

# Android Based Educational Game Development to Improve Early Childhood Reading Ability

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## ABSTRACT

This research is motivated by the sophistication of technology to be developed in early childhood learning to improve children's reading skills. Reading is one of the skills retained by early childhood. The ability to read can facilitate children's learning at the subsequent level of education. This study aims to improve children's reading skills through android-based educational games. This study employs the type of research R & D (Research and Development) with the ADDIE model, which refers to Analysis, Design, Development, Implementation, and Evaluation. Data collection techniques used a questionnaire. The results obtained from the development of children's reading skills through android-based educational games were declared valid, practical, and effective. The data collection instrument in this study was a questionnaire to test the validity, practicality, and effectiveness. The validation results of educational games were declared valid and very feasible to use with the means of Aiken's V by material experts was 0.89. The means of Aiken's V by media experts was 0.93. The Practicality of the Android-based Educational Game is highly feasible and has an average percentage result of 89%. The effectiveness is 91%. Therefore, educational games are declared effective. Hence, android-based educational games to improve children's reading skills in Raudhatul Atfhal are valid, practical, and effective.

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## 1. INTRODUCTION

Early childhood language activities are listening, speaking and reading. Therefore, it is necessary to foster and develop related reading skills in children. The reading process is an important factor in early childhood, especially in applying learning in PAUD. (Nahdi, 2020) revealed that reading the beginning

or the beginning emphasizes more on the introduction and pronunciation of sound symbols and concluding the meaning of the existing reading.

Learning to read in Kindergarten should be carried out through game activities and using media that are close to children to motivate children in learning to read. Digital games as a learning tool where digital games do not only present immersive and fun activities but also activities related to learning content to achieve certain goals (Setiawan Andri, Praherdhiono, 2019). One of the games that benefit children in learning content is educational games. Educational games are examples of games that are fun and provide learning content. Educational games are learning media in the form of games that can stimulate human thinking, including increasing concentration and solving problems. According to Patton, educational games have played an important role in modern educational methodologies (Alwan et al., 2020).

Educational games are learning media in the form of games that can stimulate human thinking, including increasing concentration and solving a problem. Educational games have played an important role in modern educational methodologies (Wulandari, H., & Purwanta, 2020). Educational games can teach children a number of skills, but to foster enough involvement that children want to learn, games must be entertaining enough. Based on the pattern possessed by the game, players are required to learn so that they can solve existing problems (Pratama, E. B., Hendini, A., & Melda, 2020). Game status, instructions, and tools provided by the game will actively guide players to explore information to enrich their knowledge and strategies while playing (Febria, 2020). The aim is to develop and make this educational game to attract children's attention to play games that have a learning function. One of them is in improving the language in early childhood. The language ability that children must develop is reading because, by reading, children can understand the meaning of words and sentences, and there is a relationship between spoken language and written language. (Rakimahwati, 2018).

The current phenomenon is the main requirement for entering elementary school to have good reading skills. This requirement is contrary to the teaching target at the previous level, namely Kindergarten, where there is no national education regulation that requires pre-school age education to excel in reading skills, especially in children's basic needs to recognize letters and symbols not only in pronunciation but also in writing. The shape of the letters, as well as knowing the collection of letters that make up words and word groups, is still minimal in RA IB 78. In 2021 education is limited by distance and a pandemic that locks every child into staying at home, doing activities and doing activities at home. This situation is reinforced by a circular letter from (Permendikbud, 2020), number 15 of 2020, concerning Guidelines for Organizing learning from home during the emergency period of the spread of Covid-19.

This policy is also given to the level of early childhood education. With the limitation of PAUD learning, it is hoped that parents will take over the roles that teachers have carried out. Covid-19 has taken opportunities and opportunities for children's education in the early years of school, but on the other hand, technology connects learning that was temporarily cut off using the internet network. So that, early childhood also impacts the collaboration of learning and technology in the new normal era with educational games that can be accessed on all smartphones.

