Development of a Financial Literacy Book, "Good and Bad Character Augmented Reality," for Early Childhood

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Article Info	Abstract
	Financial literacy education needs to be instilled from an early age through attractive media so that it is internalized and to form managing financial habits in the future. Augmented Reality (AR) technology is an alternative since it is in the 3D form to visualize abstract concepts into concrete ones. This study aims to develop a financial literacy book with augmented reality technology, "Good and Bad Character AR." This book instills financial knowledge and experience for children in forming good character and habits. The method used in this study was Design & Development (D&D), with an analysis model of design, development, implementation, and evaluation (ADDIE). Participants were material and media experts and users (teachers and children aged 5-6 years) at the UPI Campus Labschool Kindergarten in Serang. Validation was carried out by media experts, material experts, two teachers, and five children. The analysis results demonstrated that the financial literacy book "Good and Bad Character AR" was feasible for educators to use in increasing early childhood financial literacy based on the assessment of material experts of 85.33% and media experts of 87%, with a very good category. Meanwhile, the user response came from two teachers respectively at 98.33 and 90%, considered very good in terms of the attractiveness of the content, ease of use, and the children's enthusiasm during learning. In addition, of the five children, 92% were obtained, indicating a very good response. It indicated that AR technology is feasible and potentially used in early childhood learning.

Info Artikel

Abstrak

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Edukasi literasi finansial perlu ditanamkan sejak dini melalui media yang menarik agar terinternalisasi dan membentuk kebiasaan mengelola keuangan di masa depan. Teknologi Augmented Reality (AR) menjadi sebuah alternatif karena berbentuk 3D sehingga dapat memvisualisasikan konsep abstrak menjadi konkret. Berdasarkan hal tersebut, penelitian ini bertujuan mengembangkan buku literasi finansial dengan teknologi augmented reality "Good and Bad Character AR". Buku ini menanamkan pengetahuan dan pengalaman keuangan untuk anak dalam membentuk karakter dan kebiasaan baik. Metode yang digunakan dalam penelitian ini adalah Desain & Pengembangan (D&D) dengan model analisis, desain, pengembangan, implementasi dan Evaluasi (ADDIE). Partisipan terdiri dari ahli materi dan media serta user (guru dan anak usia 5-6 tahun) di TK Labschool Kampus UPI di Serang. Validasi dilakukan oleh ahli media, ahli materi, 2 orang guru, dan 5 orang anak. Hasil analisis menunjukkan bahwa buku literasi finansial "Good and Bad Character AR" layak digunakan pendidik dalam meningkatkan literasi finansial anak usia dini berdasarkan penilaian ahli materi sebesar 85,33 persen dan ahli media sebesar 87 persen dengan kategori sangat baik. Adapun respon pengguna berasal dari 2 orang guru masing-masing sebesar 98,33 dan 90 persen dinilai sangat baik dilihat dari daya tarik isi, kemudahan penggunaan dan antusiasme anak saat pembelajaran, serta dari 5 anak sebesar 92 persen yang menunjukkan respon sangat baik. Hasil ini mengindikasikan bahwa teknologi AR layak dan berpotensi digunakan dalam pembelajaran usia dini.

Kata Kunci: Literasi Finansial, Augmented Reality, Anak Usia Dini

INTRODUCTION

As a prerequisite for 21st-century life skills, Indonesia must have the ability to develop a culture of literacy through integrated education. It indicates that mastering financial literacy, one of the six foundations of literacy set by the World Economic Forum in 2015, is vital for students. Based on *the 2019 National Financial Literacy and Inclusion Survey* results of Financial Services Authority (*Otoritas Jasa Keuangan*, OJK) in 2022, the financial literacy and inclusion level aged 15-17 years was still low, 16% below the national figure of 38.3%. Even though this figure has increased in 2022 (49.68 and 85.10%), efforts to continue to increase are necessary, encouraging the achievement of the financial inclusion target of up to 90% in 2024.

