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Development of Interactive Digital Modules Based on Local Wisdom of Gandrung Lombok Dance on Plane Figures Material

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Abstract

Integrating cultural contexts into mathematics learning has increasingly been recognized as an effective strategy to enhance students' conceptual understanding and engagement. However, the incorporation of local cultural resources into digital learning media remains limited, particularly in mathematics education. This study aims to develop an interactive digital learning module based on the local wisdom of the Gandrung Lombok dance to support the teaching of plane geometry concepts. The research employed a Research and Development approach using the ADDIE model, which includes the stages of analysis, design, development, implementation, and evaluation. The study involved 32 third-semester students of the Primary School Teacher Education Program at Universitas Islam Negeri Mataram. Data were collected using expert validation sheets and user response questionnaires and were analyzed using quantitative descriptive analysis through percentage calculations. The results indicate that the developed module is highly feasible for instructional use. Expert validation of the learning material reached 95.83%, while media validation achieved 92.86%, both categorized as highly feasible. Lecturer response reached 95.25%, while student response reached 98.50%, indicating a very high level of user acceptance. These findings demonstrate that integrating cultural elements from the Gandrung Lombok dance into a digital learning module has strong pedagogical potential to support plane geometry learning while providing a culturally relevant and contextual learning experience.

Introduction

The rapid advancement of digital technology has brought significant changes to contemporary educational practices. This transformation not only affects how information is accessed but also reshapes how learners acquire knowledge and interact with learning resources. Today's learners grow up in technology-rich environments, leading to learning preferences that are increasingly visual, interactive, and multimodal. Consequently, educators are required to design learning strategies that integrate digital technology as an essential component of the teaching and learning process (Arsanti, 2018; Sholeh & Basuki, 2019).

Digital learning media enable more dynamic presentation of learning materials through the integration of text, images, animations, audio, and interactive features that can enhance students' engagement in the learning process. Technology-based instructional design has been shown to increase learning motivation and facilitate the visualization of abstract concepts through more contextual representations (Rima et al., 2024). In addition, digital media support

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independent learning by allowing students to access learning materials flexibly without being fully dependent on face-to-face classroom interaction (Istiningsih et al., 2025).

Despite these advantages, teaching practices in many educational institutions still rely heavily on conventional learning materials such as printed textbooks or static presentation slides. These materials often fail to meet the learning needs of digital-generation students who require more interactive and contextual learning experiences. This condition is particularly evident in mathematics education, where abstract concepts are frequently presented without meaningful connections to students' everyday experiences. As a result, mathematics is often perceived as a discipline detached from social and cultural realities.

One approach that can help bridge this gap is the integration of local wisdom into the learning process. Local wisdom refers to systems of knowledge that emerge from the cultural and social experiences of communities and are transmitted across generations. These values not only reflect the cultural identity of a community but also possess significant pedagogical potential as contextual learning resources (Njatrijani, 2018).

The integration of local wisdom in education has been shown to enhance the relevance of learning to students' lived experiences. This approach enables students to understand academic content through cultural experiences that are closely related to their everyday lives while simultaneously strengthening their awareness of cultural identity (Miranti et al., 2018). Furthermore, culturally based learning contributes to the development of character values such as social responsibility, ethical awareness, and communal solidarity (Badeni & Saparahayuningsih, 2023; Yuliatin et al., 2021). In a broader context, integrating cultural values into education also helps sustain local traditions while strengthening the connection between formal education and community life (Yani et al., 2025). Therefore, educators play a crucial role in designing learning strategies that contextualize cultural values within the educational process (Qudwatullathifah et al., 2025).

In recent years, the integration of local wisdom has also gained increasing attention in science and mathematics education through the perspectives of ethnoscience and ethnomathematics. These approaches emphasize that scientific concepts cannot be separated from the cultural practices embedded within communities, and thus local culture can serve as a valuable source of contextual learning in understanding scientific knowledge (Mashami et al., 2023).