In this study, the researcher refers to previous research relevant to the current research being carried out by children. According to Dewi (2020), educational games can educate and provide education to students by using various kinds of games. What distinguishes it from this research is the application carried out by researchers in the educational game section; namely, the game is the tool used. In Dewi's research, the tool used is a laptop/computer and is played by three children in turn, while in the game, researchers can be downloaded via the link distributed with Whatsapp or email so that every child can play educational games on each child's cellphone or their parents' cellphones. Further research (Amanda, 2018) states that educational games are very helpful in solving early childhood mathematics learning, such as the concept of big, small, long and short. Through games, children will get to know mathematics very pleasantly. The difference between this study and the researcher lies in the target recipient of the game. Seyla gives games to children with mild mental retardation at SLB Harapan Mulia, Children are guided to use the computer in this game alternately. The difference between the researcher and this study

lies in the tools used in the research study, using a cellphone with one child and one cellphone, while the research used Serly is a computer with one computer and one child.

Based on initial observations made by RA 78 Bangun Rejo regarding online reading learning activities during the pandemic, it was found that 60% of children spent more time at home playing and gathering with family and children tended to use cellphones to watch YouTube and play games, and based on interviews with some RA 78 parents found around 45% of parents said "often" or "sometimes" allowed their children to play on digital devices while they were doing chores. The learning provided by the school is in the form of worksheets. While the use of other learning media still uses animated videos only. There is nothing that combines reading learning with games that will give children's interest to learning in it. So, educational games have become an interesting solution and can improve children's reading skills in kindergarten in this new normal.

This research is important because of the impact of the Covid-19 pandemic on children's learning, especially in terms of reading. Learning to read with educational games is one of the learning solutions that attract children's interest in recognizing letters. So through educational games, children can play while learning, and this can improve children's reading skills in Kindergarten in this new normal period. This is important for research in developing Android-based educational games to improve early childhood reading skills.

## 2. METHODS

The type of research used is the Research Method for the development of learning media or Research and Development (R & R&D), which is carried out to improve teaching and learning in Kindergarten. According to (Sugiyono, 2012), research and development in this research is the research method used to produce a particular product and test its product effectiveness. The development in this research is in the form of software in the form of application programs made using the Adobe Anime application that can be run on Android, notebooks and computers. The development model (R&D) used in this study is the ADDIE model, which stands for analysis, design, development, implementation and evaluation.

In this study, the research procedure uses several models. It is carried out in stages starting from (Sugiyono, 2016) Analysis, Design, Development, Implementation, and Evaluation (ADDIE) of the steps presented in the form of a chart:

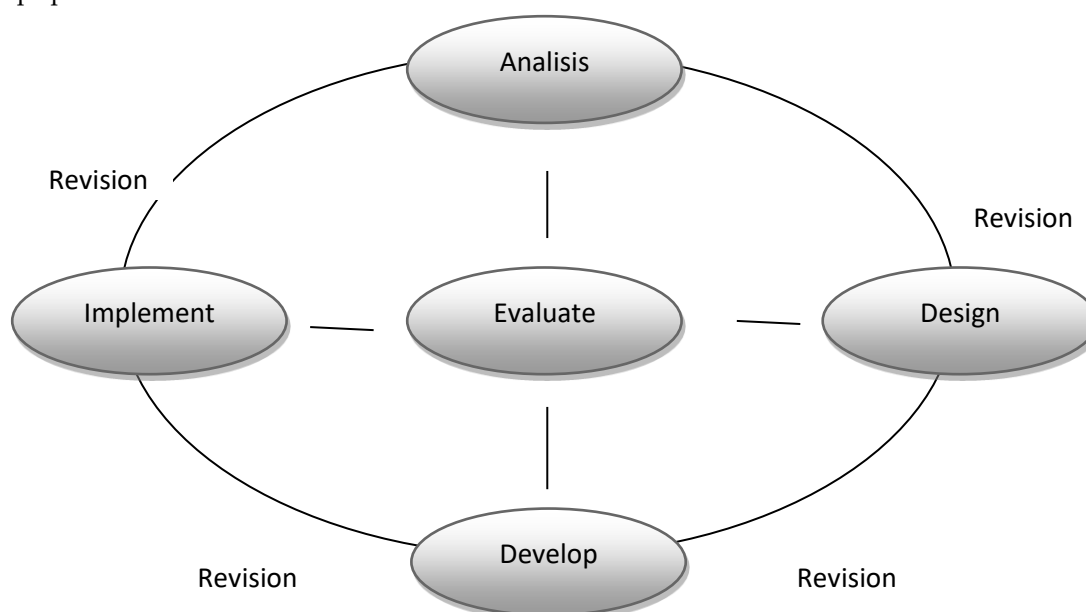


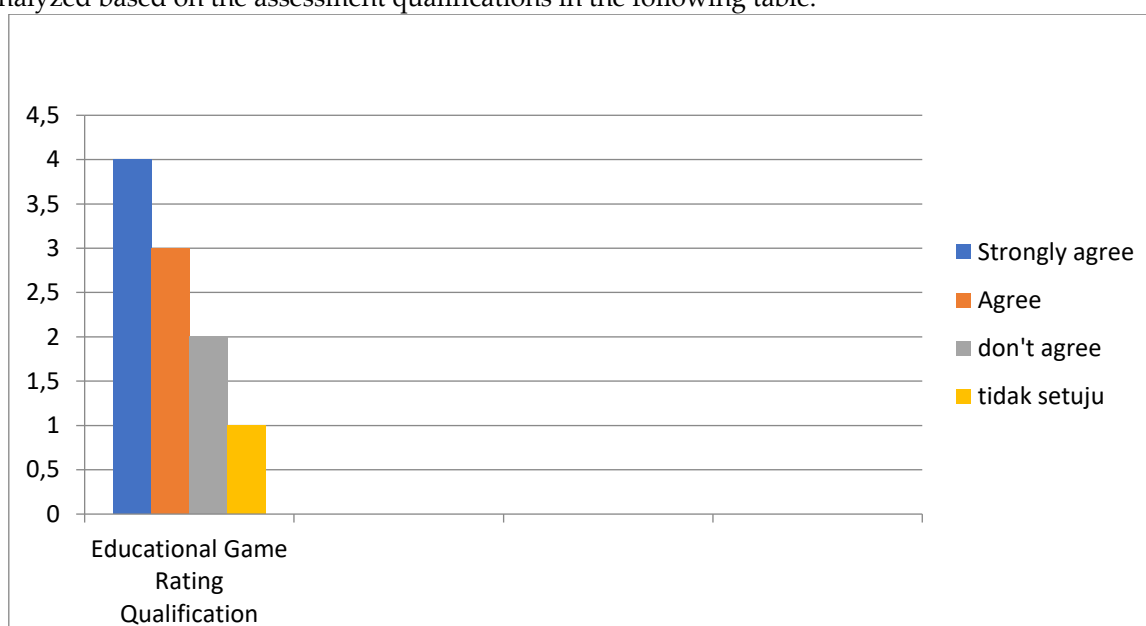
Figure 1. ADDIE Model Development Stage (Branch, 2009)

Researchers use ADDIE development because it makes an innovation from technological developments and early childhood learning in kindergarten to improve reading skills. The researchers' research was around two months, from July to August 2021. This game was piloted at RA IB 78 Bangun Rejo Pasaman Barat in Class B2, which consisted of 14 children. The data collection technique in this study was carried out with the aim of collecting the data needed to describe the validity, practicality, and effectiveness of the game. The collection technique was to use an instrument. An instrument is a tool for data collection. (Sugiyono, 2015) Instrument Validation, Practicality and Effectiveness instrument.

The data analysis technique used by the researcher is the data obtained in this study will be analyzed through the following stages:

#### 1. Analysis of the Validity of Educational Games

Validity data were obtained from product validation sheets that had been filled out by media experts, material experts, and teachers. To get a game validity assessment, the game validation data is analyzed based on the assessment qualifications in the following table:



Furthermore, the collected data is analyzed by Aiken's V Validation using the formula:

$$V = \sum s / [n(c - 1)]$$

Information:

$$s = r - lo$$

lo = The lowest Validity rating score (in this case = 1)

c = The highest Validity rating score (in this case = 4)

r = Number provided by validator

The results of the calculation of Aiken's V range from 0 to 1. After the results of the calculation of Aiken's V, the media eligibility criteria are grouped:

0.76- 1 = Very feasible

0.51-0.75 = Eligible

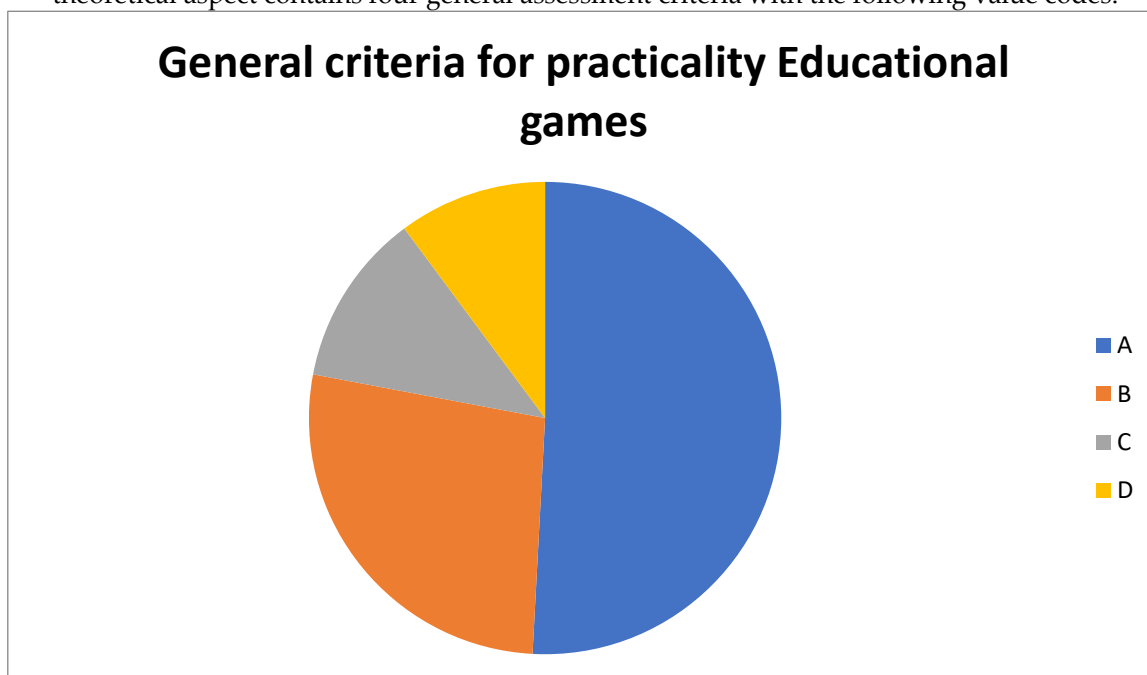
0.26-0.50 = Less feasible

0.25 = Not worth it

#### 1. Practical Analysis of Educational Games

To find out the practicality of the game, there are aspects that must be met, namely practicality in theory. Practical analysis of the theoretical aspect The practical analysis of educational games on the

theoretical aspect contains four general assessment criteria with the following value codes:



Next, according to (Sumaryono, 2010), the game can be practical on the theoretical aspect if the validators state that the game can be used with at least a few revisions.

