaire. If the Cronbach's Alpha value is ≥ 0.70, the questionnaire is considered reliable, whereas a lower value indicates the need for instrument revision. If any item lowers reliability, revision or elimination of that item is necessary. Thus, the validity and reliability tests aim to ensure that the instruments used in this study are of high quality, enabling the collection of valid and consistent research data.

4. Findings

The first stage of the research involves the researcher gathering information through observations at SD Negeri 2 Sedau and conducting a literature study related to the product to be developed. From the observations at SDN 2 Sedau, the researcher found that electronic media, such as e-modules, had not been utilized as an aid in learning, as the learning process previously relied solely on teacher's books and student textbooks. During the lessons, students appeared to be less focused and inactive. Based on the initial information gathering, the researcher began designing a Science e-module based on local wisdom, which included the module's title, visually engaging images and learning videos, and clear content on the topic of sound and its properties. Based on this planning, the researcher developed an electronic module that would serve as a teaching aid in the learning process, thereby enhancing students' creative disposition.

At the "develop preliminary form product" stage, the researcher began designing a learning media, specifically an electronic module related to the topic of sound and its properties for 5th-grade lessons. The design of the e-module media was created using Microsoft Word, employing language that students could easily understand, and was complemented with relevant illustrations and videos related to the learning material. Using the 3D Page Flip Professional application, the researcher was able to embed videos that students could learn from, aligned with the content of the lessons. The following Figure 1 is the design of the *Sasak*-based local wisdom Science e-module, which integrates these elements to enhance the learning experience for students.

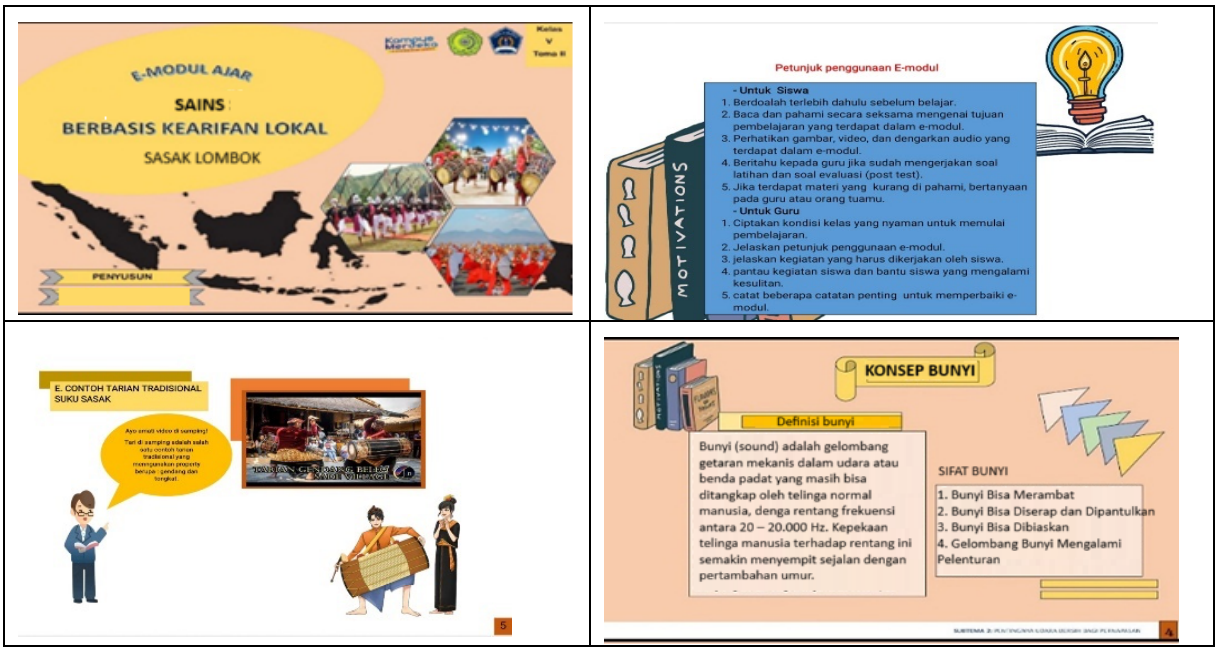

Figure 1. Image Display of the *Sasak* Local Wisdom-Based Science E-Module

After the initial e-module product was completed, the researcher proceeded with media validation, specifically validating the e-module in terms of media and content expertise. The validators consisted of two lecturers from Universitas Mataram and Universitas Muhammadiyah Mataram. The purpose of this validation was to assess the validity of the media before it was tested. Following the validation process, feedback and suggestions for improvements were collected from the media and content experts, and these were used to refine and enhance the electronic module under development.