In mathematics education, ethnomathematics allows learners to understand mathematical concepts through cultural symbols, patterns, and practices found in everyday life. This perspective positions mathematics as a social practice closely intertwined with human cultural experiences. Studies have shown that integrating cultural contexts into mathematics instruction can enhance student engagement and strengthen conceptual understanding through more meaningful and contextual learning experiences (Lubis & Baiduri, 2025). Moreover, incorporating cultural values into learning materials can promote the development of critical thinking skills as well as social awareness among students (Himawati et al., 2025). The development of culturally based learning modules has also demonstrated potential in improving students' problem-solving abilities and higher-order thinking skills (Marlina, 2025). This aligns with the contextual learning approach, which emphasizes understanding mathematical concepts through real-life situations relevant to students' experiences (Rahmayani et al., 2022). From this perspective, mathematics can be understood as a cultural practice that evolves within the dynamics of social life (Wulandari & Puspadewi, 2016).

Within this context, the development of digital learning media becomes a strategic approach to delivering more contextual mathematics instruction. One such innovation is the use of digital

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learning modules that allow learning materials to be presented in a more interactive and flexible format. Digital modules function not only as sources of information but also as learning tools that facilitate interaction between students and learning materials through various multimedia features such as text, images, animations, and interactive exercises (Arsanti, 2018).

Digital modules offer several advantages, particularly their accessibility across various technological devices, which allows students to learn flexibly without limitations of time and place. Furthermore, digital modules enable the integration of multiple visual representations that can help explain complex concepts more systematically (Kadek et al., 2022). Interactive learning media have also been shown to enhance student engagement through exploratory learning activities and problem-solving tasks (Karyadi Hidayat et al., 2023). The development of digital learning modules is also closely related to supporting self-regulated learning, which refers to learners' ability to manage their own learning processes through planning, monitoring, and evaluating their learning activities (Shi & Yang, 2025).

In the development of educational media, the Research and Development (R&D) approach is widely used because it focuses on systematic processes aimed at producing educational products that can be practically implemented in learning contexts (Judijanto et al., 2024). One of the commonly applied models in R&D studies is the ADDIE model, which consists of five main stages: analysis, design, development, implementation, and evaluation. This model provides a structured framework for developing learning media, beginning with needs analysis and continuing through the evaluation of the developed product's effectiveness (Judijanto et al., 2024). In addition, the design of digital learning media must consider instructional design principles to ensure that learning materials are not only visually appealing but also pedagogically effective through well-structured content and meaningful learning activities (Jeuring et al., 2013).

In the cultural context of the Sasak community in Lombok, one cultural heritage that has significant potential as a learning resource is the Gandrung Lombok dance. This traditional dance represents an important artistic expression of Sasak cultural identity and embodies various social values embedded within the life of the local community (Rahman et al., 2020). Beyond its symbolic meanings, Gandrung dance also displays movement patterns and spatial compositions that visually represent certain geometric structures.

Ethnomathematics studies suggest that movement patterns in traditional performing arts can serve as a contextual medium for explaining geometric concepts (Hidayati et al., 2024). The visual motifs and movement patterns found in Gandrung dance have even inspired artistic works that utilize geometric structures as part of their aesthetic composition (Masa'u et al., 2019). Aesthetic analyses of the dance further reveal relationships between rhythmic movement, spatial composition, and geometric visual structures (Utami & Dewi, 2020). Moreover, Gandrung dance also carries educational functions as a medium for conveying social and spiritual values within the community (Tri Utami & Sudarsana, 2022).

From the perspective of cultural and art studies, traditional artistic practices can be understood as systems of symbolic representation that convey various social meanings within society. Art does not merely function as an aesthetic expression but also serves as a medium for communicating cultural values and identities (Suryadmaja, 2013). The relationship between art and society also illustrates that artistic practices are embedded within the broader social dynamics of particular cultural communities (Suryadmaja et al., 2025).

Although numerous studies have explored the integration of cultural elements into education, most research has focused primarily on examining cultural values or conceptual applications

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of ethnomathematics (Kumar & Gopinaths, 2025; Lidinillah et al., 2022; Balacuit & Oledan, 2024). Studies that specifically develop digital learning media grounded in cultural contexts remain relatively limited. Several studies have developed learning modules based on folklore or local cultural narratives; however, relatively few have integrated traditional performing arts into the design of interactive digital learning modules (Kadek et al., 2022). Furthermore, culturally based learning modules also have the potential to strengthen character education while simultaneously enhancing the relevance of learning to students' socio-cultural environments (Komariah et al., 2022). Such modules can also promote independent learning literacy by providing more interactive learning experiences (Mukminah et al., 2025; Holisoh et al., 2025).

