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Development of Local Wisdom-Based E-Modules for Strengthening Education and Cultural Tourism in Tanah Toraja Regency

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Abstract

This study aims to develop a Local Wisdom E-Module for senior high school students in Tanah Toraja Regency. It focuses on identifying students' needs, designing the module, and evaluating its validity, practicality, and effectiveness before wider use. The study uses a Research and Development (R&D) approach with the 4-D model: defining, designing, developing, and disseminating. Data were collected through validation sheets, questionnaires, and pre- and post-tests. Results show the module achieved a validity score of 75%, indicating it is suitable for learning. Practicality testing revealed a very practical category with an average score of 3.32. Effectiveness testing showed improved student outcomes, with scores rising from 56.00 to 89.20. In conclusion, the e-module is valid, practical, and effective, and it also supports the integration of local cultural values into digital learning resources.

Keywords Culture; E-Module; Local Wisdom; Tourism

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1. INTRODUCTION

The rapid development of digital technology has significantly transformed the field of education, particularly in the design and delivery of learning materials that are more contextual, interactive, and flexible. In the digital era, educational institutions are increasingly required to integrate technology into the learning process in order to enhance students' engagement, motivation, and learning outcomes. Technology-based learning resources enable students to access learning materials more flexibly and support independent learning practices. One of the digital learning innovations that has gained increasing attention is the use of electronic modules (e-modules), which allow students to learn systematically and independently without limitations of time and place. Previous studies have shown that e-modules can improve learning effectiveness by presenting structured materials, integrating multimedia elements, and supporting student-centered learning approaches (Santuti et al., 2025; Septiani et al., 2025).

In line with the demands of 21st-century education, integrating local wisdom into learning materials is essential to creating meaningful learning experiences. Local wisdom refers to a collection of cultural values, traditional knowledge, and community practices that have been developed and

transmitted across generations. Integrating local wisdom into learning modules not only serves as a contextual learning resource but also strengthens cultural identity, instills character values, and develops students' appreciation for their cultural heritage. Several studies indicate that learning materials that incorporate local cultural contexts can enhance students' engagement and motivation because the learning content is closely related to their everyday experiences (Marwantika et al., 2025; Suantara et al., 2025).

Various research and development studies have demonstrated that locally developed e-modules grounded in local wisdom are highly valid, practical, and effective in improving students' learning outcomes across subject areas, including science, social studies, and language learning. The use of local cultural contexts within learning materials has been shown to increase students' understanding and participation in the learning process. When learning materials reflect students' socio-cultural environment, the learning experience becomes more meaningful and relevant. Consequently, local wisdom-based digital learning resources are considered suitable for implementation in formal educational settings (Santuti et al., 2025; Suantara et al., 2025).

Beyond their impact on academic achievement, educational practices that integrate local culture also play an important role in cultural preservation. Through learning materials that incorporate local values, traditions, and cultural practices, students not only acquire cognitive knowledge but also develop cultural awareness and appreciation for their cultural heritage. Culture-based education serves as an effective medium for transmitting cultural knowledge to younger generations, particularly in the context of globalization, which increasingly threatens the sustainability of local cultural values(Banks, 2015; Battiste, 2013; Gay, 2018a; Nugroho & Pratiwi, 2024a; UNESCO, 2021). Therefore, integrating local culture into formal education is essential to preserving and transmitting traditional knowledge and cultural values.

In a broader context, local wisdom also plays a crucial role in the development of sustainable cultural tourism. Cultural tourism highlights traditions, customs, and local cultural practices as the main attractions that distinguish one destination from another(Alwasilah et al., 2009; Ladson-Billings, 1995; Rahman et al., 2021a; Tilaar, 2015; Wahyudi et al., 2022a). Studies indicate that tourism development grounded in local wisdom and community participation, commonly referred to as community-based tourism, can sustain cultural heritage while improving local communities' economic well-being (Ermawati et al., 2025). Consequently, education that integrates local wisdom can serve as an important foundation for developing students' awareness of cultural tourism and preparing younger generations to participate in preserving and promoting their regional cultural heritage.

