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Development of ethnopedagogical augmented reality media "culture spinner" for elementary cultural diversity

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Abstract

Pancasila Education learning on the topic of cultural diversity in elementary schools still faces challenges in enhancing students' understanding of local culture engagingly and contextually. This study aimed to develop and examine the feasibility, practicality, and effectiveness of an Augmented Reality-based culture spinner media for elementary school students. The study employed a Research and Development (R&D) method using the ADDIE model, which consists of the analysis, design, development, implementation, and evaluation stages. The research subjects included media experts, material experts, language experts, classroom teachers, and 28 elementary school students. Data collection instruments consisted of expert validation questionnaires, teacher and student response questionnaires, and learning achievement tests administered through pretests and posttests. The results showed that the developed learning media achieved a "highly feasible" category from media experts with a percentage of 93.18%, material experts with 88.16%, and language experts with 92.11%. Teacher assessments also indicated a "highly feasible" category with a percentage of 100%, while student responses demonstrated a "very practical" category with a percentage of 100%. The effectiveness test revealed an improvement in students' learning outcomes, with the average pretest score increasing from 60.71 to a posttest score of 83.14. The N-Gain analysis yielded a score of 0.57, which falls into the moderate category. Therefore, the culture spinner media was declared feasible, practical, and effective for supporting Pancasila Education learning on the topic of cultural diversity in elementary schools.

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INTRODUCTION

Background of the Study

Education in Indonesia is currently facing increasingly complex challenges as a result of 21st-century developments characterized by rapid technological advancement and global change. This condition requires a transformation in both mindset and learning practices to become more adaptive to contemporary needs. (Rahayu et al., [2022](#)) stated that progress in the learning process has become an essential element in modern educational systems, particularly in an era marked by accelerated technological innovation. Therefore, elementary education in Indonesia is required to implement the characteristics of 21st-century learning that emphasize not only cognitive aspects but also the strengthening of spiritual values, critical thinking skills, independence, creativity, collaboration skills, and understanding of cultural diversity. This is in line with the policy established by (Kemendikbudristek, [2024](#)) as an effort to prepare competent and well-characterized students to face global challenges. Thus, the learning process must be systematically designed to produce students who are not only academically excellent but also possess strong character and adequate cultural awareness. In this regard, elementary education plays a strategic role in instilling the values of tolerance, mutual respect, and a sense of belonging to the nation from an early age. In line with this perspective, within the context of elementary education, the ethnopedagogical approach is considered a relevant strategy for connecting learning materials with students' real-life experiences while simultaneously strengthening their cultural identity. (Sugara, [2022](#)) defined ethnopedagogy as an educational approach that emphasizes the integration of local wisdom, cultural values, and community social practices into the learning process. This approach is understood as a culture-based learning model that utilizes local knowledge as both a learning resource and learning medium, thereby creating contextual and meaningful learning experiences. Furthermore, education in the modern era is expected to equip students with the ability to face real-life problems within their surrounding environment. This is supported by (Pertwi et al., [2024](#)), who stated that local culture-based learning has proven effective in increasing student engagement, instilling character values, and creating an inclusive learning environment that is relevant to students' social contexts.

One of the subjects in schools that plays an important role in providing meaningful learning experiences for students is Pancasila Education. This subject is taught at all levels of education, including elementary schools, with the aim of equipping students to understand various events, facts, concepts, and generalizations related to social life. Pancasila Education also functions to foster a sense of patriotism consciously, wisely, and responsibly, as stated by. At the elementary school level, Pancasila Education has an important role in introducing moral values as guidelines for students' daily lives. In addition, this subject also contributes to instilling and preserving noble values derived from Indonesian culture. One of the topics taught in Pancasila Education is cultural diversity, which is a social reality inseparable from

the life of the nation. Therefore, the introduction of cultural diversity needs to be carried out from the elementary education level. At the elementary school level, particularly in Grade 5, students are at a stage of cognitive and social development that enables them to understand various simple differences, such as language, clothing, food, and traditions. At this stage, students begin to develop attitudes of tolerance and appreciation for differences. Learning about cultural diversity not only functions to provide factual knowledge but also plays a role in shaping inclusive attitudes and improving social skills to prevent prejudice and conflicts in the future. This becomes increasingly important considering that Indonesian society has a high level of diversity in terms of ethnicity, language, race, and culture.

An effective learning process should ideally contain interactive and enjoyable elements while providing opportunities for students to develop creatively and independently according to their potential, interests, and talents. One of the factors influencing the creation of an enjoyable learning atmosphere is the selection of appropriate learning media. Learning media are tools used to support the delivery of learning materials so that the information provided can be understood more clearly and learning objectives can be achieved effectively and efficiently (Wb et al., 2024).

Technological development has had a significant impact on the field of education, particularly in the implementation of the learning process. The utilization of technology in teaching and learning activities continues to increase, requiring various innovations to ensure that learning remains relevant to contemporary developments. The use of technology-based learning media has become one of the important factors supporting the success of the learning process. In the context of the digital era, technology integration enables the creation of learning experiences that are more interactive, effective, and efficient. Who stated that the utilization of technology in learning can improve students' learning outcomes and engagement. Furthermore, learning media function as tools for delivering materials, messages, and information systematically, thereby helping students understand the concepts being taught more easily. Therefore, the use of learning media needs to be developed creatively and innovatively by utilizing various available technologies, such as social media, the internet, simulations, computers, and advanced technologies such as Augmented Reality (AR), in order to support the creation of more engaging and meaningful learning experiences.

One of the technologies with great potential to support learning is Augmented Reality (AR). In this context, AR does not merely present static visual media but also displays interactive digital objects integrated with the real environment. (Priambudi & Sutopo, 2024) explained that the use of AR in learning enables students to interact directly with digital objects displayed in real time. In the field of education, the utilization of AR has been proven to improve students' conceptual understanding and memory retention of learning materials, as stated by (Rosita, 2025). At the elementary school level, AR-based learning media function as instructional tools that integrate various digital elements, such as animations, three-

dimensional objects, text, and audio, with the real environment, thereby helping students understand learning materials in a more concrete and engaging manner. Furthermore, the development of AR learning media combined with an ethnopedagogical approach is considered capable of enhancing students' creativity, participation, and learning motivation. This integration creates learning experiences that are not only technologically innovative but also rich in cultural values, making them highly relevant for implementation in elementary education within the digital era (Bagus et al., 2025).