The following Table 2 and 3 is data from validation results from material and media experts for validation of *Sasak* local wisdom-based science e-modules.

Table 2. Data from Media Expert Validation Results

No	Validator Name	Profession	Score (%)	Information
1	Validator 1	University of Mataram Lecturer	75.00	Valid
2	Validator 2	University of Muhammadiyah Mataram Lecturer	86.50	Very Valid
Average			80.75	Very Valid

The results of the media validation showed an average score of 80.75%, which falls into the "highly valid" category. This indicates that the e-module, in terms of media, is highly suitable for use in the learning process.

Table 3. Data from Material Expert Validation Results

No	Validator Name	Profession	Score (%)	Information
1	Validator 1	University of Mataram Lecturer	62.52	Valid
2	Validator 2	University of Muhammadiyah Mataram Lecturer	83.34	Very Valid
Rata-rata			72.93	Valid

The validation results for the content indicated an average score of 72.93%, which falls into the "valid" category. The e-module content was deemed to meet validity standards and is appropriate for use. The validation process involved a comprehensive and systematic analysis, ensuring that the module is suitable for educational purposes. These findings suggest that the science e-module is not only technically and substantively appropriate but also supports the preservation of local wisdom through its integration into the learning process. In

conclusion, the *Sasak* local wisdom-based science e-module was rated highly valid in terms of media and valid in terms of content. The module is deemed appropriate for use as a teaching material that promotes the integration of local wisdom into education.

After the validation process, revisions were made based on the validators' feedback. At this stage, the researcher implemented follow-up improvements to the product design. The development process of the *Sasak* local wisdom-based science e-module received constructive input from the validators, leading to revisions before the field trials. These revisions included enhancing the design based on media experts' recommendations, such as improving the integration of videos into the digital media and redesigning the e-module cover. Table 4 below are some of the changes made to the e-module following the validators' suggestions.

Table 4. Results of Revision of Science E-Module Media

Num	Before revision	After revision
1		
	The cover part needs to be arranged and improved to make it more danceable for students to learn. Researchers have revised the cover in terms of color, appearance and image layout.	
2		
	Researchers have revised the fonts that must be the same. Background adjustments, image selection, image quality and deepening of the material.	
3		
	Researchers have revised the e-module to adjust the instructions for using the e-module in accessing videos such as arrows or buttons.	

After the initial e-module was revised based on the validators' feedback, a limited trial was conducted. At this stage, the researcher carried out a limited trial in Class VA at SDN 2 Sedau, involving 15 students. During the trial, the researcher presented the localized wisdom-based e-module as a learning medium, which had been revised according to experts' suggestions. The researcher also distributed a student response questionnaire regarding the use of the localized wisdom-based electronic module. This questionnaire was designed to collect suggestions and input from students to further improve the localized wisdom-based e-module, ensuring the subsequent stages could proceed effectively. Figure 2 below are the student response questionnaires and scores from the limited trial. The results of the student response questionnaires and the scores from the limited trial are as follows.