Several studies have also emphasized the importance of developing learning resources that bridge education and tourism, particularly through digital learning materials that integrate local cultural values. For example, the development of local wisdom-oriented digital modules in tourism-related learning has been proven to enhance students' language skills as well as their understanding of local cultural contexts, which is relevant for supporting regional tourism development (Yosintha et al., 2023). Such educational innovations indicate that learning materials can simultaneously support academic learning and foster students' tourism awareness.

Tanah Toraja Regency is one of Indonesia's regions widely recognized nationally and internationally for its unique cultural heritage, including traditional rituals, Tongkonan houses, funeral ceremonies, and various forms of traditional arts. This rich cultural heritage represents the primary attraction of tourism in Tanah Toraja. However, without well-planned educational strategies implemented through formal educational institutions, these cultural values risk shifting in meaning and being perceived merely as commercial tourist attractions. Therefore, the development of educational materials that integrate local cultural heritage into learning processes is necessary to ensure that younger generations understand and appreciate the cultural significance of their traditions.

Despite the growing number of studies on the development of local wisdom-based e-modules

aimed at improving learning outcomes, research that specifically integrates e-module development with cultural preservation and tourism awareness remains limited. Most previous studies have primarily focused on pedagogical outcomes such as learning achievement, motivation, and digital literacy. Meanwhile, studies that examine the role of digital learning materials in strengthening cultural identity and supporting tourism development are still relatively scarce, particularly in regions with strong cultural characteristics, such as Tanah Toraja (Hadi & Lestari, 2024; Z & Yulianti, 2020).

In addition, the development of local wisdom-based learning resources aligns with Indonesia's educational transformation policies. The Kurikulum Merdeka encourages the implementation of contextual learning approaches that adapt to regional characteristics and students' needs. Learning resources that incorporate local wisdom can contribute to strengthening the Pancasila Student Profile, particularly in fostering global diversity awareness, cultural appreciation, and social responsibility among students (Kemendikbud, 2020; Sari & Wahyuni, 2023). Thus, the development of local wisdom-based e-modules represents a practical implementation of an adaptive curriculum that integrates cultural values into digital learning environments.

Furthermore, integrating local culture into digital learning materials has been shown to enhance students' higher-order thinking skills (HOTS). Students are encouraged to analyze, reflect on, and connect theoretical knowledge with socio-cultural realities in their surroundings. International research indicates that culturally contextualized digital learning resources can improve students' critical thinking and problem-solving abilities while strengthening their cultural identity and sense of belonging (UNESCO, 2020; Wahyudi et al., 2022b). Consequently, local wisdom-based e-modules not only function as learning tools but also support the development of essential competencies required in the 21st century.

At the same time, globalization and modernization have contributed to a decline in younger generations' interest in local cultural traditions. Many traditional practices and forms of indigenous knowledge remain insufficiently documented and risk disappearing due to their limited integration into formal education. The digitalization of cultural content through electronic learning materials has been suggested as an effective strategy for preserving local cultural sustainability while simultaneously adapting to the learning preferences of digital-native students (Nugroho & Pratiwi, 2024b; Rahman et al., 2021b).

In the tourism context, the quality of human resources is crucial to the development of sustainable tourism destinations. Education that integrates local wisdom at the school level can foster tourism awareness and culturally responsive attitudes among students. Regions that incorporate cultural education into their curriculum tend to achieve higher levels of tourism sustainability because younger generations develop a deeper understanding of the cultural values embedded within their heritage (Putra et al., 2022; Richards, 2021). Therefore, strengthening local wisdom-based education is an important strategy for supporting sustainable tourism development.

