Development of Augmented Reality Interactive Comic Storybooks as Art History Learning Media for Early Age Children

Alby Aruna¹, Mohamad Firzon Ainur Roziqin², Muhammad Syifa'ul Qolbi³, Iriaji⁴, Eka Putri Surya⁵, Adinda Marcelliantika⁶, Ginanjar Atma Wijaya⁷

¹ Universitas Negeri Malang, Indonesia; alby.aruna.2301218@students.um.ac.id
² Universitas Negeri Malang, Indonesia; mohamad.firzon.2305348@students.um.ac.id
³ Universitas Negeri Malang, Indonesia; muhammad.syifaul.2301218@students.um.ac.id
⁴ Universitas Negeri Malang, Indonesia; iriaji.fs@um.ac.id
⁵ Universitas Negeri Malang, Indonesia; eka.putri.2304318@students.um.ac.id
⁶ Universitas Negeri Malang, Indonesia; adinda2231@gmail.com
⁷ Universitas Negeri Malang, Indonesia; ginanjar.atma.1902146@students.um.ac.id

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ABSTRACT

The development of an interactive comic book based on Augmented Reality (AR) as a learning medium for art history for early childhood aims to enhance children's interest and understanding of art history material. This program combines AR technology with educational content in comic form, allowing children to interact with visual and audio elements that support the art history narrative. The methods used include designing and developing comic content, implementing AR technology, and evaluating effectiveness through observation and user feedback. The results indicate a significant increase in children's learning interest and understanding of art history. The implementation of this learning medium is expected to support the cognitive and creative development of early childhood.

Corresponding Author:
Alby Aruna
Universitas Negeri Malang, Indonesia; alby.aruna.2301218@students.um.ac.id

1. INTRODUCTION

Early childhood education is a fundamental stage in individual development that will determine their capacity to learn in the future. At this stage, children are in the golden age and are very receptive to stimuli from the surrounding environment (Pratama & Suryantara, 2022). Therefore, it is important to provide learning materials that are not only informative but also interesting and interactive, in order to maximize their learning potential. One area of learning that is important but often receives little attention is art history. Art history not only introduces children to works of art and famous artists, but also develops their appreciation for culture and creativity. In this digital era, technology offers various opportunities to enrich the learning process. One technology that has great potential in this context is Augmented Reality (AR). AR allows users to see and interact with digital elements added to their real environment, creating a more immersive and engaging learning experience (Karundeng et al., 2018; Kusuma et al., 2021). The

use of AR in education can make learning material more lively and easy to understand, especially for young children who learn through interaction and visualization.

The development of AR-based interactive comic storybooks as an art history learning medium is one innovation that aims to increase children's interest in learning and understanding of art history material. Comic story books are a medium that is familiar and liked by children because of its narrative and visual nature (Silitonga et al., 2021). By integrating AR technology, comic storybooks can offer a more interactive learning experience, where children not only read but also interact with educational content. In the context of art history, the use of AR interactive comics can present famous artists and their works of art more realistically. For example, through AR, children can see works of art from various angles, hear audio explanations about the work, or even watch animations of the process of making art. It is hoped that this experience can make learning art history more interesting and easier for children to understand.

The AR interactive comic storybook development method involves several important stages. First, design and development of interesting and educational comic content (Haris & Hendrati, 2018; Mahmud & Radzi, 2020). This content should be structured in such a way that it conveys art historical information in a way that is simple and easy for children to understand. Second, the implementation of AR technology in comic content. This involves developing an AR application that can be accessed via mobile devices, so that children can view AR elements using their phone or tablet camera. Third, evaluate the effectiveness of this learning media through observation and feedback from users. This evaluation is important to assess the extent to which AR interactive comic storybooks have succeeded in increasing children's interest and understanding of art history. The implementation of AR interactive comic storybooks is expected to provide several significant benefits (Hariawan et al., 2020). First, increase children's interest in learning about art history. With interactive and interesting content, children will be more motivated to learn and explore art history material. Second, increase children's understanding of art history concepts. Through visualization and interaction, children can understand concepts that may be difficult to understand through text or static images alone. Third, supporting the cognitive and creative development of early childhood. Interactive learning experiences can stimulate cognitive development, such as the ability to think critically and solve problems, as well as creative development, such as the ability to imagine and create.

Apart from direct benefits for children, the development of AR interactive comic storybooks also has wider implications for arts and culture education (Khunaeni et al., 2020; Laswi & A, 2018). By providing innovative learning media, teachers and educators can have additional tools to teach art history in a more effective and engaging way. It can also help increase awareness and appreciation of arts and culture among the younger generation, which is especially important in the current context of globalization and digitalization. Research and development of AR interactive comic story books can also provide scientific contributions in the fields of education and technology (Romadhon et al., 2023). Studies on the effectiveness of AR in education are still relatively new and developing, so the results of this research can provide valuable insight into the potential and challenges of using AR in art history learning. In addition, this research can also identify key factors that influence the success of AR implementation in education, such as content design, use of technology, and user participation.

