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Development of E-Modules for Learning Traditional Gandang Toraja Music

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ABSTRACT

Purpose – This research aims to: (1) Identify the content of the electronic learning module on traditional Gandang Toraja music developed for 10th grade high school students; (2) Develop an electronic learning module on traditional Gandang Toraja music as learning material for 10th grade high school students; (3) Test the feasibilityfeasibility of the electronic learning module on traditional Gandang Toraja music for 10th grade high school students;.

Methodology – This study is an R&D (Research and Development) study based on the ADDIE model. The subjects of this study are 10th-grade students at SMA Negeri 2 North Toraja, with data collected through observation, interviews, documents, and tests. The data collection instruments used include observation sheets, document sheets, interview sheets, and product evaluation sheets, which include expert material assessment sheets, expert media assessment sheets, student responses, and teacher responses. Data analysis techniques include both quantitative and qualitative methods**.**

Findings – The results of this study are the outcome of developing an electronic learning module product featuring traditional South Sulawesi music material, specifically Gandang Toraja. This electronic module is based on a flipbook using the Flip PDF Corporate Edition 2.4.10 application, which can be accessed via a computer or laptop. The electronic learning module was evaluated by subject matter experts with "very good" category in all aspects.

Contribution – Providing learning resources in the form of traditional Gandang Toraja music learning materials, which were previously rarely available in the form of electronic modules based on flipbooks, using the Flip PDF Corporate Edition 2.4.10 application, which can be accessed via computers or laptops, making it an interactive and engaging learning medium so that students can learn about local music culture in a more modern and easily accessible way.

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INTRODUCTION

Indonesia is a country rich in artistic and cultural heritage. Given the heterogeneity of its population, Indonesia has a diverse array of ethnic groups and cultures, which are reflected in regional languages, customs, traditional houses, traditional weapons, musical instruments, regional dances, and various other forms of artistic expression. One of these treasures is the performing arts, which include music, dance, and drama. The performing arts are a form of appreciation that must be upheld and preserved by the nation. However, in the face of the modern era and globalization, marked by rapid technological and communication developments, the performing arts—especially traditional music—are increasingly marginalized. Local communities, especially the younger generation, are more fond of Western or foreign music, resulting in a decline in the frequency of traditional music performances. This condition aligns with the findings of Panduraja et al. (2021), who stated that globalization and modernization have changed the mindset of the younger generation, thereby reducing their interest in traditional arts. This can be explained through the theory of cultural globalization, which posits that intensive interaction with foreign cultures shifts the preferences of the younger generation from local cultural products to global cultures that are considered more modern and popular.

Cultural diversity and unique performing arts can be found in South Sulawesi, which is characterized by three major ethnic groups: Bugis, Toraja, and Makassar. These three ethnic groups share similarities and differences in form, structure, and cultural patterns, including their performing arts. Unfortunately, the culture that defines a region's identity is slowly being eroded. One clear example is traditional Gandang Toraja music, a percussion instrument unique to the Toraja tribe that plays a crucial role in community life, encompassing rituals, entertainment, and traditional and religious ceremonies. The frequency of performances has declined due to the popularity of modern music, the increasing use of gadgets that have shifted the interests of the younger generation, and the aging of Gandang artists. One clear example is the Gandang Toraja traditional music, a percussion instrument unique to the Toraja people that plays a crucial role in their social and spiritual life, from traditional ceremonies and religious rituals to community entertainment. However, the frequency of Gandang Toraja performances is now declining due to the increasing popularity of modern music and the shifting interests of the younger generation, who are more focused on using gadgets and digital media. This phenomenon aligns with the theory proposed by West et al. (2023), which explains that the increasing intensity of social media and digital technology use among adolescents can shift their orientation from social interaction and real-world activities to engagement in the digital world. Excessive use of digital media not only affects concentration and learning but also limits youth participation in direct cultural and social activities, as their time and energy are more absorbed in the digital space. Thus, the decline in young people's interest in traditional arts, such as Gandang Toraja, can be understood as part of a shift in cultural consumption patterns due to the increasingly dominant expansion of digital media in everyday life. Therefore, it is essential to preserve and protect traditional regional music, especially Gandang Toraja, so that it can continue to exist and be preserved for future generations. One way to do this is through formal education.

In South Sulawesi, particularly in North Toraja, Rantepao, there is a school where students lack knowledge and skills in traditional music, especially in music education. This is reinforced by the results of a pretest, which showed an average knowledge test score of 52.53 and a skill test score of 40.94. Additionally, the teaching process still relies heavily on print media. Based on initial observations conducted through interviews with Enos Membia, S.Sn, one of the Cultural Arts (Music) teachers at SMAN 2 North Toraja, it was noted that there are no modules that discuss traditional music, especially traditional Toraja music. Furthermore, no electronic learning modules have been found in the school. In the process of teaching traditional music, only the flute is studied, and even then, very rarely (only once). Regarding these limitations, the researcher intends to develop an e-module.

Several studies have shown that the effective use of digital media can increase students' interest and understanding of traditional music. One such study, conducted by Sari et al. (2024), also demonstrates that interactive e-modules can enhance students' understanding and involvement in the Indonesian Music course. Another recent study discussing the development of e-modules for traditional musical instruments in South

Sulawesi is the research conducted by Furqan and Machfauzia (2024). This study developed a flipbook-based e-module for introducing traditional musical instruments of South Sulawesi in arts and culture education. The results showed that the flipbook-based e-module was effective in improving students' understanding of traditional musical instruments of South Sulawesi. This e-module was designed with an interactive and accessible approach, enabling students to learn about the region's various traditional musical instruments in depth. In line with this, several international studies support the development of interactive e-modules in music education. Furthermore, Gong and Wang (2025) researched approaches to creating interactive learning environments for music studies in elementary and secondary schools, which can be adapted for the development of traditional music e-modules.