Thus, various studies indicate that learning media integrating Augmented Reality (AR) with an ethnopedagogical approach can serve as a strategic solution in creating engaging and contextual learning experiences, while also contributing to the preservation of local culture. Based on this, this study aims to develop an ethnopedagogy-based learning media supported by Augmented Reality (AR) technology called "Culture Spinner."

This media is designed to present learning objects and components in a more engaging and imaginative way, so that it can be used by students as a learning tool that provides interactive, contextual, and meaningful learning experiences, particularly in understanding cultural diversity in Grade 5 elementary school. The development of the "Culture Spinner" learning media is expected to improve the quality of the learning process as well as strengthen students' understanding of cultural values. In addition, this media is also expected to increase students' interest and engagement in the learning process through the presentation of innovative materials that are relevant to the demands of 21st-century learning.

The Problem of The Study

This learning topic plays a very important role, both in academic aspects and in shaping students' character, so it needs to be taught optimally and continuously. However, in reality, students' understanding of this concept is still relatively low. This is due to the perception that Pancasila Education is a monotonous subject, as it is often dominated by memorization and theoretical delivery. In addition, learning practices are still largely dominated by lecture methods, with limited use of innovative media and learning approaches, as well as broad subject matter that is difficult for students to understand. These findings are supported by interview results with a Grade 5 teacher at SD Islam Sultan Agung 3 Semarang, which indicate that learning about cultural diversity still faces various challenges. Conventional teaching methods have led to low student engagement in understanding cultural values. Teachers tend to use lecture-based methods and static textbook media, causing students to focus more on memorizing concepts without deeply understanding cultural meanings. As a result, learning becomes less relevant to students' daily lives in a multicultural society.

Nevertheless, technology-based supporting facilities are actually available, such as smartboards and projectors in every classroom. However, their utilization has not been

optimal in supporting interactive learning processes. In practice, some students are not actively involved and tend to lose focus during learning activities. This condition indicates that teacher-centered learning limits students' active participation. As a result, students have limited opportunities to explore ideas, express opinions, and develop creativity optimally. Therefore, a transformation in the learning approach toward student-centered learning is needed. Active student involvement in the learning process is an important factor in fostering creativity and learning independence, as stated (Togatorop et al., [2025](#)).

In the implementation of elementary education in Indonesia, there are several challenges encountered in the learning process, including limited teacher competence in developing culturally rich learning materials, restricted access to interactive learning media that are aligned with local contexts, and the need for adequate tools and guidelines to ensure that cultural content is presented authentically and avoids stereotypical simplifications. These conditions require a comprehensive mastery of learning content so that students can be guided to understand concepts holistically and relate them to real-life situations. In response to these challenges, the ethnopedagogical approach can serve as a relevant alternative for fostering innovation in the learning process. Defines ethnopedagogy as a learning approach that integrates local wisdom, cultural values, and community traditions into learning activities. At the elementary school level, the application of ethnopedagogy can be realized through the use of local wisdom-based learning media, thereby creating a learning environment that is more active, creative, effective, and enjoyable through the incorporation of games and cultural interactions. This is supported by the findings of (Gunardi et al., [2024](#)), which indicate that ethnopedagogy-based learning not only improves the relevance of learning materials for students but also contributes to the preservation of local culture.

Research's State of the Art

Augmented Reality (AR) is a technology that combines two-dimensional (2D) elements with three-dimensional (3D) virtual objects into a real-world environment in real time. In general, AR technology is developed through two main approaches, namely marker-based AR and markerless AR. Marker-based AR utilizes visual markers in the form of two-dimensional illustrations, typically black-and-white patterns resembling barcodes, which are scanned using device cameras such as smartphones to display three-dimensional objects. This is as explained by (Asrizal et al., [2024](#)). Meanwhile, the markerless AR approach enables the visualization of three-dimensional objects without the use of specific markers by utilizing tracking technologies such as face tracking, object tracking, motion tracking, or GPS-based tracking. This approach offers greater flexibility in its application, as stated by (Zhang et al., [2025](#)). Thus, AR-based learning media operate through either marker scanning mechanisms or direct 3D object visualization, enabling the creation of interactive and effective learning experiences, particularly in helping students understand abstract concepts.

The characteristics of Augmented Reality (AR)-based learning media contribute to improving students' conceptual understanding and learning outcomes. AR is capable of integrating the real environment with the virtual world, presenting three-dimensional objects interactively, and operating on mobile devices that support independent and exploratory learning. In addition, the use of AR also provides positive stimulation for students, particularly in learning materials that require a high level of visualization, as stated by (Pramuditya et al., [2022](#)). One of the topics that requires strong visualization skills is cultural diversity Thom (no year specified). Based on these characteristics, the use of AR-based learning media is considered relevant and effective in supporting the learning of cultural diversity in a more concrete, interactive, and meaningful way, thereby helping students to develop a deeper understanding of the concepts being taught.

Recent studies show that the use of Augmented Reality (AR) technology in elementary school learning is increasingly developing as an innovative solution to enhance student engagement and understanding, particularly for abstract topics such as cultural diversity. A study by (Sudrajat et al., [2024](#)) found that integrating AR with local cultural values can strengthen students' character and improve their understanding of cultural concepts through interactive visualization. In line with this, research by penelitian (Hidayat et al., [2025](#)) emphasizes that local culture-based AR media is effective in improving students' cultural understanding, although it still faces challenges related to the availability of contextual content and teacher readiness. In addition, a needs analysis conducted by (Ruliani et al., [2025](#)) shows that learning is still dominated by conventional methods with limited use of interactive media, indicating the need for AR-based media development that integrates an ethnopedagogical approach to enhance student engagement. Other studies also confirm that AR media based on local wisdom can significantly improve students' motivation, collaboration, and cultural appreciation. However, most existing research still focuses on general AR development or local culture-based AR without explicitly integrating an ethnopedagogical approach into a single, structured, and innovative learning product. Therefore, this study addresses this gap by developing an ethnopedagogy-based learning media called "Culture Spinner" supported by Augmented Reality, specifically designed for teaching cultural diversity in elementary schools

Novelty, Research Gap, & Objective

Previous studies have shown that the use of Augmented Reality (AR) in learning can enhance students' motivation and understanding, while the ethnopedagogical approach is effective in integrating local cultural values into the learning process. However, studies that combine both approaches within a single, structured learning media are still limited, particularly for cultural diversity topics in elementary schools. In addition, most research still focuses on the general use of technology without developing specific, contextual, and student-appropriate learning media for elementary education. Therefore, this study offers novelty through the development of a learning media called "Culture Spinner" that integrates an

ethnopedagogical approach with Augmented Reality technology in an interactive way. This media not only functions as a visualization tool but also serves as a means of instilling local cultural values through contextual and engaging learning experiences. This study aims to develop an ethnopedagogy-based learning media supported by Augmented Reality on the topic of cultural diversity in elementary schools, as well as to examine the feasibility, practicality, and effectiveness of the media in improving students' understanding.

