



The Influence of Using the "Berka" Application (Learning Words) Based on Augmented Reality as a Media for Understanding Vocabulary in Children with Speech Delay at Early Childhood Education (PAUD).

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Abstract. The phenomenon of speech delay is increasingly prevalent in the realm of child development. It is estimated that 7% of young children experience language delay issues. Children with speech delay require a psychological approach that enhances their self-confidence. Continuous stimulation and guidance are essential, both at home from parents and at school from teachers. One effective tool for this purpose is the "Berka" (Word Learning) Application based on Augmented Reality, which is both attractive and interactive. This tool is crucial in helping children comprehend vocabulary accurately and effectively. The objective of this research is to analyze the influence of the "Berka" Application based on Augmented Reality in introducing vocabulary to children with speech delay and to demonstrate the anticipated benefits of aiding these children in understanding and using vocabulary within sentences at the Early Childhood Education (PAUD) level. This study adopts a quantitative approach with a quasi-experimental design, specifically the Nonequivalent Control Design. Data collection employs observation and documentation techniques. The sample consists of 36 children aged 4-6 years from PAUD Kharisma Sidoarjo. The experimental group comprises 18 children, while the control group consists of 18 children. Data analysis utilizes the Mann Whitney U-test. The results of this analysis reveal that the U-test statistic value is significantly greater than the critical value, confirming the acceptance of the alternative hypothesis (Ha). Based on the data analysis, it can be concluded that the usage of the "Berka" Application based on Augmented Reality has a positive impact on introducing vocabulary to children with speech delay.

Keywords: Speech delay, Child development, Language delay, Self-confidence, Continuous stimulation, Guidance

1 Introduction

In communication activities, speaking plays a vital role in interacting with others to establish familiarity. Simply put, speaking can be defined as the process of producing sounds executed by humans using their speech organs. The development of language in children varies from one child to another of the same age group, leading to some children facing challenges in their social interactions. Speech delay is a phenomenon in the realm of child development that continues to increase in prevalence. It is estimated that 7 percent of young children experience language delay issues. Consequently, there is a need to formulate innovative approaches to learning that are suitable for children facing speech delay disorders. Furthermore, children with speech delay require psychological approaches to foster their self-confidence [3].

According to E. Espir, speaking is a skill acquired through a learning process. Building on this viewpoint, it can be stated that speech is not acquired automatically; rather, it involves a process of imitating sounds from the language environment. The term "speech delay" is commonly used by pediatric developmental specialists, while neurologists refer to it as "developmental dysphasia." Children who experience speech delay challenges fall under the category of expressive language disorders or can be described as having difficulties in expression. While young children can understand what others say, they struggle to put words together to respond effectively.

Expressive language disorders in children can arise from brain trauma or developmental issues. A lack of communication intensity between young children and their parents or peers significantly impacts their language proficiency. Insufficient communication can lead to expressive language disorders [3]. A child might comprehend what others say to them, but lacking expressive language abilities hinders effective communication. Hence, addressing and preventing speech delay in children is crucial.

The issue of speech delay in children is a serious matter that requires immediate attention, as it can contribute to various developmental disorders in children. Speech delay is evident in the accuracy of word usage, marked by unclear pronunciation and the use of sign language in communication, making it challenging for parents and those around the child to understand them. This anomaly is observed when a child's speech abilities lag behind those considered normal for their age.

Early detection of speech disorders is essential for successful intervention. Early detection should involve all adults interacting with the child, including parents and family members. This process entails distinguishing whether the speech delay is functional or nonfunctional. Functional speech delay is often experienced by some children and is typically mild, representing a delay in the maturation of speech functions. Nonfunctional delays require closer attention, as they are not as trivial, and prompt stimulation and intervention are necessary.

Language is viewed as a cultural heritage, much like someone learning to ride a bicycle. Stimuli provided to children with speech delay can encompass information and sounds that stimulate their hearing. These stimuli aim to refine and familiarize their auditory perception of sounds.

Children with speech delay cannot undergo normal learning or language acquisition processes. Their initial language acquisition can be facilitated through parent-child communication and communication practice among peers. Total communication is a complex form of interaction involving spoken language, reading activities, and gestures. Preparing relevant education for children with speech delay involves updating and developing an effective learning system.

Children experiencing speech delay are at risk of encountering learning difficulties that can negatively impact their overall academic achievements, even into adulthood. If left unaddressed, these issues can lead to behavioral problems and psychosocial adjustments. Parents and teachers need to understand effective learning strategies for dealing with children with speech delay [1].

For children with speech delay who have a visual emphasis [2], information reception is directed through their visual senses. Typically, vocabulary introduction for these children is done through common/manual pictures, whether in print media or on chalkboards. While the advantage of these media lies in helping children comprehend words within sentences due to the inclusion of concrete images, their drawback is the monotony of implementation, leading to children becoming easily bored. To overcome this, the use of more attractive and interactive digital learning media is crucial.

