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DESIGNING AUGMENTED REALTY (AR) TO EXPLAIN THE CHEMICAL COMPOSITION OF WAXES USED IN BATIK PRODUCTION BASED ON DIVERSITY

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Abstract

The use of technology in identification has become mandatory, including explaining the chemical composition of wax. This research aims to design the use of augmented realty (AR) to support the introduction of various batik patterns from various regions. Using the BDR (design-based research) method with stages of analysis, development, iterative and reflection. The results of this research understand that the chemical composition of wax (C), (H), (wax), and C_nH_{2n+2} can produce various batik patterns. This result is expected from the chemical wax to produce a variety of batik motifs from various regions, to increase awareness of Indonesia's cultural diversity. The diversity of batik patterns, which in the end can become a unique and unifying symbol in preserving ancestral cultural heritage.

Keywords: Augmented reality (AR), Batik production, Chemical composition, Diversity, Wax.

1. Introduction

Batik is Indonesia's cultural heritage which has become the nation's identity. The process of making batik which involves traditional techniques and materials, such as the use of candles, is an important aspect in maintaining the authenticity and value of batik art [1]. The wax in batik acts as a retainer for the colour which is applied to the fabric to form the motif. One technology that has the potential to be used is augmented reality (AR) [2]. AR technology allows combining virtual elements with the real world in real-time, thereby providing a more interactive and immersive experience. Through the AR application, people can understand the chemical composition of wax more clearly and in depth and understand the importance of traditional techniques in the batik making process.

The diversity of batik motifs from various regions helps increase awareness of Indonesia's cultural diversity [3]. Each batik motif contains different local wisdom values and preserves cultural riches. Batik production is able to increase perceptions of cultural diversity reflected in every piece of batik cloth from various regions in Indonesia. Therefore, explaining the chemical composition of batik production wax not only aims to increase technical understanding, but also to encourage appreciation of the diverse cultural heritage of the nation's ancestors.

The styles of each batik region in Yogyakarta, Cirebon, Pekalongan and Solo vary, distinguishing batik styles from the origin of each region, the diversity reflects the values of the various cultures, beliefs and lives of the people [4]. Overcoming challenges to create batik works and increasing interest in the art of batik, especially in the younger generation. The problem in making batik does not only involve the canting technique but also understanding the chemical composition: the chemical composition of wax (C), (H), (wax), and C_nH_{2n+2}.

Meanwhile, the melting point of paraffin: 50-60%, Beeswax: 20-30%, Damar/Resin: 10-20%, Coconut Oil: 5-10%. The composition of wax wax can melt at temperatures (usually around 60-70 °C), is sticky enough to stick to fabric, but is still easy to remove during the wax wax washing process after colouring is complete [5]. Table 1 shows several previous studies regarding the reproduction of batik diversity.

Based on a number of problems and initial studies, this article aims to develop AR technology as a means of collecting information related to problems and the use of technology in introducing a variety of batik patterns. Although there are many studies that have discussed the use of AR applications, the innovation offered in this research is the development of AR specifically to display batik patterns from various regions. In addition, this research includes validation results from experts regarding the quality of AR as well as trials on the use of AR in collecting information about various batik patterns, which are very important to preserve in each region.

2. Literature Review

The latest technology, systems, and sophistication as an augmented reality (AR) technology application that obtains real-time incorporation of the video to be displayed [6]. This technology provides a more immersive and interactive experience because it combines reality with the digital world to watch various videos [7]. Through various educational initiatives using applications and

socialization, it is hoped that batik will not only be preserved but also integrated in everyday life.

Table 1. Previous research.

No.	Title	Ref.
1	The role of corporate social responsibility on the relationship of competitive pressure and business performance of batik industry in Central Java, Indonesia.	[8]
2	Batik in Malaysia and Indonesia: A collaboration for reconciling issues of cultural heritage.	[9]
3	Social culture impact and value changes of batik tourism village: A case study of pesindon-Indonesia batik tourism Village.	[10]
4	Batik in Malaysia and Indonesia: A collaboration for reconciling issues of cultural heritage.	[11]
5	Heavy metal characteristics Of Wastewater from Batik Industry in Yogyakarta Area, Indonesia.	[12]
6	Readiness in implementing green industry standard for SMEs: Case of Indonesia's batik industry.	[13]
7	I Am in Prison, making batik, and you are visiting me: A postcolonial feminist perspective in interreligious Prison Educational and Missional Ministry for female inmates in Indonesia.	[14]
8	Accommodation of local wisdom in conflict resolution of Indonesia's urban society.	[15]
9	Kategori dan fungsi sosial teks cerita rakyat mayarakat Banjar Hulu: sebagai pengukuh warisan kebudayaan lokal bangsa.	[16]
10	Values of Indonesian unity principles in the diversity of Indonesian culture.	[17]

