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# The Effect of 3D-Based Educational Games on Literacy Skills in Group B Children

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**ABSTRACT:** This study aims to determine the effect of the use of 3D-based educational games on early childhood literacy skills, especially in group B at Insan Madani Kindergarten, Ujung Bulu District, Bulukumba Regency. The method used was an experiment with a one-group pretest-posttest design and a qualitative approach. The sample consisted of 17 children aged 5-6 years who were treated using 3D-based educational games during three meetings. Literacy ability data was measured through pretest and posttest, then analyzed using the paired sample t-test. The results showed a significant increase in children's literacy skills with an average pretest score of 23.18 and posttest score of 55.24. Statistical analysis showed a significant difference ($p < 0.05$) between the pre- and post-treatment values. 3D-based educational games provide an interactive, engaging, and fun learning experience that can optimally improve children's interest and literacy skills. This study concludes that the use of 3D-based educational games is effective as an innovative learning method to develop early childhood literacy skills.
**KEYWORDS:** effect, 3D-Based Educational Games, Literacy Skills

## INTRODUCTION

Education is part of a series of efforts to fulfill the individual's drive to learn, create, and become students with strong personalities (Dewi et al., 2021). Providing early education to children is a crucial foundation in shaping their character, skills, and potential for the future (Intisari et al., 2025). One of the aspects that is the main highlight in early childhood education is the development of literacy (Intisari, Mutmainnah, et al., 2024), which includes not only It is limited to reading and writing skills, but it also includes an understanding of the surrounding environment, communication skills, and critical thinking skills (Intisari, Purwati, et al., 2024).

Children of group B are in an important phase of literacy development where they are very active in absorbing new knowledge and skills (Intisari, Amri, et al., 2024). Therefore, learning in this period must be presented in a way that is fun, engaging, and relevant to their experience in order to stimulate interest and motivation to learn optimally 6 (Sadaruddin et al., 2022). A creative and interactive approach is needed to help children understand the concept of literacy effectively according to their cognitive and emotional development (Intisari, Nurlaelah, et al., 2024).

In this digital era, technological changes have had a major impact on various areas of life, including in the world of education (Pare & Sihotang, 2023). One form of technology that is in demand and interesting for children is games or games (Agustina, 2023). Games have become one of the most popular uses of technology among everyone, generally used as a means of entertainment to overcome boredom, fill free time, and as a form of entertainment (Alya et al., 2025). However, not only that, games are also used as a learning tool to increase knowledge and insight, known as educational games (Karuniasari, 2018). The use of technology, including educational games, has great potential to increase children's interest in learning (Mardia, 2023).

By utilizing educational games or games, children can learn more effectively because they are actively involved in the learning process. These games can be designed to introduce basic concepts such as reading, writing, and counting in a fun and engaging way (Fitrialdi & Anshori, 2023). In addition, the use of technology in learning can also help develop children's digital skills from an early age, which is becoming increasingly important in this ever-evolving world (Purwanti et al., 2023). Thus, combining learning with technology and educational games can provide a holistic and enriching learning experience for children in an important phase of their literacy development (Nidha Eka Restuti Munawir et al., 2025).

In Bulukumba Regency itself is an area that has rich and diverse cultural characteristics. Therefore, the use of technology there is very influential in the world of education. By understanding how 3D-based educational games develop children's literacy skills can be implemented effectively in Insan Madani Kindergarten, Ujung Bulu District, Bulukumba Regency, so that it can provide a foundation for the development of more inclusive and competitive learning strategies.

The results of initial observations at Insan Madani Kindergarten in Ujung Bulu District, Bulukumba Regency show that the gap between the expectation to improve the literacy skills of group B children in Insan Madani Kindergarten through 3D-based educational games, and the fact that there has been no specific study investigating the direct impact of the use of 3D-based educational games on early childhood literacy skills in the environment. The urgency of research on this issue arises because of the need for a deeper understanding of 3D-based educational games as a tool to improve children's literacy skills, as well as the need to add this knowledge in the practice of early childhood education at the Insan Madani Kindergarten. 3D-based educational games can support children in learning while enjoying playtime. In essence, the game combines aspects of fun and entertainment, making the learning process more interesting for them.

According to Mardhotillah and Rakimahwati (2022) The rapidly evolving use of technology, such as gaming, is considered effective in providing an enjoyable learning experience. Games bring together elements of song, puzzle, and game

media, making the learning process more engaging for learners. Using games positively can provide great benefits, especially when games are used as an edutainment media that combines elements of education and entertainment. This makes it possible to learn while playing, creating a fun and effective learning experience. According to Hariyani and Fitri (2023) The use of educational games is considered superior to conventional learning methods by most learning media. Its main advantage lies in the animated display that can improve children's comprehension and practice literacy skills, so that they can retain learning information for a longer period of time than conventional methods.