In its implementation, the development of this AR interactive comic story book requires collaboration between various parties, including education experts, content designers, technology developers and art practitioners (Inayah et al., 2023; Purnamasari, Sari, et al., 2023). This collaboration is important to ensure that the products produced are not only visually attractive but also educational and easy for children to use. Apart from that, the involvement of teachers and parents is also important in testing and providing feedback on this product, so that further improvements and development can be made. Funding and support from educational institutions are also key factors in the success of this project. Financial support enables the development of quality technology and content, as well as the implementation of comprehensive evaluations (Purnamasari, Wahyuni, et al., 2023). Apart from that, institutional support can also help in the dissemination and implementation of this AR interactive comic story book in schools and other educational institutions. In this context, the development of AR interactive

comic storybooks as an art history learning medium for young children is an innovative step that has great potential to improve the quality of arts education. Through the use of AR technology, it is hoped that a more interactive, interesting and effective learning experience can be created, which in the end can support children's cognitive and creative development (Prasetyo et al., 2023; Wulansari et al., 2023). It is also hoped that the implementation of this learning media can make a positive contribution to arts and culture education in Indonesia, as well as provide scientific insight in the fields of education and technology.

2. METHODS

The "Rapid Rural Appraisal (RRA)" method is a participatory approach used to gain a quick and efficient understanding of conditions and problems in an area, especially in rural areas. This method involves various data collection techniques that allow researchers to explore information in depth in a relatively short time (Syahza et al., 2018). In the context of developing augmented reality interactive comic storybooks as an art history learning medium for early childhood, the RRA method can be adapted to understand the needs and potential application of this technology among children and educators in rural environments.
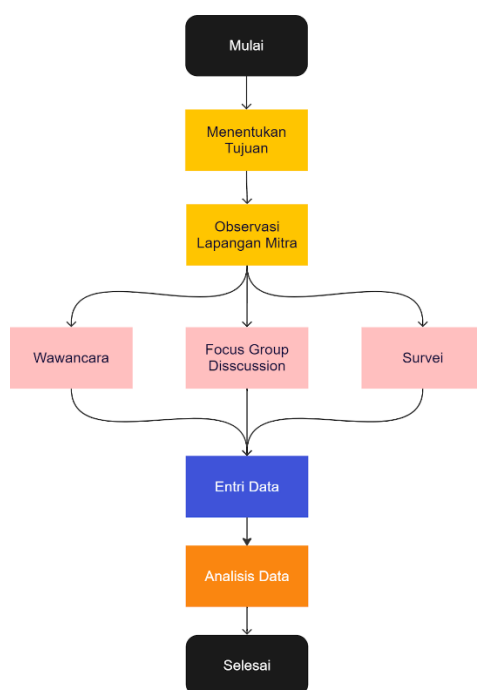

Figure 1. Rapid Rural Appraisal (RRA) Method

The first stage in the RRA method is determining goals. Researchers must formulate clear and specific goals, which in this case are developing effective and attractive learning media for young children (Fitriani et al., 2018). This objective will guide the entire research process, ensuring that every step taken is always oriented towards achieving the desired results. Next, partner field observations were carried out. This observation aims to identify real conditions in the field, including the potential and obstacles that may be faced in implementing augmented reality interactive comic storybooks. These field observations involve reviewing the technological infrastructure in schools, the availability of supporting devices, and the readiness of educators and children to accept this new technology. Observations were carried out directly to get an accurate and comprehensive picture. After field observations, the RRA method involves three main data collection techniques: interviews, focus group discussions (FGD), and surveys. Interviews were conducted with interested parties, including teachers, parents and children. This interview aims to explore their views, experiences and hopes for the proposed learning media. The interview questions were designed in such a way as to elicit rich and

varied information, covering technical, pedagogical and cultural aspects. Focus group discussion (FGD) is another technique used to collect data in a participatory manner. In the FGD, a small group of participants, consisting of teachers, parents and education experts, discussed the concept and design of an augmented reality interactive comic story book (Nasrul et al., 2022). These discussions allow researchers to obtain direct input from multiple perspectives, as well as identify any agreements and differences in views that may exist. FGD also functions as a forum to explore innovative ideas that can be integrated into learning media.