Digital media utilization can take various forms, and one of them is augmented reality technology. Augmented reality involves the integration of virtual objects that interact with the real world, such as text, animations, 3D models, or videos. Hence, a potential solution is to use the "Berka" or "Belajar Kata" application, which can be used to stimulate early language development in children with speech delay. This can be achieved by modifying the content to include images accompanied by sentences. The "Berka" application is expected to enrich vocabulary and enhance sentence understanding for children in Early Childhood Education (PAUD) with speech delay, making the learning process more attractive and interactive. However, during usage, children should be assisted by teachers or parents using total communication methods, sign language, or oral communication (lip movement reading) to ensure effectiveness.

The research aims to investigate the influence of the "Berka" Application, based on Augmented Reality, in introducing vocabulary to children with speech delay and the benefits of helping children understand vocabulary within sentences. The mobile-based application is expected to contribute to vocabulary comprehension for children with speech delay in PAUD, with the assistance of teachers or parents. Therefore, the research question is: Does the use of the "Berka" Application have an impact on facilitating vocabulary comprehension for children with speech delay in PAUD? The objective of this study is to analyze the influence of the "Berka" Application based on Augmented Reality in introducing vocabulary to children with speech delay and to provide benefits in introducing and understanding vocabulary within sentences for children with speech delay in PAUD.

2 Methods

This study employs a quantitative approach. The research design utilizes Quasi-Experimental Design with a Nonequivalent Control Group Design arrangement. Quasi-experimental design is considered more robust than pre-experimental design as it includes a control group, even though it might not fully control external variables that influence the experiment's implementation. In this research design, there are two groups: the experimental group and the control group.

The selected location for conducting this study is PAUD Kharisma Sidoarjo. The population under study comprises children, totaling 54 individuals. Purposive sampling is employed for this study. The sample consists of 36 children aged between 4 and 6 years, who attend PAUD Kharisma Sidoarjo. The experimental group is composed of 18 children, while the control group also consists of 18 children. The data collection technique utilized in this research is observation. The specific type of observation utilized is non-participant observation, where the researcher is not directly involved in the activities being observed but contributes to facilitating the observational process.

In order to support the data collected, the researcher also includes documentation of activities during the pre-test, treatment, and post-test phases. Additionally, the researcher employs documentation methods to gather data about the children, teachers, and school profiles.

Based on the type of data being analyzed, this study employs the Mann Whitney U-Test. The U-Test is used because the hypotheses formulated by the researcher involve a comparative analysis of two independent samples with ordinal data. The Mann Whitney U-Test is utilized for data that does not follow a normal distribution. To determine whether the pre-test and post-test data follow a normal distribution, a normality test is performed using SPSS 21. If the significance value is greater than 0.5, the data is normally distributed. Conversely, if the significance value is less than 0.5, the data is not normally distributed.

3 Findings and Discussion

This study aimed to analyze the influence of using the "Berka" (Word Learning) application based on "Augmented Reality" to provide vocabulary introduction to children with speech delay in early childhood education (PAUD). The study took place over 7 sessions, including 2 pre-tests, 3 treatments, and 2 post-tests, using the same instrument for the pre-tests. The first pre-test was conducted by the experimental group, while the second pre-test was done by the control group.

Subsequently, treatment was administered to the experimental group using the "Berka" (Word Learning) application based on "Augmented Reality." The treatment was given 3 times gradually. On the other hand, the control group received education according to the institution's daily lesson plan (RPPH) using a chalkboard as a medium.

Post-tests were conducted on both groups using the same method as the pre-tests. From the data collected before and after the treatment (post-tests), it was evident that both groups, the experimental and the control, experienced significant improvement. This suggests that using the "Berka" (Word Learning) application based on "Augmented Reality" has a positive impact in providing vocabulary introduction and understanding sentence structure for children with speech delay in early childhood education (PAUD).

These findings align with the perspective (Musfiqon, 2012:28) that learning media serves as an aid to explain concepts verbally. This demonstrates that Augmented Reality technology can provide significant benefits for children with speech delay.

In terms of data analysis, the results of the normality test shown in Table 1 indicate that the pre-test and post-test data for the experimental group do not follow a normal distribution, which also applies to the control group. Therefore, non-parametric tests such as the Mann Whitney U-Test are more appropriate for analysis.

Table 1. Normality Test.

| Class* | Kolmogorov-Smirnov | | |
|----------------------|--------------------|----|------|
| | Statistic | Df | Sig. |
| Pre-test Experiment | 177 | 18 | 141 |
| Post-test Experiment | 184 | 36 | 003 |
| Control Pre-test | 199 | 18 | 058 |
| Control Post-test | 192 | 18 | 078 |

* Source: Data Processing.

Results of the normality test indicate that data from the experimental group and the control group do not follow a normal distribution. Due to this non-normal data distribution, non-parametric statistical methods are appropriate for analysis. Thus, data analysis was performed using the Mann Whitney U-Test. The test of normality is one of the hypothesis tests (Sumanto, 2014:145). The normality test is conducted to verify whether the data from the samples are normally distributed or not (Sumanto, 2014:146).