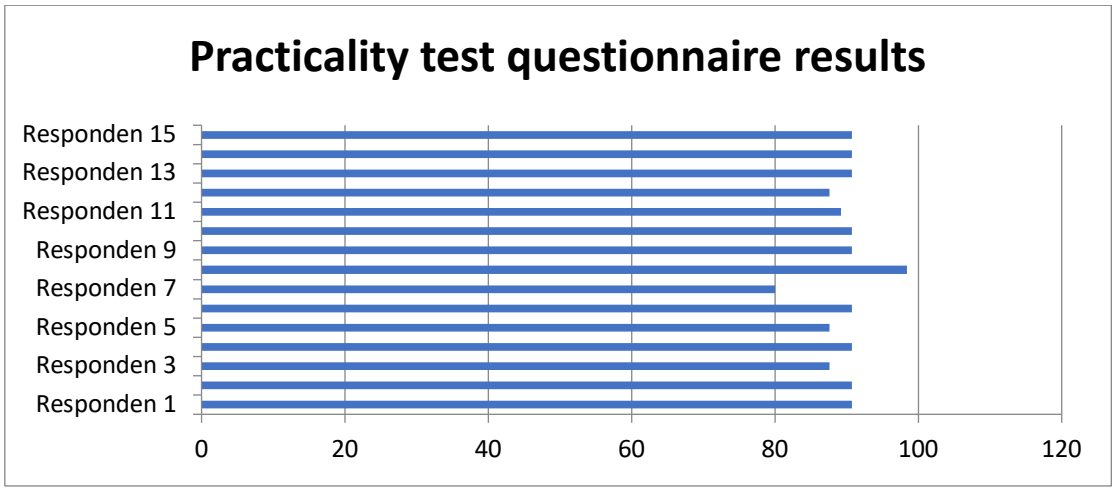

Figure 2. Graph of Practicality Test Questionnaire Results

The practicality results of the e-module obtained from Class V at SDN 2 Sedau indicated a percentage of 89.78%, categorized as highly practical. Thus, the localized *Sasak* wisdom-based science e-module is considered highly practical, as it has met the criteria for practicality and is deemed suitable for proceeding to the next stage, namely the operational field trial. At this stage, the researcher also revised the science e-module in accordance with suggestions for improvement from the student response questionnaires. However, no further suggestions or input were provided during this stage, as the e-module was deemed appropriate for use in the operational field trial.

Following the limited trial, the study proceeded with a broader operational field trial. At this stage, the researcher conducted the operational field trial in Classes VA and VB at SD Negeri 2 Sedau, involving a total of 42 students. The researcher tested the e-module that had been revised based on the improvement suggestions. The operational field trial began with administering a pre-test questionnaire to measure the students' initial creative disposition. After the localized *Sasak* science e-module-based instruction, the students' creative disposition was reassessed using a post-test questionnaire. A comparison of the pre-test results, post-test results, and N-gain scores for creative disposition in the effectiveness trial is presented in Figure 3.

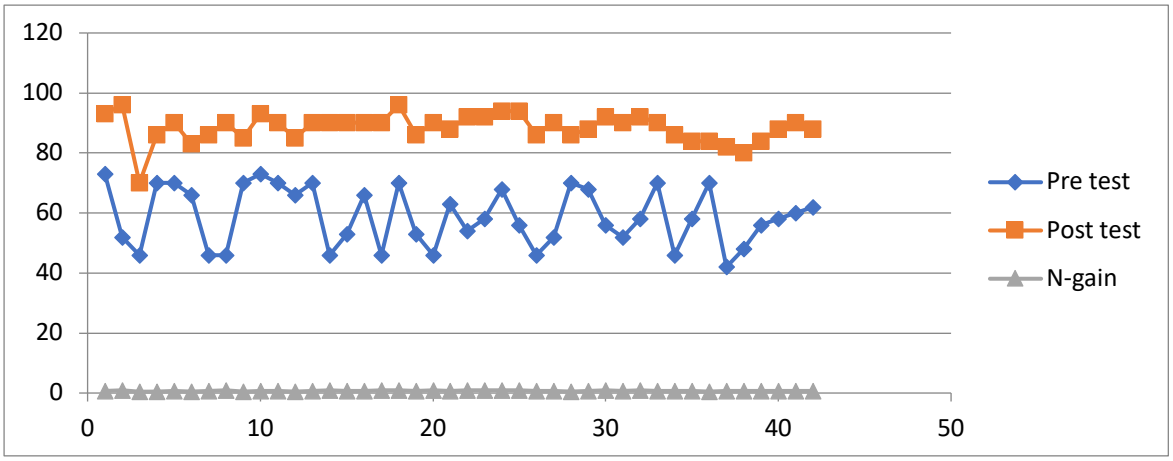

Figure 3. Results of Pre Test, Post Test and N Gain Creative Disposition

The effectiveness test data from Classes VA and VB at SDN 2 Sedau revealed an average pre-test score of 58.78%, while the average post-test score was 88.31%. Based on the N-gain analysis, there was an improvement in creative disposition, with an average N-gain score of 0.71, categorized as high. The results of the analysis for the improvement in each indicator of creative disposition are presented in Figure 4.