As one of Indonesia's leading cultural tourism destinations, Tanah Toraja Regency faces the challenge of balancing cultural preservation with the commercialization of tourism. Several studies indicate that without strong cultural education, tourism development may risk transforming sacred cultural values into mere economic spectacles. Consequently, strengthening local wisdom-based education through the development of digital learning resources can serve as a preventive strategy to ensure that young people in Toraja become not only participants in the tourism sector but also guardians of their cultural heritage (Cole, 2021).

Based on these considerations, research on the development of local wisdom-based e-modules in educational institutions in Tanah Toraja Regency becomes both relevant and strategic. Therefore, this study aims to develop a local wisdom-based e-module for senior high school students in Tanah Toraja Regency and to evaluate its validity, practicality, and effectiveness in supporting learning while simultaneously strengthening students' awareness of cultural heritage and regional tourism potential.

2. METHODS

This study employed a Research and Development (R&D) approach using the 4-D development model proposed by Thiagarajan, which consists of four stages: define, design, develop, and disseminate. The purpose of this method was to develop and evaluate a Local Wisdom E-Module that senior high school students in Tanah Toraja Regency can effectively use. In the define stage, a preliminary analysis was conducted to identify problems and learning needs related to the use of digital learning resources in schools. This stage involved a needs analysis to determine the potential of local wisdom as learning content and the challenges teachers and students face in using technology-based learning media. In addition, a learner analysis was conducted to examine the characteristics of high school students in Tanah Toraja Regency, including their academic abilities and familiarity with digital learning applications. Material analysis, concept analysis, and learning objective formulation were also conducted to determine the scope of the content and the indicators of learning outcomes to be integrated into the Local Wisdom E-Module. The design stage focused on preparing the initial prototype of the e-module. This stage included selecting appropriate learning media, determining the module's structure and format, and designing the initial layout and content of the Local Wisdom E-Module. At this stage, feedback from validators was also considered to refine the module's initial design. During development, the e-module prototype was evaluated through expert validation. The validation process involved material experts and media experts who assessed the feasibility, accuracy, and presentation of the developed module. The results of expert validation were used to revise the initial draft (Draft I) and produce an improved version (Draft II). Subsequently, Draft II was tested through a limited field trial involving students from senior high schools in Tanah Toraja Regency. This stage aimed to evaluate the practicality and effectiveness of the Local Wisdom E-Module in classroom learning. Data were collected through questionnaires, observation sheets, and pre-test and post-test instruments. Finally, in the disseminate stage, the finalized Local Wisdom E-Module was distributed for broader educational use. The module was also published as a nationally distributed book with an ISSN to facilitate wider access and implementation in learning activities.

3. FINDINGS AND DISCUSSIONS

The media development procedure used in this study is the Thiagarajan development model, known as the 4-D model, with the following development stages: the definition stage, the design stage, the development stage, and the deployment (dissemination) stage (Semmel, Semmel, & Thiagarajan, 1974). The product developed will then be tested to find out the results of teacher and student responses.

Overview of Local Wisdom E-Module Development Needs

a. Preliminary Analysis

The initial analysis identified problems faced by teachers and students during lectures, which became a concern, especially in the subject of learning media development. Based on the results of the implementation of learning media development at Tanah Toraja Regency High School, students need support in understanding the material due to disparities in their basic computer knowledge and their inability to keep pace with the teacher's rhythm. Therefore, one solution is to develop a Local Wisdom E-Module. Through the Local Wisdom E-Module, students can easily learn to absorb and understand the material presented by the lecturer, both in and out of the classroom, and to understand it independently. This module is expected to make students more active in independent learning and to increase their motivation to achieve learning goals.

