



Evaluating the Effectiveness of Digital Bibliotherapy in Enhancing Language Intellectual Development in Children with Speech Delay

Aulia Aziz Salsabilla, Anggun Kurnia Likawati, Afifah Dwi Mufidah*

Universitas Pendidikan Indonesia, Indonesia

*Correspondence: E-mail: aulia.a.salsa@upi.edu

ABSTRACT

An important aspect of children's development is how they learn to speak and use language. Language and speech will be their main tools to communicate and socialize with others. However, some children experience difficulties in developing language and speech that prevent them from expressing themselves. This challenge is commonly referred to as speech delay. In response to the critical need to address speech delay in children, we have developed an innovative initiative called Bestari App. It is a digital bibliotherapy application designed to provide customized support to children with language learning challenges, particularly those with speech delays. The app is still in the development stage. Therefore, our study aims to investigate the effectiveness of the Bestari App in improving the language skills of children with speech delays. In this research, we conducted an experimental study using the case study method with the object of 2 (two) 10-year-old students who indicated speech delay. The experiment involved a series of six sessions using intervention techniques and instructional methods facilitated through the use of the Bestari application. Based on the following method, the results of the study were an increase in the post-test score of AD by 77% with an initial score of 35 to 62 and AT by 33% with an initial score of 62 to 82. From these results, it can be concluded that the Bestari App is effective enough to improve language skills in children with speech delay. However, the application still needs further development to maximize the existing results.

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1. INTRODUCTION

The "golden period" is a critical phase during which the brain undergoes rapid and optimal development. This period spans from the prenatal stage to the first two years of a child's life, encompassing the toddlerhood stage (Aulia *et al.*, 2023). It is aptly named the "golden period" as it represents a significant window of opportunity for parents to nurture and guide their children in alignment with their unique potential.

During this golden period, children acquire knowledge primarily through observation, listening, and sensory experiences of their surroundings. A child's development can go in either a positive or negative direction, depending on the inputs they receive. Positive support from parents, a nurturing environment, and good friendships can lead to healthy development. On the other hand, if a child lacks attention and support from their parents, lives in an unfavorable environment, or has negative friendships, their development may not reach its full potential (Aulia, et al., 2023).

One crucial aspect of children's development is how they learn to speak and use language. According to information from raisingchildren.net.au (2021), children go through various stages of language development from 3 months to 8 years:

- **3-12 months:** Babies begin by cooing and smiling, then progress to babbling around 4-6 months. Their first real words usually come around 12 months.
- **12-18 months:** Young children begin with basic words like "Dada." As time goes on, they learn more words and can understand more than they can say. They can also follow simple instructions, like "Sit down."
- **18 months to 2 years:** At this stage, most kids begin to put two words together to form short sentences. They understand a lot of what is said to them, and strangers can often comprehend about half of what they say.
- **2-3 years:** Around this age, children start combining two words into short sentences, grasp a lot of spoken language, and can be understood by strangers for about half of their speech.
- **3-5 years:** Children at this stage engage in longer, more complex conversations, ask questions about things not in front of them, use words like 'because' and 'when,' and keep growing their vocabulary while enjoying discussions and storytelling.
- **5-8 years:** In the early school years, kids expand their vocabulary, learn to tell stories, and express themselves more effectively. By age eight, they can hold conversations similar to adults.

This is important because as kids grow, language and speech become their primary tools for communication and socializing with others. When children acquire these skills, it paves the way for their overall development. However, if they experience difficulties in developing language and speech, it can hinder their ability to express themselves and have their needs met, as others may struggle to understand them. This challenge in language and speech development is referred to as speech delay (Suhadi, 2019).

A child is considered to have a speech delay when their ability to speak and use language is below the expected level for their age (Aulia, et al., 2023). This can manifest as frequent language errors, like adding or leaving out consonants. When children with speech delays reach 4-6 years old, you might notice difficulties in their reading and spelling skills. They may struggle to spell words correctly and have trouble understanding written content. These speech delays can also lead to behavioral issues and challenges in communication, which can have broader impacts on their social, emotional, cognitive, psychological, and academic development (Hasanah & Sugito, 2020).

Data from the Indonesian Pediatric Society (IDAI) indicates that around 5-8% of preschool kids have trouble with speaking, and this rate jumps to 21% in Jakarta. Moreover, a common issue is pure speech delay, which affects 5-8% of the population. Sometimes, speech delay isn't just on its own; it can be part of a bigger issue like global developmental delay (Jeong et al., 2016). The study looked into whether a technique using brain imaging can help tell the difference between global developmental delay and speech delay in young children.

