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Study Analysis: Learning Pattern of Blind Children Using Aid Applications for Science Learning

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Abstract

Use of technology for learning for blind children. One of the main gaps is the availability and accessibility of this technology in the school environment. Not all schools have adequate infrastructure or financial support to implement technology effectively. This research uses a descriptive qualitative approach with triangulation techniques in data collection to provide an in-depth description of the learning process evaluation for blind students at SLB 1 Makassar. The data collection technique involved four blind students and four teachers who were also blind, selected through purposive sampling. The Context, Input, Process, Product (CIPP) approach developed by Stufflebeam was used as the framework. This research focuses specifically on evaluating the learning process. Unique dynamics in the blind class at SLB 1 Makassar, where teachers and students face blind disabilities. The presence of teachers who are also blind, especially those with total blindness, creates a learning environment full of empathy and mutual understanding. The Be My Eyes, Voice Dream Reader, and Blind Square applications contribute significantly to the inclusive education of blind children at SLB 1 Makassar. With the help of this application, it is possible to increase the independence of blind children in learning, especially science learning.

Keywords: Blind Children, Technology for learning, Science Learning

Introduction

Teaching Science and Environment subjects to blind students at the junior high school level faces various challenges, such as problems with facilitators, media and technology support, learning materials, and curriculum relevance (Tyas Pratiwi et al., 2022; Wulandari & Hendriani, 2021). These obstacles hurt the academic performance of blind students at the

elementary level. Special schools for blind students are educational institutions that serve individuals with visual impairments and use special teaching methods to meet students' unique physical, intellectual, and emotional needs (Jannah et al., 2021; Kadir, 2016).

In Indonesia, many such schools provide primary education for blind students and children with other special needs (Dermawan, 2018). However, the curriculum generally follows a curriculum designed for sighted students, so they need help in science and environmental education. Blind students also often face obstacles in accessing essential teaching equipment, tools, media, technology, and learning materials needed for effective learning. In addition, graphic information that is important in science learning is only sometimes readily available to them (Effendi et al., 2021).

Developing practical learning approaches for students with visual impairments is critical to overcoming these challenges. Several key factors in this process include facilitators, (Effendi et al., 2021)the learning process, media and technology, curriculum adaptation, and efforts to increase student self-confidence. Many studies have underscored the importance of these factors in the context of inclusive education.

Facilitators have an essential role in supporting the educational process. They must ensure they prepare the necessary equipment and tools to make learning activities accessible (Arif et al., 2021) In addition, they also act as coaches and instructors, demonstrating effective learning methods, including problem-solving approaches. Science and environmental learning involve an experimental learning process where facilitators guide students in identifying problems and finding correct answers (Permatasari, 2022; Tan et al., 2021) Sometimes, a particular instructor is needed to provide additional support and involvement from classmates with disabilities, teachers, and parents (Kanter, 2019; Tarigan, 2022). However, instructors often face various obstacles, such as time constraints, budget constraints, lack of personnel, and high emotional burden. Therefore, ongoing professional development for special education teachers is critical.

School staff, including teachers, can adopt practices that encourage initiative and professional learning among teachers. Instructional training plays a central role in shaping teachers' beliefs and practices (Nagase et al., 2021). Professional learning opportunities that are collaborative and context-specific can provide significant benefits for special education teachers. School reform and professional development must go hand in hand, integrating content, curriculum, and learning resources to build confidence and competency among educators who work with students with special needs. One learning process that is quite difficult to carry out is for blind children.

The learning process for blind students is complex. In the educational context, the learning process includes acting, listening, observing, visualizing, creating mental images, practicing, or memorizing with focused attention and motivation (Praptaningrum, 2020). Media and technology act as tools to facilitate students' access to science learning, such as accessible textbooks, scientific models, and experiments in scientific (Prasertpong et al., 2023). Online learning offers many benefits to society, including equal opportunities, social support through cooperation and communication, student engagement, prioritization of achieving learning goals, flexibility, and integration in the learning environment (Senjam et al., 2020). However, technology can sometimes detract from students' live demonstrations, affecting their persistence, excitement, and motivation.

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The urgency of using technology to support the learning of blind children at school is very significant. Blind children often face obstacles in accessing information and learning materials that predominantly rely on visuals (Hartz, 2000) Using technology in the form of applications can provide solutions to expand their accessibility to information and knowledge (Wijaya et al., 2020) By utilizing technology, schools can create a more inclusive learning environment, support the development of independence, and improve the quality of education for blind children.

