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Designing Augmented Reality Application about Legendary Paintings in Indonesia for Gen Z

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Abstract. Traditional museums that display such paintings are often perceived as boring by most individuals in this generation. However, art education plays a crucial role in shaping identity, critical thinking skills, and creativity. Augmented Reality (AR) technology offers an innovative solution by allowing users to view virtual 2D or 3D objects in the real world, creating a more immersive and interactive experience compared to traditional website-based information. The target audience for this interactive information media is teenagers aged 17-25 years, considering their high sense of curiosity and exploration. To ensure a comprehensive research approach, a mixed research method combining quantitative data from questionnaires and qualitative data from interviews and reference studies is employed. The design process of the app used for interactive information on legendary Indonesian paintings is discussed, employing the Human-Centered Design methodology proposed by Don Norman. Through this research, the aim is to create an immersive media platform that not only makes learning about Indonesian legendary paintings more enjoyable and intriguing but also contributes to the popularity and awareness of art and design in Indonesia.

Keywords: Painting, Augmented Reality, Interactive Media, Mobile Application

1 Introduction

Legendary paintings are artworks that have gained immense fame and widespread recognition as exceptional works of art with high historical, cultural, or artistic value [2]. Indonesia possesses numerous legendary paintings displayed in museums [24]. These paintings depict important aspects of culture, tradition, and history that are crucial to learn and understand [7].

According to statistical data from the National Gallery, teenagers constitute the group that visits museums the most. However, only a few Gen Z individuals come to museums to explore the existing content, with most of them merely visiting for photo opportunities [15]. This is due to several factors such as less engaging and interactive learning methods, as well as time and resource constraints [23]. Additionally, Generation Z prefers to learn history through interactive and enjoyable digital media [13].

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Gen Z perceives museums as places solely for housing collections [22]. Museums are also seen as unappealing for study due to perceptions of being outdated, poorly maintained, and boring [15]. However, studying and understanding art, such as Indonesian paintings, can shape one's identity and foster critical and creative skills, strengthening analysis, perspectives, and the development of interests and talents in the field of art and design [16]. Moreover, interest and appreciation for Indonesian paintings and artists can help introduce Indonesian culture and art to other countries, thereby increasing the popularity and awareness of the art and design industry through cultural exports and tourism [16].

According to Grammatikopoulou [14], the role of the public in art has evolved from merely observing and "worshipping" objects to wanting to be part of the "ritual" and creative process. Through participation, the experience becomes more extensive. Hence, there is a need for the design of interactive media showcasing legendary paintings in Indonesia to introduce and enhance the public's experience with Indonesian culture. Augmented reality (AR) technology enables users to view virtual 2D or 3D objects placed in the real world [17]. AR also provides a high level of immersion, offering a more interactive experience than simply viewing information on a website [12]. The use of immersive technology has been proven to have a positive impact on long-term memory performance compared to non-immersive experiences [21].

Furthermore, according to Mustaqim & Kurniawan [9], augmented reality has advantages such as better interaction, efficient usage, wide implementation across various media, relatively low production costs, and user-friendliness. This aligns with the selection of Generation Z as the target market because they tend to seek interactive and enjoyable experiences, and interactive AR media can provide such experiences for them. Additionally, as stated by Basuki [13], Gen Z possesses a high level of curiosity and exploration, making interactive augmented reality media a useful educational tool to meet their needs. Moreover, immersive experiences have been shown to positively influence Gen Z's intention to repurchase cultural heritage virtual tours in Indonesia [10].

The resulting AR cards will be organized into several different series, each focusing on unique topics or themes. This approach aims to provide diverse and engaging experiences for users. Some series may focus on legendary figures in art history, delving into their lives and works with in-depth detail. Other series could spotlight influential women painters, honoring their contributions that are often overlooked in art narratives, with the possibility of designing additional series.

2 Methods

The author employed the Human-Centered Design approach by Don Norman [8] in the development of interactive augmented reality media for legendary paintings in Indonesia. [5] Human-Centered Design is a design approach that focuses on the human experience as the center of the design process, taking into account psychological, social, and cultural factors in creating products and services that assist and facilitate users. Norman

also emphasizes the importance of collaboration among users, designers, and developers in implementing Human-Centered Design, enabling solutions that truly meet users' needs and desires [8].