METHOD

Type and Design

This study employed a Research and Development (R&D) method. The development model used in this research was the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). ADDIE is an instructional system development model consisting of five sequential steps: Analyze, Design, Develop, Implement, and Evaluate, which serves as a systematic framework for producing effective learning solutions. In the ADDIE development model, the output of each stage becomes the input for the next stage, meaning that the process is carried out in a sequential and interconnected manner. The ADDIE model was originally developed by Walter Dick and Lou Carey for instructional system design. Research and Development (R&D) itself is a process or series of stages used by researchers to develop learning media.

Data and Data Sources

The subjects of this study consisted of 28 fifth-grade students at SD Islam Sultan Agung 3 Semarang. The class was composed of both female and male students. This study used two types of data sources, namely primary data and secondary data. Primary data were obtained directly through several data collection techniques, including semi-structured interviews with fifth-grade teachers and students at SD Islam Sultan Agung 3, direct observation of classroom learning activities, validation Culture Spinner media conducted by media experts, subject matter experts, language experts, and users (teachers and students), as well as learning achievement tests (pre-test and post-test). Primary data were used to obtain an authentic description of the learning process, media feasibility, teacher and student responses, and the effectiveness of the developed media. Meanwhile, secondary data were obtained from various written sources relevant to the study, including scientific journal articles, textbooks, previous research findings, and other references supporting the theoretical and methodological aspects of this research.

Quantitative data on product feasibility were obtained from media experts who evaluated five aspects through 22 indicators using a Likert scale. Subject matter experts evaluated five aspects through 19 indicators using a Likert scale, while language experts also evaluated five aspects through 19 indicators. In addition, this study collected quantitative data on teacher responses to the developed media, which was implemented and evaluated across five aspects

through 16 indicators using a Likert-scale questionnaire. Student responses to the media were also collected, evaluating five aspects and 15 indicators. To test product effectiveness, this study used pre-test and post-test instruments, and the results were analyzed using the N-gain score. Product validation involved three experts: a media expert, a subject matter expert, and a language expert. The media expert was a lecturer in elementary school teacher education with experience in technology-based media research and development at the university level. The subject matter expert was a senior elementary school teacher with a master's degree, while the language expert was a lecturer in Indonesian language and literature education experienced in developing learning media for elementary school students. All three validators were selected based on their competence and expertise in their respective fields to assess the developed media.

Quantitative data on product feasibility were obtained from a media expert who evaluated five aspects through 22 indicators using a Likert scale. The subject matter expert evaluated five aspects through 19 indicators using a Likert scale, while the language expert also evaluated five aspects through 19 indicators. In addition, this study collected quantitative data on teacher responses to the developed and implemented learning media, which were assessed across five aspects through 16 indicators using a Likert-scale questionnaire. Student responses to the media were also evaluated across five aspects and 15 indicators. To measure product effectiveness, this study used pre-test and post-test instruments, and the results were analyzed using the N-gain score. Product validation involved three experts, namely a media expert, a subject matter expert, and a language expert. The media expert was a lecturer in elementary school teacher education with experience in technology-based learning media research and development at the university level. The subject matter expert was a senior classroom teacher with a master's degree, while the language expert was a lecturer in Indonesian Language and Literature Education with experience in developing learning media for elementary school students. All three validators were selected based on their competence and expertise in their respective fields to assess the developed learning media.

Data Collection Technique

Data collection in this study was conducted at SD Islam Sultan Agung 3 Semarang, involving teachers and students as research subjects. Various instruments were used to obtain comprehensive data related to the feasibility, practicality, and effectiveness of ethnopedagogy-based learning assisted by Augmented Reality (AR) in the topic of cultural diversity. Product validation was carried out by media experts, subject matter experts, and language experts using a Likert-scale questionnaire. Media expert validation focused on visual aspects (display), technical and media engineering aspects, interactivity, the alignment of the media with ethnopedagogical principles, and usability feasibility. Meanwhile, subject matter expert validation emphasized content relevance, accuracy and depth of material, ethnopedagogical content, presentation of material within the AR media, and readability of

the language used. In addition, language experts assessed language appropriateness, clarity of information, grammatical accuracy, readability, and the overall language feasibility of the developed media.

Furthermore, teacher response questionnaires were used to collect data on the practicality of the media and its suitability for classroom learning processes. Student response questionnaires were used to determine students' acceptance level, engagement, and learning experience after using the "Culture Spinner" learning media. To measure the effectiveness of the media, pre-test and post-test assessments were conducted. The pre-test was administered before the implementation of the media to determine students' initial abilities, while the post-test was given after the use of the media in learning activities. The test results were then statistically analyzed to determine the significance of learning improvement as a result of using the developed learning media.

Data Analysis

Data analysis in this study used both qualitative and quantitative approaches. Quantitative analysis was conducted on data from the validation results of media experts, subject matter experts, and language experts obtained through Likert-scale questionnaires. The assessment results were analyzed by calculating percentages to determine the feasibility level of the ethnopedagogy-based learning media assisted by Augmented Reality (Culture Spinner). The feasibility level of the media was based on several aspects, including visual appearance, technical and media engineering aspects, interactivity, alignment with ethnopedagogical principles, and usability. A qualitative descriptive approach was used to interpret non-numerical data obtained from validation results and user responses to the developed learning media. The assessment results from each expert were compiled and grouped based on the evaluated aspects, including media design, content quality, ease of use, and material comprehension. Subsequently, the obtained scores were converted into percentage form to determine the overall feasibility level of the learning media. Data interpretation was conducted descriptively to identify the strengths and limitations of the developed media.

