

## Creating Augmented Reality Teaching Materials to Support a Local Wisdom-Based Curriculum in Secondary Schools

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### Abstract

*Teaching materials that integrate Augmented Reality for developing teaching and learning based on local wisdom in secondary schools are highly important. Students gain access to learning about their local wisdom, supporting the implementation of the curriculum. However, the lack of teaching materials to support the implementation of this core curriculum becomes a major obstacle for teachers. The method of this research utilizes a descriptive qualitative research method with the implementation of the conceptual framework by Freeman (1998). Data collection techniques include observations, interviews, and questionnaires from 130 students. Teachers, art practitioners, and students in Toraja city, South Sulawesi Province, are the samples of this research. The research results show that; (1) Teaching materials are incomplete, such as videos being unavailable; (2) Artwork dimensions dominate the conceptual framework analysis, while in the four frames analysis, both subjectivity and structural aspects appear frequently ; (3) Questionnaires show an average of 3.00 in students' recent understanding of their cultural wisdom ; (4) This research provides six steps to create Augmented Reality. Implementing Augmented Reality is beneficial for both teachers and students. It provides learning opportunities that support the implementation of the curriculum based on local wisdom..*

**Keywords:** Augmented Reality Local Wisdom Curriculum Teaching Material Secondary Schools.

429

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## INTRODUCTION

In this 21st-century education, the implementation of technology in teaching and learning is highly essential. Today's generation in secondary schools has spent more of their time on screens. This tendency could be used as a learning method that engages their learning process. Thus, implementing Augmented Reality (AR) in learning is a win-win solution for both teachers and students (Abdillah et al., 2020), (Ali et al., 2023) dan (Lah et al., 2024). There is no doubt that teaching with traditional methods is unattractive and does not engage students (Nurhikmah H et al., 2021) dan (Muhammad, 2024). As a result, students' motivation in learning is declining over time. Therefore, it is crucial to develop teaching materials that support the implementation of AR, as well as the content of its materials supporting multiculturalism, which represents students' diversity.

Teaching materials based on local wisdom support the implementation of the curriculum in multicultural societies. Providing students with a curriculum based on their cultural tradition is significant to improve students' awareness of their cultural heritage. This not only provides students with a relevant understanding of their cultural heritage but also improves their awareness of cultural values (Jayawardena, 2021) dan (Jessiman et al., 2022). Moreover, it is highly important for students to learn their cultural heritage in their curriculum because it relates to their environment. Students will have a greater opportunity to explore their cultural heritage, and they might be able to develop their cultural heritage in a way that reflects their local tradition (Salam et al., 2022), (Widiaty et al., 2015), (Dewi & Kuswanto, 2023) dan (Sudirman et al., 2020). For example, when students implement a curriculum based on their local wisdom, they will have a better understanding of the significance of their tradition. Hence, it will provide the locals with their symbolic aspect in their life. This not only improves their local values but also promotes the significance of their local tradition. One good example of this would be the implementation of cultural wisdom in Bali. Balinese have a tendency to implement their curriculum with their cultural values, and their assignments and projects in schools often represent their cultural traditions (Husain et al., 2020). Therefore, their knowledge and understanding of cultural values are implemented throughout their life, such as in their business, like interior design, and so on. Therefore, developing a curriculum based on local wisdom provides opportunities for development. Both teachers and students have the opportunity to create learning experiences that reflect their communities.

Secondary education provides opportunities to develop critical understanding in the early stages of development. Research on arts education shows that in the early stages of development,



students have the capacity to develop their understanding to a significant level of knowledge (Casler-Failing, 2024) dan (Ebbutt, 2002). Therefore, this period of development is crucial to provide students with relevant content for learning based on their local wisdom. There is no doubt that most schools have limited access to teaching materials that reflect students' cultural values. Even in one of the most diverse cultures, for example, in Indonesia, the availability of teaching materials based on local content is highly limited. Teachers tend to give lessons to students based on their understanding of the subject. Instead of using a curriculum that is relevant to their cultural background, most teachers teach their students with materials that are available to them. However, this tendency does not support the learning process that is relevant to students' needs, as teachers have no options. Most teachers have limited knowledge of writing teaching materials, and their understanding of cultural traditions is limited. Therefore, to tackle this issue, it is highly important to implement teaching material with AR with local wisdom. This will provide more opportunities for students to learn their cultural values and implement them at their level of development.