It is expected to better understand and appreciate the process of making batik as a valuable cultural heritage. Deeper knowledge of the history, meaning, and techniques of batik making, as well as the uniqueness of the diversity of patterns from each region including Yogyakarta, Pekalongan, Surakarta and Cirbon by increasingly realizing the importance of preserving and developing culture in diversity for the preservation of cultural heritage, is important in strengthening a sense of ownership, identity, togetherness, and tolerance in the community of various social studies on cultural heritage in Indonesia [18].

Local fabric products, such as batik techniques and motifs typical of each region can promote local textile wealth through the creative industry to encourage the utilization of natural materials and the application of traditional techniques in the manufacturing process [19].

The process of making batik, the materials used include malam/wax, which functions as a colour barrier on the fabric. The night is applied to the fabric to cover parts that do not want to be exposed to the dye, thus creating the desired patterns and motifs.

The use of malam is a traditional technique that characterizes the batik process [20]. The chemical composition of wax is the basic chemical raw material of carbon

(C) and hydrogen (H). Paraffin from wax is used as the main ingredient in the formation of candles. Wax has the chemical formula C_nH_{2n+2}, which is a mixture of chemicals from hydrocarbons can be seen in Table 2.

Table 2. Chemical composition of candles.

No	Ingredients	Chemical Content
1	The chemical basis of carbon	(C)
2	Hydrogen	(H)
3	Paraffin	(wax)
4	Candlelight Night	C_nH_{2n+2}

3.Method

This research uses the Design-Based Research (DBR) method to explore and design a model for using Augmented Reality (AR) that scans videos in an effort to preserve national identity through diversity. The stages carried out in this research are analysis, development, Iterative, Reflection, with DBR, the stage is the problem of batik as a historical cultural heritage. Making batik a very valuable heritage of various motifs and diverse pattern techniques reflects the beauty of Indonesian culture.

Through each motif, we can tell a story of life values, hopes, and dreams. By purchasing authentic batik products, we not only help the local economy, but also contribute to the preservation of techniques and knowledge passed down from generation to generation. This approach is relevant because cultural elements, including the various batik patterns from different regions, are interrelated. The needs analysis explains why it is easier to develop this model because developing an information model about the diversity of batik types will provide significant benefits to the community and the preservation of Indonesian culture.

So that this design is a solution to make it easier for people to recognize and distinguish the various styles of batik and make it easier to recognize them. The weaknesses of the development after being built are sufficient in expert validation, for further research.

4. Results and Discussion

The results of the application of Augmented Reality (AR) technology using the DBR (Design Based Research) process through the stages of Analysis, Design, Development, and Evaluation show the importance of understanding the needs in promoting batik techniques. This analysis is carried out to overcome the low interest in batik in order to achieve the goal of sustainable information with the help of technology. Some of the analysis results include: (i) Flow of Introduction to Preserve Cultural Diversity, (ii) Introduction of Batik Pattern Variety, (iii) Development of Preservation Program, (iv) Implementation and Benefits, (v) Utilization of Technology and Media, (vi) Monitoring & Evaluation, and (vii) Socialization and Promotion.

Problems that arise in this process should be identified and used as important information to provide appropriate solutions to facilitate continuous knowledge. One of the proposed developments is to create an application that is able to collect information from various sources in one metadata simultaneously even though it is done in different ways. Augmented Reality (AR) was chosen as an alternative to

collect problem data, which was inputted by several informants at once. This application is flexible and easy to use by anyone can be seen in Fig. 1.

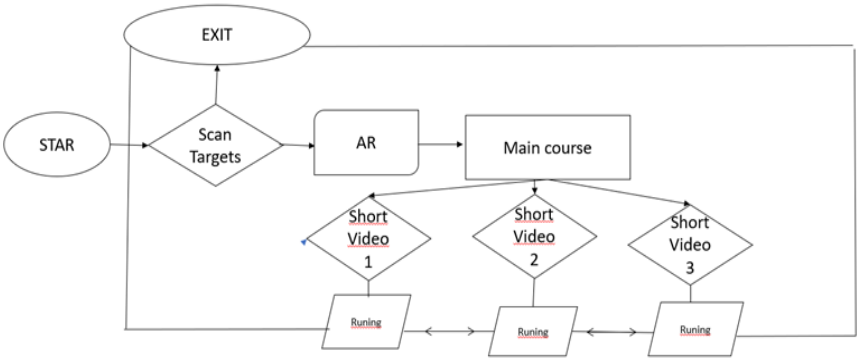

Fig. 1. Augmented reality (AR) technology.