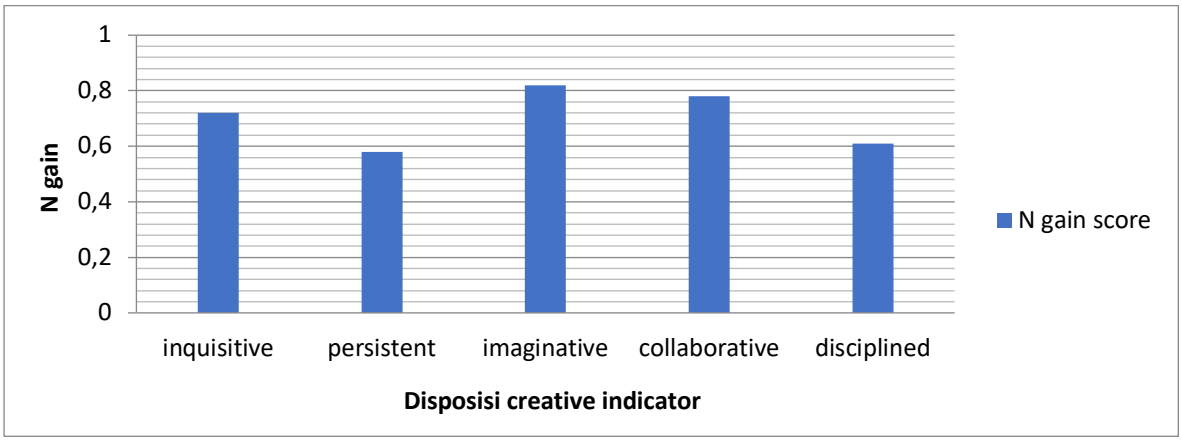

Figure 4. Analysis of N Gain Creative Disposition Indicators

Based on the N-gain analysis for creative disposition indicators, the imaginative indicator achieved the highest score, while the persistent indicator recorded the lowest score.

5. Discussion

This study began with observations at SDN 2 Sedau, which revealed that the teaching process still heavily relied on teacher and student textbooks. This method was less effective in capturing students' attention, as evidenced by their lack of focus and participation during the learning process. In response to this issue, the researcher decided to develop a more innovative learning medium: a localized *Sasak* wisdom-based science e-module. The primary aim of this research was to create a science e-module that not only enhances student engagement in learning but also integrates *Sasak* local wisdom. By integrating modern technology with local culture, this educational medium is anticipated to enhance students' learning experiences, making them more enriching and meaningful (Fischer et al., 2020).

The development of this e-module was designed using Microsoft Word in combination with 3D Page Flip to incorporate interactive elements such as videos. The chosen topic is "Sound and Its Properties," presented with visually engaging content and language that is easy for fifth-grade students to understand. This approach aims to provide a more interactive learning

experience tailored to students' needs. *Sasak* local wisdom plays a significant role in the design of this e-module. By embedding cultural values within the learning materials, students not only acquire knowledge of scientific concepts but also deepen their appreciation for their cultural heritage (Rahmawati et al., 2023). The integration of *Sasak* local wisdom in this e-module not only strengthens students' understanding of scientific concepts but also creates a more meaningful and culturally relevant learning experience. By connecting scientific principles to familiar cultural contexts, students become more actively engaged in learning. Interactive features such as videos and digital simulations further simplify complex concepts. This approach not only enhances academic achievement but also fosters pride in cultural heritage, emphasizing the importance of local knowledge in modern education.

To evaluate the validity of the developed e-module, a validation process was conducted by experts to ensure its quality, relevance, and feasibility as a learning tool. The validation was carried out by two experts from University of Mataram and University of Muhammadiyah Mataram, who specialize in elementary education and instructional media. The process involved assessing various technical aspects, such as design, navigation, layout, and the alignment of the media with students' characteristics. The validation results for the media showed an average score of 80.75%, categorized as "highly valid." This rating indicates that the technical design of the e-module, including the use of visuals, layout, and interactive elements such as videos, meets the standards for feasibility and effectiveness as a learning medium. The e-module was deemed capable of capturing students' attention while facilitating their understanding of the presented material. Content validation was conducted to evaluate the e-module's subject matter, including the accuracy of the information, the relevance of the material to the curriculum, and its suitability for fifth-grade students' comprehension levels. The content validation received an average score of 72.93%, which falls under the "valid" category. This result suggests that the e-module's content meets the necessary scientific and pedagogical standards, although some improvements were recommended. Following the validation stage, the researcher made revisions based on the experts' suggestions. These changes included enhancing the visual quality, adjusting font styles, and refining the usage instructions. Additional visual elements and improved video integration were also incorporated to make the media more engaging and easier for students to use.