Additionally, the *OECD/INFE 2020 International Survey for Adult Financial Literacy* reported by Organisation for Economic Co-operation and Development in 2020 revealed that Indonesia's financial literacy score was 13.3. Even though this score was 63.3% of the maximum literacy score, it was still lower than Germany (13.9), Austria (14.4), Slovenia (14.7), and Hong Kong, China (14.8).

In the last few decades, several developed and developing countries have become increasingly aware of ensuring that their citizens are financially literate. The majority of these countries have introduced finance topics in the curriculum. For example, in the United States, it is taught as part of a cross-curricular subject, while in Lativa, it is taught as part of mathematics (Salas-Velasco et al., 2021).

Therefore, financial literacy as an essential life skill needs to be introduced from an early age because it can shape children's behavior and financial habits when they enter adulthood. Financial literacy can train children to avoid bad behavior related to misuse of the financial sector (Ariyani, 2018) so that later, they do not live extravagantly and can carry out proper financial management to get what they want (Nabila et al., 2021). In this case, early age forms children's habitual behavior by observing the surrounding environment. This behavior will grow into adulthood and affect future perspectives and problem-solving.

Financial knowledge and experience instilled early on will be internalized to form good character and habits in future financial management. By forming a solid financial literacy foundation from an early age, it is hoped that it will form a young generation that is not consumptive and can spend their money wisely (Novieningtyas, 2018; Oktaviani et al., 2022).

One of the efforts to develop a literacy culture is through providing reading materials that interest children. Interesting media and materials can provide a good experience for children to imagine, an essential aspect of their development (Fitriasari, et al., 2021). In addition, one of the elements of learning outcomes in early childhood education based on the 2022 Prototype Curriculum is the learning outcomes of literacy basics. For children to have literacy skills, a broad understanding is needed in early childhood education units and the parent community regarding the development of early literacy, including the ability to listen and process information and a love of books (Hasbi, 2021; Saputra & Susanti, 2021).

Introducing children to books from an early age will support optimal child development as mandated by the Ministry of Education in *Supporting Material of Financial Literacy* by National Literacy Movement. Nevertheless, it is unfortunate that learning media for developing financial literacy is still limited, especially in early childhood (Sari et al., 2022a). Sometimes, the delivery of material in books about financial literacy is less attractive, so children do not get a direct learning experience.

Notably, the children of the alpha generation have truly lived side by side with technology since they were born, so they need to be integrated into education through media designed to change a person's behavior (Devincenzi et al., 2017). Hence, one way to adapt to this generation is to utilize Augmented Reality technology in learning media. AR technology has been developed into an interesting learning medium that can be used interactively with cute 3D images featuring attractive sounds and colors so that children are motivated and easily understand learning and get direct learning experiences (Cahyaningtyas, 2020).

For that reason, this study aims to develop a financial literacy book with Augmented Reality technology entitled "Good and Bad Character AR." This book contains financial knowledge and experience visualized more concretely for children aged 5-6 in forming good character and habits.

METHODS

The method used in this study was Design & Development (D&D), with an analysis of the design, development, implementation, and evaluation (ADDIE) model, as described in Figure 1.
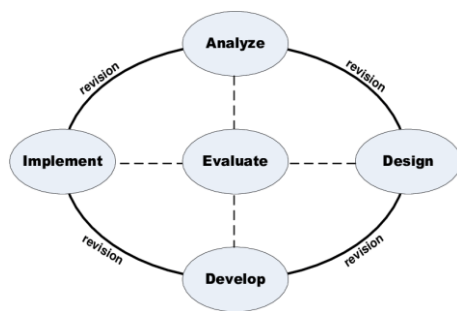
Figure 1. ADDIE Model

Participants were material and media experts and users (teachers and children aged 5-6 years) at the UPI Campus Labschool Kindergarten in Serang. In developing the financial literacy book "Good and Bad Character AR," the researchers first conducted an analysis based on observations and interviews with students and teachers, which became the basis for the importance of designing books that fit learning needs. Then, the development design was implemented through trials on subjects researched through class learning. What is evaluated is related to the behavior patterns of children and teachers when using the book. The instrument refers to the modified Classroom Learning Activities Checklist (CLAC) (Reynolds & Candee, 2019).

