

## Develop ECE's Virtuous Character by Designing Inspirative Storybook with Android-based Augmented Reality Application

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DOI: 10.15294/ijeces.v11i2.61095

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### History Article

Submitted September 2022

Revised October 2022

Accepted November 2022

### Keywords:

Augmented Reality;  
Merdeka Belajar Curriculum,  
Innovative Learning; Character Education

### Abstract

Character education is a challenge for the current educational curriculum, especially how to develop an innovative edutainment learning model. The context of edutainment education for character development in students requires assistive media that acquire innovative learning models. The direction of this research is first to develop a fairy tale storybook with Augmented Reality (AR) technology as a breakthrough in innovative character education. Second, implementing AR technology products in the context of an merdeka belajar curriculum in students. The research results have developed a storybook as a fable built on 44 sub-stories that inspire virtuous humanist characters with story nuances of local Indonesian characters. Storybooks are equipped with AR technology that can be downloaded via Google Playstore. Testing of storybook products is proven to build cognitive and affective aspects and mediate the presence of edutainment in the Merdeka Belajar curriculum.

### How to cite

Hermawan, I., Inayah, I., Windiarti, R., Hindrawati, G. (2022). Develop ECE's Virtuous Character by Designing Inspirative Storybook with Android-based Augmented Reality Application. *Indonesian Journal of Early Childhood Education Studies*, 11(2), 132-138.

## INTRODUCTION

Learning for Early Childhood is important because students are in the golden age, which absorbs much knowledge stored in their memory as a provision to solve future problems. (Rohmadi et al., 2020). Therefore, teachers are challenged to provide educational induction by developing innovative learning (Ciolan, 2013). Innovative learning can be developed as a breakthrough in character education induction based on simulation-based instruction. The trend for innovative learning in the future is the use of virtual technology to perform simulations, where students interact directly with the media to build skills and knowledge (Sari et al., 2021). Innovative education in line with technological developments is built through educational props such as games, animations, storytelling, and the application of Augmented Reality (AR) as supporting technology (Kompaniets et al., 2020; Maraffi et al., 2017).

Augmented Reality is an interactive technology that supports the display of a real-world environment combined with 3D virtual objects through computer-generated information (Chen et al., 2017). AR is applied in many fields of work. AR was originally applied to aviation as a tool inherent in aircraft flight training simulations (Thomas & David, 1992). Furthermore, this technology has penetrated various sectors, such as manufacturing, tourism, marketing, fashion, and education. Education for early childhood must emphasize a pleasant environment and atmosphere so that the transfer of knowledge goes well, which is implemented edutainment concept, thereby increasing student interest in learning (Hermawan et al., 2019). It could require the application of appropriate technologies, such as AR. AR is a medium that encourages the cognitive abilities of the student to build imaginations and express them in real life (Fajrie & Purbasari, 2021). 3D models make students more involved in the visual simulation of character induction. The application of AR in storybooks for education has been widely carried out (Hung et al., 2017). However, the characters used to inspire students are foreign figures such as Chibi Maruko-chan, Thomas, Doraemon, Spongebob, and Boboboy, who have cultural roots that differ from the local Indonesian culture. These cultural differences create a gap for students to imagine recognizing the national cultural environment more closely, such as a rural, maritime, tropical climate, collectivism, humanist learning instructions, and environmental care (save the world). It creates a space for developing innovative technology-based fairy

tales that integrate the local nuances environment and the strengths of iconic characters who can inspire virtuous behavior in early childhood. Iconic figures are taken from the Indonesian environment where students grow up, so they will be more familiar with the story. Iconic characters can be humans or animals in fables to reinforce the entertainment aspect of the education model. Therefore, this study developed a fairy tale storybook with AR technology entitled *Binoa: Inspirational Fairy Tales to Build Children's Character* (ISBN 978-602-5669-4).

The Binoa storybook develops a role model based on a 3D using AR system for early childhood by creating a local environment. The local environment represents religion, honesty, tolerance, disciplined, hard work, creativity, independence, democracy, curiosity, national spirit, achievement-appreciation, friendliness, peace-loving, likes to read, social care, and responsibility. Each story theme has an AR hologram section that makes the 3D characters appear in the book. The characters look like they came out of a book. 3D virtual characters that emerge from storybooks stimulate student's imagination to play a role in humanist story scenarios and strengthen teacher skills in story building and storytelling. The main character in this storybook is Binoa, a one-horned rhinoceros, as an effort to identify and conserve Indonesia's endangered species. The design of Binoa's fairy tale storybook is built on 44 stories of student's daily lives with light storylines related to character education for students with virtuous characters. The story's moral value is included at the end to build cognitive aspects, especially in distinguishing good and bad behavior.