b. Student analysis

Student analysis is conducted to identify students' characteristics to inform the design and

development of lectures. Based on the results of the researcher's interview with the school, namely the teacher in the History Subject Learning Task, several explanations about the characteristics of students were obtained, namely; 1) the average age of students is 18 years old; 2) they have different ethnic backgrounds; 3) students' abilities obtained in history education subjects, some have not reached the cumulative achievement index; 4) lack of interest and motivation of students in paying attention to the explanation of the material; 5) The media used by lecturers is less innovative so that students are less motivated to participate in learning; 6) In general, students' learning styles are more inclined to technological developments.

c. Task Analysis

Based on the concept of learning media development for learning materials, an analysis was conducted focusing on learning outcomes. Competence directs students to understand better and master learning materials related to the development of learning media, and to complete assignments after the learning process, thereby achieving lecture objectives. Each student must pay attention and listen to the learning material using the Local Wisdom E-Module.

d. Analysis of Learning Objectives

The analysis of learning objectives is prepared based on the learning outcomes of graduates as determined. Based on the learning materials, namely, 1) Introduction to Local Wisdom E-Module, 2) Making animations, 3) Making media about history education, 4) Introduction to action scripts, 5) Making quizzes, and 6) Inserting sounds. The results of the analysis at the stage of determining the initial analysis, student analysis, task analysis, and the specification of learning objectives through observation and discussion with teachers in charge of history education subjects are to obtain illustrations of the use of learning media that are not optimal. Lectures tend to be dominated by teachers, so students are not effective during the lecture. Given this problem, it is necessary to develop Local Wisdom E-Modules to achieve learning outcomes determined by the results.

Overview of Augmented Reality (AR) Design

Overview: Several stages are carried out during the design stage, including developing an idea, conducting concept analysis, creating an initial description, and creating flowcharts and storyboards. These stages can be explained below.

a. Design Stage

Based on needs analysis, it is important to develop Local Wisdom E-Modules in learning media development courses that support the implementation of the learning process. This stage aims to design a prototype of a Local Wisdom E-Module for troubleshooting. The results of each activity in the design stage are described as follows:

1) Media Selection

Media selection is carried out to identify media that are relevant to the characteristics of the material. In addition, the selection of media is based on concept and assignment analyses, as well as on the characteristics of media use that help students achieve learning goals. Learning media used in the learning process include Local Wisdom E-Modules that allow each student to use them.

2) Format Selection

The format of the semester process plan is adjusted to include the learning plan, time allocation, materials, methods, learning steps, activities, learning facilities, and infrastructure. Augmented Reality (AR) was developed for history education subjects in accordance with the learning outcomes of graduates.

3) Initial Design

After determining the semester learning plan based on the needs, the researcher designed a Local Wisdom E-Module. The initial range is an overview prototype of the Local Wisdom E-Module design. The initial design of this Local Wisdom E-Module is a prototype to be developed, and the result is a design obtained. The prototype, the Local Wisdom E-Module as a medium lecture, was then developed through validation, revision, and limited stage trials. The initial design of learning media is described as follows:

4) Teaching Materials/Lecture Materials

The initial design of this teaching material is made in a material. This teaching material is designed to support students' knowledge related to learning media development materials, which include several materials in each meeting, namely, 1) Introduction to Local Wisdom E-Module, 2) Making animations, 3) Making media about history education, 4) Introduction to action scripts, 5) Making quizzes, and 6) Inserting sounds.

5) Designing an Augmented Reality (AR) Module

The design of the Local Wisdom E-Module begins with designing media covers. This section provides information on the Local Wisdom E-Modules, designed to be engaging and enhance their appeal for process learning. The module above displays the content in the Local Wisdom E-Module. The module includes pictures, explanations, and practice activities, making it easier for students to understand the material and more engaging. Based on the cover of the storyboard for the Local Wisdom E-Modules content page, while still considering the learning process in using the Local Wisdom E-Modules.

6) Teacher Response Sheet

The teacher response aims to determine the teacher's response to the Cost of learning media development courses for Local Wisdom E-Modules, which have been implemented for teachers and students, and to assess the level of teacher response in a limited classroom trial.