The data analysis technique was derived from the scores obtained from the evaluations or validations of media experts, subject matter experts, and language experts, with the following criteria: (See Table 1).

Table 1. Validation Scores

Category	Score
Very Good	5
Good	4
Fair	3
Poor	2
Very Poor	1

Based on the scores obtained from the media expert above, the data can be processed as follows:

$$\text{Suitability (\%)} = \frac{\text{scores obtained}}{\text{Maximal Skor}} \times 100\%$$

The media feasibility rating is calculated based on the scores given by the media expert, subject matter expert, and language expert using the following criteria: (See Table 2).

Table 2. Media Validity and Practicality Categories

Percentage	Validity Criteria	Practicality Criteria
85-100	Highly Feasible	Very Practicality
70-84	Suitable	Practical
55-69	Fairly Acceptable	Fairly Practical
40-54	Less Acceptable	Less Practical
<40	Not Suitable	Not Practical

Improvements in both types exams were analysed using the N-gain formula

$$N - \text{Gain} = \frac{\text{skor posttes} - \text{skor pretest}}{\text{skor maksimum ideal} - \text{skorpretest}}$$

N-gain scores were categorised as high ($N\text{-gain} \geq 0.7$), moderate ($0.3 \leq N\text{-gain} < 0.7$), or low ($N\text{-gain} < 0.3$). The product is declared effective if the N-gain for both tests is at least moderate (≥ 0.3), and interest in spatial construction material increases with at least 80% of students reaching the 'High' category (≥ 6).

RESULTS

The Culture Spinner media is an interactive learning medium designed to present various cultural elements, such as traditional houses, traditional clothing, regional dances, and traditional musical instruments. This media is delivered in the form of an application that offers flexibility in use and operation. When students spin the spinner and scan the marker using a digital device, cultural objects appear in AR visual form. This media can encourage active student engagement, increase curiosity, and facilitate exploration-based learning. The Culture Spinner media was developed following the ADDIE stages (Analyze, Design, Development, Implementation, and Evaluation).

This learning media was tested by a media expert, a subject matter expert, and a language expert. The media expert in this study was a lecturer in Elementary School Teacher Education at Universitas Islam Sultan Agung. Meanwhile, the subject matter expert was a classroom teacher at SD Islam Sultan Agung 3 who had completed postgraduate education. In addition, the language expert was a lecturer in Indonesian Language and Literature Education at Universitas Islam Sultan Agung. The developed learning media product was then revised based on the comments and feedback provided by the experts during the research process.

The experts' suggestions and input were considered and used as a reference for improving and refining the product.

Media Expert Validation Results

The validation of the learning media was carried out by a media expert with competence in instructional design and educational technology. The validation process aimed to evaluate several aspects, including visual appearance, technical and media engineering quality, interactivity, alignment with ethnopedagogical principles, and the usability of the developed media. The results of the media validation are presented in Table 3 below.

Table 3. Result of Media Expert Validation

Evaluation Aspect	Total Score (Media Expert)	Maximum Score	Percentage
Visual Appearance	18	18	100%
Technical and Media Engineering	18	20	90%
Interactivity	16	16	100%
Alignment With Media Ethnopedagogical Principle	14	16	87,5%
Usability	16	16	100%
Total Score Obtained	82		
Maximum Total Score	88		
Score Percentage	93,18%		
Category	Highly Feasible		

Based on Table 3, the validation results from the media expert show that the developed Culture Spinner learning media is categorized as "very feasible" with a percentage of 93.18%. The evaluation was conducted across five main aspects, namely visual appearance, technical and media engineering, interactivity, alignment with ethnopedagogical principles, and usability.

In the visual appearance aspect, a score of 18 out of 18 was obtained, with a percentage of 100%. This result indicates that the media design has met very high-quality criteria. The assessment of this aspect was based on several indicators, including an attractive display that is appropriate for elementary school students' characteristics, proportional color selection, readability of text, neat and systematic layout of elements, and clarity of 3D object visualization. Therefore, the visual aspect of the developed Culture Spinner media is considered to meet the feasibility standards.

In the technical and media engineering aspect, a score of 18 out of 20 was obtained, with a percentage of 90%. This result indicates that the developed media falls into the "very

feasible” category. The assessment in this aspect included several indicators, namely ease of use of the application, system smoothness in running features, media responsiveness to user interaction, compatibility with the devices used, and application stability during the learning process. Thus, in terms of technical quality and engineering, the developed Culture Spinner media has met the feasibility criteria and can be effectively used to support the learning process.

In the interactivity aspect, a score of 16 out of 16 was obtained, with a percentage of 100%. This result indicates that the developed media is categorized as “very feasible.” The evaluation of this aspect included the media’s ability to respond to user actions, the ease of interaction between users and the system, and the availability of features that support active student engagement in the learning process. Thus, the Culture Spinner media is capable of creating an interactive learning experience and encouraging active student participation.

In the aspect of alignment with ethnopedagogical principles, a score of 14 out of 16 was obtained, with a percentage of 87.5%. This result indicates that the developed media falls into the “very feasible” category. The assessment of this aspect included the integration of local cultural values within the media, the relevance of learning materials to students’ daily life contexts, and the media’s ability to introduce and preserve regional culture. Thus, the Culture Spinner media has successfully integrated ethnopedagogical elements into the learning process, thereby supporting the strengthening of students’ character and cultural understanding.

In the usability aspect, a score of 16 out of 16 was obtained, with a percentage of 100%. This result indicates that the media is categorized as “very feasible.” The evaluation of this aspect included the ease of use of the media for both students and teachers, the clarity of usage instructions, and the suitability of the media for classroom learning activities. Thus, the developed media is considered practical and easy to use, thereby effectively supporting the learning process.

Subject Matter Expert Validation Results

The validation results from the subject matter expert were obtained through an assessment instrument completed by the expert. The scores obtained from the subject matter validation are presented in Table 4 below.