These findings suggest that integrating digital media and interactive strategies can significantly enhance student engagement and understanding. However, none of the above studies specifically discusses traditional music from a particular region, such as the Toraja region. Unlike these studies, research on the Gandang Toraja focuses on the development of technology-based e-modules. Gandang Toraja is a unique percussion instrument of the Toraja people, possessing significant cultural, social, and religious value. In addition to cognitive aspects, this study also emphasizes the development of students' practical (psychomotor) skills and the preservation of local culture, as well as supporting the regeneration of the next generation of Gandang artists. Thus, research on Gandang Toraja fills a gap that has not been widely addressed by national and international research. Based on these conditions, the question arises: How can we develop a Toraja Gandang e-module that improves students' knowledge and skills? Therefore, this study aims to develop a valid, practical, and effective e-module for teaching traditional Toraja Gandang music to 10th-grade high school students, thereby improving students' understanding and skills while strengthening efforts to preserve local culture.

METHODOLOGY

Research Design

This study uses a research and development (R&D) approach. Sugiyono (2017: 30) states that development research is a scientific method for researching, designing, producing, and testing the validity of products that have been produced. This study employs the ADDIE model, which comprises the stages of Analysis, Design, Development, Implementation, and Evaluation. In the analysis stage, a literature study was conducted on the traditional Gandang Toraja musical instrument, along with a needs analysis that included a review of teaching materials and school facilities, as well as a curriculum analysis and examination of student characteristics. In the design stage, the researcher took several important steps, namely determining the title, formulating learning objectives, selecting materials, and compiling a module framework.

Development Stage involves product creation, validation, and revision. Product creation begins with preparing material on Gandang Toraja traditional music, which is then compiled using Microsoft Word 2021. Next, the module is designed using CorelDRAW 2021, converted to PDF format, and further processed using Flip PDF Corporate Edition 2.4.10 to create an interactive electronic module. Two experts validated the module: content validation was performed by Dr. Cipto Budy Handoyo, M.Pd, and media validation was performed by Dr. Drs. Kusnadi, M.Pd.

The implementation stage was carried out at SMA Negeri 2 Toraja Utara, where teachers and researchers guided the learning process using electronic modules. Before the learning process began, a pretest was administered to students. Following the learning process, a post-test was administered, and a questionnaire was distributed to students and teachers to gauge their responses to the developed module. The final stage was the evaluation stage, which was used to make improvements based on feedback from teachers and students regarding the developed module. Based on the results of the pilot study, neither teachers nor students requested any revisions regarding the electronic Gandang Toraja module that was implemented.

Participant

The research participants were 10th-grade students at SMA Negeri 2 Toraja Utara, who were the subjects of a trial of the Gandang Toraja traditional music e-learning module. The pilot test to determine the effectiveness of the e-module was conducted in two classes, namely the experimental class (with treatment) and the control class (without treatment). Both classes underwent pre-tests and post-tests; however, the author focused on the experimental class because it was the class that implemented the electronic learning module on Gandang Toraja, which consisted of 32 students. The control class, in contrast, consisted of 30 students. The electronic module was initially tested on a small scale with eight students and then on a larger scale with 32 students (in an experimental class), who were approximately 15–16 years old. Participants were selected using purposive sampling. Based on specific considerations relevant to the research objectives, the students selected were from class X because at this level they studied Cultural Arts, specifically music, making them suitable subjects for testing the Gandang Toraja traditional music electronic module. This study also involved one subject matter expert and one media expert as validators, a teacher, and students as evaluators and module users. The research participants were selected to provide a comprehensive picture of the product's suitability in terms of content, media, and users.

Data Collection

Data collection was conducted using several techniques, namely: observation to determine the initial conditions of cultural arts learning and students before the implementation of the module; structured interviews with cultural arts teachers (Enos Membia, S.Pd) and students to obtain information related to traditional music learning; documentation in the form of photos of learning activities, distribution of assessment sheets, and supporting research documents; and tests (pre-test and posttestposttest) used to measure students' cognitive and psychomotor skills before and after using the Gandang Toraja electronic module.

Instrument

The research instruments used were: observation sheets to record the initial learning conditions, interview sheets to obtain information from teachers and students, documentation sheets as evidence of the research implementation, and product assessment sheets, which included expert validation instruments for materials and media, as well as questionnaires for teachers and students to respond to the Gandang Toraja electronic learning module. The research instruments were assessed using a five-category rating scale, namely: score 1 (inferior), score 2 (poor), score 3 (fair), score 4 (good), and score 5 (very good). The assessment aspects used in each instrument included validation by subject matter experts, which covered three aspects: learning aspects, content/material aspects, and language aspects. Validation by media experts covered aspects of presentation feasibility, graphic feasibility, and usefulness. Meanwhile, the student response questionnaire focused on three aspects, namely appearance, material/content, and usefulness. Teacher responses cover the aspects of content/material feasibility, language feasibility, and presentation feasibility.

The validity of the expert material and media assessment instruments was tested using Gregory's Matrix, which showed a value of 1.00, meaning that all assessors agreed on the validity of the instrument items. According to Gregory, a value of 1 indicates complete agreement among assessors, indicating that the instrument has very high content validity. This finding aligns with the opinion of Zamanzadeh et al. (2015), who emphasized that expert assessment is a crucial approach in ensuring that the instrument's content accurately represents the construct being measured. Furthermore, the inter-rater reliability test, using the Intraclass Correlation Coefficient (ICC), yielded a value of 0.72. Based on the criteria of Koo & Li (2016), a value range of 0.50–0.75 indicates moderate reliability. This means that the developed instrument has been consistently assessed by media experts and subject matter experts, although there is still some variation in the assessments.