7) Student Response Sheet

Student responses aim to determine how students respond to the Local Wisdom E-Modules implemented by teachers in a limited classroom trial. The initial design of the Local Wisdom E-Modules was the result of a temporary learning medium (hypothesis) that two experts would assess.

Level of Validity, Practicality, and Effectiveness of Augmented Reality (AR) Module

The development stage is the final stage of the Augmented Reality (AR) module, providing a clear view of the level of validation, practicality, and effectiveness. Further details will be explained as follows:

a. Development Stage

At this stage, it aims to produce a revised learning media based on expert input and limited trials. The steps in the development stage are as follows:

1) Validation

One of the main criteria for determining whether learning media is suitable is the validation results. Expert validation involves two experts: one material expert and one media expert. As for those who act as validators in assessing the validity of existing instruments by keeping the names of existing expert validators, they are coded V1 to maintain the code of ethics, namely:

2) Validator 1 (V1)

Professors at Makassar State University who are competent in studying media development materials. Based on the results of material validation by experts. The results of the assessment/validation

of materials for the Local Wisdom E-Modules module, provided by the validator, are presented in Table 1 below.

Table 1. Material Validation Results

No.	Aspect	Validator Value
A	**Theory**	
	1 Conformity with learning objectives	4
	2 Determination in choosing material	4
	3 Sufficient material to achieve learning objectives depth	3
	4 Material presented	3
	5 The order of the material is in accordance	4
	6 The subject matter of the examples presented	4
	7 Clarity of language in the material	4
	8 Relevance of the material to the subject	4
	The average validity of each criterion on the material aspect	3,7
B	**Learning**	
	1 Conformity of competency standards and basic	3
	2 Competencies: clarity of goals to be achieved	3
	3 The suitability of indicators with basic competencies	4
	4 The learning sequence is clear and easy to follow	4
	The average validity of each criterion on the aspect of attractiveness	3,5
The average validity of each criterion on the aspect of attractiveness		**3,6**

Source: Material Validation Data Analysis, 2025

Based on the validator's assessment of the material aspect, an average score of 3.6 was obtained, indicating that this aspect falls in the very valid category. The material aspect received an average score of 3.7, indicating it is in a very valid category. An average score of 3.5 was obtained in the learning aspect, indicating that it falls into a very valid category. The earlier problem was the absence of applied materials related to postgraduate learning outcomes—expert validator advice: The material can be developed by including explanations and values relevant to technological developments.

3) Validator 2 (V2)

Lecturer at the Faculty of Teacher Training and Education, Pejuang University of the Republic of Indonesia, Makassar. He was chosen as a media expert validator because; competent in media learning. Here are the results of the module expert validation. The results of the media assessment for the Local Wisdom E-Modules module, provided by the validator, are presented in Table 2.

Table 2. Media Validation Results

No.	Aspect	Validator Value
A	**Appearance**	
	1 The accuracy of the selection of letters in the text	4
	2 The accuracy of choosing the image	4
	3 Background color compatibility with text color	4

No.	Aspect		Validator Value
	4	The accuracy of visualizing the material	3
	5	Module design view	3
	6	Content image display	4
	7	Clarity of content	3
	The average validity of each criterion on the appearance aspect		3,5
B	**Design**		
	1	It can be understood well	4
	2	Easy to use and simple to understand	4
	3	Accuracy in selecting designs for material development	4
	4	Ease of interaction with the module	4
	5	Clarity of choosing a design	3
	The average validity of each criterion in the design aspect		3,8
Average total validation of media assessment instruments			**3,6**

Source: Media Validation Data Analysis, 2025

Based on the validator's assessment of the display's quality, an average score of 3.5 was obtained, indicating that this aspect falls into the very valid category. An average score of 3.8 was obtained for the design aspect, indicating it is in a very valid category. The average validation score for the Local Wisdom E-Modules module is 3.6, indicating it is in a very valid category. The problem identified earlier is that the module design can be more appealing to the validator's recommendations: it should be as attractive as possible, with a graphic design feel, to attract students' interest in reading.