However, what needs to be paid attention to is the use of technology for learning for blind children. One of the main gaps is the availability and accessibility of this technology in the school environment. Not all schools may have adequate infrastructure or financial support to implement technology effectively. Training for teachers and school staff on integrating technology into the curriculum is also a critical factor that needs to be considered. Therefore, efforts to improve and increase technology accessibility in the school context are significant so that all blind children can feel the benefits of using technology in their learning process.

This research is fundamental because it explores critical aspects of the learning of blind children in science subjects at SLB Negeri 1 Makassar. First, this research provides a deeper understanding of the characteristics and special learning needs of blind children. We can design more adaptive and practical learning approaches by understanding their learning patterns. The diversity of learning styles among children with visual impairments suggests that one approach may not fit all, and this research may provide valuable insight into developing more personalized and focused strategies.

Furthermore, this research is necessary because it explores the use of technology in supporting the learning of blind children. In a world increasingly dependent on technology, understanding how blind children can use it to access learning materials can open new opportunities for their inclusivity and independence. This research, therefore, can become a basis for developing and improving applications or technological tools that can better support the successful learning of blind children.

Research Method

This research uses a descriptive qualitative approach with triangulation techniques in data collection to provide an in-depth description of the learning process evaluation for blind students at SLB 1 Makassar. The triangulation approach is used to increase the validity and reliability of data by combining results from various data sources, such as observation, interviews, and documentation.

The data collection technique involved four blind students and four teachers who are also blind, selected through purposive sampling. Data was collected through direct observation of the learning process, in-depth interviews with teachers and students, and document analysis related to curriculum and learning materials.

The Context, Input, Process, Product (CIPP) approach developed by Stufflebeam was used as the framework. This research focuses specifically on evaluating the learning process (Russon & Russon, 2018). The qualitative data collected will be analyzed in depth to identify aspects of success and challenges in implementing learning to provide specific and contextual

improvement recommendations for improving the quality of learning for blind students at SLB 1 Makassar in the 2023/2024 academic year.

Result

In exploring the learning patterns of blind children at SLB 1 Makassar, this study delves into the analysis of their educational experiences, specifically focusing on the utilization of assistive applications for science learning. The investigation aims to unravel the intricacies of how these applications influence and contribute to the overall learning process of visually impaired students within the unique educational context of Special Schools for the Blind (SLB). Through a comprehensive examination of the implemented aid applications, including Be My Eyes, Voice Dream Reader, and BlindSquare.

Picture 1. Teachers teach science learning with the lecture method.

The pedagogical approach employed in teaching Natural Sciences (IPA) at Special School 1 Makassar is marked by innovation, featuring a visually impaired educator grappling with total visual limitations. Despite the substantial visual obstacles, the educator selects the lecture method as the primary vehicle for disseminating content to visually impaired students with limited vision. Throughout the instructional sessions, the student's active engagement becomes palpable, manifesting a heightened concentration indicative of a profound interest and attentiveness to the materials presented by the visually impaired educator.

In the unique context of SLB 1 Makassar, where a visually impaired educator with total visual limitations employs vocal skills and heightened auditory sensitivity to deliver IPA content, a distinctive approach to teaching emerges. This method resonates with visually impaired students with limited vision, as evidenced by their active participation and notable concentration levels during the educator's presentations. The success of the lecture method in this inclusive environment underscores its efficacy in supporting IPA learning, demonstrating that visually impaired students can leverage their sense of hearing for a profound understanding of study materials. Moreover, the dynamic interaction between the educator and students

fosters a supportive learning environment that imparts scientific concepts and promotes collaboration and inclusivity within the classroom.

Picture 2. While teaching, students record teacher conversations using mobile phones placed in drawers, occasionally taking notes using brile.

Students at SLB 1 Makassar demonstrate a distinctive and resourceful learning approach, incorporating the Be My Eyes, Voice Dream Reader, and BlindSquare applications to enhance the inclusive education of blind children. Beyond conventional learning methods, these applications significantly contribute to the students' educational experience by providing access to visual information and facilitating navigation within the learning environment. The use of technology aligns with the principles of inclusivity, catering to diverse learning styles and addressing accessibility challenges faced by blind students.