Based on these considerations, this study aims to develop an interactive digital learning module based on the Gandrung Lombok dance as a learning medium for teaching plane geometry concepts. The study also aims to evaluate the feasibility of the developed module through expert validation and to analyze students' responses to its implementation in the learning process. By integrating digital technology, ethnomathematical perspectives, and local cultural wisdom, this research is expected to contribute to pedagogical innovation in mathematics education while simultaneously supporting the preservation of local culture through modern educational practices.

Methods

This study employed a Research and Development approach aimed at developing an interactive digital learning module based on the local wisdom of the Gandrung Lombok dance for teaching plane geometry concepts. The Research and Development approach was selected because this study focused on producing and evaluating an instructional product that could be used in a real learning context. The product developed in this study was an interactive digital module designed to integrate plane geometry materials with cultural representations derived from the movement patterns and spatial formations of the Gandrung Lombok dance.

The development process followed the ADDIE model, which consists of five stages, namely analysis, design, development, implementation, and evaluation. The ADDIE model was used because it provides a systematic framework for developing instructional media, starting from the identification of learning needs to product evaluation. In the analysis stage, the researchers identified the need for interactive and contextual mathematics learning media. This stage focused on determining the relevance of plane geometry materials, the characteristics of students, and the potential integration of Gandrung Lombok dance as a cultural context in mathematics learning.

In the design stage, the structure of the digital module was prepared by determining learning objectives, organizing plane geometry content, designing module navigation, and developing visual representations of Gandrung Lombok dance movements related to geometric shapes. The design also included the preparation of learning activities, practice exercises, and evaluation components. In the development stage, the module design was transformed into an interactive digital product containing learning materials, visual illustrations, cultural integration, interactive exercises, and assessment components.

The implementation stage was conducted by using the developed digital module in a learning activity involving students of the Primary School Teacher Education Program. During this stage, students used the module to study plane geometry concepts through visualizations connected to Gandrung Lombok dance movements. The evaluation stage was carried out to determine the feasibility of the developed module based on expert validation and user

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responses. The evaluation focused on content quality, media quality, usability, visual design, interactivity, and the relevance of cultural integration in mathematics learning.

This study was conducted in the Primary School Teacher Education Program, Faculty of Tarbiyah and Teacher Training, Universitas Islam Negeri Mataram. The participants consisted of 32 third-semester students who were enrolled in a course related to elementary mathematics instruction. The students were selected because they are prospective primary school teachers who are expected to teach mathematical concepts at the elementary school level. Therefore, the development of a culturally based digital module was considered relevant to their academic and professional preparation.

The data in this study were collected using validation sheets and response questionnaires. The validation sheets were administered to two expert validators, consisting of a material expert and a media expert. The material expert evaluated the accuracy of mathematical concepts, the suitability of plane geometry content, the clarity of material presentation, and the relevance of Gandrung Lombok dance elements in supporting mathematics learning. The media expert evaluated the visual appearance, layout, interactivity, navigation, readability, and technical quality of the digital module.

Response questionnaires were administered to one course lecturer and 32 students after the implementation of the digital module. The lecturer response questionnaire was used to evaluate the feasibility of the module from the perspective of instructional use, including the alignment of the material with learning objectives, clarity of presentation, cultural relevance, visual quality, and ease of use. The student response questionnaire was used to measure students' perceptions of the attractiveness, usability, clarity, interactivity, and usefulness of the module in supporting their understanding of plane geometry concepts.

All instruments used a four point Likert scale consisting of 4 for strongly agree, 3 for agree, 2 for fairly agree, and 1 for disagree. The use of a four point scale was intended to obtain clear responses from validators and users regarding the quality and feasibility of the developed module. The aspects assessed in the instruments included content relevance, conceptual accuracy, clarity of presentation, visual design, interactivity, ease of use, cultural integration, and learning usefulness.

The data were analyzed using quantitative descriptive analysis. The scores obtained from expert validation sheets and user response questionnaires were converted into percentages. The percentage score was calculated by comparing the total score obtained with the maximum possible score and then multiplying the result by 100 percent. The formula used was as follows.

$$Percentage = \frac{Obtained\ Score}{Maximum\ Score} \times 100$$

The percentage results were then interpreted using feasibility criteria. A score of 0 to 20 percent was categorized as very infeasible, 21 to 40 percent as infeasible, 41 to 60 percent as fairly feasible, 61 to 80 percent as feasible, and 81 to 100 percent as highly feasible. Based on these criteria, the feasibility of the digital module was determined through the validation results from experts and the response results from lecturers and students.