Teaching materials with AR are highly significant for developing students' understanding. First, students have the opportunity to explore emerging technologies; this will not only engage students in their curiosity but also give them a sense of a different method of learning (Azizoon et al., n.d.). Since students already have the tendency to use their smartphones, it would be better for them to use them for learning. Learning with teaching materials that utilize AR provides students access to different kinds of materials, from textbooks to videos. Moreover, videos that are available will reflect their learning process. This will assist students in following the instructions more effectively and successfully. When students learn with the assistance of text and videos, their cognitive abilities will be guided in certain ways to support their understanding to a greater extent.

Previous research has focused on developing teaching materials in science classes. Although, minimal studies on cultural aspects, especially integrating it into the curriculum in secondary schools (Pattaufi & Arnidah, 2019) dan (Pattaufi et al., 2023). Moreover, a limited number of researchers integrate technology, culture, and curriculum. This is unfortunate since early development should provide students with experiences that promote diversity. This is highly crucial for students to understand before they jump into a real-world experience. Having been in a world that is multicultural, it is highly significant to provide learning opportunities that promote different ethnicities, languages, and perspectives. Therefore, this research that emphasizes teaching materials with AR will provide many significant benefits for students in their life and provide new significant contributions to research.



The urgency of this research in secondary education is highly critical, since students in this early development need more relevant materials in their learning. Engaging students with emerging technologies will provide them with different methods of learning that benefit their life. Moreover, this research will provide a better method of learning for students with diverse ethnicities in schools. This research will provide learning models that support teachers to teach students based on their local wisdom. As a result, more and more students will have a greater understanding of their cultural background. This will improve their awareness of their cultural values, and they will better understand diverse cultures in secondary education.

## RESEARCH METHODS

This research is a qualitative research method with the implementation of the conceptual framework by Freeman 1998. Qualitative research methods are the best method for exploring cultural values that reflect oral traditions, as most cultural people have a tendency to record their culture in symbolic aspects that they practice in their life (Freeman, 2004). Most of the local wisdom is recorded by transmitting information orally from generation to generation. That is why the method of this research will employ observations and interviews in Toraja city. This city represents the most applicable cultural wisdom in their everyday lives. The sample of this research will include art practitioners, teachers, and 130 students in secondary schools. Data analysis will utilize the conceptual framework by Freeman (1998), which highlights the four important aspects of artist, artwork, audience, and the world.

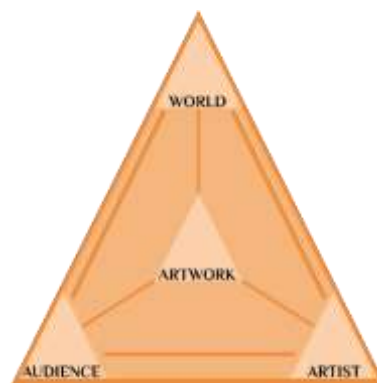


Figure 1. The conceptual framework

When analyzing the aspect of the artist, this method analyzes culture based on the perception of art practitioners. It is believed that every culture has its own traditional artists who hold their cultural values generation after generation. In Toraja, most of the artists who carve and

432

maintain their cultural traditions are represented by females. Moreover, when analyzing the artwork dimension, it is discussed in the context of cultural artifacts. This forms the foundation for providing students in secondary schools with an education based on their cultural artifacts. Following this, there is an important aspect of the audience and the world. The audience plays a significant role because it provides an understanding of the audience's tendency to view their traditions. Moreover, the world dimension analyzes the era in which the cultural tradition is lived. This dimension is the most crucial aspect of research because it requires extensive research and literature to support the understanding of cultural values (Makawi, n.d.). Finally, in data analysis, to improve the framework, the four frames are also added in data analysis to provide more detailed information. The four frames consist of Subjective, Cultural, Structural, and Postmodern (K. Maras, 2018). These four agencies are used to identify the characteristics of arguments to analyze the thinking process of certain individuals.

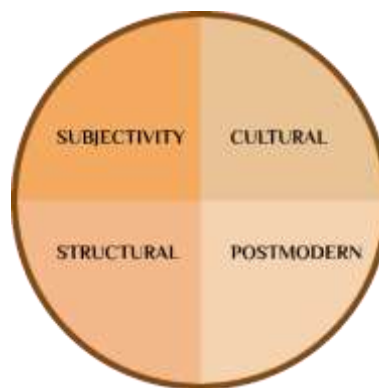


Figure 2. The Four Frames

## RESULTS AND DISCUSSION

The findings show that Toraja provides detailed information related to their cultural values from the art practitioners and art educators. The results begin by providing information related to the detailed situation in both regions. The first questions regarding the research are used to guide a better understanding of the context from arts educators and practitioners. This is crucial for providing detailed information related to the current conditions in both regions. Thus, the information is then used as a primary source to create the design of AR for students in schools. The results begin in Toraja, where information related to Toraja in general and how the research was conducted is provided in detail, followed by observation results. After that, the interview results are presented, and finally, the results of the questionnaires are shown based on students'

433

responses. Following this, the results show a prototype model of AR based on local culture in Toraja city. Both selected illustrations and the model of AR are shown to provide detailed information and results of the research.