Table 2. Post-Test Rank of Experimental and Control Groups.

| | Group | N | Mean Rank | Sun of Ranks |
|-----------|------------|----|-----------|--------------|
| | Eksperimen | 18 | 25.75 | 463.50 |
| Post-Test | Control | 18 | 11.25 | 202.50 |

Total 36

* Source: Data Processing.

Table 3. Test Statistics for Post-Test in Experimental and Control Groups.

| | Post-Test |
|--------------------------------|-------------------|
| Mann-Whitney U | 31.500 |
| Wilcoxon W | 202.500 |
| Z | -4.198 |
| Asymp.Sig.(2-tailed) | .000 |
| Exact Sig. [2*(1-tailed Sig.)] | .000 ^b |

* Source: Data Processing.

After conducting the normality test, a hypothesis test or Mann Whitney U-Test for difference was carried out. The table shows that the mean rank and sum ranks in the experimental group are higher than those in the control group. The hypothesis in this study states that the experimental group can be identified with a significance value of $0.000 < 0.05$, i.e., asymp.sig (2-tailed), indicating that the null hypothesis (H₀) is rejected and the alternative hypothesis (H_a) is accepted.

The language abilities of PAUD children, especially in terms of vocabulary usage and understanding words and sentences, were influenced by using the "Berka" (Word Learning) application based on "Augmented Reality." This approach can provide vocabulary introduction and understanding sentence structure for children with speech delay, making learning enjoyable and engaging for them. As a result, during the post-test, the children displayed more enthusiasm as they started to grasp the concept of vocabulary and words. These research findings also support the viewpoint of Hamalik (in Arsyad, 2014:15) that the use of teaching media in the learning process can enhance motivation, stimulate learning activities, and even have psychological effects on children.

This study can be considered successful because the utilization of the "Berka" (Word Learning) application based on "Augmented Reality" was shown to influence vocabulary introduction and understanding of sentence structure for children with speech delay. It provided benefits in terms of vocabulary acquisition and understanding sentence formation.

Table 4. The "Berka" (Word Learning) Application Based on "Augmented Reality"

| Image(s) | Explanation |
|----------|-------------|
|----------|-------------|



On the homepage, there are options to start, access instructions, and exit. The "Start" button will display further features, the "Instructions" button provides guidance on using the application, and the "Exit" button is used to close the application. In the bottom left corner, there is a sound button. When activated, this button will play sounds from the application.



After the "Start" button is activated, there will be options for reading, pronunciation, and writing. The first step of the treatment begins with the reading feature. When the reading icon is pressed, a selection of 6 pictures will appear, and the user can choose one of those pictures.



Once a picture is selected, there will be an instruction to point the smartphone's camera towards an empty space to bring up the augmented reality-based 3D object. Subsequently, a descriptive sentence related to the chosen image will appear. As an example, the image to the side displays the word "book."

Below the sentence, there is a tutorial video that is created to emphasize the clarity of pronouncing a word, providing a clear example to the child. Just like the image to the side demonstrates how to pronounce the word "book."





After completing the reading feature, you proceed to the pronunciation feature. In this step, the user is prompted to pronounce the sentence related to the chosen image by pressing the available microphone button. Once the pronunciation is done, a reward in the form of a "nice" emoticon will appear.



And the last feature is the writing feature. The user is asked to fill in the missing letters in a sentence to test comprehension.

If the entered answer is incorrect, an "x" mark and the word "wrong" will appear.

* Source: Data Processing.

4 Conclusion

Conclusion

Based on the results of this study, it can be concluded that using the "Berka" (Learn Words) Augmented Reality-based application can influence the introduction of vocabulary to children with speech delay issues and provide benefits for introducing and understanding words in sentences. From the data analysis results using Mann Whitney U-test calculations with a significance level of 0.05 and a sample size of $n_1 = 18$ and $n_2 = 18$, the calculated value $U = 31.500$ is greater than the table value $U = 88$ ($31.500 < 88$), thus the alternative hypothesis (H_a) is accepted.

In conclusion, the usage of the "Berka" (Learn Words) Augmented Reality-based application can indeed influence the introduction of vocabulary to children with speech delay issues and provide benefits for introducing and understanding words in sentences in PAUD (Early Childhood Education) settings.

Recommendations:

Based on the above conclusion, here are some recommendations:

1. For Teachers:

Teachers can utilize the "Berka" (Learn Words) Augmented Reality-based application to stimulate vocabulary introduction tailored to the needs of PAUD children.

2. For Future Researchers:

It is hoped that this study will serve as a literature reference for further research involving the "Berka" (Learn Words) Augmented Reality-based application and improving children's language skills. This could help stimulate speech delay intervention from an early age. However, it's important to note that the results of this research may not be generalized to all situations and conditions due to the unique context of the institution where the study was conducted. Title, author and affiliation frame

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