This study was conducted in accordance with ethical research principles. All participants were informed about the purpose of the study, and their participation was voluntary. The data collected in this study were used only for academic purposes and for evaluating the feasibility of the developed digital learning module.

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Results and Discussion

The results of this study are presented based on the stages of product development and quantitative evaluation of the developed digital learning module. The presentation of results includes the development process using the ADDIE model, expert validation results, lecturer response results, and student response results. The quantitative data were obtained from validation sheets and response questionnaires, then converted into percentages and interpreted based on the predetermined feasibility criteria. Therefore, the results focus on the feasibility and user acceptance of the Gandrung Lombok dance-based interactive digital module as a learning medium for plane geometry.

Development Process Using the ADDIE Model

The development of the interactive digital learning module based on the local wisdom of the Gandrung Lombok dance followed the ADDIE model, which consists of analysis, design, development, implementation, and evaluation. Each stage produced specific outcomes that supported the development and evaluation of the digital module as a mathematics learning medium.

The analysis stage was conducted to identify the need for interactive and contextual learning media in plane geometry instruction. The preliminary analysis indicated that plane geometry learning required media that could present mathematical concepts more visually and connect them with students' cultural context. Based on this stage, the Gandrung Lombok dance was selected as the cultural basis for the module because its movement patterns and spatial formations could be represented through geometric shapes.

The design stage focused on preparing the structure and flow of the digital module. This stage included the formulation of learning objectives, the selection of plane geometry materials, the arrangement of module navigation, and the design of visual illustrations derived from Gandrung Lombok dance movements. The module was designed to present plane geometry concepts through text, images, visual representations, practice exercises, and evaluation components.

The development stage involved transforming the module design into an interactive digital learning product. The developed module contained learning materials on plane geometry, visual illustrations of Gandrung Lombok dance movements, interactive exercises, and learning evaluation features. The visual elements were designed to connect dance movement patterns with geometric concepts such as circles, triangles, squares, and rectangles.

The implementation stage was carried out by using the developed module in a learning activity involving 32 third-semester students of the Primary School Teacher Education Program at Universitas Islam Negeri Mataram. During this stage, students used the module as a learning medium to study plane geometry concepts through cultural and visual representations.

The evaluation stage was conducted by administering expert validation sheets and user response questionnaires. The evaluation involved a material expert, a media expert, one course lecturer, and 32 students. The validation and response data were analyzed quantitatively using percentage calculations to determine the feasibility and user acceptance of the digital module. The overall development process based on the ADDIE model is summarized in Table 1.

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Table 1 Stages of Module Development Based on the ADDIE Model

Stage	Main Activities	Outcomes
Analysis	Identification of learning needs, student characteristics, and cultural integration potential	Need for an interactive digital module based on Gandrung Lombok dance
Design	Preparation of learning objectives, module structure, navigation, visual design, and practice exercises	Digital module design and learning flow
Development	Production of the interactive digital module containing materials, cultural illustrations, exercises, and evaluation features	Prototype of the Gandrung Lombok dance-based digital module
Implementation	Use of the module in plane geometry learning with 32 PGMI students	Module implemented in learning activities
Evaluation	Administration of expert validation sheets and user response questionnaires	Percentage scores of expert validation, lecturer response, and student response

Design of the Digital Learning Module

The digital learning module was designed as an interactive instructional medium that integrates plane geometry concepts with the local cultural context of the Gandrung Lombok dance. The design of the module focused on presenting mathematical concepts through visual and contextual representations so that students could understand plane geometry in a more concrete and engaging manner.

The module structure was organized systematically to support independent learning. The content was arranged from introductory materials to practice exercises and learning evaluation. The main components of the module include: 1) Introduction, which provides an overview of the topic and learning objectives; 2) Plane geometry concepts, which explain geometric shapes such as triangles, squares, rectangles, and circles; 3) Visualization of Gandrung Lombok dance movements, which is used to represent geometric patterns through dance movement illustrations; 4) Practice exercises, which are designed to help students reinforce their understanding of the learning material; 5) Learning evaluation, which is used to assess students' comprehension of the concepts presented in the module.