In addition to application-based learning, students exhibit another unique approach by discreetly using mobile phones placed in drawers to record teacher conversations. This unconventional practice reflects their initiative in leveraging technology for educational purposes and highlights their adaptability in overcoming accessibility challenges. The students' use of mobile phones for recording and occasional notetaking in Braille represents a comprehensive strategy that combines modern technology with traditional tactile methods, addressing diverse learning needs within the inclusive education framework.

This innovative practice sparks essential discussions about the intersection of technology and inclusive education, prompting considerations regarding privacy, consent, and responsible technology use in the educational context. Furthermore, the approach underscores the significance of auditory learning and aligns with inclusivity principles that cater to diverse learning styles. In conclusion, the students' resourcefulness and technology integration reflect a commitment to ensuring an inclusive, practical, and effective educational experience at SLB 1 Makassar.

Discussion

The Be My Eyes application significantly contributes to the context of inclusive education for visually impaired children in SLB 1 Makassar, according to the findings of previous research by (Theodorou et al., 2023) The research highlighted the importance of visual aids in increasing blind children's independence and engagement in learning. Be My Eyes, with its concept of involving volunteers in providing visual aids, reflects these findings. However, the study also expressed the need for a more structured strategy to overcome reliance on volunteers, emphasizing potential drawbacks that need to be addressed in its implementation.

As for the context of Voice Dream Reader, this application has relevance to the findings of previous research by (Chen et al., 2020) who highlighted the critical role of text reader technology in improving accessibility for visually impaired readers. Voice Dream Reader allows visually impaired children at SLB 1 Makassar to access learning materials through high-quality sound. Nonetheless, the study also highlighted challenges related to the intelligibility of synthetic voices, signaling the need to continue developing more natural and comprehensible synthetic voice technology.

Meanwhile, Blind Square creates relevance to previous research exploring voice-based navigation technology for visually impaired children. Research by (Theodorou et al., 2023) emphasized the importance of technology that can enhance the mobility and independence of blind children in exploring their environment. Blind Square provides a solution that matches these findings. However, the research also shows that location accuracy is critical, emphasizing the importance of developing navigation technology that can reliably support blind children's learning and mobility.

By integrating this application into the curriculum and daily activities at SLB 1 Makassar, previous research can be used as a foundation to design more effective and inclusive learning approaches. Technological developments also allow for improvements and updates to enhance the quality of services these applications provide (Silva & Wimalaratne, 2016). Therefore, collaboration between schools, researchers, and technology developers can continue to advance the use of these applications in supporting the education of visually impaired children in SLB 1 Makassar and various other inclusive education institutions.

Interestingly, it is necessary to appreciate and understand the unique dynamics in the blind classroom at SLB 1 Makassar, were teachers and students alike face blind disabilities. The presence of teachers who are also blind, especially with total blindness, creates a learning environment full of empathy and mutual understanding. This strengthens the bond between teachers and students and creates a supportive and inclusive classroom atmosphere. In this case, visually impaired teachers bring their uniqueness as they rely on their sense of hearing and sensitivity to sound to provide detailed explanations in science learning.

Despite their visual limitations, blind teachers at SLB 1 Makassar show resilience and creativity in providing learning. By using Braille books or listening to information from their cellphones, teachers can communicate detailed science learning materials to students. This reflects teachers' high adaptability and commitment to delivering knowledge to students in ways that suit their conditions. In this context, the blind classroom at SLB 1 Makassar is a place of learning and a space where teachers and students support and empower each other, creating an inspiring learning environment for all individuals involved.

Conclusion

In summary, the study explores the learning patterns of blind children at SLB 1 Makassar, emphasizing the role of assistive applications like Be My Eyes, Voice Dream Reader, and BlindSquare in science education. The pedagogical innovation of a visually impaired teacher using the lecture method proves effective, fostering active engagement and concentration among students. Students' resourceful use of technology, discreetly recording lessons and utilizing applications, reflects adaptability and addresses accessibility challenges. The applications contribute significantly to inclusive education, providing access to visual information and enhance navigation. However, discussions highlight the need for structured strategies, addressing challenges like volunteer reliance and synthetic voice intelligibility. The study underscores the intersection of technology and inclusive education, raising considerations about privacy, consent, and responsible technology use. The unique dynamics in the blind classroom, with visually impaired teachers, create an empathetic and supportive learning environment, showcasing resilience and creativity in delivering science education. Overall, the study advocates for continued collaboration to advance technology integration in supporting the inclusive education of blind children.

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