Data Analysis

The data analysis techniques employed in this case include both qualitative and quantitative data analysis. The qualitative data analysis model used is the Miles and Huberman model. According to Onwuegbuzie & Weinbaum (2016), Miles and Huberman's data analysis model consists of three stages, namely data reduction, data presentation, and conclusion drawing or verification. Meanwhile, the quantitative data in this study were obtained from product feasibility data by media experts, material experts, teachers, and students, as well as data on the effectiveness of the developed module. Quantitative feasibility data were calculated from assessment sheets, which were then converted into a standard score of 100. To obtain the product quality score (feasibility), the following formula was used:

$$\text{Product Quality Score} \frac{\textit{Raw Score}}{x\ \textit{Ideal Maximum score}} x\ 100$$

Converting quantitative data into qualitative data using percentage criteria is as follows:

Table 1. Product Feasibility Module

Score	Feasibility Criteria
>80-100	Very Good
>60-80	Good
>40-60	Fair
>20-40	Poor
0-20	Very Poor

To determine the effectiveness of the module, a Multivariate Analysis of Covariance (Mancova Test) was conducted. According to Iqbal et al. (2020: 52), the assumptions that must be met in the Multivariate Test are the Multivariate Normality Test, the Homoscedasticity Test, which is divided into two parts: variance homogeneity and covariance matrix homogeneity tests, and finally the Significance Test. The Multivariate Normality Test in this study employed the Mahalanobis distance test, with a critical value of 13.82, based on the Mahalanobis distance calculated in the Maximum Mahalanobis column. The distance obtained a value of 1.058 (dependent variables of knowledge and skills), which means that 13.82 < 1.058. Therefore, the data is normally distributed because the Mahalanobis distance value is less than the critical value.

The Homogeneity Test is based on the Box Test of Equality of Covariance Matrices table and Levene's Homogeneity Test table, the results of which can be concluded that the data is homogeneous (H_o accepted) because Sig.>0.05, namely the Sig. in the Box Test of Equality table is .873>0.05, and in Levene's table, the Sig. The value for Traditional Gandang Toraja Music Knowledge is 0.640 > 0.05, and the significance value for Traditional Gandang Toraja Music Skills is .681>0.05. Finally, the significance test was conducted by examining the Group Wilks' Lambda column, which indicates that the Sig. The value is 0.003 < 0.05, so it can be concluded that there is a significant difference between the control class and the experimental class in terms of knowledge and skills.

FINDINGS

Analysis Stage

The analysis stage was conducted to identify the needs, curriculum, and characteristics of the students. Interviews with cultural arts teachers revealed that traditional music education at SMA Negeri 2 Toraja Utara remains limited to the flute (taught only once) and modern instruments, such as the guitar and keyboard, while teaching materials on Gandang Toraja are not yet available, despite the availability of facilities like computers and projectors. The curriculum used is the Merdeka Curriculum, so the development of modules is aligned with the cultural arts ATP for grade X by integrating regional traditional music content. From the students' perspective, their knowledge of traditional music remains very limited due to the scarcity of teaching materials and low interest in traditional musical instruments, which are perceived as outdated. This situation

highlights the need to develop an electronic Gandang Toraja module as an additional learning resource that is engaging, relevant, and functional, while also serving as an effort to preserve local culture.

Design Stage

The Design Stage is the process of creating and designing the content of the module to be produced. Based on the conditions and information obtained in the field, the content of the material to be used as a module is designed. First, we draw on several scientific papers, books, and research results available in the literature on traditional Gandang Toraja music, which serve as reference materials for the compilation. Second, the school has facilities such as projectors and computers that have never been used by teachers in their lessons, especially by art and culture teachers, except for lessons related to computers (Tikom). Therefore, the module is designed in a way that makes the language clear and easy for students to understand, presented in an electronic learning format. Third, the writing and development of the module content are based on learning outcomes.

Development Stage

This stage involves actions taken in compiling modules based on the principles of teaching material module development that have been studied theoretically by identifying research needs and gathering preliminary information. The developed module is an electronic resource for learning traditional Toraja gandang music, comprising 55 pages.

An Electronic Module Material for Learning Traditional Gandang Toraja Music Has Been Developed

The material in the module was compiled from sources related to traditional music learning materials in South Sulawesi, including journal articles, books, and research studies. The module was compiled using a learning module compilation framework. The material in the electronic module includes:

1) Learning Activity 1 discusses traditional music (Definition of Traditional Music, Traditional Music of South Sulawesi, Types of Traditional Musical Instruments of South Sulawesi, Functions of Traditional Music, and How to Play Traditional Musical Instruments of South Sulawesi). The types and methods of playing traditional South Sulawesi music that we commonly encounter and originate from tribes in South Sulawesi are Pakarombi, Papelle/Pabarrung, Suling Lembang, Pa'pompang—all of these instruments are played by blowing into them. Then there are Kecaping/kecapi, Talindo/Popondi, which are played by plucking, and there are also Ana becing, Tennong, Gandang, which are played by striking, and finally Kesok-Kesok and Geso'-Geso', which are played by rubbing.
2) Learning Activity 2 discusses Gandang Toraja (its definition, the form of the traditional Gandang Toraja musical instrument, Gandang Toraja in accompanying the Pagellu dance, the playing patterns of the traditional Gandang Toraja musical instrument, and the values contained in Gandang Toraja). The Toraja Gandang is a traditional musical instrument originating from the Toraja region of South Sulawesi. The Toraja Gandang instrument is classified as a membranophone because the sound it produces comes from the vibration of a membrane made from buffalo skin. Gandang is cylindrical in shape with a diameter of usually 50 cm and a length of 75 cm. The membrane (babana) on the Gandang instrument is located on the right and left sides. Both sides of the Gandang are covered with buffalo skin. Gandang Toraja is made of strong antero wood because a dancer will climb on top of it while the rhythm of the Gandang continues to play. The following is an explanation of the parts found on the Toraja Gandang instrument:
    a) Babana
    Babana in Indonesian means drum skin or, in musical terms, drum membrane. It is made from buffalo skin that is attached to the right and left sides of the instrument. The buffalo skin is shaped into a circle with a diameter of 45 cm and attached using pegs (pointed pieces of wood).
    b) Pasak
    Pasak is a piece of wood with a pointed end. *Pasak* is made for the purpose of attaching the *babana* to the *kalena Gandang* (drum body).
    c) Kalena Gandang

