Research article

Design of Augmented Reality-Based Thematic Textbooks to Improve the Literacy of Elementary Students

Eem Kurniasih[1*], Barokah Widuroyekti[1], Lusi Rachmiazasi Masduki[2]

[1]Department of Early Childhood Education, Universitas Terbuka, Indonesia
[2]Department of Mathematic Education, Universitas Terbuka, Indonesia

Abstract.
During the pandemic, breakthroughs in learning were required, one of which was the conversion of printed versions of traditional teaching materials into digital teaching materials. While there were many digital textbooks or e-books available on the internet, there was no SD thematic material packaged digitally based on augmented reality and capable of displaying an engaging, augmented reality for students. This augmented reality-based thematic textbook could help elementary students understand basic thematic material, and its products could be installed on all students' computers and smartphones, making learning more enjoyable. The research method of this study was based on the ADDIE R&D model (analysis, design, develop, implement, and evaluate). Elementary thematic textbooks from various publishers were analyzed, which revealed that no national publisher has produced augmented reality-based elementary thematic textbooks for grade 1. Following that, four chapters of augmented reality-based elementary thematic textbooks were designed, which were validated by learning material and learning media experts with scores of 90 and 92, respectively, indicating that this product is suitable for limited testing in elementary schools in Semarang and its environs. This augmented reality-based elementary thematic textbook is effective because it displays augmented reality, pictures and fun music.

Keywords: design, elementary thematic textbooks, augmented reality, ability, student literacy

Corresponding Author: Eem
Kurniasih; email:
ekurniasih@ecampus.ut.ac.id

1. Introduction

In the world of education today, there are many textbooks circulating in the market, but they are not in accordance with the demands of the times, for example, textbooks in elementary thematic learning, so far the available textbooks are only in the form of print versions and have not been linked to the application of renewable technology, from This reality makes teachers have to be able to package and create interesting textbooks for students and be able to improve students' literacy skills, elementary schools in the city of Semarang and its surroundings, both public and private, have not been able to provide augmented reality-based elementary thematic textbooks that are able to display 3D objects in every area. textbook pages, therefore it is necessary

to make augmented reality-based elementary thematic textbooks that can improve students' ability to understand elementary thematic material in a measurable manner. This is confirmed by the research which shows that by making an electronic book on augmented reality-based elementary school mathematics lessons [1], it can improve student learning outcomes, then has conducted a survey of schools that use augmented reality in learning, showing that schools that use AR in learning make students more motivated in doing learning in class and at home [2].

Based on interviews with several elementary mathematics teachers in the city of Semarang, both public and private, the fact that almost 100% of elementary schools in the city of Semarang still use elementary thematic textbooks that have not had a touch of renewable technology such as augmented reality, virtual reality, other renewable software applications, This makes a significant finding for the development of textbooks that are able to accommodate these problems, based on research there are several factors that cause the low thematic grades of elementary school grade 1 such as 1) the textbooks owned by the teacher are less attractive, 2) the student's skills are weak in recognizing letters and numbers, 3) Teachers who teach material on recognizing numbers and letters only use media to make sketches or pictures and there are still a few teachers who use software-based media that facilitates the abstraction of subjects for students, 4) Students are still weak in solving problems relating to numbers and letters that are stem from everyday life. 5) students have difficulty recognizing letters and numbers so they need renewable media that displays augmented reality accompanied by interesting music and games [3]. This is in accordance with the research which shows that mobile augmented reality is very effective in learning in higher education because it is able to display augmented reality that attracts students [4].

According to the results of observations made by researchers at SDN Pedurungan Tengah 01 Semarang and SDN Pandean Lamper 01 Semarang, the thematic learning processes in elementary schools were less active and less interesting, this was due to the absence of learning media used by teachers, thus making students bored quickly. Teaching and learning interactions in the classroom can not be separated from the influence of the media used by teachers in delivering teaching materials that are growing rapidly at this time are smart phones/smartphones. The existence of technology, especially smartphones, which are now growing, must be addressed wisely. The phenomenon of the high number of smartphone users is certainly a challenge and opportunity in the world of education. The challenge is abuse for negative things. Besides being a challenge, the existence of smartphones also brings great opportunities to develop useful technology in the field of education. One of the benefits that can

be taken from the existence of this technology is to use it as an effective, creative and educational learning medium. This is the research That good interaction with AR media makes users more aware of the advantages of AR media [4], then showed the application of AR (augmented reality) technology in wind energy learning for grades IV SD in smart homes al -barokah able to improve students' literacy skills [5]. So the making Interactive learning media innovation: utilization of augmented reality and pop-up book to improve user's learning autonomy [6]. Make learning pop up books more interactive. So that educational application media can continue to be developed, one of which is Augmented Reality (AR) technology in interesting elementary thematic books [7].