Table 4. Result of Subject Matter Expert Validation

Evaluation Aspect	Total Score		
	(Material Expert)	Maximum Score	Percentage
Content Relevance	15	16	93,75%
Accuracy and Depth of Material	14	16	87,75%
Ethnopedagogical Content	14	16	87,5%

Presentation of Material And AR Media	13	16	81,25%
Language and Readability	11	12	91,67%
Total Score Obtained	67		
Maximum Total Score	76		
Score Percentage	88,16%		
Category	Highly Feasible		

Based on Table 4, the validation results from the subject matter expert indicate that the developed Culture Spinner learning media is categorized as “very feasible” with a percentage of 88.16%. The assessment was conducted across five main aspects, namely content relevance, accuracy and depth of the material, ethnopedagogical content, presentation of material in the Culture Spinner media, and language and readability.

In the content relevance aspect, a score of 15 out of 16 was obtained, with a percentage of 93.75%. This result indicates that the presented material is aligned with learning outcomes, learning objectives, elementary school students’ characteristics, and the local cultural context based on ethnopedagogy.

In the accuracy and depth of the material aspect, a score of 14 out of 16 was obtained, with a percentage of 87.5%. This indicates that the presented material demonstrates conceptual accuracy, factual correctness of cultural examples, appropriate depth of content in accordance with elementary school students’ cognitive level, and relevance of the material to students’ daily life experiences.

In the ethnopedagogical content aspect, a score of 14 out of 16 was obtained, with a percentage of 87.5%. The evaluation of this aspect included the media’s ability to reflect local wisdom values, instill attitudes of tolerance and appreciation of cultural diversity, ensure the relevance of local culture to national culture, and support the development of students’ character formation.

Next, in the aspect of material presentation in the Culture Spinner media, a score of 13 out of 16 was obtained, with a percentage of 81.25%. This result indicates that the material presentation in the Culture Spinner media has been clearly structured, supported by the alignment between AR objects and learning content, clarity of narration or explanations, and integration between text, visuals, and 3D objects.

In the language and readability aspect, a score of 11 out of 12 was obtained, with a percentage of 91.67%. This indicates that the language used in the media is in accordance with Indonesian language rules, easy to understand for elementary school students, and composed of short, clear, and unambiguous sentences.

Overall, the results of the subject matter expert validation indicate that the developed Culture Spinner media has met the criteria for content feasibility and is appropriate for use in the learning process without requiring significant revisions.

Language Expert Validation Results

The validation results from the language expert were obtained through an assessment instrument completed by the expert. The scores obtained from the language validation are presented in Table 5 below.

Table 5. Result of Language Expert Validation

Evaluation Aspect	Total Score (Language Expert)	Maximum Score	Percentage
Language Appropriateness	16	16	100%
Clarity Information	14	16	87,5%
Accuracy of Language Rules	15	16	93,75%
Readability	9	12	75%
Language Feasibility	16	16	100%
Total Score Obtained	70		
Maximum Total Score	76		
Score Percentage	92,11%		
Category	Very Feasible		

Based on Table 5, the validation results from the language expert show that the developed Culture Spinner media obtained a percentage of 92.11%, which falls into the “very feasible” category. The assessment was conducted across five main aspects, namely language appropriateness, clarity of information, accuracy of language rules, readability, and language feasibility.

In the language appropriateness aspect, a score of 16 out of 16 was obtained, with a percentage of 100%. This result indicates that the language used in the media is appropriate for the characteristics and developmental level of elementary school students. The vocabulary, sentence structure, and presentation of the material are considered suitable for students’ level of comprehension.

In the clarity of information aspect, a score of 14 out of 16 was obtained, with a percentage of 87.5%. The assessment of this aspect included the clarity of information delivery, the accuracy of instructions for using the media, and students’ ease in understanding the presented material. This result indicates that the information in the media has been well conveyed and is easy for users to understand.

In the accuracy of language rules aspect, a score of 15 out of 16 was obtained, with a percentage of 93.75%. This result indicates that the language used in the media is in accordance with proper Indonesian language rules, including correct spelling, punctuation, and sentence structure.

Next, in the readability aspect, a score of 9 out of 12 was obtained, with a percentage of 75%. The assessment of this aspect included the ease of reading the text, the font size used, and the clarity of text presentation in the media. Although it falls into the feasible category, the readability aspect still requires minor improvements to ensure that the text in the media is easier to read for elementary school students.

In the language feasibility aspect, a score of 16 out of 16 was obtained, with a percentage of 100%. This result indicates that the language used in the media is overall appropriate for use in the learning process and supports the achievement of learning objectives.

Overall, the results of the language expert validation indicate that the developed Culture Spinner media has met the criteria for language feasibility and can be used in the learning process without requiring significant revisions.

Teacher Response Results

The teacher response results were obtained from questionnaire scores filled in by the fifth-grade teacher as their response to the learning process. The obtained scores are presented in Table 6 below.

Table 6. Learning Assessment Results from Teacher

Assesment Aspect	Total Teacher Assessment	Maximum Score	Percentage
Content Relevance	20	20	100%
Design and Media Appearance	20	20	100%
Interactivity	15	15	100%
Language	10	10	100%
Usefulness	15	15	100%
Total Score Obtained	80		
Maximum Total Score	80		
Score Percentage	100%		
Category	Very Practical		

Based on Table 6, the teacher's assessment of the developed Culture Spinner media obtained a percentage of 100%, categorized as "very practical." The evaluation was conducted across five main aspects, namely content relevance, media design and appearance, interactivity, language, and the usefulness of the media in the learning process.

In the content relevance aspect, a score of 20 out of 20 was obtained, with a percentage of 100%. This result indicates that the material presented in the media is aligned with learning outcomes, learning objectives, and elementary school students' characteristics. In addition, the content is considered relevant to the learning context and easy for students to understand.

In the design and media appearance aspect, a score of 20 out of 20 was obtained, with a percentage of 100%. The evaluation of this aspect included the attractiveness of the media display, appropriateness of color selection, layout of components, clarity of object visualization, and ease of navigation in using the media. This result indicates that the media has an attractive design and effectively supports the learning process.

In the interactivity aspect, a score of 15 out of 15 was obtained, with a percentage of 100%. This result indicates that the media is capable of providing an interactive learning experience through active student engagement in using the features of the Culture Spinner media. The media is also considered effective in increasing students' attention and participation during the learning process.

In the language aspect, a score of 10 out of 10 was obtained, with a percentage of 100%. This indicates that the language used in the media is appropriate for elementary school students' developmental level, easy to understand, communicative, and follows proper Indonesian language rules.

