

The Effectiveness of AKUBERANI Media: An Interactive Visual Education for Children with Mild Intellectual Disabilities on Body Boundaries and Consent

Efektivitas Media AKUBERANI: Edukasi Visual Interaktif Bagi Anak Tunagrahita Ringan Mengenai Batasan dan Persetujuan Tubuh

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Abstract

Mildly disabled children often experience barriers in understanding the concept of bodily boundaries and consent, which impacts their vulnerability to the risk of rights violations and sexual violence. This study aims to develop and test the effectiveness of augmented reality-based learning media AKUBERANI as an interactive visual educational media to improve mildly disabled children's understanding of body boundaries and consent. The research method used is a mixed method with an exploratory design. The research subjects were four children with mild impairment in phase D at SLB Negeri Duri. Data were collected through observation, interviews, expert validation, and tests of children's understanding abilities before and after using the media. The analysis showed a significant increase in children's understanding after using augmented reality "AKUBERANI" media, as indicated by the pre-test average score of 48.25% to 96.25% in the post-test. This media was rated highly valid by material and media experts, and easy to use by teachers and students. Thus, AKUBERANI media effectively improves the understanding of children with mild disabilities about body boundaries and consent and is recommended as an alternative learning media in special schools. augmented reality technology can continue to be utilized to create rich, personalized, and inclusive learning experiences for all children without exception. The more interactive media like AKUBERANI is developed, the greater our hope for a generation of resilient, intelligent, and protected children with special needs.

Keywords: *Augmented reality, disabilities, sexual, technology, mildly disabled children.*

Abstrak

Anak tunagrahita ringan sering kali mengalami hambatan dalam memahami konsep batasan dan persetujuan tubuh, yang berdampak pada kerentanan mereka terhadap risiko pelanggaran hak dan kekerasan seksual. Penelitian ini bertujuan mengembangkan dan menguji efektivitas media pembelajaran berbasis *augmented reality* AKUBERANI sebagai media edukasi visual interaktif untuk meningkatkan pemahaman anak tunagrahita ringan mengenai batasan dan persetujuan tubuh. Metode penelitian yang digunakan adalah metode campuran dengan desain eksploratori. Subjek penelitian adalah empat orang anak tunagrahita ringan fase D di SLB Negeri Duri. Data dikumpulkan melalui observasi, wawancara, validasi ahli, serta tes kemampuan pemahaman anak sebelum dan sesudah menggunakan media. Hasil analisis menunjukkan adanya peningkatan signifikan dalam pemahaman anak setelah menggunakan media *augmented reality* "AKUBERANI", yang ditunjukkan oleh kenaikan skor rata-rata pre-test sebesar 48,25% menjadi 96,25% pada post-test. Media ini dinilai sangat valid oleh ahli materi dan media, serta mudah digunakan oleh guru dan peserta didik. Dengan demikian, media AKUBERANI efektif dalam meningkatkan pemahaman anak tunagrahita ringan tentang batasan dan persetujuan tubuh, serta direkomendasikan sebagai media pembelajaran alternatif di sekolah luar biasa. Teknologi *augmented reality* dapat terus dimanfaatkan untuk menciptakan pengalaman belajar yang kaya, personal, dan inklusif bagi semua anak, tanpa terkecuali. Semakin banyak media interaktif seperti AKUBERANI dikembangkan, semakin besar pula harapan kita untuk membentuk generasi anak-anak berkebutuhan khusus yang tangguh, cerdas, dan terlindungi.

Kata Kunci: *Augmented reality, disabilitas, seksual, teknologi, tunagrahita.*

1. Introduction

Cases of sexual violence against school-age adolescents show an alarming upward trend and have become a serious issue in the world of education. A prominent case that attracted public concern occurred in a boarding school in Bandung Regency, where a teacher was charged with raping 13 female students (Suhadianto & Ananta, 2023). The phenomenon of sexual violence not only affects adolescents in general, but also has a significant impact on groups with special needs, including children with disabilities. Based on the CATAHU Annual Report in 2023, there were 2,228 cases of sexual violence against women in Indonesia and 72 of them involved women with disabilities. This is in line with the findings of Azis et al. (2023), who stated that adolescents with disabilities tend to be targets of sexual violence due to limitations in recognizing risks and their inability to protect themselves effectively.