**Tabel. 1 Information regarding interview relations to the conceptual frameworks and the four frames**

| No. | Questions                                                                                            | Conceptual Frameworks                                                                                                                                                                        | The Four Frames                                                                                                                                                 |
|-----|------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Do you have a teaching materials based on local wisdom?                                              | <b>Artworks:</b> teaching materials related to artwork that is used by teachers in their teaching. This gives information related to teachers approach.                                      | <b>Subjectivity:</b> teachers have tendency to teach students without proper source of teaching materials. And they end up using irrelevant teaching materials. |
| 2   | Where did you get your sources of teaching materials?                                                | <b>Artist :</b> teachers have a role as an artist who decide their materials.                                                                                                                | <b>Subjectivity:</b> often times teachers teach based on their subjectivity understanding.                                                                      |
| 3   | Do you use your local culture as a source of your information in class?                              | <b>Audience :</b> local culture represents audience agency which related to the society                                                                                                      | <b>Cultural:</b> this aspect is mandatory for teachers to teach their students based on their culture.                                                          |
| 4   | How important is teaching materials based on local culture being used in classrooms?                 | <b>Artworks:</b> local culture represents artwork agency representing the value of culturaleal wisdom                                                                                        | <b>Structural:</b> This information related to the meaning of cultural values for students to understand in schools.                                            |
| 5   | Do you think it is mandatory for teachers to provide students with recent development of technology? | <b>World:</b> from the perspective of the world, it is crucial for the teachers to understand recent development in technology. AR provides those approach in teaching that engage students. | <b>Post Modern:</b> It is essential for teachers to engage students with recent method, compare to traditional approach.                                        |



### Research in Toraja

First and foremost, research is conducted in Toraja Schools at SMP Negeri 1 Rantepao, then followed by cite visit in Tongkonan Toraja in *Adat Sa'dan*, Sa'dan region, North Toraja, on 25th of Juni 2024. The purpose of the research is to collect information from art educators who teach secondary students in schools. And to gain information from art practitioners to provide more detail information and to avoid any future misunderstanding. As for cultural wisdom, it is paramount to provide accurate information to be used in schools. The step is first observation in school, followed by cite visit in Tongkonan Toraja in *Adat Sa'dan*, Sa'dan region, then questioners from the students conducted online using google form. This stage is crucial for creating the design of Augmented Reality based on studentt cultural wisdom and their needs. This research is similar to the implementation of local culture into a technology.

### Toraja Observations

Observations in this research are paramount, as it collected information related to cultural values in Toraja. When conducting research related to cultural values, it is crucial to make sure that information collected is as accurate as possible. This research is related to previous findings that emphasizes the significance of meaning in culture (K. E. Maras, 2018) dan (Mustamin et al., 2023). Furthermore, conducting discussions with art practitioners and art teachers to provide detailed information is valuable to gain valid information on cultural values and norms. When conducting discussions, it is highly recommended to bring the discussion related to research questions that use specific guidelines. In this research we use the conceptual framework and the frames to gain relevant information.

**Table 2 Observations in Toraja**

| No | Observation                                                                         | Description                                                                                                                                                                                                                                                                                                                                                 |
|----|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  |  | First, observation in schools of Public Secondary Schools in Rantepao (SMP N 1 Rantepao). The observation consists of discussion and interview with teachers who teach art subject in schools. The results shows that teachers have teaching materials but lack of information and videos tutorials are not available. Although this is a very good result. |

|   |                                                                                    |                                                                                                                                                                                                                                                                                                                                                                    |
|---|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 |   | Second, teachers showcase their students' artworks, based on local wisdom. Here it is called <i>Kandaure</i> and represents cultural values in Toraja. At this point, there is no video tutorial nor any information to support teaching. In other schools' information is unavailable.                                                                            |
| 3 |   | Following this, the discussion between researchers and art practitioners and art teachers continues to discuss further the need of students in schools related to teaching material. The discussion results in more information related to symbolic meaning that is needed for students in schools.                                                                |
| 4 |  | Next, cite visit conducted in <i>Adat Sa'dan</i> , Sa'dan region, North Toraja, on 25th of Juni 2024. The purpose of this visit is to collect information related to symbolic meaning and images of ornament in Tongkonan House. As it can be seen that Tongkonan have many motif on wall, and every part of the Tongkonan, which make it special and outstanding. |

### Toraja Interview

#### Source 1 (Teacher 1):

In secondary school education, students are provided with learning materials aligned with the culture of Toraja. For instance, students create beadwork. However, this learning is conducted directly in class without any specific guides, related books, or instructional videos on making traditional Toraja beadwork.