2. Research Methods

This type of research is research and development. The population in this study were students of elementary school [8]. Data collection techniques used are tests validation expert judment, questionnaires and documentation. The material in this learning media is elementary school learning media and resources especially thematic class 1, Data analysis techniques in this study were analysis questionare. The development model used is the ADDIE model which includes analysis, design, development, implementation, and evaluation. **The ADDIE model can be shown in Figure 1.**
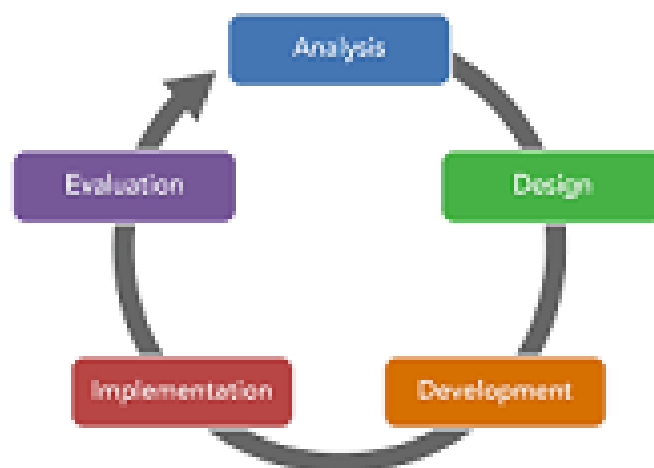

Figure 1: ADDIE Model [8].

3. Results and Discussion

3.1. Analysis

has been carried out on the performance of the teachers of SDN Pedurungan Tengah 01 and SDN Pandean Lamper 01 Semarang who teach elementary thematic material for grade 1 which shows that so far there have been no teachers who have used AR-based elementary thematic textbooks during the COVID-19 pandemic. Therefore, it is very necessary to have this textbook media in helping students practice AR in understanding thematic material and its types.

In the second stage, the needs analysis is a necessary step to determine the abilities or competencies that students need to learn to improve learning achievement [9]. What is clear is that learning media is needed that is able to produce elementary thematic material for grade 1 which is packaged in augmented reality and makes students able to practice recognizing other elementary thematic materials in an interesting and systematic way.

3.2. Design

This step requires a clarification of the learning program designed so that the program can achieve the learning objectives as expected, In product design, what is done is the next stage of the ADDIE model, namely design. At this step, it is necessary to clarify the learning program designed so that the program can achieve the learning objectives as expected [9].

In making SD thematic textbook products based on augmented reality, grade 1 material has been made in a team by the UT research team and assisted by IT experts outside UT so that there is good collaboration with the UT research team to create a material framework and design that is expected in making elementary thematic materials based on AR, then executed by IT experts who are competent in their fields, after the design of the AR-based elementary thematic textbooks took approximately 3 months according to the advice from the results of the first year research, the product was continued in the third stage, namely development[10].

3.3. Development

This development step includes creating, buying, and modifying learning media to achieve predetermined learning objectives. The development step, in other words, includes the activity of selecting and determining the appropriate methods, media and

Figure 2: Design of temathic textbook about elementary school class 1 material after revision.

learning strategies used in delivering personal material [11]. In this development stage, the framework that has been designed will be realized so as to produce a product that can be implemented. In this development stage, the AR-based SD thematic textbook product was validated first to the experts, namely material experts and media experts, so that this augmented reality-based elementary school thematic product was worthy of use before being tested limitedly at SDN Pandean Lamper 01 Semarang.

At the development stage, AR-based SD thematic textbooks will be made according to the material, after the print-based and AR-based media are completed, they will be validated by media experts and material experts by the validator to get input and evaluate according to the input given by the validator [12]. Furthermore, the android-based media is revised according to the input given by the validator to improve the product.

TABLE 1: Validation of learning media experts.

Media expert	Application aspect	Creative aspect	Innovation aspect	Communication visual aspect
Validation score	92%	94%	90%	92%

From the table above, an average score of 92% is obtained, meaning that this augmented reality-based elementary thematic textbook media is very suitable for use in elementary thematic learning in elementary schools in Semarang.

Table 2 shows an average score of 90%, meaning that the material in this AR-based elementary school thematic textbook is very suitable for use in thematic learning in elementary schools. Then continued with material expert validation so that the suitability of the material content can be accounted for, so that AR-based elementary school

TABLE 2: Validation of learning material experts.

Material expert	Material substantion aspect	Language aspect
Validation score	91%	89%

thematic textbook media products can materially be used. It was strengthened that the development of digital teaching materials and its application in the 5E Learning Cycle Model (Learning Cycle 5E) was able to increase learning activities and outcomes [13]and then with the development of learning media knowing human digestive organs using augmented reality technology can improve student achievement [14].

4. Conclusion

Based on the results of the study, it can be concluded that the application Augmented reality-based elementary thematic textbook products have been produced that can be used in public and private elementary schools, especially in the Semarang city area, so the product has been expertly validated and received a very good response from users including teachers, media experts and learning material experts

Authors' Contributions

The author hopes that the results of this study can be an alternative for teacher elementary school to using thematic textbook media with different materials. So it is expected to improve motivation student.

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