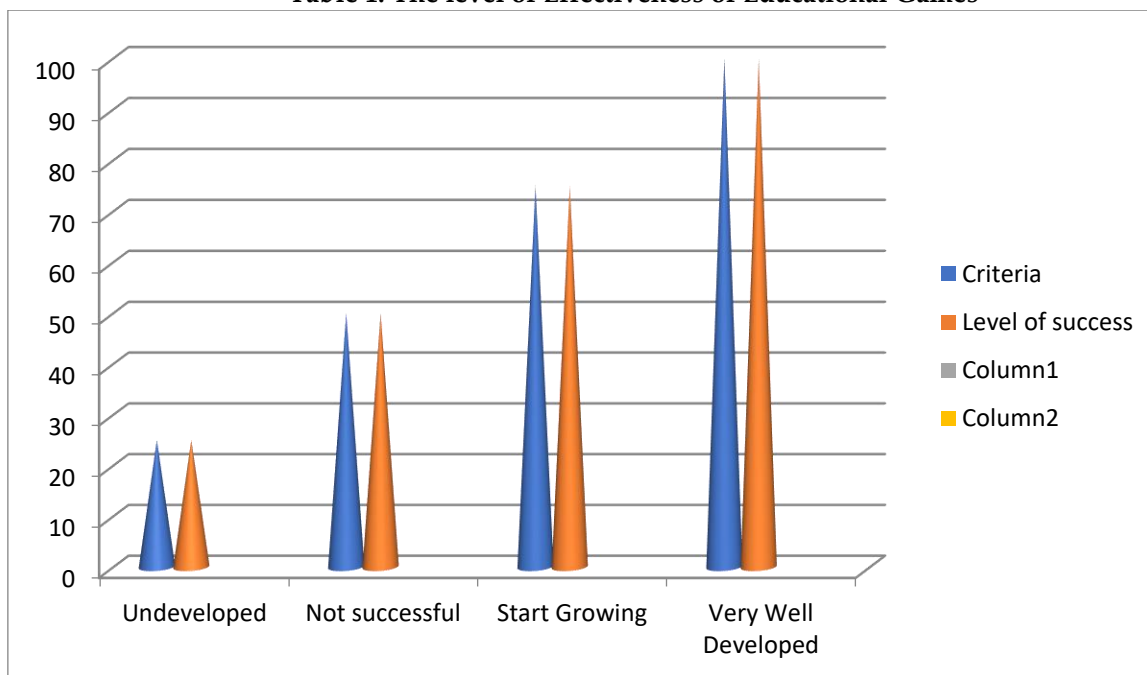
1. Effectiveness Test Analysis

The effectiveness analysis was obtained by counting the children who carried out the activities contained in the observation sheet. The data were analyzed using the percentage technique stated by (Sugiyono, 2016) as follows:

$$\text{Effectiveness Percentage} = \frac{\text{Ideal Score}}{\text{Maximum Score}} \times 100 \%$$

To determine the level of effectiveness of educational games, it can be adjusted according to the criteria in the following table:

**Table 1. The level of Effectiveness of Educational Games**



Based on the above criteria, educational games are said to be effective if there is an increase in children's reading skills and earn a percentage > 51%.

### 3. FINDINGS AND DISCUSSION

#### FINDINGS

##### Analysis Stage

This stage of analysis is to analyze the importance of developing educational game products that researchers innovate. The development of this product was initiated by observations in the field where learning was hampered due to the pandemic, which caused learning to run from home so that a lot of learning was left behind, especially reading, as well as the solutions and learning media provided by work from home did not attract children's interest. So that researchers provide educational game innovations that are used anywhere to help improve early childhood reading skills.

##### Curriculum Analysis

The analyzed curriculum has referred to the 2013 Curriculum Permendikbud No. 146 of 2014, which relates to the language in the aspect of literacy development, namely reading.

##### Analisis Student and Teacher

RA 78 Bangun Rejo has six educators, including HR, a B1 class teacher. KS is a class B2 teacher, ST is a B3 class teacher, MP is a B4 class teacher, ER and SL are accompanying teachers. The analysis of children includes children aged 5-6 years who attend RA IB 78 Bangun Rejo Kinali Pasaman Barat totalling 14 children from class B2.

The researchers designed an Android-based educational game product for early childhood at this stage. In this game, the researcher wants to improve children 's reading skills. This stage is designing an Android-based educational game in accordance with the analysis of the early childhood education curriculum. At this stage, the first step is to make a daily learning implementation plan (RPPH) with an animal theme and a pet sub-theme. Game design is carried out in accordance with the curriculum and is supported by several theories. The following are designs according to the stage of child development. The following is an overview of the design for the development of children's educational games



Figure 1. Initial appearance of the game



Figure 2. Game hint



Figure 3 game menu list



Figure 4. Playing with letter balloons



Figure 5. Letter puzzle game



Figure 6. Syllable games



Figure 7. Assembling letters



Figure 8. Stringing words



Figure 9. Children's rewards in the closing part of the game

In validating educational games, two experts consist of two experts from universities. The validators were asked to rate the materials and media that the researchers had created. Assessment of educational games includes material/content and media/display. Namely Dr. DS as a material expert and Dr. A. H. S. Pd., M.Pd as media experts. Experts were asked to correct the media and material before the researcher entered the field. After the expert stated that it was ready to be used, the researcher proceeded to the implementation section.

After the Android-based educational game is complete, the educational game validation process was carried out by an expert, namely DS as a material expert on June 8, 2021. Experts view and comment on designs that have been made and revised according to expert advice, so they can improve the content of Android-based educational games to improve children's reading skills. The value of V for item 1 is obtained from  $V = 2/1(4-1) = 0.67$  as well as V for items 5, 7, 10, 14 and for item 2 we get  $V = 3/1(4-1) = 1$ , as well as items 3,4,6,8,9,11,12,13,15,16. Aiken's coefficient value ranges from 0-1. Aiken's coefficient value of 1 is found in items 2, 3,4,6,8,9,11,12,13,15,16. While the values for items 1, 5, 7, 10, 14 get Aiken's coefficient value of 0.67. So the average value of Aiken's coefficient of  $V = 0.89$  can be declared valid.