Children with special needs are often seen as vulnerable individuals and rely heavily on the help of others to carry out their daily activities (Auliani & Ardisal, 2019). This vulnerability is closely related to cognitive and emotional maturity limitations, which cause difficulties in planning actions, solving problems, thinking abstractly, and evaluating situations thoroughly (Widhiati et al., 2022). Such limitations represent significant barriers for children in adjusting to biological changes when entering adolescence and in understanding social norms that apply in the surrounding environment. As stated by Rochyadi (2012) in Ummah et al., (2023), children with special needs, especially tunagrahita, have limitations in capturing abstract concepts, so the learning process is more mechanical or memorization than meaningful understanding. They also tend to repeat the same mistakes, avoid complex thinking activities, and have short attention spans (Mannika, 2018). They have limited focus and interest in learning and difficulty independently creating new ideas. These limitations make children with disabilities a very vulnerable group to various forms of rights violations, including sexual violence, due to their low ability to recognize, understand, and respond to risky situations.

The results of field observations conducted at SLB Negeri Duri show that the learning process regarding body boundaries and consent for children with disabilities still faces various obstacles. One of the main challenges educators face is the limited learning media that specifically supports the delivery of this material (Carolina et al., 2022). Effective learning media for children with disabilities must not only be visually engaging but also be able to stimulate their attention, memory, and thinking skills. Interactive media that combine visual elements and hands-on learning experiences have been shown to increase learning motivation and help understanding abstract concepts in children with disabilities (Padmadiani et al., 2021; Fauzi et al., 2021). Thus, educational media following the characteristics and cognitive needs of children with disabilities is important in supporting learning effectiveness, especially in materials related to body awareness and personal rights.

In response to the learning challenges, This study aims to develop learning media based on augmented reality technology specifically designed to improve mildly impaired children's understanding of body boundaries and consent. The utilization of augmented reality in education is a form of modern technology integration that aims to strengthen learning effectiveness through a more immersive and contextual learning experience. This media follows the latest technological developments and offers an interactive visual approach that suits the learning characteristics of children with disabilities. The development of this augmented reality media is expected to be an educational tool that supports children in recognizing their rights over their bodies and distinguishing between acceptable touches and those that need to be rejected - from strangers, peers, and adults in the immediate environment.

Unlike previous studies that have focused primarily on general sexual education or traditional media, this study offers a novel approach by utilizing augmented reality specifically tailored to the cognitive characteristics of children with mild intellectual disabilities in addressing the sensitive topic of body boundaries and consent.

2. Literature Review

The utilization of technology in the development of learning media has become an increasingly used approach in education. Technology-based media plays an important role as a bridge between teachers' delivery of material and their support of students' understanding of the material taught. One of the relevant studies in this context is research by [Hardiyantari and Fatmawati \(2021\)](#), who developed interactive learning media in the form of augmented reality-based flashcards to introduce sexual education to children at the pre-operational stage. The results showed that the augmented reality media developed were considered feasible and effective as a means of sexual education in early childhood. The trials showed increased children's understanding of sexual education material after using the media, thus strengthening the potential for using augmented reality to deliver sensitive and abstract material that is more interesting and easily understood by students.

Then, research conducted by [Lase et al. \(2024\)](#) increased elementary school student's understanding of private areas of the body and awareness of sexual harassment through the use of augmented reality technology, which emphasizes the improvement of elementary school children's ability to understand social norms through an interactive visual approach. The media developed by Lase uses augmented reality modeling based on Android devices to simulate social interactions, such as greeting, asking for help, or asking for permission. The results showed that the use of augmented reality was able to improve elementary school children's social responses in the context of awareness of sexual harassment. Although there are similarities in using augmented reality technology to improve children's understanding, there are fundamental differences in the focus of substance between the two studies above and this study. This study specifically targets the improvement of mildly impaired children's understanding of the concept of body boundaries and consent, which is a crucial aspect in self-protection and prevention of sexual violence. Mildly impaired children tend to have limitations in understanding complex social situations, including recognizing signs of personal boundary violations as well as the ability to voice refusal appropriately. Therefore, educational interventions tailored to their cognitive and learning characteristics are essential to support a better understanding of the right to one's own body and early self-protection strategies.

The urgency of the research entitled "The Effectiveness of AKUBERANI Media: Interactive Visual Education for Mildly Impaired Children on Body Boundaries and Consent" lies in the urgent need for an educational approach that is inclusive, adaptive, and able to bridge the cognitive limitations of children with mild intellectual disabilities. The novelty of this research lies in the development of "AKUBERANI" media that is specifically designed as an interactive visual media based on an affirmative educational approach, where children are not only passively taught but also actively involved in the learning process through simulations, concrete illustrations, and interactive scenarios that are close to their real life. Compared to conventional media that are textual or only in the form of leaflets and posters, "AKUBERANI" integrates visual elements, audio, and interactive activities in an integrated learning unit that is easier to understand and more interesting for children with mild disabilities. This research needs to be conducted to fill the gap in

effective and contextualized educational interventions on the issue of protecting children with special needs, which is still very limited.

