Utilization of augmented reality technology as a learning media for early childhood

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Abstract. The purpose of this study is to describe the use of augmented reality technology as a learning medium for early childhood. This study used descriptive qualitative method. Data collection techniques using observation and interviews with 4 early childhood. The results of this study indicate that the use of augmented reality technology as a medium of learning in early childhood can provide an understanding of an object concretely, improvisation of sounds and images that support the learning atmosphere, and be able to attract the attention and focus of children in school. In addition, a lot of potential is developed when implementing augmented reality technology. It is hoped that the use of this technology can be applied to early childhood as a form of learning media innovation.

1. Introduction
Early childhood education is the most basic institution in shaping human resources. The nature of this education is to help children get the right stimulation to develop their potential to be able to enter the next level of education. Early childhood education helps stimulate child development through learning [1,2].

The media used by early childhood teachers generally use an educational game tool. However, the use of this tool as a learning medium has not been successful in providing a concrete picture of an object and has not been able to attract the attention of children in the learning process [3]. Early childhood is in the pre-operational stage. Pre-operational stage is the stage where children think concretely and cannot think abstractly. That is, it needs something concrete to explain an object to children. In addition, the child's focus point is also minimal, a maximum of only 15 minutes [4].

Early childhood institutions must innovate, especially in the use of instructional media. Bearing in mind, now entering the era of the industrial revolution 4.0 where technological developments are developing rapidly. Children are more interested in the use of gadgets as learning media compared to the use of educational game tool [5,6]. The Government of Indonesia issues regulations on the use of technology on ICT competency utilization maps, namely students can use applications to learn to recognize visual forms and images [7]. Therefore, through this research we designed augmented reality as a learning media in early childhood education that can provide real object images and can attract children's attention in the learning process.
2. Method
The methodology in this research is descriptive qualitative in which the natural setting as the direct source of data and the researcher is the key instrument. The point is the researcher as the main data collection tool. Qualitative descriptive research in this study is observational data about the activities of early childhood in utilizing augmented reality and described in descriptive form. The attitude shown from the beginning of the activity until the end of the utilization of augmented reality technology [8,9]. The subjects of this study were 3 early childhood.

Data collection techniques using observation and interviews. Data collection techniques in qualitative research can generally be grouped into two ways in which data collection techniques are interactive and non-interactive. In this study the authors used interactive techniques including observations and interviews. The observations referred to in this study are participant observation. Participant observation is an in-depth observation by blending into the middle of the research subject. So through observation, researchers learn about the behavior and meaning of the behavior. Observations were made to find out early childhood activities in using augmented reality as a learning medium.

Observations are carried out in an unstructured manner, then carried out repeatedly. We did the interview to conduct a preliminary study to find problems that must be investigated, and want to know things from respondents in more depth. Interviews as data collection techniques by way of question and answer are carried out systematically based on specific objectives. Interviews were conducted with 3 early children. Through interviews, efforts are made to dig deeper information. Interviews conducted in a structured and face to face.

Data obtained from the results of observations and interviews are outlined in writing and analyzed. At this stage the writer describes what is seen, heard, felt and asked. The author reduces all information that has been obtained by sorting data or choosing which data is interesting, important, useful and new. Data that is not used is removed. Based on these considerations, the data are then grouped into various categories determined as the focus of the study.

The next stage is the presentation of data, which presents information obtained from the data reduction process, then is organized and presented with a narrative text model. The next stage is the conclusion and verification of data that has been patterned, focused, and arranged systematically, then concluded, to further search for new data, as a test of tentative conclusions obtained.

The last step is data validation using triangulation/comparison which combines various existing data collection techniques and data sources [9]. The goal is to check and compare answers between participants and experience among fellow researchers conducting data collection.

3. Results and discussion
The application of augmented reality in normal children can increase children's focus point in learning, children get interactive learning media, can improve children's vocabulary and so on. Facing the industrial revolution 4.0 the education sector must change and keep up with rapid technological developments. Little by little the field of education began to develop, especially in utilizing learning media. Learning media can take advantage of technological developments such as augmented reality [10].