After the material expert, the assessment from the media expert is that the V value for item 1 is obtained from  $V = 3/1(4-1) = 1$ , the same as items 3,4,5,7,8,9,11,12,13,14,15,17,18,19,20 and for V item 2 is obtained from  $V = 2/1(4-1) = 0.67$ , which is equal to item 6,10,16. Aiken's coefficient values range from 0 to 1. Aiken's one coefficient values are found at 1, 3,4,5,7,8,9,11,12,13,14,15,17,18,19,20 and the coefficient value is 0,67 is found in items 2, 6, 10, 16. So the average value of Aiken's coefficient is  $V = 0.93$ . It can be stated that it has valid item validation and is declared suitable for use with revisions.

A limited trial was carried out at Raudhatul Atfal Islam Bakti 78 Bangun Rejo Pasaman Barat, which was carried out on June 11, 2021, in class B1 with a total of 12 children. The total score obtained is 48, the average percentage of each aspect of the assessment is 85%, which can be stated as very practical so that with the results of a limited trial, educational games can be continued to the next stage, namely the implementation stage.

## Implementation

At the implementation stage, it is done by preparing an Android-based educational game product that has been declared feasible by experts and tested on children. In the next stage, educators evaluate educational games to determine the feasibility of games when used by children and how children respond after using these educational games. The implementation of android-based educational games to improve early childhood reading skills is carried out at Raudhatul Atfhal 78 Bangun Rejo class B2 (Fatimah class), consisting of 14 children. Furthermore, the media were assessed by the teachers in the FGD (Forum Group Discussion) activity which was held on Saturday, July 11 2021.

The practicality questionnaire given to the teacher is filled out after the game is finished being applied to the child. The teachers who assessed the questionnaire were Kasmawati S.Pd from class B2 and Eka Ramadani (assistant teacher). The average practicality percentage of the two teachers was 95%. From the results of the practicality test, it is stated that Android-based educational games to improve children's reading skills are stated to be practical. Furthermore, the assessment of the game media was also assessed by the teachers of RA Islam Bakti 78 Bangun Rejo as many as 6 teachers. Based on the results of the assessment in the FGD (Focus Group Discussion) Raudhatul Atfal Islam Bakti activity 78, As many as 6 teachers with an average result of 85% were declared very practical.

## DISCUSSION

An educational game is a game designed and made to stimulate children's thinking power, including to increase children's concentration and be ability to solve problems in learning with games. Children are required to learn to use something fun. Educational games are very interesting if developed. One of the main advantages of educational games is the visualization of real problems. The Massachusetts Institute of Technology (MIT) has proven that games are very useful for improving players' logic and understanding of a problem through a game project called Scratch (Vitianingsih, 2018). In line with that, children's interaction using games through pictures, symbols, sounds, movements, and simple words fosters interest and builds sustainable cognitive concepts (Setiawan Andri, Praherdhiono, 2019). Then (Rakimahwati, 2018) found educational games are one type of media used to provide teaching, and increase user knowledge through unique and interesting media. This type is usually intended for children, so the colour game is very necessary here, not only the difficulty level of the game.

(Setiawan Andri, Praherdhiono, 2019) revealed that digital educational games provide interactive, fun learning experiences and social interactions according to their development needs. First, children need stimulation to develop fine motor skills before heading to the cognitive realm. Children can interact by touching a screen or pressing a button, then learn skills such as understanding simple rules or making choices. Educational games grow knowledge, skills, intelligence, emotions, and attitude values. So it can be concluded that an educational game is a game that can be done to support learning facilities because a game, it is not only completing missions but also as good learning information for children.

And this is also in line with the purpose of educational games put forward by Darmanto, 2016 stating that educational games have an educational type of purpose: to provoke children's interest in learning about the subject matter while playing. so that with a happy feeling, it is hoped that children can more easily understand the subject matter presented (K. W. Sari, S. Saputro, 2014). The definition of educational games is in line with the current situation, where all learning is delivered remotely and is required to be online. The pandemic affects learning ineffectively, thus making teachers have to rethink how to deliver learning in a fun way without being burdened with learning, especially for early childhood learning. Educational games are a solution to situations requiring you to study productively and efficiently at home.