The study by Sunderajan and Kanhere (2019) found that there are factors outside of medical issues that can cause speech and language delays in children. These factors can be grouped into two categories: family-related and environmental.

Family-related factors include growing up in a multilingual family, having many siblings, having close relatives with speech or language issues, and having parents with lower levels of education. Environmental factors include things like experiencing trauma, exposure to loud noise, excessive TV watching, coming from a low-income background, and not getting enough mental and sensory stimulation (Sunderajan & Kanhere, 2019). These factors from the child's family and surroundings can make it harder for children to develop their language skills.

Other recent research summarized by The Hannen Centre, said most studies have found that spending more time on screens has either no connection or has a negative connection with children's language abilities. For example, a 2020 review of 42 studies found that children who spent more time on screens had lower language skills. Another study of 157 toddlers found that children who spent more time on screens had lower language skills (Lowry, 2020).

Drawing from existing research and data, it becomes increasingly evident that the issue of speech delays in children demands heightened attention due to its growing prevalence. Failing to address this matter promptly can hinder a child's future development. This study revolves around two ten-year-old children experiencing speech delays, alongside personality issues such as Autism Spectrum Disorder (ASD). Our aim is to explore effective methods to support and enhance their language learning journey.

Fleury and Hugh (2018) found that children with ASD struggle with engagement and reading, largely due to their challenges with social interaction and communication. To make bibliotherapy more effective, adjustments can be made. Their study compared how children with ASD react to different types of literature, suggesting that nonfiction might be more relatable because it relies on general knowledge rather than social or emotional content. As a result, bibliotherapy shows promise for supporting language learning in children with ASD. Bibliotherapy, as a concept, originates from the fusion of the Latin words "*biblion*" (book) and "*therapeo*" (healing) and centers on the transformation of behaviors and attitudes through the influence of reading (Akgün & Benli, 2019). Marković (2015) emphasizes that bibliotherapy serves diverse functions tailored to participants' needs, spanning from medical and clinical to developmental and preventative.

In response to the critical need to address speech delays in children, especially those with ASD, we have developed an innovative initiative called the Bestari App. This digital bibliotherapy application is designed to provide tailored support for children experiencing speech-language-learning challenges, specifically those with speech delays. The Bestari App leverages the power of technology and literature to create an engaging and effective platform for enhancing language development in children.

Bestari App comprises two primary features, namely "Pustaka Cerita" and "Pustaka Kata". Pustaka Cerita concentrates on delivering factual stories through videos and literary content,

aimed at fortifying children's comprehension and retention of factual information. Meanwhile, *Pustaka Kata* aims to enhance and sustain their grasp of Bahasa Indonesia vocabulary. Through consistent practice, these features not only enhance their speaking and language skills but also bolster their vocabulary competence, contributing to their overall linguistic development. This approach aligns with bibliotherapy methods, using tailored content and engagement to facilitate language skill development in children with speech delays.

Our research aims to investigate the effectiveness of the *Bestari* App in improving the language skills of children with speech delays. By using this digital tool, we hope to offer a unique and engaging way to promote language development, as well as address the associated personality traits that often accompany speech delays, such as those observed in children with Autism Spectrum Disorder (ASD). This innovative approach has the potential to provide a valuable resource for parents, caregivers, and speech-language pathologists working with children with speech delays.

By integrating technology and the principles of bibliotherapy, the *Bestari* App seeks to bridge the gap between therapy and the child's everyday life. This initiative embodies our commitment to improving the lives of children with speech delays, offering them a tailored, engaging, and effective means of enhancing their language skills and overall development.

2. METHODS

In the context of this study, we employed an experimental design utilizing a case study approach with a focus on two 10-year-old children, designated as AD and AT, both experiencing speech delay. These participants were enrolled in an educational institution in Bandung, Indonesia.

The experimental phase comprised a series of six sessions incorporating intervention techniques and instructional methods, predominantly facilitated through the utilization of the *Bestari* app. The research outcomes are presented descriptively and qualitatively, shedding light on the language competency advancements observed in the children, specifically in relation to the two primary features of *Bestari*: *Pustaka Cerita* and *Pustaka Kata*.

Data collection for the experiment involved a comparative analysis of pre-test results (conducted before the introduction of the *Bestari* App) and post-test results (conducted after the implementation of the *Bestari* App). These assessments were administered at the initiation and conclusion of the instructional sessions, providing a comprehensive view of the impact of the intervention on the language proficiency of the participants.