From these two references, it can be concluded that the use of technology through educational games not only makes the learning process more interesting and interactive, but also increases the effectiveness of learning by significantly strengthening children's understanding and literacy skills. Therefore, the use of technology in the form of educational games has an important role in supporting the success of the learning process, especially in early childhood.

Based on research conducted by Mastoah et al. (2022) Implementing educational games creatively by optimizing the use of these media can increase children's digital literacy levels by maximizing their involvement in the learning process. However, the main difference lies in the approach used; Previous research used creative educational game media, while this study focused on 3D-based educational games, which provide children with the opportunity to learn while playing can give them fun, thus significantly improving their literacy skills.

Therefore, this research emerged as a response to the real need to improve children's literacy skills. Thus, the use of 3D-based educational games can improve early childhood literacy skills, which can be designed through more effective methods and beneficial for early childhood development.

## METHOD

This research was conducted at Insan Madani Bulukumba Kindergarten located on Jalan Dato Tiro, Ela-ela Village, Ujung Bulu District, Bulukumba Regency, South Sulawesi. Insan Madani Kindergarten School in Bulukumba was chosen as the research site because of its very strategic position and easy to reach, as observed by the researchers. In addition, the institution is located in the middle of a residential environment, which creates an atmosphere conducive to learning.

The research method used in this study is an experimental method with a qualitative approach. By using the design *One-group pretest-posttest*, where it makes use of the already existing groups naturally (Widuroyekti & Luluk, 2023). The focus of observation and measurement in this study is children's literacy skills, using 3D-based educational games as the independent variable. The determination of the research sample was carried out through purposive sampling, with the criteria of the child's age between 5-6 years and willingness to be a research subject. As a result, group B consisting of 17 students who met these criteria was selected as a research sample.

This research involves the treatment of students by involving them in 3D-based educational games. Indicators used as a tool to measure the level of child development include: a. ability to understand concepts b. language skills c. cognitive ability. The researcher applied a parametric inferential statistical approach to analyze the data collected through observation sheets. In testing the hypothesis, the researcher used the paired test analysis of the t-test sample, which requires that the data be normally distributed

## RESULT

The results of the study showed that the significant influence of the use of 3D-based educational games on the literacy skills of group B children in Insan Madani Kindergarten. The experimental group that received treatment using 3D-based educational games experienced a greater increase in literacy ability scores compared to the control group that did not receive the treatment. The researcher collected data using the practice test method, with data consisting of pretest and posttest results which were then analyzed using sample pair tests through IBM SPSS software.

**Table 1.**
**Descriptive Statistics**

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Pretest | 17 | 15 | 30 | 23,18 | 4,927 |
| Posttest | 17 | 45 | 60 | 55,24 | 4,381 |
| Valid N (listwise) | 17 | | | | |

Based on the table above, it can be concluded that this study involved 17 samples that took pre- and post-treatment tests. The results of the pretest showed the lowest score of 15 and the highest of 30, with an average of 23.18 and a standard deviation of 4.927. After the treatment was administered, there was a significant improvement in posttest results, with a minimum score of 45 and a maximum of 60. The average posttest score reached 55.24 with a standard deviation of 4.381. A considerable increase in the average score showed that the treatment given had a positive effect on the respondents' learning outcomes.

**Table 2.**
**Normality Test**

| | Group | Kolmogorov-Smirnova | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | | Statistics | Df | Sig. | Statistics | Df | Sig. |
| Literacy Ability | Pretest | ,118 | 17 | ,200* | ,943 | 17 | ,351 |
| | Posttest | ,184 | 17 | ,127 | ,906 | 17 | ,087 |

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Based on the Kolmogorov-Smirnov and Shapiro-Wilk tests, it is known that the significance values for the pretest are 0.200 (Kolmogorov-Smirnov) and 0.351

(Shapiro-Wilk), while the significance values for the posttest are 0.127 and 0.087 respectively. Because all significance values are greater than 0.05, it can be concluded that both pretest and posttest data are normally distributed. Thus, the data meets the assumption of normality and can be further analyzed using parametric statistical tests.

**Table 3.**
**Homogeneous Test**

| | | Living Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Kemampuan_Literasi | Based on Mean | 1,083 | 1 | 32 | ,306 |
| | Based on Median | ,897 | 1 | 32 | ,351 |
| | Based on Median and with adjusted df | ,897 | 1 | 31,930 | ,351 |
| | Based on trimmed mean | 1,031 | 1 | 32 | ,318 |

Based on the results of the Levene test, a significance value of 0.306 (based on the mean), 0.351 (based on the median), and 0.318 (based on the trimmed mean) was obtained. All of these significance values were greater than 0.05, which means there was no significant difference in variance between groups. Thus, it can be concluded that the data meet the assumption of variance homogeneity, so parametric statistical analysis that requires similarity of variance can be performed.