Next, in the usefulness aspect, a score of 15 out of 15 was obtained, with a percentage of 100%. The evaluation of this aspect included the benefits of the media in helping teachers deliver the material, increasing students' learning motivation, facilitating conceptual understanding, and supporting the creation of more engaging and meaningful learning experiences.

Overall, the teacher's assessment results indicate that the developed Culture Spinner media has met the feasibility criteria and is highly suitable for use in the elementary school learning process.

Student Response Results

The student assessment was conducted by all fifth-grade students. The results of the student evaluation were used to examine the suitability of the learning media. The student assessment results are presented in Table 7 below.

Table 7. Student Response Questionnaire Results

Aspect	Total Students	Maximum Score	Percentage
Assessment	Score		
Interest	12	12	100%
Ease of Use	12	12	100%
Material	12	12	100%
Understanding			

Learning Motivation	10	10	100%
Usefulness	12	12	100%
Total Score Obtained	58		
Maximum Total Score	58		
Score Percentage	100%		
Category	Very Practical		

Based on Table 7, the results of the student response questionnaire toward the Culture Spinner media obtained a percentage of 100%, categorized as “very practical.” The assessment was conducted across five main aspects, namely interest, ease of use, understanding of the material, learning motivation, and the usefulness of the media.

In the interest aspect, a score of 12 out of 12 was obtained, with a percentage of 100%. This result indicates that the developed Culture Spinner media is able to attract students’ attention and interest during the learning process.

In the ease of use aspect, a score of 12 out of 12 was obtained, with a percentage of 100%. This indicates that the Culture Spinner media is easy for students to use, both in operating the application and in understanding the features available in the learning media.

In the material understanding aspect, a score of 12 out of 12 was obtained, with a percentage of 100%. This result indicates that the Culture Spinner media is able to help students understand the material more easily through object visualization and an engaging presentation of the content.

In the learning motivation aspect, a score of 10 out of 10 was obtained, with a percentage of 100%. This indicates that the use of the Culture Spinner media can increase students’ enthusiasm and motivation in participating in the learning process.

Next, in the usefulness aspect, a score of 12 out of 12 was obtained, with a percentage of 100%. The assessment of this aspect shows that the Culture Spinner media provides positive benefits in supporting the learning process, increasing student engagement, and helping students understand the material more effectively.

Overall, the student response results indicate that the developed Culture Spinner media is highly practical for use in the elementary school learning process.

Media Effectiveness Test Results

This trial was conducted to determine the effectiveness of the media in improving students’ learning outcomes. This was done by administering a pre-test before learning using the instructional media and a post-test after learning using the instructional media.

Tabel 8. Dependent T-test for Pre-Test and Post-Test Data

Variable	N	Mean	Mean Difference	Calculated t	df	Sig. (2-tailed)	Description
Pretest	28	60.71	22.43	18.52	27	0.000	Significant

Posttest	28	83.14
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Based on Table 8, the results of the dependent t-test showed a significant difference between students' pretest and posttest scores after using the Culture Spinner Media. The mean score increased from 60.71 in the pretest to 83.14 in the posttest, with a mean difference of 22.43. The obtained significance value was 0.000 (<0.05), indicating that the developed learning media had a significant effect on improving students' learning outcomes. Therefore, the Culture Spinner Media is considered effective for use in elementary school learning.

Tabel 9. N-Gain Pretest and Posttest of Learning Outcomes

Number Of Students	Average Pretest Score	Maximum Pretest Score	Average Posttest Score	Maximum Posttest Score	N- Gain	Category
28	60.71	100	83.14	100	0,57	Medium

Based on Table 9, the results of the N-Gain analysis showed an N-Gain score of 0.57, which falls into the medium category. The average pretest score increased from 60.71 to 83.14 in the posttest after students used the Culture Spinner media. These results indicate that the developed learning media was effective in improving students' learning outcomes at a moderate level.

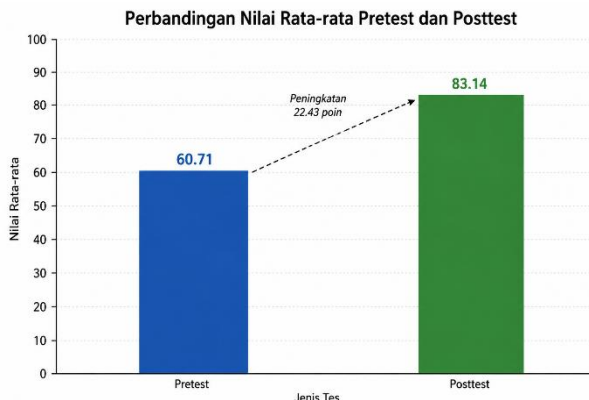


Figure 1. Graph of Students Average Test Scores

The graph shows a comparison of students' average pre-test and post-test scores. Based on the graph, the average pre-test score was 60.71, while the average post-test score increased to 83.14. This improvement indicates a difference of 22.43 points after students participated in the learning process. These results demonstrate that the implemented learning process was able to significantly improve students' knowledge achievement. Therefore, it can be concluded that the treatment or learning media applied is effective in improving students' learning outcomes.

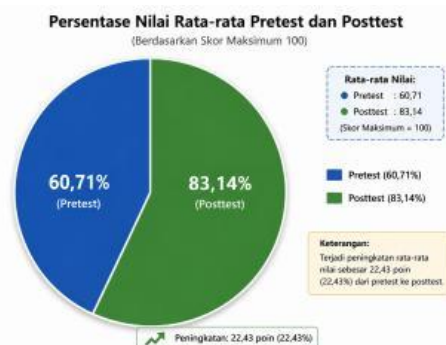


Figure 2. Graph of the Percentage of Students Knowledge Test Mastery

Based on the pre-test results, out of 28 students, 16 students achieved scores above the minimum mastery criteria (KKM), while the remaining 12 students obtained scores equal to or below the KKM. These results indicate that students' initial ability regarding the cultural diversity material was still not optimal. The relatively low pre-test scores suggest that students' initial understanding of the learning material was limited before the implementation of the Culture Spinner learning media. Therefore, the use of innovative and interactive learning media is needed to help improve students' understanding and learning outcomes.