Kalena Gandang or drum body. *Kalena Gandang* is made in a circular shape, and on the drum body, some carvings are deliberately made to represent the cultural identity of the instrument's owner.

d) Inan Gandang
Inan Gandang, or the drum stand, functions as a place to hold the Gandang and is deliberately made so that when the instrument is played, it does not shift and remains in place.

e) Stik Gandang
Stik Gandang is a tool used to strike the membrane in playing the Gandang Traditional Musical Instrument. *Stik Gandang* is made of wood.

Accompanying the Pagellu dance, each Pa'gandang or gandang rhythm player must practice beforehand. Only when the gandang rhythm is solid can the dancers perform. A gandang drumming group consists of two to four gandang players, each of whom plays their role with their own drumming pattern, namely:

a) *Ma'pamisa* is a drumming pattern that sets the tempo for the dance. This drumming is played constantly from the beginning to the end of the dance. The drumming pattern is as shown in the image below:
b) *Mangrepe'* is a pattern of drumming that provides rhythm for the dance. This drumming is also constant throughout the entire dance.
c) *Manglendokan* is almost the same as mangrepe', where this drumming pattern provides a distinctive rhythm for the dance. Therefore, each drummer in this drumming performance must focus on their playing because if the rhythm is wrong, the dancers will lose their way and automatically stop.
d) *Mangindo'i* is a drumming pattern that gives signals or codes/signs for changes in each dancer's movements, whether it is when starting the dance, paying respects, or ending the dance.

The values embodied in Gandang Toraja include aesthetic values, values of responsibility, values of togetherness and cooperation, and finally, economic values.

3) Activity 3 discusses the form of Gandang Toraja performances and presentations. This musical instrument is commonly used to accompany pagellu' dances, typically accompanied by one gandang instrument and two to four players. This musical instrument can be found in joyous ceremonies (Rambu Tuka') in traditional Toraja ceremonies. The presentation of Gandang Toraja is not without its aesthetic value, such as the costumes worn by the gandang players (Pa'Gandang). The costumes worn by the gendang (Gandang) players are: first, Seppa Tallu Buku, which is traditional clothing specially made for Toraja men. This outfit consists of a set of shirts and knee-length shorts. Second, Selendang Kain is an accessory for Toraja men that is placed or worn over the left shoulder, crossing the chest, and then wrapped around the right back. Third, the Pasappu is a headdress worn by Toraja men that is commonly used in ceremonial activities, particularly in traditional ceremonies in Toraja.

Form and Process of the Gandang Toraja Traditional Music Electronic Learning Module

The form and process in this electronic module undergo several stages to produce an electronic module that is both interesting and useful for students and teachers. The development of the product, in the form of an electronic module for learning traditional Gandang Toraja music, proceeds through several stages. First, material related to traditional Gandang Toraja music is prepared based on journal literature, books, and research. Second, compiling the material using the Mic. Office Word 2021 application. Third, create the design using the CorelDRAW application and compile the module by transferring the module material files from Microsoft Word 2021 to CorelDRAW. Moreover, fourth, transferring the module from the Corel Draw application to a PDF file, and finally, transferring and processing the PDF module file to the Flip PDF Corporate Edition 2.4.10 application.

Validation (Module Feasibility)

The final product of this electronic module is titled "Traditional Music of South Sulawesi" with the subtitle "Getting to Know Traditional Gandang Toraja Musical Instruments," consisting of 55 pages that can be used as a learning resource for students in the arts and culture subject of the independent curriculum for grade X

at the high school/vocational school level. The following is a percentage diagram of the assessment results from Subject Matter Experts, Media Experts, Student Responses, and Teacher Responses.

Material Expert

The validation stage by subject matter experts covers three aspects, namely the Learning Aspect, which consists of five indicators with a score of 20 and a total score of 80; the Content/Material Aspect, which consists of 11 indicators with a score of 46 and a total score of 84; and the Language Aspect, which consists of seven indicators with a score of 30 and a total score of 86.

Table 2. Module Feasibility by Material Expert

No	Aspect	Number of Points Obtained	Ideal Maximum Score (IMS)	Score	Mean	Standard Deviation
1.	Learning Aspect	20	25	80	4.0	0.00
2.	Content Material/Aspect	46	55	84	4.0	0.40
3.	Language Aspect	30	35	86	4.0	0.49
	Total	96	115	83	-	-

The three aspects in the diagram bellow have a total of 23 indicators, with scores of 96, an expected score of 115, and a total score of 83. If converted to qualitative data, it is in the Very Good category.