The integration of Gandrung Lombok dance elements was implemented through visual illustrations of dance movements linked to geometric shapes. Circular dance movements were represented as circles, while certain movement formations were illustrated as triangles, squares, and rectangles. The visual design combined text, images, and cultural illustrations to make the module more attractive and easier to use.

Expert Validation Results

After the digital module was developed, expert validation was conducted to determine the feasibility of the product. The validation involved two validators, namely a material expert and a media expert. The material expert assessed the accuracy of mathematical concepts, the suitability of plane geometry content, the clarity of presentation, and the relevance of Gandrung Lombok dance elements in supporting mathematics learning. The media expert assessed the visual appearance, layout, interactivity, navigation, readability, and technical quality of the digital module.

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The validation scores were obtained by converting the total scores from the expert validation sheets into percentages based on the predetermined feasibility criteria. The expert validation results are presented in Table 2.

Table 2 Expert Validation Results

Assessment Aspect	Percentage	Category
Content validation	95.83%	Highly feasible
Media validation	92.86%	Highly feasible

The results show that the developed digital module achieved a very high level of feasibility in both content and media aspects. The content validation score of 95.83% indicates that the plane geometry materials, conceptual accuracy, and cultural integration were considered highly feasible. The media validation score of 92.86% indicates that the visual design, navigation, interactivity, and technical quality of the module were also categorized as highly feasible. These results demonstrate that the Gandrung Lombok dance-based digital module met the feasibility criteria for use as a mathematics learning medium.

Lecturer and Student Response Results

After the module was validated by experts, user responses were collected from one course lecturer and 32 third-semester PGMI students. The response questionnaires were administered after the implementation of the digital module in plane geometry learning. The lecturer response questionnaire was used to evaluate the feasibility of the module from the perspective of instructional use, while the student response questionnaire was used to measure students' acceptance of the module in terms of visual appearance, clarity of material, usability, engagement, and usefulness in supporting the understanding of plane geometry concepts.

The lecturer response results showed that the module obtained an average score of 95.25%, which falls within the highly feasible category. The results are presented in Table 3.

Table 3 Lecturer Responses to the Digital Learning Module

Assessment Aspect	**Percentage**	**Category**
Alignment of materials with mathematical concepts	96%	Highly feasible
Clarity of material presentation	95%	Highly feasible
Integration of cultural elements in learning	94%	Highly feasible
Visual design and interface quality	96%	Highly feasible
Ease of module use	95%	Highly feasible
Average	95.25%	Highly feasible

The results in Table 3 indicate that the digital module was considered highly feasible by the lecturer in all assessed aspects. The highest scores were obtained in the alignment of materials with mathematical concepts and visual design and interface quality, both reaching 96%. These results show that the module has strong instructional relevance and appropriate visual quality for use in plane geometry learning. The integration of cultural elements also obtained a high score of 94%, indicating that the Gandrung Lombok dance context was considered relevant to support mathematics learning.

Student responses also showed a very high level of acceptance. The student response questionnaire results indicated that the module was attractive, easy to use, and helpful in supporting students' understanding of plane geometry concepts through visualizations of dance

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movements connected to geometric shapes. The student response results are presented in Table 4.

Table 4 Student Responses to the Digital Learning Module

Assessment Aspect	Percentage	Category
The visual appearance of the module is attractive	99%	Highly feasible
The learning material is easy to understand	98%	Highly feasible
Dance movement visualization helps understand geometry	99%	Highly feasible
The module is easy to use	98%	Highly feasible
Practice exercises help reinforce understanding	98%	Highly feasible
Learning becomes more engaging compared to conventional methods	99%	Highly feasible
Average	98.50%	Highly feasible

The results in Table 4 show that student responses to the digital module were highly positive. The highest scores were found in visual appearance, dance movement visualization, and learning engagement, each reaching 99%. These findings indicate that students accepted the module very well as an interactive and culturally contextual learning medium. The average score of 98.50% confirms that the developed module was categorized as highly feasible based on student responses.

The comparison between lecturer and student responses is illustrated in Figure 1. The lecturer response reached 95.25%, while the student response reached 98.50%. Both scores fall within the highly feasible category, indicating that the module received strong acceptance from users.