3. RESULTS AND DISCUSSION

The implementation of the *Bestari* App, rooted in bibliotherapy principles, was executed through a meticulous 6-session assessment and intervention process. This encompassed pre-tests and post-tests designed to align with the research objectives, focusing on optimizing children's linguistic insights and listening skills through the utilization of the *Bestari* application. The evaluation of indicators on both pre-tests and post-tests aimed to measure the extent to which children acquired specific skills. This encompassed their ability to understand and engage with stories, language proficiency, and communication skills. The following ten indicators were employed to assess the children's progress:

1. Understand the Story

- Recognize what the story is about.
- Describe the characters in the story.
- Identify where and when the story takes place.

2. Language Skills

- Define new words used in the story.
- Explain what’s happening in pictures or illustrations.
- Retell the story using simple words.

3. Communication

- Express their own feelings and experiences using a simple grammatical structure.
- Point out 2-4 pictures when prompted by the teacher.

These indicators were evaluated using a scoring scale ranging from 1 to 4, where 1 represented "Not Developing," 2 indicated "Starting to Develop," 3 denoted "Developing as Expected," and 4 reflected "Developing Very Well." In the overarching assessment, the overall developmental gains of participants AD and AT exhibited disparate scores.

The detailed assessment allowed for a nuanced understanding of the children's progress across various linguistic and communicative dimensions. The differentiation in scores shed light on the individualized responses and advancements made by each participant, contributing to a comprehensive view of the Bestari App's impact.

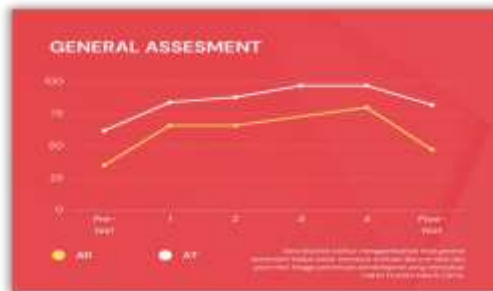


Figure 1: General Assessment Result both AD & AT

In the initial assessment, AD displayed a pre-test score of 35, which significantly improved to 62 in the post-test, marking a notable progress of 77%. On the other hand, AT started with a higher pre-test score of 62 and demonstrated improvement, reaching a post-test score of 82, indicating a 33% increase. These results provide a comprehensive overview of the general advancement observed in both students, emphasizing the effectiveness of the learning sessions facilitated by the Bestari App.

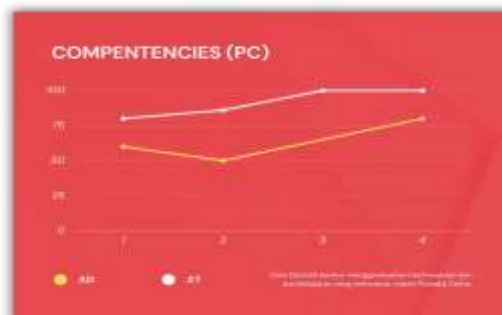


Figure 2: Competencies Growth for both AD & AT using Pustaka Cerita (PC)

In the evaluation of the Pustaka Cerita features, a noticeable divergence in performance between AD and AT was observed. AT consistently exhibited higher scores

compared to AD, implying a more focused and comprehensive understanding of the content. This distinction is further highlighted by the absence of robust two-way interaction between the program team and AD. Additionally, it was noted that AD's performance on this feature was influenced by the intervention session, suggesting an area for potential enhancement in the learning program.

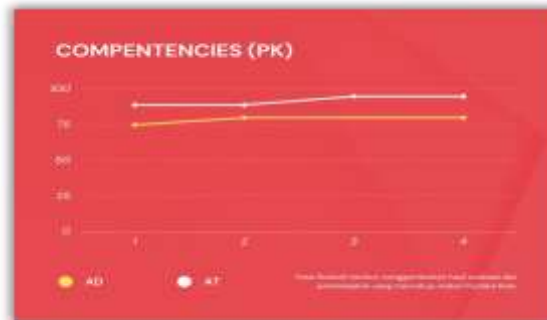


Figure 3: Competencies Growth for both AD & AT using Pustaka Kata (PK)

Examining the graph depicting competencies growth in Pustaka Kata, it becomes evident that students with speech delay, specifically AD and AT, showcased varying levels of performance throughout the learning program.

The following key findings emerge:

1. Individual Performance

AD and AT showcased varying levels of performance both before and after the learning sessions. AD's pre-test score of 35 improved modestly to 62 in the post-test, while AT, starting with a higher pre-test score of 62, demonstrated substantial improvement to 82 in the post-test.