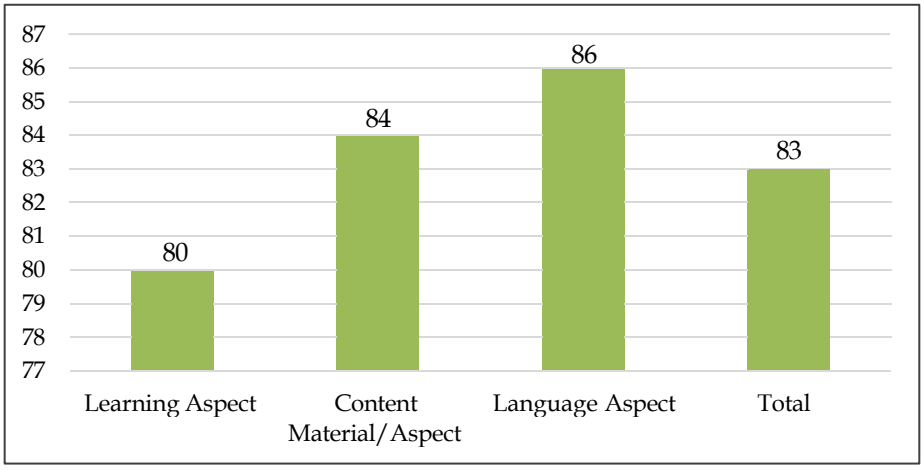

Figure 1. Expert material feasibility chart

Media Expert

Furthermore, the validation process carried out by media experts covered three aspects, namely Presentation Feasibility, which consisted of seven indicators with a score of 31 and a total score of 88; Graphic Feasibility, which consisted of 15 indicators with a score of 61 and a total score of 81; and Usefulness, which consisted of two indicators with a score of 8 and a total score of 80.

Table 3. Module Feasibility by Media Expert

No	Aspect	Number of Points Obtained	Ideal Maximum Score (IMS)	Score	Mean	Standard Deviation
1.	Presentation Feasibility	31	35	88	4.0	0.53
2.	Graphic Feasibility	61	75	81	4.0	0.25
3.	Usefulness	8	10	80	4.0	0.00
	Total	100	120	83	-	-

The three aspects in the diagram above have a total of 24 indicators, with scores of 100, 120, and 83, respectively. If converted to quantitative data, it is in the outstanding category.

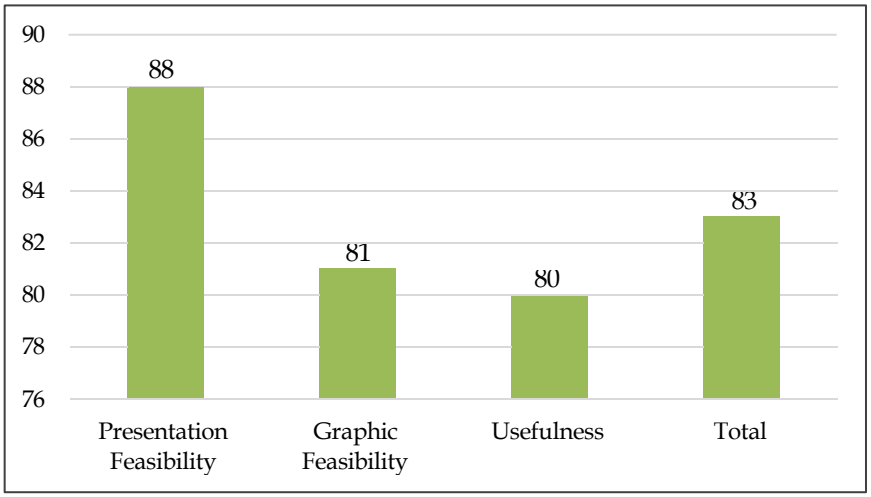

Figure 2. Media expert feasibility chart

Student Response

Students also conduct assessments of electronic modules to determine the responses to the modules that are applied, so that the electronic modules can be evaluated for their feasibility and quality. The electronic module assessment was conducted on a small scale with eight students and a larger scale with 32 students.

Small Scale Student Response and Large-Scale Student Response

Student Response consists of 3 aspects, namely the Display Aspect, which consists of 5 indicators with a score of 21 and a total score of 84, the Material / Content Aspect consists of 8 indicators with a score of 34 and a total score of 85, and the Benefits Aspect consists of 4 indicators with a score of 17 and a total score of 85.

Table 4. Module Feasibility by Student Response

No	Aspect	Number of Points Obtained	Ideal Maximum Score (IMS)	Score	Mean	Standard Deviation
1.	Display Aspect	21	25	84	4.2	0.44
2.	Material/Content Aspect	34	40	85	4.25	0.46
3.	Benefits Aspect	17	20	85	4.25	0.5
	Total	72	85	85	-	-

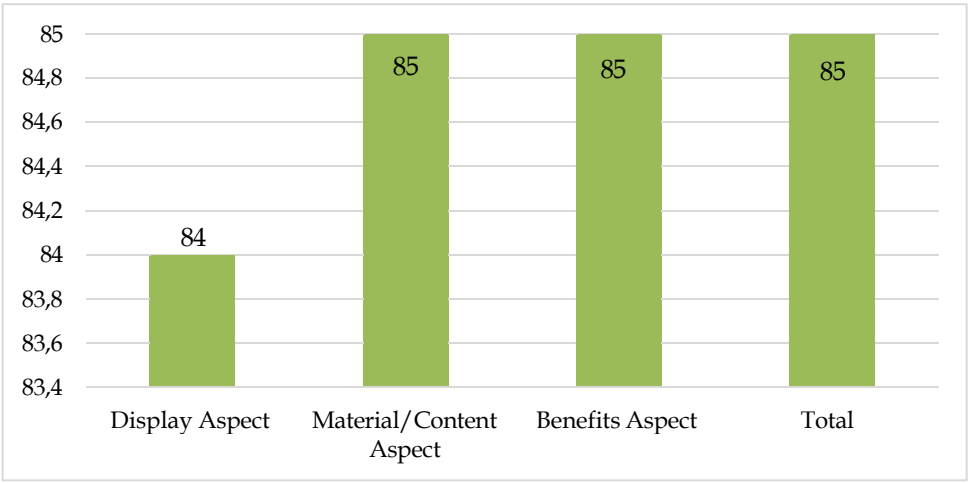

Figure 3. Student response feasibility chart

The three aspects in the Small Scale Student Response diagram above have a total of 17 indicators with a score of 72, an expected score of 85, and a total score of 85. If converted to qualitative data, it is in very good condition.