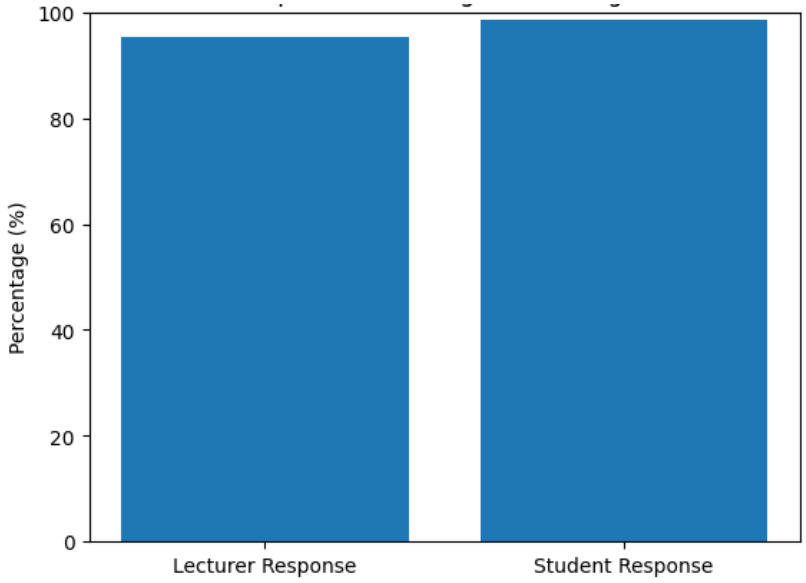

Figure 1. Lecturer and Student Responses to the Digital Learning Module

Figure 1 shows that both lecturer and student responses were within a very high percentage range. Although the student response score was slightly higher than the lecturer response score,

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both results indicate that the Gandrung Lombok dance-based digital module was highly feasible and well accepted by users. These findings support the expert validation results and confirm that the module can be used as an instructional medium for teaching plane geometry concepts.

Cultural Contextualization in Mathematics Learning

The findings of this study indicate that integrating local cultural elements into digital learning modules can create mathematics learning experiences that are more contextual and meaningful for students. The visualization of Gandrung Lombok dance movements linked to geometric shapes enables students to understand plane geometry concepts through more concrete representations. These findings suggest that cultural contextualization can function as a pedagogical bridge, connecting abstract mathematical concepts with cultural experiences that are more closely related to students' everyday lives.

From the perspective of mathematics education, this approach aligns with the framework of ethnomathematics, which views mathematics as a social practice embedded within various cultural activities. Within this perspective, mathematical concepts are not merely understood as formal symbolic systems but also as representations of patterns and structures emerging from human cultural practices. Previous studies have shown that integrating local cultural elements into science and mathematics learning can increase student engagement and support a more contextual understanding of concepts (Mashami et al., 2023).

The findings of this study also demonstrate that the movement patterns of the Gandrung Lombok dance possess pedagogical potential as a medium for representing geometric concepts. Movement formations, spatial compositions, and rhythmic patterns in traditional dance can be translated into geometric structures that assist students in visualizing plane geometry concepts. This indicates that cultural practices do not merely hold aesthetic value but also contain underlying mathematical structures that can be utilized in educational contexts.

This approach strengthens the argument that mathematics learning can be contextualized through cultural experiences that are relevant to students' social environments. Previous research has demonstrated that cultural integration in mathematics learning enhances student engagement and reinforces conceptual understanding through contextualized instructional approaches (Lubis & Baiduri, 2025). In this study, the use of Gandrung Lombok dance as a learning context illustrates how local cultural practices can function as a medium for explaining mathematical concepts in a more intuitive and accessible way.

Beyond improving conceptual understanding, the integration of cultural elements in learning also contributes to the development of students' cultural awareness. When local cultural elements are incorporated into learning activities, students not only learn academic content but also develop an appreciation for cultural values embedded within their communities. This suggests that culturally based learning has the potential to strengthen the relationship between formal education and local cultural identity.

In this context, the integration of cultural elements into mathematics learning should not be viewed merely as a pedagogical strategy but also as a broader educational approach that promotes inclusivity and contextual relevance. Research has shown that cultural integration in education can enhance the relevance of learning materials to students' social experiences while fostering more meaningful learning environments (Fairus et al., 2024). Therefore, cultural contextualization in mathematics learning represents an important strategy for reducing the gap between abstract mathematical concepts and students' real-life experiences.