The validation results indicate that the e-module has been well-designed in terms of both technical aspects and content. The high scores in media validation reflect that the e-module is not only visually appealing but also functional in supporting the learning process. The material validation, categorized as valid, demonstrates that the e-module provides accurate and relevant information, with minor adjustments needed to further enhance content quality. Based on these results, the e-module is deemed suitable for use in education and is expected to contribute to improving the quality of teaching and learning processes at the elementary level.

In the limited trial phase, the *Sasak* wisdom-based e-module was tested with 15 students from Class VA at SDN 2 Sedau. This stage was designed to evaluate the practicality of the learning media by measuring how easily it could be used, how well it captured students' attention, and how it supported the overall learning process. Data collection was carried out through a questionnaire that assessed students' perceptions of the visual aspects, ease of navigation, and the relevance of the content in aiding their understanding of the learning material. The results of the limited trial indicated that the e-module received a practicality score of 89.78%, which falls under the "highly practical" category. This score reflects the students' strong acceptance of the media. They found that the e-module featured an intuitive layout, complemented by engaging visual elements and effective interactive video integration to explain abstract concepts. The questionnaire also indicated that students were more motivated and actively engaged during the learning process using the e-module compared to conventional methods.

In the operational field trial phase, the evaluation was expanded to include 42 students from Classes VA and VB at SDN 2 Sedau. This phase focused on measuring students' creative disposition abilities before and after learning with the e-module. The measurement was

conducted through pre-tests and post-tests to assess the impact of the e-module on students' understanding of the material. The average pre-test score was 58.78%, reflecting the students' initial level of understanding of the concepts being taught. After using the e-module for instruction, the average post-test score increased significantly to 88.31%. This improvement suggests that the e-module made a substantial contribution to enhancing students' comprehension of the material. Further analysis using N-gain values revealed that the e-module effectively promoted a significant increase in students' creative disposition abilities. The N-gain analysis yielded an average value of 0.71, categorized as "high," indicating that the e-module not only helped students grasp the material but also encouraged them to think more creatively. Analysis of the creative disposition indicators revealed that the "imaginative" indicator scored the highest, while the "persistent" indicator had the lowest score. This analysis indicates the e-module's effectiveness in stimulating students' creativity through visual and interactive elements, particularly in fostering imagination (Alyusfitri et al., 2024). However, the low score on the "persistent" indicator suggests the need for additional features, such as ongoing activities, to enhance students' persistence. This could include tasks or challenges that require continued effort or long-term engagement, helping to cultivate perseverance and determination in the learning process.

These findings suggest that the localized wisdom-based e-module is not only effective in facilitating the development of students' creative disposition skills but also integrates crucial elements such as *Sasak* cultural values, the use of engaging visuals, and interactive elements, which play significant roles in its success. The high practicality and effectiveness of the media further support increased student engagement in the learning process, ultimately leading to improved learning outcomes. The integration of these factors makes the e-module a valuable tool for fostering both academic and cultural understanding among students. (Abdulrahaman et al., 2020).

The *Sasak* wisdom-based science e-module has a key advantage in combining technology with cultural values. The interactive video elements and engaging visuals provide a more dynamic learning experience. This integration enhances students' understanding by not only presenting scientific concepts but also immersing them in the rich cultural context of the *Sasak* community. By blending modern technology with local heritage, the e-module offers an innovative and meaningful learning tool that resonates with students on multiple levels (Liu & Elms, 2019), At the same time, it emotionally engages students by incorporating local values into the learning process. This connection to cultural heritage helps students form a deeper, more personal bond with the content, fostering a sense of pride and identity. By aligning scientific concepts with local wisdom, the e-module encourages students to see the relevance of learning in their own cultural context, which enhances their motivation and emotional investment in their education (Rizvic et al., 2019). For teachers, this e-module is an effective tool in delivering material. This media also makes it easier for teachers to connect academic material with local cultural contexts, so that students feel learning is more relevant to their daily lives.