2.1 Inspiration

In this stage, the author undergoes several processes to fully understand the needs, expectations, behaviors, feelings, and thoughts of the users, as well as the reasons behind them [5]. During the inspiration phase, the writer conducted a literature study by reading journal articles, news, and books related to legendary paintings to gain a basic understanding of the existing issues. This also helped the writer formulate questions for interviews with experts as sources [19][20]. The author interviews Galeri Nasional Indonesia team and Vuforia Indonesia for gaining information about legendary painting and immersive technology such as AR. The results of interviews with experts showed that museums with legendary paintings can continue to improve through ongoing innovation and the utilization of technology.

Additionally, with the presence of popular media highlighting painting themes, people are becoming more interested in learning about existing paintings, although some individuals only visit for the sake of FOMO, dating options, or taking selfies [15]. Furthermore, another source emphasized the potential of AR media as an immersive technology that can help generate interest in various aspects, including educational media [11][12]. However, it was also highlighted that there is still a lack of awareness regarding the widespread and effective utilization of AR media in Indonesia.

The writer not only collected qualitative data through interviews with experts but also gathered quantitative data through questionnaires to assess the knowledge and behavior of the target audience regarding legendary paintings [18]. The results from the questionnaires indicate that the majority of respondents are interested in learning facts and information about legendary paintings in Indonesia. However, they admit to getting bored visiting museums occasionally, mainly using it as a way to spend leisure time or for dating, even though some of them enjoy the museum's ambiance. They expressed a need for more interactive informational media about paintings.

All the data collected from various sources provide valuable insights for the writer in designing an AR application about legendary paintings specifically targeting late teenage Gen Z.

2.2 Ideation

In this stage, the writer gathers information and creates a mind map, conducts brainstorming for big ideas, determines the tone of voice, and develops mood boards based on the collected data [5]. The mindmap is used to organize keywords that form the basis for the big ideas [6]. From the mindmap, five keywords are selected: imagination, canvas, antique, digital, and mirror/reflection. These keywords then will be used for creating the big idea.

The chosen big idea is "Discover The Hidden Stories Through the Reflection of Digital Frame". The concept of this interactive media design involves utilizing AR technology to uncover hidden information about paintings through reflection or projection on a digital frame. The application is enhanced with flashcards, puzzle games, and trivia to enrich the user's experience. The tone of voice used in this design is intriguing, whimsical, and majestic, aiming to spark curiosity, create a magical and fantasy atmosphere, and convey a sense of grandeur and authority.

The author decided on the writing technique to be used. The author opted for using two languages, Indonesian and English, with a ratio of 95:5. This decision was based on the target audience residing in the Greater Jakarta area with socio-economic status A-B. The use of English is limited to certain terms that are commonly known in English. This choice is also influenced by the fact that the target audience belongs to Generation Z, which has been exposed to high levels of globalization.

After the selection process, the author finally decided on the name of the application as "ARTistik". "ARTistik" is a combination of the word "art," which means art, and "AR," which is an abbreviation for augmented reality, forming the word "ARTistik," which means having artistic value with the emphasis on AR. This term can be used to refer to an application that combines the concept of art with augmented reality (AR) technology.

As for the content, it adopts a delivery style that aligns with the language style of young adults today, creating a friendly and attention-grabbing tone. One example is the selection of a hashtag for the application's copywriting, which is "#ArtMeetsAR."

2.3 Prototype

The author moves from the ideation stage to the prototyping stage. Begin by creating a simplified version of the app design, incorporating visual elements and predetermined features. The prototype is then tested to determine its suitability and identify areas for improvement [11]. Several prototyping techniques are employed, including setting up AR markers using Vuforia Engine, creating 3D models using Blender, adding textures and colors to the models, animating the models, and finally developing the prototype using Unity. The development stage involves integrating all the design elements into a functional AR application, adjusting the scale and position of 3D models, adding visual effects and interactions, scripting functionality, optimizing performance, and ultimately building the application for installation on Android devices. The use of 3D elements in the design aims to provide a broader perspective and a more creative depiction, ultimately offering a whimsical and immersive experience [1].

By following tone of voice, the colors chosen by the author are night, walnut brown, satin sheen gold, and battleship gray. According to the color theory book "Artist's Toolbox: Color: a Fine Artist's Guide to Understanding Basic Color Theory," the black and gray tones create a sense of mystery and elegance while conveying clarity [3]. Meanwhile, the gold color represents enchantment, something precious and valuable, and also adds a touch of luxury and elegance.