Table 5. Module Feasibility by Student Response

No	Aspect	Number of Points Obtained	Ideal Maximum Score (IMS)	Score	Mean	Standard Deviation
1.	Display Aspect	22	25	88	4.4	0.54
2.	Material/Content Aspect	34	40	85	4.25	0.46
3.	Benefits Aspect	17	20	85	4.25	0.5
	Total	73	85	86	-	-

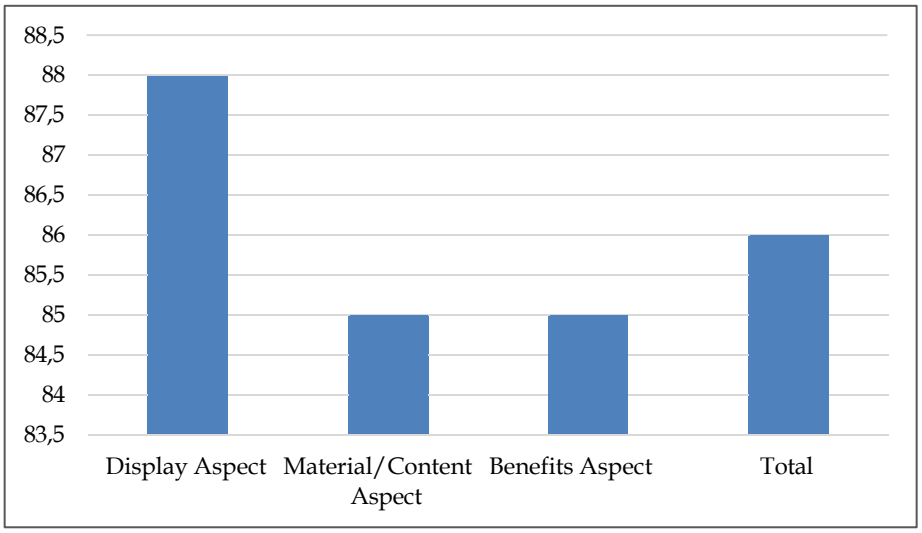

Figure 4. Student response feasibility chart

Student Response in large-scale trials consists of 3 aspects, namely the Display Aspect consisting of 5 indicators with a score obtained of 22 and a total score generated 88, the Material / Content Aspect consists of 8 indicators with a score obtained of 34 and a total score generated 85, the Benefits Aspect consists of 4 indicators with a score obtained of 17 and a total score generated 85. The three aspects in the diagram above have a total of 17 indicators, with a score of 73 and an expected score of 85. The resulting total score is 86. If converted to qualitative data, it is in very good condition.

In addition to quantitative assessments showing excellent results, students' open responses also revealed several factors that made the module interesting and valuable. Most students mentioned that the e-module was more interactive than printed books, which encouraged them to study more enthusiastically. The content, which included images, videos, and straightforward explanations, was considered helpful in understanding the Gandang Toraja material, which was previously unfamiliar to them. Several students also found the module helpful because it introduced them to traditional music that they rarely encountered in formal learning, thereby broadening their knowledge and fostering a sense of pride in their local culture.

Teacher Response

Similar to student responses, the module assessment was also carried out by the teacher concerned. The Teacher Response consists of three aspects, namely Content/Material Feasibility, which comprises six indicators with a score of 26, totaling 87. The Language Feasibility aspect comprises four indicators, scoring 19 and totaling 95, while the Presentation Feasibility aspect consists of 7 indicators, scoring 34 and totaling 97. The aspects of Content/Material Feasibility, Language Feasibility, and Presentation Feasibility in the diagram

above have a total of 17 indicators, with a score of 79 and an expected score of 85. The total score generated is 93. If converted to qualitative data, it is in very good condition.

Table 6. Module Feasibility by Teacher Response

No	Aspect	Number of Points Obtained	Ideal Maximum Score (IMS)	Score	Mean	Standard Deviation
1.	Feasibility Material/Content	26	30	87	4,33	0,51
2.	Language of Feasibility	19	20	95	4,75	0,5
3.	Feasibility of Presentation	34	35	97	4,85	0,37
	Total	79	85	93	-	-

In addition to the quantitative results, which show excellent categories, teachers' responses also highlight several factors that make this module worth using. Teachers assessed that the language used in the module is communicative and straightforward, making it easy for students to understand. In terms of presentation, teachers appreciated the attractive visual display and the use of digital flipbook media, which made the material more engaging and interactive than traditional printed teaching materials. Teachers also considered the valuable module because it fills a gap in traditional Toraja music teaching materials, which have not been available until now, thereby helping to teach cultural arts and introduce local wisdom values to students.