4) Results of Assessment/Validation of Lecturer Response Instruments

The results of the assessment/validation of the lecturer response instrument for the Local Wisdom E-Modules module are shown in Table 3.

Table 3. Results of Validation of Teacher Response Instrument

No.	Aspect		V1	V2
A	**Instruction**			
	1	Instructions for filling out the questionnaire are clearly stated	4	4
	2	The choice of the teacher's response is stated clearly	4	4
	The average validity of each criterion in the instruction aspect		4,0	4,0
B	**Language**			
	1	The use of language in terms of the use of Indonesia language rules	3	4
	2	Clarity of instructions/directions, comments, and problem-solving	3	4
	3	The simplicity of sentence structure	3	4
	4	The language used is communicative	4	4
	The average validity of each criterion on the language aspect		3,2	4,0

No.	Aspect	V1	V2
C	**Contents**		
	1 The purpose of using the questionnaire is clearly stated and measurable	4	3
	2 The statements in the questionnaire can capture all the user responses to the Augmented Reality (AR) module	4	3
	3 The statements submitted are in accordance with the measurement objectives	3	4
	4 The formulation of the questions on the questionnaire uses words/commands/statements that require a response from the teacher	4	3
	The average validity of each criterion in the contents aspect	3,7	3,2
Average total validation of media assessment instruments		**3,6**	**3,7**

Source: Data Analysis of Teacher Response Instrument Validation, 2025

As for the results analysis table 3, the validity obtained is 1, or V = 100%. This means that the assessment results of the two validators have "strong relevance," with a validity coefficient of more than 75% (V > 75%), so it can be said that the measurements or interventions carried out are valid.

Results of the Assessment/Validation of Student Response Instruments in Module Development Local Wisdom E-Modules are shown in Table 4 below.

Table 4. Results of Validation of Student Response Instrument

No.	Aspect	V1	V2
A	**Instruction**		
	1 Instructions for filling out the questionnaire are clearly stated	4	4
	2 The choice of the teacher's response is stated clearly	4	4
	The average validity of each criterion in the instruction aspect	4,0	4,0
B	**Language**		
	1 The use of language in terms of the use of Indonesia language rules	3	4
	2 Clarity of instructions/directions, comments, and problem-solving	3	4
	3 The simplicity of sentence structure	3	4
	4 The language used is communicative	4	4
	The average validity of each criterion on the language aspect	3,2	4,0
C	**Contents**		
	1 The purpose of using the questionnaire is clearly stated and measurable	4	3
	2 The statements in the questionnaire can capture all the students' responses to the Augmented Reality (AR) module	4	3
	3 The statements submitted are in accordance with the measurement objectives	3	4
	4 The formulation of the questions on the questionnaire uses words/commands/statements that require a response from the student	4	3
	The average validity of each criterion in the contents aspect	3,7	3,2
Average total validation of media assessment instruments		**3,6**	**3,7**

Source: Data Analysis of Student Response Instrument Validation, 2025

The results of the analysis in Table 4 show that the validity obtained is 1, or V = 100%. This means that the assessment results of the two validators have "strong relevance," with a validity coefficient of more than 75% (V > 75%). Then it can be said that the measurement or interference results are valid.

b. Limited Trial

After analyzing the results from the two validators, limited trials were conducted with teachers and objects to collect data on the development of the Local Wisdom E-Modules module. At this stage, 1 lecturer is involved in history education subjects at SMA Tanah Toraja Regency.

1) Student Response Analysis

The results of the analysis of student responses to the development of the Local Wisdom E-Modules module are shown in each category statement in Table 5.