2. Differential Improvement

Notably, AT exhibited significant improvement from pre-test to post-test, indicating a higher responsiveness to the learning program. Conversely, AD's performance witnessed a comparatively marginal improvement, suggesting the potential for further enhancement to cater to their specific needs.

3. The Effect of Learning Sessions

An integral aspect is the examination of how individual sessions, both in Pustaka Cerita and Pustaka Kata, contributed to the overall improvement. Understanding whether one session had a more pronounced impact on students' potential than the other is crucial for refining the intervention strategy.

4. Individualized Approach

Given the discernible differences in the competence levels of AD and AT, there arises an opportunity to tailor the learning program according to each student's individual needs. An individualized approach may better address their unique requirements and optimize the impact of the Bestari App.

5. Long-term Progress

Continuous monitoring and evaluation of both students' progress over time are imperative. The anticipation is that with sustained exposure and practice, their language skills will exhibit ongoing improvement. This longitudinal perspective is vital for understanding the enduring impact of the Bestari App on speech-delayed children.

Based on that result, it concluded that in the integration of bibliotherapy digitization within the Bestari App, the effectiveness of its two distinctive features, namely Pustaka Cerita

and Pustaka Kata, is evident in the targeted improvement of language skills. The multifaceted impact of these features is designed to enhance various aspects of language development, fostering a comprehensive approach to address the unique needs of children with speech delays.

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Pustaka Cerita: A Catalyst for Holistic Language Development

The Pustaka Cerita feature within the Bestari App serves as a catalyst for the holistic development of language competencies. Through this feature, expressive language skills are cultivated, empowering children to articulate their thoughts and ideas effectively. Vocabulary expansion becomes an organic outcome, as exposure to diverse stories enriches their lexical repertoire. Reading comprehension is stimulated, promoting a deeper understanding of narrative structures and content. Listening skills are honed through engagement with audio-visual materials, fostering an integrated approach to language learning. The pragmatic language and social skills of speech-delayed children are nurtured, providing a platform for improved communication in various social contexts.

Pustaka Kata: Precision in Language Enhancement

Complementing Pustaka Cerita, the Pustaka Kata feature is designed to optimize students' language skills with a focus on precision. Vocabulary expansion continues to be a key objective, with an emphasis on exposing children to a spectrum of words in Bahasa Indonesia. Sentence construction is honed, aiding in the development of grammatical structures and coherent expression. Articulation and speech development are targeted, addressing the specific challenges faced by children with speech delays. Pragmatic language and social skills are further refined, ensuring a well-rounded improvement in their ability to navigate linguistic interactions.

Application and Implementation for Sustainable Growth

The application and implementation of the Bestari App for children with speech delays not only showcase immediate benefits but also underscore its potential for sustained growth. The limited intervention meetings between students emphasize the self-guided nature of the app, allowing children to independently navigate and engage with its features. This autonomy contributes to the app's sustainability, providing a continuous and accessible resource for language development. The iterative and progressive nature of the Bestari App aligns with the evolving needs of speech-delayed children, offering a dynamic and adaptable tool for ongoing linguistic support.

Long-Term Effects: Nurturing Lasting Linguistic Proficiency

The Bestari App transcends the realm of immediate impact, offering promising long-term effects that are particularly significant for children grappling with speech delays. One notable long-term benefit is the cultivation of lasting linguistic proficiency. As speech-delayed children engage consistently with the app's features, the iterative nature of the exercises contributes to the gradual internalization of language skills. The sustained exposure to diverse

vocabulary, narrative structures, and linguistic patterns establishes a foundation for enduring language development.

Over time, the Bestari App serves as a virtual companion, reinforcing language skills beyond the confines of structured intervention meetings. The self-paced nature of the app allows children to revisit content, facilitating reinforcement and consolidation of previously acquired language competencies. This cyclical reinforcement contributes to the internalization of language patterns, ultimately translating into enhanced communicative abilities in the long run.

Moreover, the Bestari App's adaptability plays a pivotal role in accommodating the evolving needs of speech-delayed children as they progress in their linguistic journey. The app adjusts to their developmental milestones, offering challenges commensurate with their growing proficiency. This adaptability not only sustains engagement but also ensures that the app remains a relevant and effective tool throughout the extended duration of language intervention.

Beyond linguistic realms, the long-term effects of the Bestari App extend to social interactions. By fostering pragmatic language and social skills in the early stages, the app contributes to the gradual integration of speech-delayed children into social contexts. As their linguistic capabilities mature, so too does their ability to navigate and participate meaningfully in diverse social interactions.

In essence, the Bestari App stands as a beacon of long-term linguistic empowerment for children with speech delays. Its sustained impact, characterized by continuous reinforcement, adaptability, and social integration, positions the app as a valuable and enduring ally in the overarching goal of nurturing comprehensive and lasting language proficiency.