AR design is designed to be in line with technological developments to ensure a simple and easy-to-use display. The information displayed in the application is in Fig. 2 users can easily access AR through simple steps, starting with downloading the application from the Play Store using an Android device. After the application opens, there is a camera selecting the SCAN ME option on the AR display and then clicking the START button, then selecting options. Next, you can choose Batik Material, Variety of Batik, or Indonesia Batik to see a video presentation of various information about batik.

The utilization of augmented reality (AR) technology aims to be a bridge that connects communication, needs, and solutions in order to take advantage of technological advances. It is hoped that the community will have a high awareness in maintaining and preserving the richness of batik patterns, so that a sense of pride in wearing Indonesian cultural heritage can grow.

The product results expected from the expert stage validation need reflection to be followed up because there are still shortcomings. Among them there is no back icon, volume icon, on the video display you have to see gradually starting from video 1, 2, and 3 so you have to watch until completion, there are shortcomings that can be carried out further research to develop and add further.

The use of technology with cultural recognition has become a necessity, including in explaining the chemical composition of wax used in batik making. This research aims to design the application of AR technology to support the introduction of various batik patterns from various regions in Indonesia. This research uses the design-based research (DBR) method which consists of the stages of analysis, development, iteration, and reflection. The chemical composition of wax, which includes the elements carbon (C), hydrogen (H), wax, and the structure C_nH2_{n+2}, contributes to the creation of a variety of batik patterns [21].

Hopefully, this understanding can produce a variety of batik motifs from various regions, increasing awareness of Indonesia's cultural diversity [22]. The positive impacts that can be taken as follows: Increased Creativity and Innovation, Cultural Preservation: The diversity of batik motifs from various regions can be further enriched. Increased Cultural Awareness: With a deeper understanding of

the process of making batik, people will be more aware and appreciate the diversity of Indonesian culture, especially regarding the distinctive batik patterns and motifs from each region. The diversity of batik motifs resulting from understanding the chemical composition of wax can serve as a unifying symbol, showing the wealth and unity of Indonesia which is diverse but still one [23].

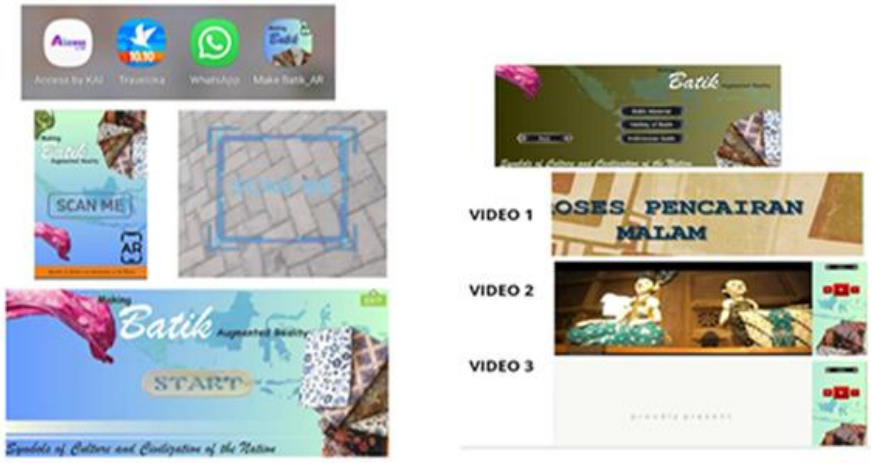

Fig. 2. Accessing augmented reality (AR).

Thus, this research not only benefits the cultural aspect, but also has a positive impact on economic, social, and technological understanding in traditional arts. Finally, this study adds new information in virtual laboratory as reported elsewhere [24, 25]

5. Conclusions

In conclusion, the use of technology has become an important requirement in various fields, including in efforts to introduce cultural diversity such as batik. This research aims to design the application of augmented reality (AR) technology to support the introduction of various batik patterns from various regions in Indonesia. Using the design-based research (DBR) method involving analysis, development, iteration, and reflection, this research shows that understanding the chemical composition of wax, such as carbon (C), hydrogen (H), and the compound structure of CnH2n+2, plays an important role in the formation of batik patterns. The results of this research are expected to enrich the variety of batik motifs through a better understanding of wax composition, as well as increased awareness and appreciation of Indonesia's cultural diversity through the application of interactive and educational AR.

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