Table 1. Behavior Patterns of Children and Teachers

Indicator	Response Answer		
	Yes	No	Sometimes
The child appears to be fully engaged in the activity.			
Children actively participate in activities.			
The child's attention to the material is clearly visible.			
Children share answers and thoughts.			
Children follow the rules and directions.			
Children show positive peer relationships.			
The teacher shows an openness to the active participation and involvement of the child.			
The teacher is responsive to the child's frequent behavior.			
Teachers consistently involve children in using media.			
Teachers provide extra help to children when needed.			

Measuring children's understanding of choosing good character decisions was analyzed through three indicators: 1) children can classify good and bad characters, 2) children can explain the reasons for choosing good characters, and 3) children can tell their experiences. The data obtained were then interpreted with the criteria described in Table 2.

Then, product testing, referred to as the *Learning Object Review Instrument (LORI): User Manual* developed by Nesbit et al. consisted of nine aspects. However, only five criteria were applied to the products developed in this study. Material experts assessed the content's quality, learning and goals' alignment, and motivation, while media experts assessed the presentation's design and interaction's usability. Meanwhile, the assessment for each aspect was measured by an assessment score of 5 = very good, 4 = good, 3 = good enough, 2 = not good, and 1 = not good. Table 2 below describes the instrument outline for media and material experts.

Table 2. Media and Material Experts' Validation Instrument Outline

Media Expert			
No	Aspect	Indicator	Number of Items
1	Presentation's Design	Visual	6
		Animation	3
		Audio	2
2	Interaction's Usability	Ease of navigation	5
		Feature quality	4
Number of Items			**20**

Material Expert			
No	Aspect	Indicator	Number of Items
1	Content Quality	Ideas	3
		Accuracy	3
2	Learning and Goals' Alignment	Learning objectives	3
		User characteristics	3
3	Motivation	Ability to motivate users	3
Number of Items			**15**

Determining the criteria for the above instruments were calculated using the formula:

$$Result = \frac{Total\ score\ obtained}{Maximum\ score} x100\%$$

The feasibility category was based on the following criteria (Arikunto & Jabar in Firdaus et al., 2023).

Table 3. Feasibility Criteria

Achievement Rate (Percentage)	Interpretation
81– 100	Very good
61 – 80	Good
41 – 60	Enough
21 – 40	Not enough
< 21	Very less

RESULTS AND DISCUSSION

Referring to the ADDIE model, the following are the stages:

Analysis

The initial stage of developing a financial literacy book, "Good and Bad Character," was a needs analysis. Based on an interview with a teacher at the Labschool Kindergarten, information was obtained about the constraints of the media in developing financial literacy: the media available so far was less attractive and limited. In addition, the use of technology in learning has not been optimized. However, based on the results of environmental observations in the kindergarten, there was a computer laboratory that could be used during learning.

The interview results also revealed that teachers and parents were very familiar with smartphones, which is necessary for supporting daily activities. Related to the financial literacy material needed for children aged 5-6 years was material supporting character building, such as thrifty, responsibility, and honesty. Table 4 presents the scope of early childhood financially intelligent attitudes or characters in developing the book "Good and Bad Character AR".

Table 4. Scope of Character of Financial Intelligence

No	Character	Indicator
1	Simple	Sufficient, thrifty, what it is, and humble
2	Respect	The feeling of ownership, using valued objects as needed
3	Self-control	Controlling and delaying self desires
4	Social	Generous, giving, caring, sharing, and fair
5	Responsible	Maintain, treat, and repair
6	Integrity	Honesty

Design

The second stage was the design. For the design of the pictures in the book, the researchers used the services of an illustrator with the provision that each drawing design depicted the character they wanted to build, referring to the scope of financially intelligent attitudes/characters. Meanwhile, the characters in the pictures in the book were divided into two, namely good and bad, including stealing,

giving alms, saving, lying, selling, wasteful, responsible, arrogant, and breaking up friends fighting (Table 5).