Table 5. Results of Student Response Analysis

No.	The average score of respondents (1-15 Respondent)	Category
1	3,25	Very Practical
2	3,50	Very Practical
3	3,75	Very Practical
4	3,33	Very Practical
5	3,58	Very Practical
6	3,33	Very Practical
7	3,58	Very Practical
8	3,33	Very Practical
9	3,50	Very Practical
10	3,58	Very Practical
11	3,25	Very Practical
12	3,16	Very Practical
13	2,08	Practical
14	3,08	Very Practical
15	3,50	Very Practical
Related	**3,32**	**Very Practical**

Source: Student response data analysis, 2025

Table 5 shows that students responded positively after following the lectures using the Local Wisdom E-Module, with a score of 3.32, indicating a strong response in the very practical category. It can be concluded that the students' responses strongly support the development and use of Local Wisdom E-Modules to support the lecture process.

2) Teacher Response Analysis

In addition to the students' responses in this limited trial, it also involved one teacher in charge of the history education course, who provided informational feedback on the development of the Local Wisdom E-Modules module. This assessment is used to determine the teacher's response after carrying out the learning process, which can be seen in Table 6 as follows:

Table 6. Results of Teacher Response Analysis

No	The Average Score of Respondents (1-15 respondents)	Response
1	The Augmented Reality module is very practical	4
2	The Augmented Reality module is easy to use	3
3	The Augmented Reality module can make it easier for lecturers	4
4	The Augmented Reality module makes it easier for lecturers to explain the material	4
5	The Augmented Reality module adds interaction between the teacher and students	3
6	The Augmented Reality module can help students learn independently	4
7	The Augmented Reality module is easy to understand	4
8	The Augmented Reality module can activate lecturers in the teacher process	3
9	The Augmented Reality module uses an attractive graphic design	3
10	The Augmented Reality module makes it easier for students to understand the material presented by the teacher	4
11	The Augmented Reality module can develop student talent	3
12	The Augmented Reality module can improve student academic achievement	4
13	The Augmented Reality module has a clear, systematic description	4
14	The Augmented Reality module can always be developed with technological developments	4
	Rerata	3,64

Source: Student response data analysis, 2025

Based on Table 6, which shows the teacher's response after conducting a process study using the Local Wisdom E-Modules, the average score was 3.64, indicating that the teacher's response falls in the very practical category. It can be concluded that the teacher's response stated that using Local Wisdom E-Modules to support the learning process is very practical. Based on the results of development, with consideration of the needs of the learning process, to provide benefits for schools, teachers, and students.

c. Effectiveness of Augmented Reality (AR)

In general, teachers and students consider that the development of Local Wisdom E-Modules is well qualified. In the next stage, to determine the effectiveness of the Local Wisdom E-Modules, field tests are conducted with students using pre- and post-tests. Pre-tests are administered to students before the application of Local Wisdom E-Modules in the learning process, and post-tests are administered after their application. The following is the data on the pre-test and post-test scores achieved by the students in Table 7. As follows:

Table 7. Student pretest and posttest score

Number Respondent	Pretest Score	Posttest Score
1	55	88
2	54	88

Number Respondent	Pretest Score	Posttest Score
3	54	90
4	55	90
5	55	88
6	57	90
7	60	88
8	56	85
9	56	90
10	63	98
11	50	90
12	55	90
13	60	88
14	55	85
15	55	90
Rerata	56,00	89,20

Source: Analysis of the student pre-test and post-test data, 2025

Table 7 shows that the pre-test scored an average of 56.00%, while the post-test scored an average of 89.20%. This means that the results of the learning process before and after using the Local Wisdom E-Modules module differ. In other words, there is a significant difference in student learning outcomes before and after using Local Wisdom E-Modules in the learning process. In the limited trial, the activities of students and teachers during the learning process fall into the active category, indicating that the Local Wisdom E-Modules meet the criteria of validity, practicality, and effectiveness for use in the learning process.