This study aims to develop AR design through storybooks as a breakthrough innovation in educational fields. The resulting design is complemented by action research through a qualitative approach at Al Kamilah ECE. The originality of this research is implementing educational innovations with AR technology to implement an *merdeka belajar* curriculum for students.

## ECE Virtuous Character

Virtuous character refers to the humanist character in line with studies (Hermawan & Joga, 2018). Humanist character is built from the philosophy of Pancasila, including belief in God, honesty, courtesy, intelligence, responsibility, discipline, sharing, helping each other, and being creative. The challenge in character education is transferring knowledge and values from teachers to students (Muassomah et al., 2020). Innovative

learning-based education strategies are essential because students cannot distinguish right and wrong as well as good and evil, so they need to transfer knowledge through fun media and build edutainment-based education.

### Fairytale Storybook

Fairytale story is one of the educational media widely used to inspire student's behavior, especially in early childhood. Fairytale stories can be in the form of legends, myths, sage, or fables which generally carry folklore with various cultural heritages that are inherent and told from generation to generation (Rahman, 2017). Fairytale is often set out in the form of a picture storybook. Storybooks highlight visuals and characters and are iconic so that students are interested in reading and will indirectly be influenced to follow the character's behavior and make learning lessons.

The Fairytale storybook developed in this study is based on a fable with the main character, Binoa, who is told to live in Kampung Damai Nusantara. The storybook title is Binoa: Inspirational Fairy Tales to Build Children's Character. This book was developed from 44 stories of Binoa and his friends with 17 fable characters created from the inspiration of endangered animals in Indonesia, including:

1. Binoa (One-horned Rhinoceros): A cute older brother protecting his younger sister, and he likes to help mom and dad with homework.
2. Belia (One-horned Rhinoceros): She is the little sister of Binoa. Belia has not gone to school with funny, innocent, spoiled, and occasionally mischievous characters.
3. Pak Bandi (One-horned Rhinoceros): Binoa and Belia's father works in an office. Pak Bandi often gives gifts to his son, who is disciplined and obeys the advice of his parents.
4. Ibu Belinda (One-horned Rhinoceros): A mother who loves their children very much. Ibu Belinda has a bakery business. Be firm when Binoa makes mistakes and protect the family.
5. Owa (Monkey): Nosy but has a good friendship with Binoa. Owa is an expert in jumping and running deftly.
6. Kussi (Cuscus): The Coquettish, beautiful, kind, and intelligent. He is the best friend of Binoa and Owa. Kussi always listens to the advice of his parents.
7. Cilo (Snail): A Kind-hearted, forgiving, helpful, and optimistic snail. Cilo is a friend of Binoa, Belia, Owa, and Kussi. Cilo comes from a neighbouring village.
8. Paman Kulot (Turtle): The wise and

loves children in Kampung Damai Nusantara. Paman Kulot often educates and advises children patiently.

9. Pak Guru Ruan (Owl): A wise teacher Who becomes the role model of his class. Pak Guru Ruan has the knowledge to provide solutions for his students.

10. Kak Wolfi (Wolf): The antagonist. He is a neighbor of Binoa, Kussi, and Paman Kulot.

11. Bibi Sarah (Elephant): Good at painting and became a private tutor for Kussi. Bibi Sarah gave examples of patient painting practice.

12. Dokter Santi (Bear): The doctor of the villager who is friendly, kind, and understanding toward others. Dokter Santi provides knowledge about healthy living.

13. Bibi Gandi (Elephant): She is a pleasant and friendly neighbor.

14. Paman Gandi (Elephant): He is a strong, great, and helpful spirit.

15. Bibi Cula (One-Horned Rhinoceros): Binoa and Belia's aunt. She often takes her nephew to go on vacation.

16. Paman Cula (One-Horned Rhinoceros): Strong and stout. Paman Cula works as a doughnut peddler.

17. Ibu Owa (Monkey): Firm, wise, loving, and always wants the best for her son, Owa.

### Augmented Reality Technology

AR is a technology that supports virtual object visualization combined with a real-world environment using advanced computer-generated information. In this study, the application of AR to fairy tales was built through the following steps:

1. To develop a story plot scenario with light language that elevates the values of character education.
2. To create 17 unique and memorable local nuanced characters.
3. To build a story setting based on a cultural environment is easy for students to imagine.
4. To integrate graphic design of environments and characters.
5. To create a framing for the book environment with a database system so it is easily recognized using a gadget camera.
6. To create a visually and audio-harmonious AR environment.
7. To register the AR system on the play store so the general public can run it.