#### Source 2 (Teacher 2):

At school, students are taught to draw using a modern visual arts approach. They are trained to draw portraits and landscapes. The materials provided are not related to the culture of Toraja. Once students can create realistic and aesthetically pleasing artworks, the learning objectives are considered achieved.

#### Source 3 (Artist 1):

I think it's very important to provide education about the ornaments of Toraja because they are a crucial cultural asset. Essentially, there are only four original ornaments, which have evolved over time into 130 ornaments. For example, the *Pa Barana* ornament must remain unbroken, and



for nobility, it must not be colored. Most carvings are further developed in the Ketekesu area.

**Source 4 (Artist 2):**

In my daily work creating highly realistic sculptures, I've observed a shift in the community. People who used to craft their own sculptures now rely more on professional artists, including visiting artists. Over time, the demand for realistic sculptures has increased, and the closer the resemblance to the original person, the more they are favored. In the past, Toraja *Tao-tao* sculptures had a rigid character, but now customers tend to request sculptures that closely resemble the deceased.

Based on the interviews, it is evident that artwork plays a significant role in Toraja culture, followed by the audience and world dimensions. Key terms associated with artwork include artwork representing Toraja culture, realistic and beautiful artworks, Toraja ornaments, and realistic sculptures. The audience dimension is highlighted in Source 4, emphasizing that most buyers prefer realistic sculptures. Meanwhile, the global dimension is addressed in Source 3, which notes the evolution of Toraja ornaments from four original designs to over 130.

Two frameworks emerge from the interviews: subjectivity and structural frameworks. Subjectivity is represented in Source 2, which mentions modern visual arts as a teaching approach instead of a curriculum based on local wisdom. The structural framework is prominently reflected in Toraja ornaments, created with symbolic significance tied to the cultural values of the Toraja people and commonly found in *Tongkonan* (traditional Toraja houses). Therefore, a suitable educational activity for students is the creation of *Kandaure* (traditional Toraja beadwork), as it holds practical daily use and greater cultural relevance. This findings is relevant to previous research conducted that describe the characteristics of South Sulawesi point of view (Makawi, 2023).

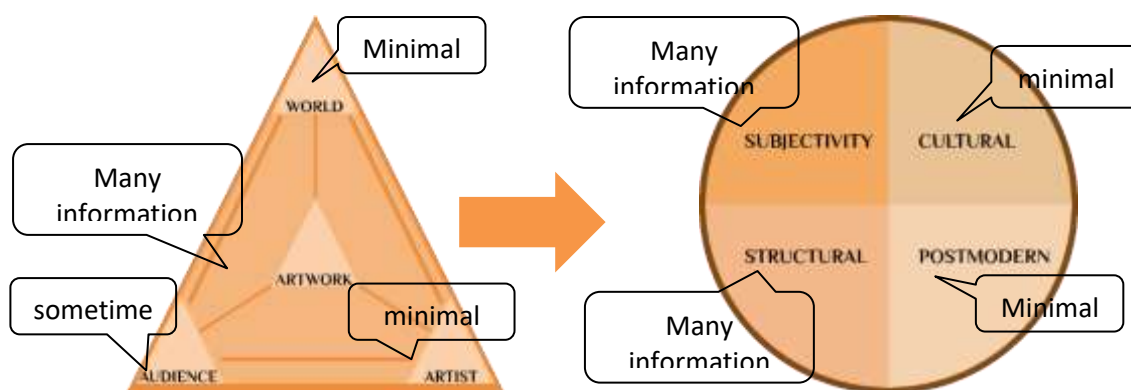


Figure 3. Representation of cultural views in Toraja.

**Toraja questioners results from the students.**

Questioners is valuable information that provides researchers with initial information to design relevant teaching materials for students. This questioner is collected from 130 students to test their prior knowledge about cultural wisdom in South Sulawesi. It is also important to bear in mind that Toraja consists of many ethnicities including Bone, Mandar, and Bugis Makassar, which is common in Toraja as a multicultural society. These findings illustrate the importance of AR in schools to engage students about their cultural differences. As for students, their average score is 3.00, which should be improved to at least 4.00. Previous research suggests that it is highly important to integrate local wisdom into schools curriculum (Yuendita & Dina, 2024), (Violinda et al., 2023) dan (Syahputra et al., 2019).