Discussion

The learning product developed in this study, namely the Local Wisdom E-Module, is appropriate and feasible for use in the learning process. This is indicated by expert validation results, which show that the module has a validity coefficient exceeding 75%. A high level of validity indicates that the module's content, structure, and instructional design align with learning objectives and pedagogical standards. In the context of instructional material development, the validation process by experts plays an important role in ensuring that the developed learning materials meet both content accuracy and instructional feasibility(Anzures, 2022; Daryanes et al., 2023; Garay-Abad & et al., 2025; Laksana & et al., 2024; Luque-Vara & et al., 2020; Premkumar, 1998; Ribeiro & et al., 2018) (Branch, 2009). Moreover, digital learning materials, such as e-modules, must be systematically designed to support independent learning and facilitate meaningful learning experiences for students (Mayer, 2014). Therefore, the validation results obtained in this study indicate that the Local Wisdom E-Module is suitable for implementation as a learning resource in senior high schools in Tanah Toraja Regency.

In addition to its validity, the practicality of the Local Wisdom E-Module was also demonstrated through limited trials involving students. The results of the practicality test showed an average score of 3.32, placing it in the very practical category. This indicates that students found the module easy to use, accessible, and helpful in supporting their learning. Practicality in digital learning media is closely related to the usability and user-friendliness of the learning resource. Learning materials that are

systematically organized and presented through digital platforms are known to improve students' engagement and motivation in learning activities (Rahman et al., 2021b). Furthermore, the integration of local cultural contexts into learning materials creates a more meaningful learning experience because students can connect the learning content with their own social and cultural environment (Bank, 1993; Gay, 2018b). As a result, the Local Wisdom E-Module not only functions as a technological learning tool but also supports contextual and culturally responsive learning.

The effectiveness of the Local Wisdom E-Module is reflected in the significant improvement in students' learning outcomes, as indicated by the comparison between pre-test and post-test scores. The average pre-test score of 56.00 increased significantly to 89.20 in the post-test. This improvement demonstrates that the developed module successfully enhances students' understanding of the learning material. Previous studies have also shown that digital learning modules can significantly improve learning outcomes by presenting structured materials, interactive content, and visual learning support (Cramer et al., 2018; Nugroho & Pratiwi, 2024b; Septiani et al., 2025; Supriharyanti et al., 2020). In addition, contextual learning approaches that integrate local culture into instructional materials have been proven to improve students' higher-order thinking skills and conceptual understanding (Liu et al., 2024;Wahyudi et al., 2022). Thus, the Local Wisdom E-Module not only improves academic achievement but also strengthens students' cognitive engagement in the learning process.

Furthermore, integrating local wisdom into digital learning materials also strengthens students' cultural awareness and appreciation of local heritage. In the context of Tanah Toraja, which is widely known for its unique cultural traditions and heritage-based tourism, educational efforts that incorporate local culture into formal learning are highly relevant. Educational materials that integrate local wisdom can function as an effective medium for cultural transmission across generations (UNESCO, 2021). At the same time, such educational initiatives can contribute to sustainable cultural tourism by increasing young people's awareness of the cultural values embedded in their communities (Cole, 2021; Richards, 2021). Therefore, the development of Local Wisdom E-Modules not only supports effective learning but also plays an important role in preserving cultural heritage and strengthening students' awareness of the tourism potential of their region.

4. CONCLUSION

The research shows that the development of E-Modules based on local wisdom in Tanah Toraja Regency meets the criteria for validity, practicality, and effectiveness in learning at the high school level. The module's validity, as assessed by experts, received an average score of 3.6, placing it in the very valid category. The results of the practicality test showed an average score of 3.32, placing it in the very practical category. In addition, the module's effectiveness is evident in the increase in student learning outcomes, from an average pretest score of 56.00 to a posttest score of 89.20. These findings show that E-Modules based on local wisdom not only enhance learning effectiveness but also have the potential to strengthen students' cultural awareness and understanding of regional cultural tourism's potential.

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