The third technique is a survey, which is used to collect quantitative data from a larger sample. This survey was designed to measure the level of acceptance, interest and need of potential users for augmented reality interactive comic storybooks. Survey data can provide a general overview of dominant trends and preferences among respondents, as well as assist researchers in developing strategies for developing and implementing learning media. After data is collected through interviews, FGDs and surveys, the next step is data entry. The data that has been collected needs to be organized and entered into a structured system to facilitate analysis. This data entry process must be carried out carefully to ensure the accuracy and completeness of the data to be analyzed. Data analysis is a crucial stage in the RRA method (Chakraborty et al., 2020). The data that has been organized is analyzed using various techniques, both qualitative and quantitative, to identify patterns, themes and insights that are relevant to the research objectives. This analysis helps researchers to understand the needs, challenges, and potential for implementing augmented reality interactive comic storybooks as an art history learning medium for young children. The results of this analysis are then used as a basis for formulating recommendations and effective development strategies.

The final stage in the RRA method is to summarize the findings and complete the research report. Findings from the entire research process are integrated into a comprehensive report that explains the results of observations, interviews, FGDs and surveys, as well as data analysis that has been carried out. This report not only presents empirical findings, but also provides practical recommendations for the development and implementation of augmented reality interactive comic storybooks in rural schools. By applying the RRA method, researchers can gain a deep and comprehensive understanding of the local context and user needs (Irwandi & Zulamri, 2020). This approach ensures that the learning media developed truly suits the conditions and expectations of children and educators in rural areas. In addition, active participation from various parties in the research process also increases the sense of ownership and commitment to the successful implementation of this new technology. The RRA method is not only effective in collecting data quickly, but also allows researchers to establish good relationships with local communities. This participatory approach builds trust and collaboration between researchers and the community, which is critical to the success of learning media development projects. Thus, the RRA method can be a very useful tool in developing augmented reality interactive comic storybooks as an innovative and interesting art history learning medium for young children in rural areas.

3.   FINDINGS AND DISCUSSION

3.1. Goals and Benefits of Using Augmented Reality in Storybooks

In the ever-growing digital era, education is required to keep up with technological developments in order to improve the quality of learning. One technological innovation that has great potential to be integrated into education is Augmented Reality (AR). In the context of art history learning for young children, the use of AR in comic story books is a strategic step that not only makes learning more interesting, but also more effective and interactive.

Early childhood children generally have a short attention span and are easily bored with conventional learning methods that are less interactive. By integrating AR in comic story books, learning material can be presented in a more interesting and fun way. AR visualization allows characters in comic stories to "come to life" and interact with children, creating an immersive learning

experience. For example, when children scan a book page with an AR device, they can see art historical figures appear in three-dimensional form, complete with animation and sound. This not only attracts children's attention but also makes them more involved in the learning process, because they can interact directly with the elements in the story.

Studies show that interactive and immersive learning experiences can improve retention and understanding of material. With AR, children not only read and see images, but also interact directly with learning content. These interactions create multisensory learning experiences that can strengthen children's memory and understanding. For example, in learning about famous artists such as Leonardo da Vinci, AR can be used to show the process of creating a work of art, from the initial sketch to the final result. Kids can see how Leonardo used various techniques to achieve certain effects, and even try the techniques themselves through an interactive AR app. This direct experience makes learning more in-depth and meaningful.

AR enables more active and collaborative learning. In class, kids can work together to complete assignments or projects that involve the use of AR. They can share AR devices, discuss what they see, and learn from each other. This collaborative learning not only improves social and communication skills, but also makes the learning process more dynamic and interactive. This active and collaborative learning encourages children to think critically and creatively, and builds important teamwork skills.

The integration of Augmented Reality (AR) in comic storybooks for art history learning provides various significant benefits. AR makes learning more engaging, interactive, and effective, helps children understand abstract and complex concepts, improves retention and understanding of material, facilitates active and collaborative learning, provides customized and personalized learning experiences, and encourages the use of technology in education since early stage. By utilizing AR technology, art history education for early childhood can be transformed into an immersive, fun and meaningful learning experience, which not only increases children's knowledge but also prepares them for an increasingly digital future.

3.2. AR Comic Storybook Design and Content

The development of comic story books based on Augmented Reality (AR) for early childhood art history learning is an innovative project that aims to combine education with advanced technology. The book is designed with a structure and content that not only captures children's attention but also provides an immersive and interactive learning experience. The beginning of the AR comic story book includes an introduction containing a brief introduction to the book, learning objectives, and instructions for using AR technology. The second part will introduce the characters and setting of the story and continue with the division of chapters and storyline. The main characters in AR comic story books must be interesting and relatable to children. Character choices can be children the reader's age, cute animals, or colorful, imaginative creatures. This main character acts as a guide who takes children through an art history adventure. For example, the main character could be a child named Aira who likes drawing and dreams of becoming a famous artist. Aira has a loyal friend, a cat named Milo, who is clever and always curious. Together, they explore the world of art, meet famous artists, and learn about amazing works of art.