**Table 3. Questioners' results**

| <b>Understanding of Local Wisdom of Four Ethnicities</b> | <b>N</b> | <b>Mean</b> | <b>SD</b> | <b>MFN</b> | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> |
|----------------------------------------------------------|----------|-------------|-----------|------------|----------|----------|----------|----------|----------|
| Understacnding of <i>Bugis</i> Makassar Local Wisdon     | 130      | 3,16        | 0,95      | 3          | 6        | 22       | 56       | 37       | 8        |
| Understacnding of <i>Bugis</i> Bone Local Wisdon         | 130      | 2,56        | 1,19      | 2          | 26       | 43       | 34       | 16       | 10       |
| Understacnding of Toraja Local Wisdon                    | 130      | 2,62        | 1,01      | 2          | 16       | 49       | 38       | 22       | 4        |
| Understacnding of Mandar Local Wisdon                    | 130      | 2,37        | 1,23      | 1          | 42       | 28       | 41       | 8        | 10       |
| Importance of Preserving Local Wisdom in Modern Society  | 130      | 4,32        | 0,85      | 5          | 1        | 3        | 18       | 40       | 66       |



### Creating Design of Augmented Reality Based on Local Culture

Illustration model for school project (provide images of selection schools project (Songkok racca & Manik-manik)

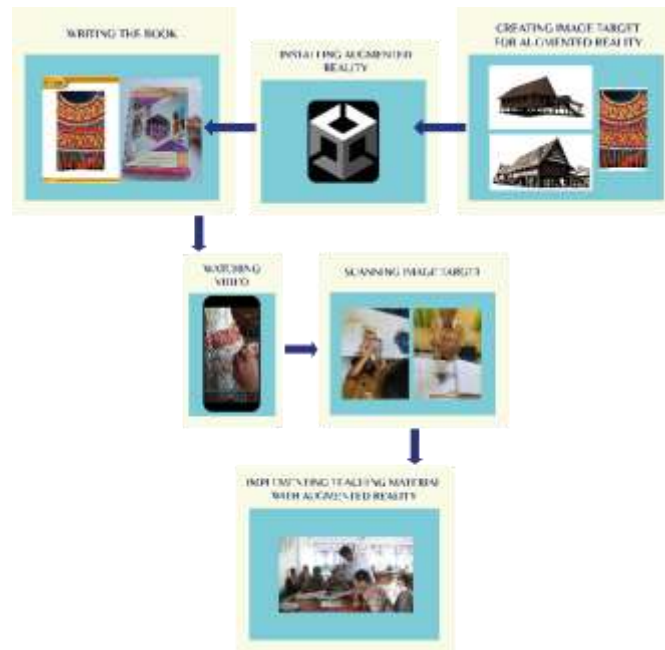


Figure 4. Design of Augmented Reality

Augmented Reality is designed to provide teaching materials with recent technology. To create this design, there are six steps that consist of: first, creating image target for augmented reality, secondly, installing AR, followed by writing the book that contain image target on it, so that when students scan the image videos will be available on their smartphone, next students will have the chance to scan on their mobile device, then videos will be available to assist their learning, and finally, the AR is ready to be implemented in schools.

### CONCLUSION

Teaching materials based on local wisdom are highly crucial as a teaching method in the classroom. This research is conducted in one of the most cultural cities in the world, Toraja. Students often study subjects without proper teaching materials and recent developments in technology. Thus, this research focused on developing teaching materials based on local culture. Results show that, first, teachers have teaching materials but lack information, such as the symbolic meaning and the reason why students need to learn the *Kandaure* as students' projects.

439

Next, videos are unavailable to assist students in their learning. After that, discussion results indicate that more information related to symbolic meaning is needed. Secondly, representation of cultural views in the conceptual framework is dominated by artwork dimensions, followed by audience, and minimal representation from world and artist dimensions. Meanwhile, in the four frames, subjectivity and structural aspects are shown in the interviews. Third, the students' questionnaires show that the 130 students have limited knowledge of cultural understanding, with an average cultural understanding score of only 3.00. Finally, six steps for designing AR, from creating image targets to implementation in the classroom, are available to provide a more comprehensive teaching method based on local wisdom. The availability of teaching materials will provide many benefits for both teachers and students.

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