(Palupi, 2016) said that every child has its own specialities in every development. Most children start their language development by crying, where children express external stimuli. Language development takes place as long as the human mind is active and as long as there is an environment

for learning. Through the availability of a learning environment, children can make new vocabulary acquisitions. According to Papalia et al., Kindergarten age children aged 5-6 years already have a speech vocabulary of about 2,600 words and understand more than 20.00 words. (Soetjningsih, 2014).

According to (Pransiska, 2012), language is all forms of verbal and non-verbal communication where a person or student can express what the child wants. Furthermore, Badudu stated that language is a liaison or communication tool between community members consisting of individuals who express their thoughts, feelings and desires. (Dhieni, 2014) Bromley argues that language is an orderly system of symbols for transferring various ideas and information consisting of various visual and verbal symbols. From the visual symbol, it can be seen, written and read, while the visual symbol can be spoken and heard. (Nurhazizah, 2019) argues that the language aspect includes the way people communicate and interact, which is manifested in the form of verbal symbols or symbols, sign language, and facial expressions in expressing something.

Based on the description of the language development in early childhood, it can be concluded that language development in children follows a predetermined sequence even though there are many variations in development that differ from one child to another. The earliest language development occurs when a new child is born in a state of crying and groping, followed by the use of one word such as 'ma ma', followed by two words until the child's vocabulary increases every year. And after entering school age, children will be faced with developments in the next stage, namely learning the linguistic system in the written or printed language.

Talking about reading Crawley and Mountain state that reading is essentially a complex activity that involves many things, not just reciting the text, but also involving visual, thinking, psycholinguistic, and metacognitive activities because the reading process is a process of translating written symbols into words (Mediana Githa, Widyana Rahma Astuti, 2020). Then, (Suryana, 2018), reading is an activity that involves auditory (listener) and visual (observer) elements. Children's reading skills begin when children evaluate books by holding and flipping books. (Allen, 2010) also argues that at the reading stage, children can recognize letter symbols. Children must learn to develop letters to form words and arrange words to form readable thoughts.

In line with the opinion above, Dhieni (2014) said that in the pre-reading stage, students are taught by introducing the letters of the alphabet A-Z, and then combining them into syllables to make it easier for children to start reading. While at the initial reading stage, children are taught to read syllables into a word, and introduce children to consonants (patents) making it easier for children to read several words into a sentence (Mediana Githa, Widyana Rahma Astuti, 2020). The initial reading stage is when children can voice letters, syllables, words and sentences (Nahdi, 2020)

**Table 2: Developmental Achievement Levels of Children aged 5-6 Years (Permendikbud, 2014)**

Scope of Development	Developmental Achievement Level	Dimension
Read	Recognizing and Mentioning letter symbols	Mention the symbols for vowels and consonants
	Recognize the sound of the initial letters of the names of objects around them.	Saying syllables or spelling words
		Combining syllables into simple words

Stimulation is a stimulus or encouragement that children need before reading activities. The role of educators and parents is very important to stimulate children's early reading abilities, and this can be built before the age of one year. These skills will develop according to the development of the child's age and how we stimulate the child. Looking at pictures is the simplest form of reading (Widyastuti, 2017). (Nahdi, 2020) said that children's reading ability starts at the age of 5-6 years, of which children can say 2600 words, and sentences have reached six or seven words. Some things can improve and stimulate children's reading, namely playing games. In addition to books in real form, parents can also provide games that are on a computer, laptop or android.

#### 4. CONCLUSION

The results of the study found that an android-based educational game to improve reading skills for early childhood with the theme of animals, and sub-theme of pets, was declared valid, practical and effective. The development of educational games has been innovated to be able to develop children's reading skills. This educational game can be played and run on android applications, notebooks and PCs. This educational game is made in a way that is easily understood by children and is expected to be able to improve children's reading skills and can be guaranteed when at home during the pandemic. Researchers carry out several stages of development, including analysis, design, development, implementation, and evaluation or assessment. Educational games provide direct learning to children where children learn while playing, fun learning so that children are involved in the learning process.

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