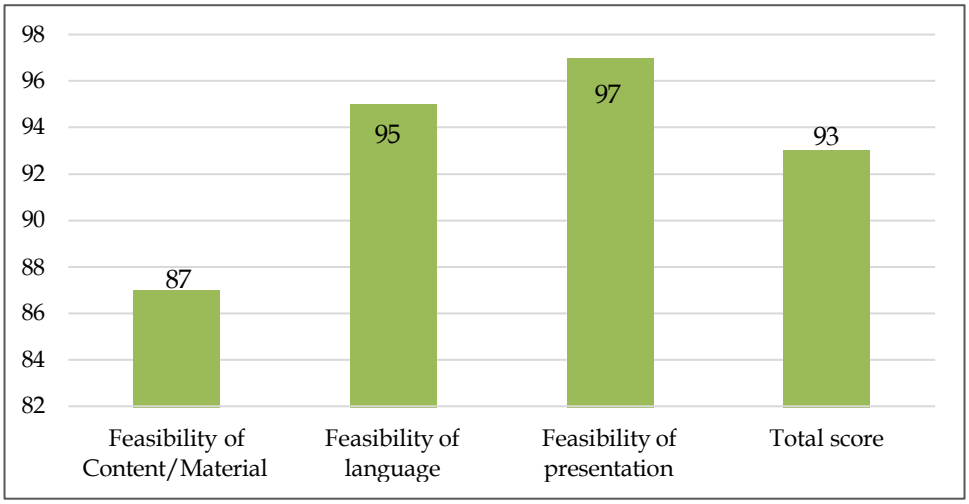

Figure 5. Teacher response feasibility chart

Implementation Stage

The implementation stage was carried out as part of the product trial, which resulted in a learning process. The trial was conducted in two classes, namely the experimental class (with treatment) and the control class (without treatment). Both classes underwent pre-tests and post-tests; however, the author focused on the Experimental Class because it implemented the Gandang Toraja electronic learning module.

Product Trial Results

Based on the results obtained from the cultural arts learning process using the developed electronic module, the author will present an analysis of the data from the pretest and post-test results. The following is an explanation of the pretest and post-test results from the experimental class and the control class:

Table 7. Pre-test and Post-test class Experiment

Pre-Test Class Experiment				Posttestposttest Class Experiment			
Knowledge Test		Practical Test		Knowledge Test		Practical Test	
Max Score	70	Max Score	66	Max Score	100	Max Score	93
Min Score	36	Min Score	33	Min Score	70	Min Score	60
Mean	52,53	Mean	40,94	Mean	85,09	Mean	78,94
Median	53,00	Median	38,00	Median	83,00	Median	76,00
Mode	43	Mode	33	Mode	80	Mode	76
Standard Deviation	9,608	Standard Deviation	9,705	Standard Deviation	8,767	Standard Deviation	10,638

Table 8. Pre-test and Post-test Class Control

Pre-Test Class Control				Post-Test Class Control			
Knowledge Test		Practical Test		Knowledge Test		Practical Test	
Max Score	66	Max Score	60	Max Score	93	Max Score	93
Min Score	30	Min Score	33	Min Score	66	Min Score	66
Mean	46,60	Mean	40,70	Mean	79,70	Mean	76,40
Median	43,00	Median	33,00	Median	80,00	Median	76
Mode	43	Mode	33	Mode	80	Mode	66
Standard Deviation	10,361	Standard Deviation	9,411	Standard Deviation	7,657	Standard Deviation	9, 485

MANCOVA Test Results (Multivariate Analysis Covariance)

Multivariate Analysis: Covariance is an analysis of covariance with more than one dependent variable and involves concomitant variables or covariates. The dependent variables in this study were knowledge and skills in traditional Toraja gandang music. The independent variables were the control class and the experimental class, while the covariates were the pretest and post-test. The MANCOVA test was conducted to determine whether there were differences between the experimental group and the control group, allowing the results to be used to evaluate the effectiveness of the developed Toraja Gandang electronic learning module. The following are the results of the MANCOVA test conducted using SPSS 26:

a. Multivariate Normality Test in the Gandang Toraja Electronic Module research using the Mahalanobis Distance Test. Based on the Maximum Mahalanobis Distance column, which obtained a value of 1.058, the dependent variables of Knowledge and Skills of Gandang Toraja Musical Instruments obtained a value of 1.058 and a critical value of 13.82, which means that the Maximum Mahalanobis Distance value of knowledge and skills of 1.058 < the critical value of 13.82, so it can be concluded that the value is normally distributed multivariate.
b. The homoscedasticity test is divided into two, namely the Variance Homogeneity Test and the Covariance Matrix Homogeneity Test. The Variance Homogeneity Test is obtained from Levene's Test, which is conducted to determine whether the variance in the research data is homogeneous or not. The Covariance Matrix Homogeneity Test is derived from Box's Test of Equality of Covariance Matrices, which is conducted to determine whether the groups used in the research are homogeneous or not. Based on the Box Test of Equality of Covariance Matrices and Levene's Homogeneity Test table, the Sig. of .873>0.05, and in Levene's table, the Sig. The value for Traditional Gandang Toraja Music Knowledge was 0.640, which is greater than 0.05, and the significance was P-value for Traditional Gandang Toraja Music Skills was 0.681, which is greater than 0.05. Therefore, it can be concluded that the data are homogeneous (H_0 accepted) because Sig. > 0.05.
c. Significance testing was conducted to determine the difference in student learning outcomes between the experimental and control classes. Based on the MANCOVA test conducted, the student learning

outcomes in the multivariate table of Wilks' Lambda significance values showed that the significance level was Sig. The value was 0.003<0.05, so it can be concluded that there was a significant difference between the control class and the experimental class in terms of knowledge and skills. Therefore, based on the results obtained, it can be stated that the use of the electronic module for learning Traditional Gandang Toraja Music is effective because there is a significant difference in learning outcomes between the control class and the experimental class in terms of knowledge and skills.

Evaluation Stage

This stage involves improving the developed module by distributing assessment instruments to students and teachers, which include columns for improvements/revisions. These improvements and revisions from teachers and students provide the author with input to enhance the developed module and make it more suitable for use. In the developed module, no specific improvements or revisions were suggested by teachers or students.