Based on the post-test results, out of 28 students, 25 students (89.29%) achieved scores above the minimum mastery criteria (KKM), while 3 students (10.71%) scored below the KKM. These results indicate that most students have achieved learning mastery after participating in the learning process using the Culture Spinner media. The dominance of scores above the KKM shows an improvement in student learning outcomes following the implementation of the developed learning media. Thus, the learning process can be considered effective in helping students achieve the expected learning competencies.

Product Revision

Based on the comments and suggestions provided by the media expert, the product was revised in accordance with the validator's feedback. The suggestions and revisions are presented in Table 10 below.

Table 10. Revisi Produk

Comments and Suggestions	Revision
The media title color is less contrasting with the background	Adjusted the font color and background of the media title
The questions in the orientation menu are still less engaging	Added guiding questions in orientation menu
Navigation buttons in the media are less prominent	Added highlighting to the media navigation buttons
The AR object display needs to be clearer	Improved the clarity of AR object visualization in the Culture

	culture spinner media
Instructions for using the media	Added simpler and clearer
are still unclear	usage instructions

DISCUSSIONS

This study aims to develop an ethnopedagogical learning media using Augmented Reality, namely the Culture Spinner, for teaching cultural diversity in elementary schools. The integration of culture-based learning media such as the Culture Spinner within an ethnopedagogical approach combined with Augmented Reality technology has been proven to improve students' learning outcomes, particularly in Pancasila (Rohani et al., 2025; Sadila et al., 2024). The Culture Spinner media is able to increase students' active participation and engagement by providing interactive learning experiences through the manipulation of virtual objects and the exploration of concepts in a concrete and meaningful. In addition, the Culture Spinner media helps address the issue of low learning outcomes in Pancasila Education at schools, which is caused by students' limited understanding of learning concepts, particularly in cultural diversity material, as AR provides concrete visualization and interactive learning experiences.

The Culture Spinner media, supported by the Assemblr application, was developed through several stages using the Research and Development (R&D) method with the ADDIE model, namely analysis, design, development, implementation, and evaluation. The Culture Spinner media can be accessed using an Android smartphone. The low level of conceptual understanding and students' learning outcomes in cultural diversity material in elementary schools prior to the use of the Culture Spinner media was caused by the dominance of conventional teaching methods that were less varied and lacked visualization. Learning that relied solely on textbooks and verbal explanations made it difficult for students to understand cultural concepts that are abstract and contextual. The learning process in elementary schools still often used printed media and was teacher-centered, resulting in low student engagement and limited understanding of the material. Therefore, innovation in technology-based learning media such as Culture Spinner is needed to address these issues, as AR is capable of presenting interactive three-dimensional visualizations that help students understand cultural concepts in a more concrete and meaningful way. The final product of the developed Culture Spinner media consists of several components, namely (1) home page; (2) menu; (3) learning materials; (4) practice questions; (5) concept map; (6) introductory learning video; and (7) content section (consisting of material descriptions, traditional houses, traditional clothing, ethnic groups, and regional musical instruments).

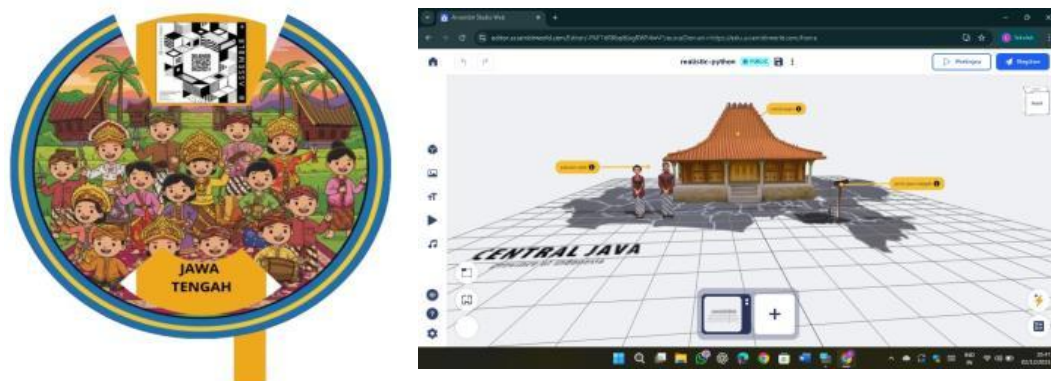


Figure 3 & 4. Design Media

Figure 3. Design Culture Spinner

Practicality and Effectiveness Product Validity

In terms of product validity, the assessment results from the media expert, subject matter expert, and language expert indicate that the developed Culture Spinner media has a very high level of feasibility and appropriateness. The media expert validation confirmed that the developed media possesses good quality in terms of visual appearance, design, and ease of use, making it suitable for implementation in the learning process. Meanwhile, the subject matter expert validation suggested adding more examples relevant to students' daily lives and connecting the concepts more explicitly with meaningful learning approaches. In addition, the language expert recommended simplifying sentence structures and ensuring that the vocabulary used is appropriate for students' age levels, while complex terms should be explained using simpler language. These findings are in line with previous studies stating that validation by media experts, subject matter experts, and language experts is an important stage in ensuring the quality, feasibility, and effectiveness of learning media before its implementation in the classroom (Putu et al., 2024).

In terms of product practicality, the results of teacher and student responses indicate that the Culture Spinner media is easy to use, relevant to the learning material, time-efficient, and contextual to classroom learning needs. Teachers assessed that the media could support the learning process and facilitate students' active engagement. Student responses also demonstrated a high level of media acceptance, particularly in terms of visual appearance, ease of use, and clarity of instructions. These findings indicate that the media is not only theoretically feasible but also practical for implementation in real classroom learning situations. This finding is in line with the opinion of (Lee et al., 2021), who stated that application-based learning media should fulfill aspects of ease of use, ease of memorability, low error rates, and user satisfaction.

In terms of product effectiveness, the trial results showed an improvement in students' learning outcomes after using the Culture Spinner media. The increase in pre-test to post-test scores, as well as the N-Gain score which falls into the medium category, indicates that this media is effective in improving students' understanding of cultural diversity material.

In addition, the use of the Culture Spinner media was also able to enhance students' abilities and enthusiasm, as reflected in their active involvement in discussions, media exploration, and task completion both independently and in groups. These findings are consistent with previous studies showing that the use of Culture Spinner learning media can significantly improve students' learning outcomes and encourage active engagement in the learning process (Saputra et al., [2024](#)).