Fig. 1. Color Palette

During the design process, the author incorporated orchestral audio and sound effects into the application to create a majestic and elegant tone of voice. The inclusion of audio is crucial as it enhances the user experience and helps to establish a captivating atmosphere. Furthermore, it assists in facilitating the ease of use for the application [4].

One of the challenges in creating the “ARTistik” application is the large number of legendary paintings. Due to time constraints, the author only developed designs for 5 out of 10 legendary paintings based on recommendations from the national gallery. Additionally, another challenge is optimizing the application to find a balance between performance, quality, and app size. As the author is a visual communication design student without a specialized background in application engineering, the focus was primarily on the quality of the application rather than the final app size. The current app size is 180 MB with only 5 paintings which is considered huge for most people, but there is potential for further improvement by gaining a better understanding of optimization techniques and file compression to reduce the app size.

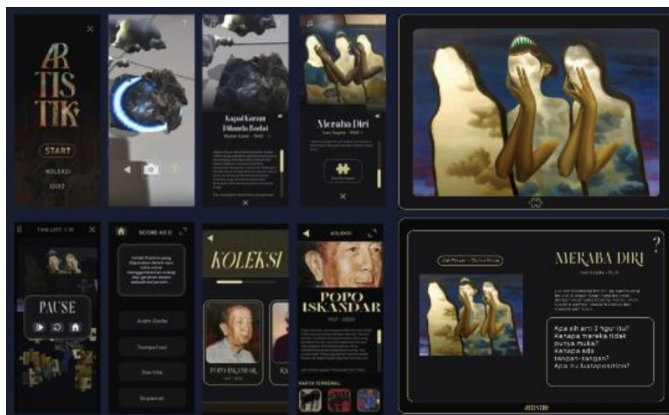


Fig. 2. ARTistik Mobile App and Flashcard

Due to time and resource constraints during the design process, the “ARTistik” application is currently limited to Android devices with a screen size of 1080x2400 pixels. However, this provides an opportunity for future improvements and expansion, allowing for compatibility with a wider range of platforms, such as iOS, and accommodating various screen sizes. This ensures that the application can reach a larger audience and adapt to different device specifications in the future.

In the design process, A6-sized flashcards were chosen for their practicality while still providing an immersive experience in the application. These flashcards feature paintings, brief information, and unique question facts that can only be accessed through the app. The writing style is designed to spark curiosity and create an intriguing impression. Furthermore, the “ARTistik” application can also be used directly with the original legendary paintings in museums, specifically at the national gallery. Considering the larger size of the paintings, this enhances the overall immersive experience even further.

2.4 Testing

In this stage, the author conducts application testing to ensure that all features and functionality work well and as expected. The testing process involves evaluating various aspects of the application, including marker recognition, the appearance and behavior of 3D models, user interactions, and overall performance.

User testing involves having others use the application to gather feedback on the user experience and ensure that navigation and interactions are easy to understand and use [5]. User testing is conducted during the alpha test. The alpha test took place on Prototype Day, May 12, 2023, at Lobby B of Universitas Multimedia Nusantara. The feedback from the alpha test was analyzed by the author, and improvements were made based on the feedback.

In the alpha test, the author managed to gather 44 participants who were then given three scenarios related to the interactions to be performed in the “ARTistik” application prototype. These scenarios included finding a way to wake up the cat in the painting “Kucing” by Popo Iskandar, playing a hidden puzzle in one of the paintings, and taking a quiz within the application. After successfully completing these three scenarios, the 44 respondents were asked to fill out a questionnaire regarding their experience using the prototype through Google Form with Likert scale to give some insights about the design [18].

3 Result

The Likert scale scoring formula used for the questionnaire is as follows:

$$\begin{aligned} I &= 100 / \text{Total Score (Likert)} \\ &= 100 / 5 \\ &= 20 \end{aligned}$$

Table 1. Interval Score

0% - 19,99%	Strongly Disagree
20% - 39,99%	Disagree
40% - 59,99%	Somewhat Disagree
60% - 79,99%	Agree
80% - 100%	Strongly Agree

In summary, the Likert scale scoring formula is used to determine the interval and interpret the responses. The percentage index is calculated based on the total score and the highest Likert score multiplied by the number of respondents. This allows for categorizing the responses into different levels of agreement or disagreement. After conducting trials on 44 respondents, the following are the results:

Table 2. Result

	Statement	Mean	Score %
1	The content information in the ""ARTistik"" app been created correctly, well, and relevant to the purpose/topic of the app	4,84	97%
2	The information presented in the ""ARTistik"" app comprehensive and engaging	4,77	95%
3	The Augmented Reality feature in the ""ARTistik"" app enrich the learning experience about visual arts	4,81	96%
4	The ""ARTistik"" app increases the interest and appreciation of Gen Z towards Indonesian visual arts	4,86	97%
5	The physical flashcard media of ""ARTistik"" easy to use and effective in enhancing appreciation and understanding of visual arts	4,84	97%
6	Recommend this app and media to others (Family, friends, relatives)	4,70	94%
Total Score			96,1%

Based on the evaluation data above, a total score of 1269 was obtained. The score is then calculated to interpret users' assessment of the application. However, since the total score is the result of evaluating 6 statements, the formula Y will be multiplied by 6. To find the average value of the data, the following calculation formula is used:

$$\text{Percentage Index} = \text{Total Score} / (Y \times 20) \times 100$$

Thus, the calculation result is as follows:

$$1269 / (220 \times 6) \times 100 = 96.1\%$$

Therefore, based on the range and index value obtained, the assessment of the application's information content falls under the category of "Strongly Agree/Good".

From the test results obtained several notes regarding the "ARTistik" app:

1. **Animated Zoom Guide:** It is recommended to add animations when objects are detected in the "ARTistik" app to provide clearer instructions to users. These animations can help users understand how to use the zoom feature on the detected objects.
2. **Improved Close Button Position:** To enhance user comfort, it is suggested to relocate the close button on the panel. One option is to move the close button within reach of the thumb, such as the upper left side of the panel aligned with the narration button. Alternatively, the close button can swap positions with the narration button. This adjustment is necessary as the current close button position is too low and incompatible with some phone models, where it may be hidden or covered by the native home button.
3. **Rotation Button Option:** To provide a more immersive experience, adding a rotation button is recommended. With this feature, users can use the "ARTistik" app while in a gallery where the original paintings are displayed. The AR objects will adjust their orientation based on the paintings hung on the wall, allowing users to view the AR objects from different angles.
4. **Profile Collection Button Function:** Based on user feedback, it is recommended to change the button function in the profile collection section. The current AR button in the upper right corner is considered ambiguous and unnecessary. Many users mistake it for enlarging the painter's image. Therefore, it is suggested to replace this button with a zoom button specifically for the painter's image. This change will provide a more intuitive user experience aligned with users' expectations.
5. **Quiz Sound Effect Modification:** The use of music is deemed suitable, but the sound effect when giving a wrong answer in the quiz section is considered too intimidating and startling for users. It is recommended to change the sound effect to something softer while still conveying the sense of error. A gentler sound effect will provide a more pleasant experience, ensuring that users are not overly surprised or intimidated when answering incorrectly in the quiz. This allows users to remain focused and engaged in the learning activities through the "ARTistik" app.
6. **Addition of Paintings and Content:** In addition to the aforementioned improvements, it is important to continuously develop the content of the "ARTistik" app by adding more paintings and engaging content. Users will be more interested and involved if there is a variety of legendary paintings to explore. The addition of new paintings will enrich the experience and broaden users' knowledge of Indonesian art and culture.

4 Conclusion

“ARTistik” is an augmented reality app that provides captivating and interactive information about Indonesian paintings. Through immersive media such as augmented reality on paintings, the “ARTistik” app offers a more satisfying and captivating experience for Gen Z users, allowing them to interact with and uncover hidden stories behind the artworks. Its goal is to educate and raise awareness among young adults about the meanings and significance of legendary paintings in Indonesia, fostering a greater appreciation for these artworks.

With the mentioned improvements and recommendations, the “ARTistik” app has the potential to become a powerful and effective medium for educating and inspiring the younger generation about art and culture in Indonesia. By capturing the interest of Gen Z users through immersive and interactive experiences, the app serves as a bridge between them and the rich artistic heritage of the country. It goes beyond simply viewing paintings, as users can directly interact with virtual objects, participate in quizzes, solve puzzles, and discover intriguing hidden facts.

Through continuous content development, incorporating engaging narratives, and taking into account user feedback, the “ARTistik” app aims to enhance art appreciation and provide a deeper understanding of legendary paintings in Indonesia. By offering accessible and interactive information, the app reshapes perceptions and enriches knowledge about Indonesian art, becoming an effective educational tool that inspires and broadens users' perspectives. It is hoped that the app will spark interest, encourage active engagement, and foster appreciation for the invaluable artistic heritage of legendary paintings among young people.

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