

Augmented Reality-Based Multimedia in Early Reading Learning: Introduction of ICT to Children

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Abstract. The background of this research is the need to develop multimedia in early reading learning. Development of this Augmented Reality-Based Multimedia is also as an effort to introduce ICT to children. This study aims to produce a multimedia learning, which combines the use of flash cards, android applications, and 3-dimensional images. This research is based on Research and Development. The steps taken in this research process refer to Borg & Gall (2003) research stages. The use of AR includes several stages, including: (1) downloading the "Let's Learn to Read (AR)!" App in the play store on android phone; (2) install the application into phone; (3) open an application already installed on the phone; (4) scan AR reading card using application; (5) 3D images, letters, and words will appear on the phone screen; (6) Point your finger behind the phone in the word that appears on the screen to bring up the audio. This multimedia has been validated by experts and is tested on a limited and wide basis to elementary school students, parents, and teachers. The test considers functionality, efficiency, and usability of this media. The test results show that the user response to this media is good .

1. Introduction

Early reading is an early stage for the child to develop the readiness to read. Early reading learning begins when the child has reached school age and is in elementary school. At that age the child is at the stage of learning to read or begin to study writing as a visual representation of language. Early reading learning is a provision for the child to get into the stage of reading further or read to learn. The age at which children enter school and learn to read is intuitively an important factor in later reading achievement [1]. The ability to read in the beginning is an important factor to achieve success in the ability to read further.

Early reading activities should be done in a creative and fun way. This is so that children do not feel burdened and feel motivated to develop the ability to read. To provide a fun early reading learning to the child, the use of media can be an alternative. By using media, early reading learning becomes more interesting. In addition, media can improve the reading ability of the children [2] [3] [4]. Media can and do improve language teaching, from non-mechanical aids such as household objects, flashcards, and magazine pictures, or mechanical aids such as video cameras and computer [5].

The use of media in today's learning continues to grow. ICT products can also be used as a media of learning. According to Siraj-Blatchford & Whitebread that children in the 21st century live in a world rich with technology. They are surrounded by the Internet, web sites, emails, chat rooms, cellphones, discussion boards, and so on [5]. It shows that children in the 21st century, have been living with



technology. Augmented reality is one form of information technology products (ICT). ICT has become one of the important needs in the education [6].

Based on the explanation, this study aims to develop the multimedia of early reading learning based on Augmented Reality. By using this multimedia, early reading learning is expected to be more interesting and fun. This is because children can learn through visual media and auditory, and children can engage interactively with the media that also present in the form of 3-dimensional images. In addition, they can learn anywhere and anytime. With ICT, student can learn without limitation of space and time [7]. Utilization of AR as a media is at the same time as an effort to introduce information technology (ICT) to children because after all the information technology is now a part and human needs. Based on this background, the purpose of this research is to know the process of developing augmented reality multimedia in early reading learning and to know the perception of users (teacher, parent, and child) on augmented reality based multimedia in early reading learning.

Early Reading is a reading activity conducted in the early class and is a basic step toward further reading activities. There are three terms that are often used to provide the basic components of the reading process are: recording, decoding, and meaning [8]. Early reading teaching is emphasized on developing basic literacy skills. Students are required to be able to speak letters, syllables, words and sentences presented in written form into oral form [9].

According to Lamb and Arnold [8] the factors that influence the early reading are: (a) Physical factors, physiological factors include physical health, neurologic considerations, and gender. Fatigue is also an unfavorable conditions for the child to learn, especially learning to read, (b) Intellectual Factors, in general, the intelligence of the child does not fully affect the success or failure of the child in reading the beginning. Factors teaching methods teachers, procedures, and the ability of teachers also affect the ability to read the beginning of children, (c) Environmental factors, environmental factors also affect the progress of reading ability learners.

The use of Augmented Reality media in early reading learning is expected to help students succeed more quickly. Augmented reality (AR) technology is a technology that allows the addition of synthetic images into the real environment. This is in contrast to Virtual Reality (VR) technology that entirely invites the user into a synthetic environment. AR technology allows users to view 3D virtual objects added to the real environment [10].

Augmented Reality is a technology that combines virtual objects (text, images, and animation) with the real world [11]. According to Lee [11], AR has great potential as a learning medium because it is able to attract students' attention, inspire, and motivate learners to explore and manage control from different perspectives, which may not previously be a consideration in teaching practice in schools. Here is an example of AR implementation as a learning medium.

Augmented Reality has several advantages, 1) AR may expand the user's perception of an object and provide a 'user experience' to the displayed 3D object, 2) AR allows users to interact that can not be done in the real world, 3) AR allows to use various tools (devices) in accordance with the needs and availability [10].