**Fig. 1.** Build Rig (bone) Animation

## METHOD

A qualitative approach via interview measures the effectiveness of developing AR technology-based character education. The method developed in this study uses a prototype approach to build a fairy tale storybook application based on AR technology. Feedback is obtained through testing student responses by providing character learning stimulants using the AR-based storybook. This technology was tested on 15 samples of early childhood in a range of five to six years which acts as the application of character education through innovative AR technology breakthroughs. Character education induction is done by presenting stories orally and through educational media. The effectiveness of character education refers to the concept of Merdeka Belajar, developed by the Ministry of Education, Culture, Research, and Technology at this time. Measurement aspects in the application of character education include the following instruments in Table 1.

**Table 1.** Research Instruments

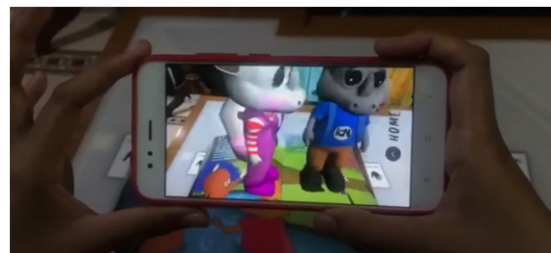
Code	Items Scale
1	The student understands the storyline
2	The student understands the importance of the honest value
3	Enthusiasm level of student for listening to stories (giving ask and comments)
4	Student dares to express themselves through facial expressions
5	Student dares to express themselves through motor movements
6	The student can listen to the fairy tales that are presented (not with props) from beginning to end
7	The student can listen to the fairy tales presented (with props) from beginning to end

Code	Items Scale
8	The student understands the vitamin content in strawberries (science)
9	The student understands that apologizing is crucial when making a mistake (virtuous)
10	The student understands that taking strawberries is not allowed to steal but must ask permission (religion)
11	The student understands that if given a mandate, they must complete the work until it is finished (identity)
12	The student can count the number of strawberries (numbers)
13	The student can know the taste and color of strawberries (science)

The score used is 1 – 6 to measure 13 indicators of achievement of virtuous character education in students through an independent approach to learning with the media of AR-based fairy tales. The book of fairy tales applied in this induction refers to Chapter 1 of 44 stories of Bino with the title “Panen Stroberi”.

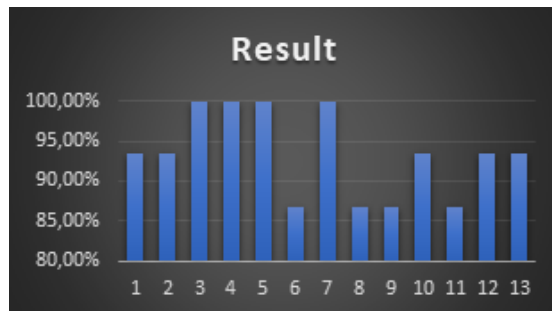
## RESULT AND DISCUSSION

AR technology developed in storybooks helps students imagine the characters in Bino storybooks in 3D visualization. The development of AR technology implemented for early childhood character education strongly builds characterizations adopted from Briggs Mayer’s character (Inayah et al., 2017). The use of characters is studied to build an inspiring character who teaches noble character values such as honesty, never giving up, being resourceful, cheerful, and caring for the environment. AR technology will encourage the characters developed in fairy tale storybooks to be displayed as if they came out of a book equipped with audio visuals so that students have the experience of getting the storyline with the desired perspective, as shown in Figure 2.



**Fig. 2.** Chapter 1 AR Bino

The direction of the development of AR technology-based applications is to support the creation of innovative learning through the spirit of Merdeka Belajar. Some indicators in Merdeka Belajar converge into six main domains: religion, literacy, identity, virtuous, numeracy, and science.