Based on the validation results from subject matter experts, media experts, teachers, and student responses, the Gandang Toraja traditional music electronic module was deemed highly suitable for use. The quality of the content, language, presentation, and graphics made this module more interesting and easier to understand than the printed teaching materials that had been used previously. These findings demonstrate that e-modules are not only academically valid but also capable of addressing initial challenges, such as limited teaching materials and low student interest in traditional music. With an interactive and technology-based approach, the Gandang Toraja e-module has the potential to enhance students' knowledge, skills, and appreciation of traditional music, thereby contributing to the preservation of local culture. Furthermore, the implementation of this e-module has been proven to improve student learning outcomes, demonstrating its effectiveness in supporting the achievement of cultural arts competencies.

DISCUSSION

The development of the Gandang Toraja e-module demonstrates the strong relevance between digital learning innovation and efforts to preserve local culture. This research addresses the problem of limited traditional music learning resources in secondary schools and the low interest and knowledge of students in regional music arts. The e-module developed presents traditional music learning interactively by combining text, images, and audio, thereby changing students' perception that traditional music is something old-fashioned into a modern and engaging art form to learn.

From a pedagogical perspective, the development of this e-module aligns with the principles of the Merdeka Curriculum, which emphasizes learner-centered, contextual learning rooted in local culture (Kemendikbud, 2022). The structure of learning activities in the e-module comprises the stages of Experiencing, Reflecting, Thinking and Working Artistically, Making/Creating, and Impacting, which align with the learning outcomes of Cultural Arts in the Merdeka Curriculum. Through these activities, students not only understand the musical concept of Gandang Toraja but also the social, aesthetic, and spiritual values contained within it. These findings support the views of Ma et al. (2023), which emphasize the importance of an immersive experience in digital learning for understanding and preserving local culture. These stages enable students not only to learn the concepts of Gandang Toraja music but also to internalize its social, aesthetic, and spiritual values, thereby contributing significantly to the cultural sustainability of this tradition. Conceptually, this study confirms the link between digital media innovation and local cultural sustainability. Several previous studies, such as those by Sari et al. (2024) and Gong and Wang (2025), have shown that the use of interactive multimedia can increase student engagement and understanding in music learning. However, these studies are still general in nature and do not emphasize specific aspects of local cultural revitalization. This study fills this gap by focusing on Gandang Toraja, thereby contributing new insights to the fields of technology-based arts education and digital ethnomusicology.

Furthermore, the results of this study reinforce the findings of Saprudin et al. (2023) and Mardhatillah & Rahmatina (2022), which suggest that flipbook-based e-modules are not only technically feasible but also effective in increasing student motivation and conceptual understanding. The innovation of this research lies in the integration of local wisdom values such as sangkepan (togetherness), responsibility, and respect for tradition into digital learning media. This aligns with the culturally responsive pedagogy approach, which bases the learning process on student culture (Caingcoy, 2023). From a practical contribution perspective, the Gandang Toraja electronic module plays a role in preserving and regenerating cultural knowledge through formal education. By utilizing digital technology, the process of learning traditional music is no longer limited to oral transmission; instead, it is systematically documented and accessible to both students and teachers. Teachers gain contextual and engaging teaching resources, while students have learning media that strengthen their pride in their regional cultural identity. These findings align with the views of Sofyan et al. (2019), who emphasize that digital media can serve as a means of integrating local wisdom into the school curriculum.

Empirically, there was a significant increase in students' knowledge and skill learning outcomes—as evidenced by the MANCOVA test ($p < 0.05$)—which showed that digital learning (Gandang Toraja Learning Module) based on local culture can be pedagogically effective and play a role in cultural empowerment. Thus, the Gandang Toraja e-module serves as a concrete example of the implementation of the Merdeka Curriculum, which combines learning innovation with the preservation of local cultural identity. Furthermore, this study also emphasizes the importance of the role of all elements of society in preserving cultural continuity. As emphasized by Kondoiyo, Sunarmi, Glennie L (2022, p. 1804), "traditional leaders, community leaders, and all parties involved are very important in preserving this tradition, both through the preservation of Baode and the skills of making sulat or kata, so that it can be passed on to future generations." This perspective emphasizes that cultural preservation is not only the responsibility of educational institutions, but also the collective responsibility of all elements of society, ensuring that traditional knowledge and values can be passed on to future generations.

CONCLUSION

The development of the Gandang Toraja e-module has successfully demonstrated that integrating digital innovation and local cultural content can enhance both the knowledge and practical skills of students in traditional music learning. This research achieved its objectives by producing a valid, practical, and effective e-module that not only improved learning outcomes but also rekindled students' appreciation for regional cultural heritage. From an educational perspective, this research contributed to strengthening the implementation of the Merdeka Curriculum through a learner-centered, contextual, and culture-based learning approach. This e-module enables students to actively engage in traditional music learning in a modern format, thereby encouraging the emergence of creative, reflective, and culturally aware students. Meanwhile, from a cultural preservation perspective, this module serves as a sustainable model for transmitting traditional knowledge in schools, ensuring that local arts such as Gandang Toraja remain known, understood, and passed on to younger generations.

The implications of this study suggest that schools can effectively implement this e-module in Cultural Arts learning to enhance student engagement, foster cultural identity, and integrate local wisdom values into formal education. Teachers can also use similar digital media to bridge classroom learning with community cultural practices. However, this study has several limitations. The e-module trial was conducted at only one school in North Toraja. To ensure broader effectiveness, implementation in various schools and regions with different student characteristics is needed. For further research, it is recommended that the development of locally-based e-modules be expanded to other levels of education, different subjects, or other local traditions. Experimental research with a larger and more diverse sample is needed to measure effectiveness, retention, and the influence on the character and cultural attitudes of students. Collaboration with cultural institutions, artists, and traditional leaders is also crucial for maintaining the authenticity and sustainability of cultural materials in digital learning media.

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