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Feasibility and User Acceptance of the Digital Learning Module

The results of this study demonstrate that the Gandrung Lombok dance-based digital module achieved a very high level of feasibility in terms of both content and media aspects. Expert validation of the learning materials reached 95.83%, while media validation reached 92.86%. Furthermore, lecturer and student responses also indicated a very high level of acceptance, with scores of 95.25% and 98.50%, respectively. These results suggest that the developed digital module met the feasibility standards required for learning media and was well accepted by users.

The high feasibility score of the module can be understood through several aspects. First, the module presents learning materials in a visual and interactive format. The visualization of dance movements connected to geometric shapes provides clearer representations of plane geometry concepts and supports students in understanding abstract mathematical content in a more concrete way. Previous research has shown that digital learning media can support conceptual understanding by providing visual representations and facilitating the explanation of abstract concepts (Istiningsih et al., 2025).

Second, the digital module provides opportunities for students to engage in more independent learning through its interactive features. The systematic structure of the module allows students to study the material progressively while checking their understanding through the provided exercises. This indicates that the module has strong pedagogical potential to support student-centered learning, especially in mathematics learning contexts that require visualization and repeated practice.

Previous studies have indicated that the use of e-modules in learning can support students' higher-order thinking skills and problem-solving abilities (Marlina, 2025). In addition, interactive learning media can enhance student engagement by encouraging exploratory learning activities and reflective thinking processes (Kadek et al., 2022). In the present study, the high level of student response indicates that the integration of digital technology with local cultural elements was positively accepted as a learning medium.

These findings suggest that the development of culturally based digital modules can serve as a relevant pedagogical innovation in mathematics education. By integrating digital technology with cultural contexts, the learning process can become more engaging, interactive, and relevant to the learning characteristics of students. However, because this study focused on feasibility and user responses, further studies are still needed to examine the effectiveness of the module in improving students' learning outcomes through experimental or quasi-experimental designs.

Educational Implications for Culturally Responsive Learning

The findings of this study have important implications for the development of culturally responsive learning approaches. This approach emphasizes the importance of integrating students' cultural experiences into the learning process so that the learning materials become more relevant to their everyday lives.

The use of the Gandrung Lombok dance as a learning context demonstrates that local cultural elements can function as effective learning resources within formal education. Cultural integration enables students to understand academic concepts through cultural experiences that are familiar and meaningful to them.

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Previous studies have shown that education based on local wisdom plays an important role in developing students' character and strengthening their awareness of cultural identity (Badeni & Saparahayuningsih, 2023). Through culturally based learning, students not only acquire academic knowledge but also develop an understanding of social values embedded within their communities.

Furthermore, cultural integration in education can contribute to strengthening students' awareness of cultural diversity within society. Research suggests that the transformation of local wisdom values within educational practices can support character development while simultaneously enhancing students' social awareness of their cultural environment (Yani et al., 2025).

In the context of teacher education, the findings of this study also provide important implications for the development of prospective teacher competencies. PGMI students, as future primary school teachers, need to possess the ability to integrate cultural elements into their teaching practices in order to create learning environments that are more contextual and meaningful for elementary school students. Therefore, the development of culturally based digital learning modules can provide an instructional model that can be adapted by educators across various educational contexts.

Cultural Preservation through Education

In addition to its pedagogical contributions, this study also demonstrates that integrating cultural elements into learning can contribute to the preservation of local culture. The use of the Gandrung Lombok dance as a learning resource illustrates that traditional arts can function as an educational medium that connects cultural values with modern educational practices.

The Gandrung Lombok dance represents an important form of artistic expression that reflects the cultural identity of the Sasak community while embodying various social values embedded within community life (Rahman et al., 2020). By integrating Gandrung Lombok dance into mathematics learning, this study demonstrates that traditional arts can serve as relevant learning resources within formal educational contexts.

From the perspective of the sociology of art, artistic practices do not merely function as aesthetic expressions but also serve as media that represent social values within society (Suryadmaja et al., 2025). Through education, the cultural values embedded in artistic practices can be transmitted to younger generations, ensuring that cultural traditions remain alive within the community. Furthermore, traditional arts play a significant role in constructing the cultural identity of a community. Education therefore becomes a strategic space for introducing cultural values to younger generations, enabling them to develop awareness of the importance of preserving local cultural heritage (Suryadmaja & Saearani, 2025).