Table 5. Image Design in the Book "Good and Bad Character AR"

Built Character	Image Design	Description
Simple		Bad
Respect		Good
Self-control		Bad
Social		Good
Responsible		Good
Integrity		Bad

To apply Augmented Reality (AR) to a book, the system workflow depiction stage was carried out first by making the use case and activity diagrams (Figure 2).
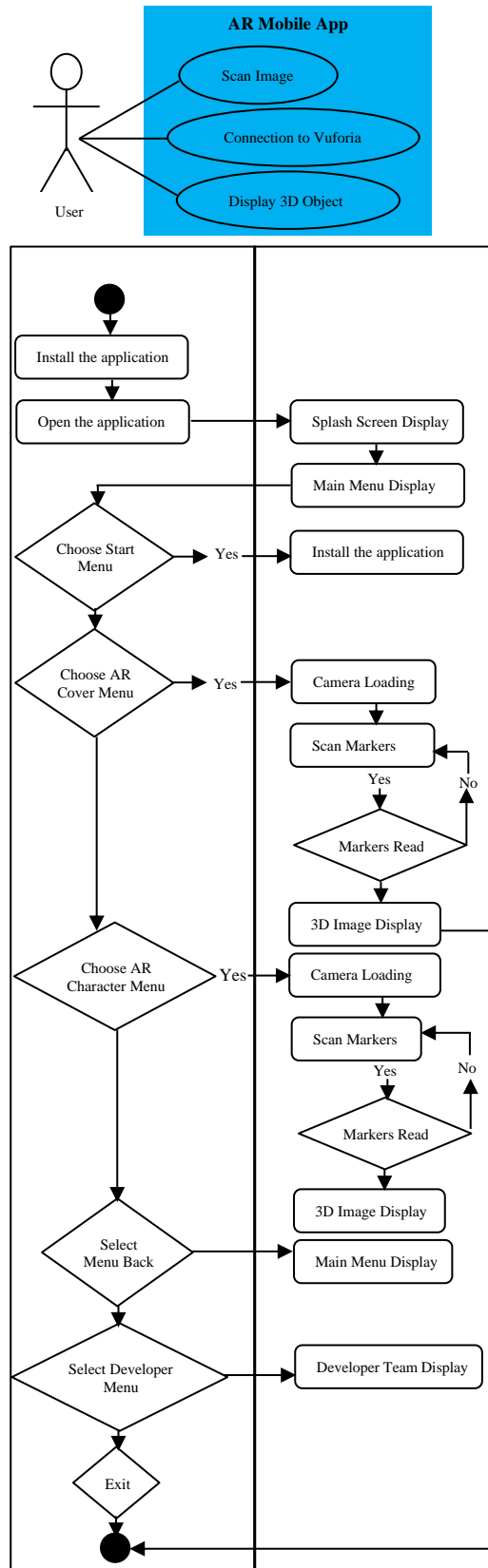
Figure 2. Use Case and Activity Diagrams in the Book "Good and Bad Character AR"

Development

At this stage, the assets were developed in the financial literacy book "Good and Bad Character AR." For 3D assets, Blender was employed. Meanwhile, Augmented Reality assets utilized software Unity 2021 version 3, Vuforia 11, and Java JDK 1. Figures 3 and 4 explain how 3D assets and augmented reality are developed in the financial literacy book "Good and Bad Character AR."

Figure 3. Blender Display

Figure 4. Inserting Images into Unity

Application development was carried out through the following steps:
- Create a marker design
- Upload the image made and then enter it into Vuforia to determine the rating on the marker that deserves a 3D object. If the image gets five stars, it can augment the image into a 3D object.
- Copy the license on Vuforia and connect it to Unity
- The marker was first inserted into the target image or marker.
- Insert an image into Unity to be processed, where the 3D object would be inserted later.
- After the 3D object model was successfully connected to the marker, the next step was

to add sound to the 3D model. The 3D model was made into two scenes: the cover scene and the book contents scene. For cover scenes, the 3D model was made into one in one marker by adding scrap arrays in the scene. Apart from that, arrow buttons were also added to make it easier for players to move to the following 3D model.
- The menu section was made of start, developer, and exit buttons. Making the main menu scene did not use AR, but the canvas is for displaying the APK UI. 2D button files were exported to 3D to suit AR 3D.
- Each scene was shown how to use it with a how-to-use button to make it easier for the user.