**Table 4.**
**Independent Samples Test**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | Df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | | Lower | Upper |
| Ability Literacy | Equal variances assumed | 1,083 | ,306 | -19,980 | 32 | ,000 | -32,118 | 1,607 | -35,392 | -28,843 |
| | Equal variances not assumed | | | -19,980 | 31,498 | ,000 | -32,118 | 1,607 | -35,394 | -28,841 |

Based on table 3. The above shows that Based on the Levene test, a significance value of 0.306 indicates that the assumption of similarity of variance is met, so the interpretation of the t-test results can use the line "Equal variances assumed". The results of the t-test showed a t-value of -19.980 with a degree of freedom (df) of 32 and a significance value (p) of 0.000 ($p < 0.05$). This shows that there is a very significant difference between pretest and posttest scores. The average difference between the two groups was -32,118 with a 95% confidence interval ranging from -35,392 to -28,843. Thus, it can be concluded that there is a statistically significant increase in literacy ability after being treated with 3D-based educational games.

## DISCUSSION

The use of 3D-based educational games has become the focus of attention in the development of children's literacy skills. Hardiyanti and Alwi (2022) argues that harmonization between the development of literacy and the advancement of information technology is very important, considering that the understanding and utilization of information and communication technology in this era requires a strong literacy foundation. The development of literacy not only includes reading and writing skills, but also honing children's competencies and skills in various aspects of life. According to Aswat and G (2020) Children's literacy skills include the ability of children to observe, understand, do, and use information intelligently through various activities such as observation, listening, reading, writing, and speaking. Therefore, children's literacy skills are involved in every aspect of their development. Literacy in early childhood is very important because it helps them prepare for the next stage of education. In simple terms, literacy is an individual's skill in reading and writing that allows them to manage information and acquire basic knowledge (Maryono et al., 2021).

Digital literacy is the ability of individuals to use technology wisely, create and share content, and communicate and collaborate effectively in a digital environment, which includes technical, ethical, and critical thinking aspects. Digital literacy involves the ability of individuals to create and share content in various modes and formats; collaborate and communicate effectively; and understand when and how to use digital technology wisely to support the process (Mastoah et al., 2022).

The current application of digital literacy makes it easier for people to use and access technology more intelligently and wisely. The benefits in the implementation of digital literacy according to Dewi et al. (2021): 1) A person's insight will increase when they actively seek and understand information. 2) Develop individual ability to think critically and understand information more deeply. 3) An individual's verbal ability will improve along with increased literacy. 4) Encourage increased concentration and focus on the individual through learning activities. 5) Individuals' reading and writing skills will develop in line with their literacy improvement. By exploring the benefits of the application of digital literacy, it is possible to use it in the realm of education. This is a tool to adapt the education system to the digital era. Especially, with online learning becoming more common, digital literacy helps students to be more easily involved in the learning process. In addition, digital literacy plays an important role in increasing the effectiveness of interaction and communication during learning.

In conclusion, the use of 3D-based educational games has become the focus of attention in the development of children's literacy skills. The harmonization between the development of literacy and the advancement of information technology is important because understanding and using information and communication technology today requires a strong literacy foundation. The

development of literacy not only includes reading and writing skills, but also involves children's competencies and skills in various aspects of life. Digital literacy enables individuals to create and share content, collaborate, communicate effectively, and use digital technology wisely. In the context of education, digital literacy facilitates online learning, makes it easier for students to engage in the learning process, and improves interaction and communication during learning.

Thus, this study provides a better understanding of how the use of 3D-based educational games can be an effective tool in helping group B children in Insan Madani Kindergarten, Ujung Bulu District, Bulukumba Regency, to improve their literacy skills. 3D-based educational games offer an interactive and engaging learning experience, thus being able to increase children's attention and interest in learning. Through engaging visualizations and gameplay tailored to a child's developmental stage, these games can stimulate reading skills, recognize letters, and understand basic vocabulary. In addition, the use of this technology also encourages active involvement of children in the learning process, making learning more fun and meaningful. Therefore, the integration of 3D educational games in early childhood learning is one of the innovative strategies in effectively improving literacy.

## CONCLUSION

Based on research findings, 3D-based educational games have proven to be effective as a method to develop early childhood literacy skills. With an interactive and fun approach, this game is able to increase interest in learning and make it easier for children to understand literacy materials more optimally. Therefore, the application of 3D educational games is highly recommended as one of the beneficial learning strategies for children's literacy development.

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