Based on the findings of this study, the integration of local wisdom, digital technology, and mathematical concepts can be understood as an interconnected pedagogical framework. The Gandrung Lombok dance functions as a source of cultural context, while the digital module acts as a pedagogical medium that connects cultural representations with mathematical concepts related to plane geometry. The interaction between these three elements creates learning experiences that are more contextual and meaningful for students. The conceptual model of this integration is illustrated in Figure 2.

Figure 2 illustrates that culturally based mathematics learning can be understood as the integration of three key components: local culture, learning technology, and mathematical concepts. Within this model, local culture provides a concrete contextual representation, digital technology functions as a pedagogical medium that facilitates learning interaction, and

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mathematical concepts form the core instructional content. The interaction among these three components generates learning experiences that are more contextual, interactive, and meaningful for students.

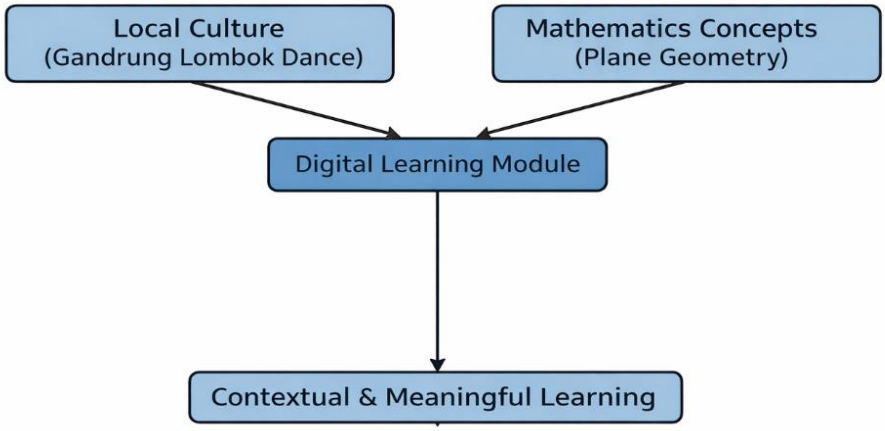

Figure 2. Conceptual Model of the Integration of Culture, Technology, and Mathematics in Learning

Therefore, the integration of traditional arts into the learning process not only provides cultural context for students but also opens opportunities for education to function as a medium for cultural preservation. Overall, the findings of this study demonstrate that the development of a Gandrung Lombok dance-based digital module contributes not only to innovation in mathematics education but also illustrates how education can serve as a space for integrating technology, culture, and academic knowledge to create more contextual and sustainable learning practices.

Conclusion

This study aimed to develop an interactive digital learning module based on the local wisdom of the Gandrung Lombok dance as a learning medium for teaching plane geometry concepts. The findings indicate that the developed module demonstrates a very high level of feasibility in terms of both content and media aspects. Expert validation of the learning material reached 95.83%, while media validation reached 92.86%, both of which fall within the highly feasible category. In addition, user responses to the module were highly positive, with lecturer responses reaching 95.25% and student responses reaching 98.50%.

The results of this study indicate that the integration of local cultural elements into digital learning media has strong pedagogical potential to facilitate more contextual and meaningful mathematics learning experiences. The visualization of Gandrung Lombok dance movements connected to geometric shapes can help present plane geometry concepts in a more concrete and intuitive manner. This approach provides students with a visual and culturally relevant learning experience that supports their engagement with mathematical content.

Furthermore, the use of the digital module provides opportunities for students to engage in independent learning through the interactive features embedded within the module. The systematic organization of learning materials and the visually engaging presentation allow students to access and study the material flexibly according to their learning needs. These findings indicate that the development of culturally based digital modules has the potential to support more active, independent, and student-centered learning environments.

This study demonstrates that the Gandrung Lombok dance-based digital module is highly feasible and well accepted as a pedagogical innovation in mathematics learning. The

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integration of digital technology, ethnomathematical perspectives, and local cultural wisdom provides a meaningful instructional model for contextual mathematics learning while also creating opportunities for education to contribute to the preservation of local cultural heritage. Future research may examine the effectiveness of this module in improving students' learning outcomes through experimental designs.

Declaration

Component	Statement
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Conflict of Interest	The authors declare that there is no conflict of interest regarding the publication of this article.
Ethical Approval	This study was conducted in accordance with research ethics principles. Participation of respondents was voluntary, and all participants provided their consent to be involved in the research.
Data Availability	The data supporting the findings of this study are available from the corresponding author and can be provided upon reasonable request.

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