Future Research Directions: Unveiling the Potential of Digital Bibliotherapy for Children with Speech-Delays

While the Bestari App marks a significant stride in leveraging digital bibliotherapy for children with speech delays, there remain uncharted territories and opportunities for future research in this evolving field. Exploring these avenues can enrich our understanding and enhance the efficacy of digital interventions tailored for speech-delayed children.

- **Individualized Digital Bibliotherapy Protocols:** Future research can delve into the development of personalized digital bibliotherapy protocols. Tailoring interventions based on the specific needs, severity, and types of speech delays can optimize the impact of digital bibliotherapy. Understanding how customization influences engagement and outcomes could pave the way for more precise and effective interventions.
- **Multimodal Approaches and Accessibility:** Another avenue for exploration is the integration of multimodal elements, such as virtual reality or interactive visuals, within digital bibliotherapy. This approach could offer a more immersive and engaging experience for speech-delayed children. Additionally, examining the accessibility of digital bibliotherapy tools across diverse demographics and socioeconomic backgrounds can ensure inclusivity and equal opportunities for linguistic development.
- **Collaborative Interventions with Speech Therapists:** Exploring collaborative interventions that involve the integration of digital bibliotherapy with traditional speech therapy practices is a promising avenue. Research can investigate the

synergies between these approaches, identifying the optimal balance for comprehensive language support.

- **Parental Involvement and Training:** Research focusing on the involvement of parents in the digital bibliotherapy process is essential. Understanding the role of parents as facilitators, their comfort with technology, and the effectiveness of any training provided can influence the success of these interventions.
- **Effectiveness Across Speech Delay Subtypes:** Given the heterogeneity of speech delays, future research can delve into the effectiveness of digital bibliotherapy across different subtypes. Understanding how various speech delay conditions respond to digital interventions can inform targeted strategies for specific linguistic challenges.
- **Integration into Educational Settings:** Finally, investigating the integration of digital bibliotherapy tools into educational settings, such as classrooms or learning support programs, is a pertinent area for future research. This exploration can provide insights into scalability, effectiveness in group settings, and potential collaboration with educators.

Embarking on these future research directions holds the promise of unlocking the potential of digital bibliotherapy as a transformative force in the realm of speech-language interventions for children. These endeavors aim to refine and expand our strategies, fostering more inclusive, accessible, and effective linguistic support for speech-delayed children.

4. CONCLUSION

An important aspect of children's development is how they learn to speak and use language. Language and speech will be their main tools to communicate and socialize with others. However, some children experience difficulties in developing language and speech that prevent them from expressing themselves. This challenge is commonly referred to as speech delay. In response to the critical need to address speech delay in children, we have developed an innovative initiative called Bestari App. It is a digital bibliotherapy application designed to provide customized support to children with language learning challenges, particularly those with speech delays. The app is still in the development stage. Therefore, our study aims to investigate the effectiveness of the Bestari App in improving the language skills of children with speech delays.

In this comprehensive exploration of the Bestari App's impact on children with speech delays, several key findings have emerged, shedding light on the effectiveness of the digital bibliotherapy intervention. The individual performance of participants AD and AT revealed varying levels of improvement, with AT demonstrating substantial progress from a higher baseline, suggesting distinct responsiveness to the learning program. This differential improvement underscores the potential for further tailoring the intervention to cater to individual needs.

Crucially, the assessment of the learning sessions in *Pustaka Cerita* and *Pustaka Kata* provides insights into how each session contributed to overall improvement. This analysis is vital for refining the intervention strategy, ensuring that the Bestari App optimally addresses the specific linguistic challenges faced by children with speech delays. The results emphasize the importance of adopting an individualized approach to better meet the unique requirements of each participant, paving the way for more targeted interventions.

As we consider long-term progress, continuous monitoring and evaluation are imperative. The anticipation is that with sustained exposure and practice, the language skills of participants will exhibit ongoing improvement. This longitudinal perspective is crucial for understanding the enduring impact of the Bestari App on speech-delayed children and highlights the need for continuous support beyond the immediate intervention period.

In conclusion, the Bestari App emerges as a transformative force in addressing the complex challenges faced by children with speech delays. Its dynamic and individualized approach, coupled with promising long-term effects, positions the app as a valuable ally in nurturing comprehensive and lasting language proficiency. Future research directions hold the key to unlocking the full potential of digital bibliotherapy in the realm of speech-language interventions, promising a more inclusive, accessible, and effective future for children with speech delays.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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