While the results of this study demonstrate the effectiveness of the *Sasak* wisdom-based e-module, some unexpected findings emerged during implementation. One notable challenge was that, despite the overall increase in students' creative disposition abilities, the "persistent" indicator received the lowest score. This suggests that while students were engaged with the interactive content, they may require additional structured activities to develop perseverance and sustained effort in problem-solving. This finding aligns with research which emphasizes the need for extended learning tasks to cultivate persistence in students (DiNapoli, 2023). Despite its strengths, this study has several limitations. First, the research was conducted in a single elementary school, limiting the generalizability of the findings. The results may vary in different educational settings with diverse student demographics. Second, while the e-module demonstrated high validity and practicality, the study did not measure long-term retention of knowledge, leaving room for further investigation into its sustained impact on student learning. Lastly, while the e-module integrates local wisdom effectively, additional feedback from educators regarding its implementation in broader curricula could further refine its effectiveness.

Future research could explore the long-term impact of integrating cultural wisdom into science education, particularly in fostering students' interest in STEM fields while maintaining a strong connection to their local traditions. Additionally, a comparative study involving multiple schools across different regions could provide broader insights into the effectiveness of culturally integrated e-modules. Another promising area of exploration is the development of extended interactive features, such as gamification elements, to further enhance student persistence and engagement in learning. This study highlights the significant impact of integrating *Sasak* local wisdom into digital learning materials. The findings demonstrate that the e-module effectively enhances student engagement, creative disposition abilities, and cultural appreciation. The combination of interactive digital features with traditional cultural elements creates a meaningful and immersive learning experience. These results underscore the importance of culturally responsive teaching materials in improving student motivation and learning outcomes. By leveraging both technology and local heritage, this approach contributes not only to academic achievement but also to the preservation and appreciation of cultural identity in modern education.

6. Conclusion

This study shows that the *Sasak* wisdom-based science e-module successfully serves as an innovative and effective learning media in enhancing students' creative disposition. The validation results indicate that the e-module has excellent media aspects quality (80.75%) and content aspects relevant to the curriculum (72.93%). The limited and field trials showed high practicality (89.78%) and an improvement in students' understanding, with the post-test score increasing from 58.78% to 88.31% and an N-gain score of 0.71 (high category). This e-module has proven effective in developing students' creative disposition, particularly in the aspect of imagination, although improvements are needed in the aspect of persistence through features such as ongoing activities. By integrating modern technology and local cultural values, this e-module provides a more contextual learning experience, supports student engagement, and strengthens their cultural identity.

Limitation

Although the *Sasak* wisdom-based e-module demonstrates effectiveness in developing students' creative disposition, this success is not uniform across all aspects of creative disposition. The higher performance in the imagination aspect compared to persistence indicates that the e-module design is more successful in stimulating imaginative creativity through visual and interactive elements. However, the low score in the persistence aspect suggests that the e-module does not sufficiently provide stimuli or mechanisms that encourage students to maintain effort and consistency in completing learning tasks. This limitation can be attributed to the pedagogical approach underlying the e-module design, which may place more emphasis on visual appeal and hands-on experiences rather than providing sustained challenges. In the context of technology-based learning, activities that support persistence, such as long-term assignments, rewards for consistent completion, or project-based learning, are often key components in developing this skill.

Recommendation

To address the limitation of the *Sasak* wisdom-based e-module in fostering students' persistence, several strategies can be implemented. First, incorporating long-term learning tasks, such as structured multi-stage assignments, can encourage sustained effort and iterative improvement. Additionally, integrating gamification elements, such as progress tracking, achievement badges, and adaptive challenges, can motivate students to remain engaged and complete tasks consistently. Enhancing project-based learning features by embedding collaborative or individual projects related to *Sasak* cultural wisdom can also promote continuous engagement. Moreover, providing scaffolding and interactive feedback mechanisms, such as step-by-step prompts and progress checkpoints, can help

students navigate challenges and maintain their commitment to learning tasks. Lastly, encouraging reflective and self-regulation strategies through self-assessment tools, reflection journals, and guided goal-setting activities can further support students in developing perseverance. By implementing these approaches, the e-module can effectively nurture both imaginative creativity and persistence in students' learning experiences.

Conflict of Interest

In writing this research report and publication, there were no conflicts of interest.

Declaration of Generative AI-assisted Technologies

This manuscript was prepared without the assistance of Generative AI. All intellectual contributions, critical analyses, and final revisions were conducted by the authors. The authors take full responsibility for the accuracy, originality, and integrity of the content presented in this work.

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