Augmented reality is a technology that combines 2-dimensional or 3-dimensional virtual objects into a real environment and then projects these virtual objects in real time. Augmented reality in education has a positive impact, which is interesting for multi-modal learning, increases the accessibility of educational content, increases student control of educational content, opens collaborative learning opportunities, motivates students to be actively involved, and turns abstracts into concrete [11].

Augmented reality-based learning for early childhood education has not been done much, although the potential use of augmented reality for early childhood education is very large and has unlimited opportunities. There are 3 principles of augmented reality, namely: (1) Augmented reality is an
amalgamation of the real and virtual worlds; (2) Augmented reality runs interactively and in real time; and (3) There is integration between 3-dimensional objects, namely virtual objects that are integrated in the real world [12].

Augmented reality systems have been developed in various applications, especially in the fields of education and entertainment. One of them is the Quiver Vision application. How to use it: (1) Download images provided by the Quiver Vision app; (2) Printing and coloring images; (3) Scanning image objects through the camera in a quiver vision application; and (4) Playing a projected 3-dimensional object.

The use of augmented reality in early childhood education can be innovated by making puzzles from images provided by quiver vision. The aim is to foster 21st century skills in early childhood such as critical thinking, collaboration, communication, and creativity [13]. The following are the stages in the use of augmented reality technology in early childhood education:

- The teacher downloads images from the quiver vision application. The pictures given to children are adapted to the theme and sub-themes of the day;
- The image has been downloaded, then edited to a number of puzzle pieces and prepare a base to be attached to the puzzle piece;
- Print the puzzle into A3 paper. Then cut the puzzle settings;
- The teacher prepares all materials and tools used in the use of augmented reality technology such as smartphones / tablets, quiver vision applications, colored pencils / crayons and so on;
- Children are directed to groups of 3-4 people. Every child is responsible for completing the puzzle picture arrangement;
- The child attaches the puzzle structure to the provided puzzle base;
- After sticking, children are directed to a perfectly arranged color image. Children are free to color using the colors they want, meaning that there is no compulsion in developing children's imagination;
- The next step, open the Quiver Vision application that has been downloaded on Google Play. Children are trained to patiently wait for their turn in the process of scanning colored augmented reality images;
- After successfully scanning and 3D images appear from each image that has been colored. The teacher explains about each picture. The teacher explains about dinosaur animals, starting from what is dinosaur, habitat, food, and everything about dinosaur animals. Children can also play the available games or quizzes.

After utilizing augmented reality as a learning media in early childhood, children's cognitive development is increasingly developing. Seen when children more easily recognize objects from the pictures they have colored, children can identify various animal shapes such as eyes, nose, mouth, feet, hands and various other body parts, children can know various colors, thinking skills critical since early childhood can be developed, children can find out animal sounds that are projected to be a vibrating vision application, children know and can operate the technology that developed in the era of the industrial revolution 4.0, namely augmented reality.

In addition, the potential gained by children when implementing augmented reality are: (1) children can use applications to learn to recognize objects concretely; (2) children are increasingly interested when using augmented reality technology as a learning medium; (3) Children can more easily recognize objects when using augmented reality than educational toys; (4) aspects of child development can be developed through the application of augmented reality; (5) 21st century skills in children can be developed; (6) Learning is more interesting and interactive.
Figure 1. Steps for using augmented reality in early childhood.

4. Conclusion
The use of augmented reality technology as a learning medium in early childhood can provide an understanding of an object concretely, improvisation of sounds and images that support the learning atmosphere, and be able to attract the attention and focus of children in the learning process. In addition, a lot of potential is developed when implementing augmented reality technology. It is hoped that the use of augmented reality technology can be applied to early childhood as a form of learning media innovation in early childhood institutions.

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