Figure 5. Display of "Good and Bad Character AR" Application

Implementation

At the implementation stage, product trials were carried out through validation by material and media experts with the following results:

The material expert validation test was measured from content quality, goal alignment, and motivation. The results obtained a total score of 64 (85.33%), meaning the instrument was declared very good. The material validator stated that the financial literacy book "Good & Bad Character AR" was feasible without revision.

Media expert validation test was measured from presentation design and interaction usability. Based on suggestions from the validator, the product was revised once, with the final result obtaining a total score of 87 (87%), indicating that the instrument was declared very good. Meanwhile, the validator's suggestions included (1) providing a background on the panel when the "How to" button makes it

easier to read the instructions; (2) the location of the "how to" button can be placed in the corner of the screen to make it easier for users to access the content; (3) labels and menu button layouts on the main page can use keywords/terms that are general and more informative.

Evaluation

The final stage was evaluation. To measure this, the researchers observed behavior patterns displayed by children and teachers when using the financial literacy book "Good and Bad Character AR" using the ten indicators as described in Table 1, with the following results: 80% of children appeared to be fully involved in activities, attention to material, sharing answers and thoughts, and demonstrating positive peer relations. Meanwhile, observations of teacher behavior patterns showed that all the indicators measured were visible.

Figure 6. Learning Situation when Using the "Good and Bad Character AR" Application

In addition, the researchers measured the teacher's response as a user with the following results.

Table 6. Teacher Responses to the Financial Literacy Book "Good and Bad Character AR"

Aspect	Number of Items	Max Score	Teacher Response 1	Teacher Response 2
The Attraction of Book Contents	4	20	20 (100%)	17 (85%)
Ease of Use	4	20	19 (95%)	18 (90%)
Child Enthusiasm	4	20	20 (100%)	19 (95%)
Total	**12**	**60**	**59 (98.33%)**	**54 (90%)**

Based on Table 6, it can be concluded that the financial literacy book "Good and Bad Character" was considered very good in terms of the attractiveness of the content, the ease of use, and the enthusiasm of the children when learning.

Discussion

Based on the results of analysis, design, development, implementation, and evaluation, and development, the financial literacy book "Good and Bad Character AR" was very good and feasible for use in instilling financial knowledge and experience for children aged 5-6 years for the formation of good character and habits. Moreover, Augmented Reality (AR) technology is currently a technology that can be developed into an interesting learning medium for children by utilizing gadgets, computers, and others, which can be used interactively anytime and anywhere (Kurniawan et al., 2019).

AR technology learning media can visualize abstract concepts in concrete. As mentioned by Zaman & Eliyawati in *Early Childhood Learning Media* that in early childhood learning, teachers must use something that allows children to learn concretely. The AR technology is relevant as new approach that has potential since easily attract young learners (Sari et al., 2022b).

This book introduces children to the character. Character education should be taught to children from an early age so that the child's personality is mature intellectually, emotionally, and spiritually (Priska, 2020). Through "Good and Bad Character AR," children can be taught and trained to make good or bad financial decisions. Children are also given examples of good and bad deeds so that one day, the child can decide to do good.

From the development of the "Good and Bad Character AR" financial literacy book, it can then be developed for other research, such as experimental research or other forms. Various deficiencies in this study can also be

study material for further research development.

CONCLUSION

Augmented Reality-based financial literacy books designed and developed can provide an understanding of good character selection decisions for early childhood. It can be seen from the character material depicted in this book displayed through cute 3D images, complete with attractive sounds and colors.

Based on the media feasibility test results based on the validation of material and media experts, the financial literacy book "Good and Bad Character AR" can be used by educators to increase early childhood financial literacy.

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