(The abscissa refers to table 1)

**Fig. 3.** Application Testing Indicator

Departing from the six main domains of merdeka belajar, the application of AR technology in character education learning is then built into 13 indicators representing that the application is running well (See Figure 3). The first indicator is that 93.33% of respondents more easily understand the storyline that the cognitive abilities can record and retell. One of these cognitive abilities was shown when the teacher asked the story, "What did Binoa do when picking strawberries?" then the students answered according to the order of the story, namely, "Eat strawberries a lot. "Then, the teacher asked again, "Finally, what happened to Binoa?". The students answered, "his stomach hurts". It shows that students understand that overeating is harmful to their health, such as stomach pain. Besides, when the teacher asked the story about the strawberries obtained from stealing, the students could see that stealing was bad behavior.

An example was shown by the teacher who asked, "Can we steal like Binoa?". Then the students answered, "No.". The student's answers were then responded to by the teacher, "Why?". The students answered, "It is bad behavior."

The second indicator has a level accounting for 93.33%. It means that respondents understand the meaning of honesty. They can apply right and wrong in developing virtuous character. This understanding of honesty is seen from the student's answers when answering the question, "What is honest?". The students replied that honesty is a responsibility and must not lie.

The third indicator achieved a 100% level of respondents enthusiastically responding to technology-based stories that display 3D audio-

visuals to help their imaginations about the figures being told. This enthusiasm was shown by the attitude of those who answered and commented on the stories presented. One of these comments was when the teacher showed the character Kussi, and then a child commented, "Kussi is like a squirrel."

The fourth indicator represents respondents who are conveyed through facial expressions. In comparison, the fifth indicator represents by body movements of the respondent that express joy when receiving educational induction from stories of noble character. As many as 100% of students showed positive motor response expressions by raising their hands, prancing, clapping, smiling, and laughing to describe the application built to provide a fun learning space.

The sixth and seventh indicator represents the difference when learning character education through oral techniques with the implementation of AR technology is related to the level of enthusiasm and interest in understanding the storyline of fairy tales. The implementation of oral storytelling increased respondent's interest by 86.67%, which increased by 14.33% when the approach method through storybook media equipped with AR technology became 100%. AR technology plays its role in encouraging innovative induction of learning in students.

The eighth indicator has a level accounting for 86.67% of respondents understanding the science subjects contained in the storyline more easily. It was shown when the teacher reviews strawberries which are healthy and contain vitamin C, then the student comments, "But it is not good to eat a lot".

The ninth indicator is the respondent's understanding of the values of noble character and the importance of apologizing when making mistakes in interacting with friends. A total of 86.67% of students managed to understand moral values through AR technology innovation.

The tenth indicator is relevant to religious norms, where 93.33% of respondents realize that stealing is a sin and that it is an act that must be avoided. This indicator refers to basic values in religious education. One example was when the teacher asked "Can Binoa take Paman Kulot's stuff without permission from the owner?". Then, the students answered, "No, that is bad."

The eleventh indicator relates to identity. This indicator measures the understanding of personality integrity in understanding that the task is a mandate that must be completed to completion. In this indicator, 86.67% of respondents know the importance of integrity.

The twelfth indicator, with the number of respondents amounting to 93.33%, shows the ability to count, which refers to the numeracy domain in merdeka belajar. The calculation ability was shown by asking the students to count the number of strawberries that had been prepared. Most of the students could correctly answer the number of strawberries served.

The thirteenth indicator shows scientific competence by knowing the taste and color of the strawberries in the story. 93.33% of students managed to express their scientific knowledge. This knowledge is proven when the teacher asks, "What color is the strawberry?" then the students answer simultaneously, "Red.". Besides, the teacher also asked about the taste of strawberries, and respondents answered it with a sweet and sour taste.

## CONCLUSION

This research has resulted in innovative educational technology engineering by building a fabled storyline in the form of the character of Bino and his friends taken with local wisdom into a learning media for character education for early childhood using AR technology. Action research is carried out through the development of AR technology in character education storybooks as the implementation of the Merdeka Belajar curriculum, which has six main competencies with 13 indicators. All indicators used indicate the achievement of this application providing character education support with a response rate above 80%. This implementation also provides evidence that AR applications can stimulate student's imagination to understand the story being told. Students easily accept stories related to character education that refer to the concept of Merdeka Belajar, such as religious values, literacy, identity, virtuousness, numeracy, and science. Thus, the implementation of AR technology equipped with storybooks has been able to answer the challenges of today's education in creating innovative learning.

## ACKNOWLEDGEMENT

The highest appreciation to the Direktorat Jenderal Pendidikan Vokasi who has provided support in the Community Service 2022 in scheme Penerapan Iptek Masyarakat, P3M Politeknik Negeri Semarang and Universitas Negeri Semarang, as well as students involved in the community service process.

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