2. Methodology

This research is based on Research and Development (R & D). The steps taken in this research process refer to Borg & Gall [12]. The steps taken are: (1) research and data collection, (2) planning, (3) product development, (4) initial field trial, (5) revision of trial result, (6) improvement of product, and (7) test of final field implementation [12]. Sources of data of this research are: (1) sample of elementary school teacher in Serang city, (2) sample of student of 1st grade of elementary school in Serang city, (3) sample of parent of student of 1st grade of elementary school in Serang city. The instruments that used in this research are assessment instruments (judgement expert) and questionnaires for user perception.

The data in this study will be collected using several data collection methods (1) questionnaires, and (2) documentation. Based on this data collection method, the data to be generated in this research is qualitative data in the form of AR-based multimedia development process and descriptive quantitative data in the form of percentage of response result on AR-based multimedia trials. In line with the data

produced by this research that is qualitative data and quantitative data. Data processing in this research will be done through two stages. The first step, qualitative data in this research will be processed by using qualitative data processing technique that is through stages (1) data inventory, (2) data classification, (3) data analysis, (4) data interpretation, and (5) making conclusion. The second stage, the quantitative data in this study will be processed with the help of simple statistics. Further data are processed, analyzed, and triangulated with various sources to obtain the meaning of research results.

3. Result and Discussion

Augmented reality-based multimedia was developed with the aim of helping children learn to read through ICT utilization. Through this educational media is also expected teachers and parents can train and develop children's ability in early reading anytime and anywhere. The following will describe the development and results of field trials that have been conducted in accordance with the stages in the research method.

3.1 Development of Multimedia Based Augmented Reality in Early Reading Learning

As mentioned earlier, this media card read is a medium that can run using android OS applications, 1GB memory, 480x800 screen, and kitcat version of the Android. The development of this media can be pursued through several steps, including the steps of media design, materials collection, and program development. Here is a chart of the AR card media development process being run.

This applications developed can be operated with android. This AR reading card consists of the alphabets A through Z. Each letter is accompanied by a letter whose first letter corresponds to the letter on the card. Not only 3D images that can be raised, this app also comes with audio that is adapted to the pronunciation / pronunciation of words printed on the card. Thus, when using this AR card media the child not only looks at the shape of the letter, but also the word, the concept of the word represented by the 3D image as well as the audio that contains the pronunciation / pronunciation of the word.

The use of AR reading media cards includes several stages, including: (1) downloading the "Let's Learn to Read (AR)!" App in the play store on android phone; (2) install the application into android phone; (3) open an application already installed on the phone; (4) scan AR reading card using application; (5) 3D images, letters, and words will appear on the phone screen; (6) Point your finger behind the phone in the word that appears on the screen to bring up the audio. Here is the result of display development of augmented reality card read media.



Fig. 1 Opening Screen

In the opening view of the media will appear the name of the programmer. After that, followed by the agency logo, and the app title and start button will appear. To sign in and use this app, users can simply hit the "start" button on the phone screen.



Fig. 2 AR Flash Card

After the start button is pressed, on the screen will appear the camera used to scan the AR card read items that have been prepared by the user. Pictures, letters, and sounds will appear according to the scanned word card.

3.2 User Perceptions of Augmented Reality-Based Multimedia in Early Reading Learning

After the media development is completed, the next step is to perform expert tests and limited tests. The following is the result of expert test and limited test of augmented reality-based multimedia in the initial reading learning.

3.2.1 Expert Validation

At this stage, this multimedia validated by experts. Experts who carry out validation are Indonesian Language in primary school expert and Teaching Media in primary school expert. Based on the validation results of both experts, it can be concluded that multimedia AR is feasible and can be used as a media for early reading learning for elementary school children.

3.2.2 Field Test Result

A limited and field AR multimedia test was conducted on 1st grade elementary school students, elementary school teachers, and parents. The user perception data is collected through a questionnaire containing questions about AR's functionality, efficiency, and usability.

a. Variable Functionality

In the first indicator, the response of the camera button, 19 respondents or as many as 95% of respondents answered Able, 0% of respondents answered Not able or no one answered, and 1 respondent or as much as 5% of respondents answered Neutral. In the second indicator, the scanning function on the card / picture, 19 respondents or as many as 95% of respondents answered Able, 0% of respondents answered Not able or no one answered, and 1 respondent or as many as 5% of respondents answered Neutral. In the third indicator, the display image on the device screen / hand phone, 18 respondents or as many as 90% of respondents answered Able, 0% of respondents answered Not able, and 1 respondent or as many as 10% of respondents answered Neutral.