The Learning Process with AR Media Using The Culture Spinner

Pancasila Education learning, particularly on the topic of cultural diversity in elementary schools, requires students to understand concepts that are abstract and contextual in nature. This often creates difficulties for students in recognizing cultural diversity, understanding the values embedded within it, and relating these concepts to their daily lives (Pandhini., [2025](#)). Therefore, learning media that can present materials in a concrete, engaging, and meaningful manner are needed. The use of Augmented Reality (AR)-based learning media is considered a relevant solution because it enables cultural objects to be displayed in three-dimensional visual forms that can be rotated, enlarged, and observed from various perspectives, thereby helping students understand the concept of cultural diversity in a more realistic and contextual way. In this study, the AR media was developed in the form of a Culture Spinner integrated with an ethnopedagogical approach, so that it not only presents cultural visualizations but also connects them with local wisdom values closely related to students' daily lives. In addition, the Culture Spinner media was implemented using a learning approach that emphasizes active student engagement, where students are encouraged to observe cultural objects, ask questions, explore information, and draw conclusions based on the learning experiences they obtain. This approach is aligned with the characteristics of both Augmented Reality and ethnopedagogy, which equally promote interactive, contextual, and meaningful learning.



Figure 4. Observing Cultural Objects



Figure 5. Discussion of Observation Result



Figure 6. Learning Process



Figure 7. Discussion Results

Figure 4 shows students observing the Culture Spinner media through smartphone devices. At this stage, students were guided to explore cultural objects visually and interactively so that they could connect learning concepts with real three-dimensional representations. These observation activities helped students build an initial understanding of the material through a more contextual learning experience. The use of this media provided students with opportunities to observe object details more clearly, thereby increasing students' focus, curiosity, and active engagement during the learning process.

Figure 5 illustrates students engaging in discussions and completing worksheets based on the results of their observations of the previously explored media. At this stage, students began identifying important information, recording their findings, and formulating answers based on the visual data obtained from the learning media. The teacher acted as a facilitator who guided students in connecting their observations with the learning concepts being studied, thereby making the learning process more directed and meaningful.

Figure 6 shows the learning atmosphere when the teacher provided guidance, explanations, and reinforcement of the material to all students. At this stage, the teacher facilitated students in presenting the results of their exploration and discussing the findings obtained during the use of the Culture Spinner media. Interaction between the teacher and students occurred actively through question-and-answer sessions and the exchange of opinions. These activities reflect that the use of interactive media is able to create a more communicative and participatory learning environment, thereby supporting the improvement of students' conceptual understanding comprehensively. This finding is consistent with the study by (Masruroh et al., [2023](#)) which states that AR-based learning media are effective in improving students' conceptual understanding because they are able to provide more concrete, interactive, and engaging visualizations in the learning process.

Figure 7 illustrates the presentation of discussion results and learning conclusions in front of the class. This activity demonstrates that the Culture Spinner media not only supports conceptual understanding but also helps develop students' communication skills, collaboration, and self-confidence. Thus, the implementation of the Culture Spinner media is

able to create a more active, contextual, and meaningful learning experience for students (Culturally & Teaching, [2025](#)).

Student Responses to the Developed Media

Based on the results of the student response questionnaire presented in Table 7, all aspects obtained a percentage of 100%, including the aspects of interest, ease of use, material understanding, learning motivation, and media usefulness. These results indicate that the developed learning media falls into the “very practical” category and was very well received by students during the learning process.

In the interest aspect, students showed very positive responses toward the media appearance, colors, and engaging visual presentation. The interactive media display was able to increase students’ attention and focus during the learning process. Which states that attractive visual design in learning media can increase students’ learning interest and positive perceptions toward digital media.

In the ease of use aspect, the 100% percentage indicates that students were able to use the media easily and understand the provided instructions. The clarity of navigation and instructions helped students operate the media independently. This finding is supported by the study of, which states that clear usage instructions are an important factor in increasing the practicality of technology-based learning media, especially for elementary school students.

In the material understanding aspect, all students gave very positive responses to the presentation of the material in the media. The media was able to help students understand learning concepts through illustrations and visualizations that were appropriate to the characteristics of elementary school students. In addition, in the learning motivation aspect, the media was considered capable of increasing students’ enthusiasm and engagement during the learning process. This finding is in line with the study, which states that technology-based interactive learning media can significantly improve students’ learning motivation.

The usefulness aspect also obtained a perfect percentage, indicating that the learning media was considered highly helpful in supporting the learning process. Overall, the results of the student response questionnaire indicate that the developed media is highly practical to use, engaging, easy to understand, and capable of increasing students’ learning motivation.

CONCLUSION

This study produced an ethnopedagogical learning media assisted by Augmented Reality, namely the Culture Spinner, for fifth-grade elementary school students on the topic of cultural diversity. The validation results from media experts, subject matter experts, and language experts indicate that the Culture Spinner media is highly suitable for use in Pancasila Education learning. The results of teacher and student responses also show that learning using the Culture Spinner is highly practical, easy to use, engaging, and beneficial in the learning process. The effectiveness test demonstrated that the use of the Culture Spinner media had a

significant effect on improving students' learning outcomes, as indicated by the difference between pre-test and post-test scores with a significance value of < 0.05 . In addition, the N-Gain score of 0.57 falls within the medium category range, indicating that the Culture Spinner media is effective in improving students' understanding of cultural diversity material. Thus, the Culture Spinner media can be used as an innovative alternative learning medium to support Pancasila Education learning in elementary schools. The development of this media is still limited to the integration of ethnopedagogy and Augmented Reality. Further research is recommended to expand the scope of ethnopedagogical learning integrated with Augmented Reality and to test its effectiveness across various educational levels and broader learning contexts. Based on the conducted research, the following suggestions and recommendations are proposed for further development: 1) This media is expected to be registered for copyright protection, as this serves as a form of legal protection granted to the media developer in this study to obtain exclusive rights over the created media product. In this way, researchers can control the use of the developed media and obtain legal protection in the event of copyright infringement. 2) The learning media developed in this study is limited to the topic of cultural diversity. Therefore, it is expected that future researchers who develop ethnopedagogical learning media assisted by Augmented Reality will expand the material coverage to other topics in Pancasila Education.

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