Stories in AR comic books must be both interesting and educational. Each chapter tells the adventures of Aira and Milo who visit various periods of art history, from ancient art, the Renaissance, to modern art. The story is designed with an easy-to-follow plot, full of interesting adventures and surprises. The language used in story narration must be simple and clear, in accordance with the understanding of young children. The dialogue between the characters is kept light and fun, but still conveys important information about art history. Illustrations in AR comic books are very important to attract children's attention. Each page should be full of interesting, colorful images that not only support the story but also help explain the art concept. Color is used strategically to attract attention and highlight important elements in the story. Bright, contrasting colors attract children's attention, while certain color palettes can be used to create an atmosphere and emphasize certain historical periods.

Each page of the AR comic story book is equipped with elements that can be activated via the AR application. When kids scan a page with a mobile device, AR content appears and adds an interactive layer to the story. AR technology also enables the use of audio and visual narratives that enrich the learning experience. Audio narration can help explain difficult-to-understand concepts, while visual animations bring the story to life. AR content allows direct interactions that make learning more engaging. Children can do various activities, such as drawing, playing games, or interacting with characters. Children are also given creative tasks that encourage them to create their own works of art, using the techniques they have learned. AR apps can help in this process by providing tools and guidance. The development of stories and characters in AR comic storybooks for early childhood art history learning involves a careful combination of engaging narrative, engaging visual design, and effective integration of AR technology. The story and characters are designed to make learning fun and relatable for children, while the visual design and use of color help attract attention and explain art concepts. AR technology enriches the learning experience by providing engaging and educational interactive content, increasing children's engagement and understanding of art history. Through this approach, learning art history can be a fun, interactive and immersive experience for young children.

3.3. Impact on Children's Cognitive Development and Creativity

The use of technology in early childhood education has shown a significant impact in improving the quality of learning. AR technology in comic story books provides an interactive and immersive learning experience, which helps children to remember information more easily. Three-dimensional visualization, animation, and direct interaction with content make the learning process more dynamic and fun. Research shows that multisensory learning experiences can improve memory retention. For example, when children learn about famous works of art through AR, they not only see static images but can also view animations that explain the techniques used by the artists. This interaction makes information easier to remember because children are actively involved in the learning process. AR allows the visualization of complex concepts in a way that is easier to understand. Young children often have difficulty understanding abstract concepts that are only explained through text and static images. With AR, these concepts can be explained through animation and interactions that make understanding easier. The use of AR in comic story books also encourages children to think critically and analytically. Interaction with AR content often involves problem solving, decision making, and evaluating information, all of which are important for the development of cognitive skills. For example, in a story where children have to help the main character solve a puzzle or find a way out of a maze based on visual clues provided by AR, children learn to analyze information, make decisions, and find solutions. This kind of activity develops their critical thinking and analytical skills.

AR comic story books provide a space for children to develop their imagination and self-expression. Interactive content allows children to create their own works of art, explore various art styles, and experiment with various techniques. The use of AR in comic story books also helps develop children's design and aesthetic skills. Through interaction with rich and varied visual content, children learn about design principles such as balance, contrast, harmony and proportion. The integration of interactivity and AR visual elements enriches the learning experience, develops critical thinking skills, and increases children's creativity and imagination. This book also serves as an effective aid for parents and educators in teaching art history in a fun and educational way. AR comic storybooks provide an effective tool for parents and educators to teach art history to children. AR technology makes learning more interesting and interactive, so children are more motivated to learn.

AR comic storybooks are a flexible and accessible resource that can be used at home or in the classroom. AR technology allows parents and educators to customize learning according to children's needs and interests. For example, if children are interested in impressionist art, parents and educators can use AR apps to explore the works of impressionist artists, explain the techniques used, and even create art projects inspired by the genre. This flexibility allows for more personalized and relevant learning for each child. The interactivity and AR visual elements in comic story books for art history

learning have a significant impact in enriching the learning experience of young children. AR technology improves critical thinking skills, develops creativity and imagination, and provides effective tools for parents and educators. By making learning more engaging, interactive and educational, AR comic storybooks open up new opportunities in arts education and make an important contribution to children's cognitive and creative development. Through this approach, children not only learn about art history but also develop skills that will benefit them throughout their lives.

4. CONCLUSION

The development of interactive comic story books based on Augmented Reality (AR) as an art history learning medium for early childhood has succeeded in increasing children's interest and understanding of art history material. The applied AR technology makes learning more interesting and interactive, allowing children to interact with visual and audio elements that support the art history narrative. The evaluation results show that this learning media is effective in supporting the cognitive and creative development of early childhood. It is hoped that the implementation of this innovation can enrich art history teaching methods and provide a sustainable positive impact on children's education.

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