b. Variable Efficiency

In the first indicator, the quality of the image that appears on the phone screen, 20 respondents or as many as 100% of respondents answered Able, while the alternative answer Not able and Neutral 0%. In the second indicator, the shape of the image that appears on the phone screen, 20 respondents or as many as 100% of respondents answered Able, while the alternative answer Not able and Neutral none or 0%. the colour that appears on the phone screen, 20 respondents or as many as 100% of respondents answered Able, while the alternative answer Not able and Neutral is 0%. In the fourth indicator, the flash card can be scanned, 19 respondents or 95% of respondents answered Able, no one of respondents answered Not able, and 1 respondent or as many as 5% of respondents answered Neutral.

c. Variable Usability

In the first indicator, the use of the flash card can help to recognize letters, 18 respondents or as many as 90% of respondents answered Able, no one of respondents answered Not able, and 2 respondents or as many as 10% of respondents answered Neutral. In the second indicator, the use of the flash card to recognize words, 19 respondents or as many as 95% of respondents answered Able, no one of respondents answered Not able, 1 respondent or as much as 5% of respondents answered Neutral. In the third indicator, the flash card can help students learn to read, 20 respondents or as many as 100% of respondents answered Able, while the alternative answer Not able and Neutral do not exist or 0%. In the fourth indicator, the flash card convenient when used, 20 respondents or as many as 100% of respondents

answered Able, while no one respondents answered Not able and Neutral. In the fifth indicator, the flash card is easy to use, 20 respondents or as many as 100% of respondents answered Able, 0% respondents answered Not able and Neutral. In the sixth indicator, respondents liked augmented reality flash card, 20 respondents or 100% respondents answered Yes, no one respondents answered No and Neutral. In the seventh indicator, the use of augmented reality card is pleasant, 20 respondents or as many as 100% of respondents answered Yes, no one respondents answered No and Neutral. In the eighth indicator, the use of augmented reality card is good, 20 respondents or as many as 100% of respondents answered Yes, no one respondents answered No and Neutral.

Based on the result, it appears that the use of Multimedia Augmented reality application shows a good usage level to be used for elementary school students. The function of the Multimedia Augmented reality application menu is easily visible from the total reached 93,33% respondents Able, ranging from the use of camera buttons, image scanning, and the emergence of images on the mobile phone screen with high response results. Efficient use of Multimedia Augmented reality applications also obtain good response from elementary school students, teachers, and parents, ranging from image, colour, and the flash card scanned with test result reach 98,75% stated Able. In addition, in terms of use of test results show the number 98.125% states Able. Based on the exposure, it can be seen that the user responses to the use of Augmented multimedia as a whole is good / positive. Based on the results of the overall tests conducted on 1st grade elementary school students, parents, and primary school teachers, it can be concluded that the Augmented reality multimedia is feasible and can be utilized in early reading learning. Multimedia can support children to learn to read [13] [14] [15].

4. Conclusion

Early reading is an early stage for the child to develop the readiness to read. To provide a fun early reading learning to the child, the use of media can be an alternative. By using media, early reading learning becomes more interesting and children's reading ability can develop [2] [3] [4].

Augmented reality-based multimedia is developed with the aim to help children learn to read through the utilization of ICT. This media is used as audio visual aids in reading the beginning mainly related to the introduction of letters, words, and word concepts. Development of this media can be reached through several steps, including media design steps, materials collection, and program development into applications. This AR reading card consists of the alphabets A through Z. Each letter is accompanied by a letter whose first letter corresponds to the letter on the card. Not only 3D images that can be raised, this app also comes with audio that is adapted to the pronunciation / pronunciation of words printed on the card. Thus, when using this AR card media, the child not only looks at the shape of the letter, but also the word, the concept of the word represented by the 3D image as well as the audio that contains the pronunciation / pronunciation of the word. Based on validation test from the experts and the results of the limited and field test to the users, it can be concluded that the Augmented Reality multimedia can be used in early reading in primary school.

Based on the results of research, the following are recommendations that can be put forward the author. Multimedia Augmented Reality is one of the alternative media that can be used in early reading learning. This media can be used anytime and anywhere. This media can be used by teachers in the classroom, as well as learning outside the classroom. One of the goals of multimedia development is to support children in learning, especially learning to read [13] [14]. However, in the utilization of each instructional media, especially for low-grade students of elementary school, still must get guidance from teachers and parents. After the existence of this research, it is expected that further research can develop other multimedia in early reading and writing learning.

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