3. Research Methods

This research uses a mixed methods approach, which combines qualitative and quantitative methods in one series of research to obtain a more comprehensive understanding (Putra et al., 2024; Herdayati et al., 2019; Moleong, 2019). The selection of this approach is adjusted to the research objectives, namely developing learning media based on augmented reality technology to improve the understanding of mildly disabled children on the concepts of body boundaries and consent. The qualitative approach was used in the early stages to explore the learning needs and initial understanding of mildly disabled children through observations and interviews. The quantitative approach is used to measure the effectiveness of the media through pre-test and post-tests. The research subjects were selected by purposive sampling based on certain criteria by the study objectives (Sari et al., 2022). The participants consisted of four mildly retarded students who were in the IQ range of 50-70 and were studying at SLBN Duri, Riau, who had been selected following the criteria set out in this study. The selection criteria included the intellectual level of basic communication skills and readiness to follow learning with interactive visual media.

Data collection in this study was conducted through several techniques that were adjusted to the characteristics of the mixed approach. The interview technique was used to explore in-depth information from the interviewees regarding the understanding and learning needs of children with mild disabilities related to body boundaries and consent (Maulida, 2020). In addition, observations were made to observe the learning process in the classroom, including teacher interactions and responses, so that the real situation in the field could be recorded systematically (Abdussamad & Sik, 2021). Additional data were obtained through documentation studies, such as learning records, learner profiles, and relevant teaching tools during the research process. Furthermore, the measurement of learners' abilities is carried out through test techniques, which include question instruments based on indicators of understanding boundaries and body consent. After data were obtained through three stages of pre-test intervention with augmented reality media "AKUBERANI" and post-test, researchers analyzed the data using a descriptive quantitative approach and supported by gain score analysis techniques or n-gain test to determine the extent of improvement in learners' understanding after the intervention was carried out. The n-gain test was used because it is suitable for measuring the effectiveness of learning on a small scale and directly comparing pre-test and post-test results on each individual. In addition to the n-gain test, researchers also conducted a data normality test to ascertain whether the data was normally distributed as a preliminary step to determine the feasibility of parametric (such as t-test) or non-parametric statistical tests. However, given the limited number of participants (only four learners), the quantitative analysis focused more on a descriptive and interpretative approach to each individual's score without a t-test because the assumptions are not met in small sample sizes. Then, to strengthen the quantitative results, the researcher also integrated qualitative analysis through direct observation of learners' behavior during the intervention process, interviews with teachers and parents, and field notes regarding learners' engagement and response to the use of "AKUBERANI" media. This approach is in line with mixed methods that combine numerical and narrative data to obtain a more comprehensive picture of the effectiveness of the learning media developed (Herdayati et al., 2019).

4. Results and Discussion

4.1. Research Results

This study aims to develop and test the effectiveness of augmented reality technology-based learning media named "AKUBERANI", which is designed to improve learners' understanding of the concept of body boundaries and consent. The research results are presented in two main sections, namely the appearance of the learning media and quantitative data from the pre-test and post-test results that reflect learners' level of understanding before and after using the media.



Figure 1. Application Login View



Figure.2. Application Start View

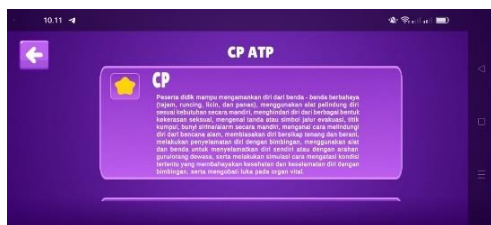


Figure.3. CP and ATP Display



Figure.4. Application Instructions Display



Figure.5. Application Credits Display



Figure.6. "Let's Be Brave" Feature Display



Figure.7. Gender Card Display



Figure.8. Display of Female Body Parts that should not be touched in the "Chest" Section



Figure.9. Display of Female Body Parts that should not be touched in the "Mouth" Section



Figure.10. Display of Female Body Parts that should not be touched in the "Pubic" Section



Figure.11. Display of Female Body Parts that should not be touched in the "Buttocks"



Figure.12. Display of Female Body Parts that may be touched



Figure.13. Feature Display "Let's Find Out" Feature



Figure.14. Problem Display



Figure.15. Display if the Answer is Correct



Figure.16. Display if the Answer is Wrong



Figure.17. Display of Problem Categories



Figure.18. Final Score Display

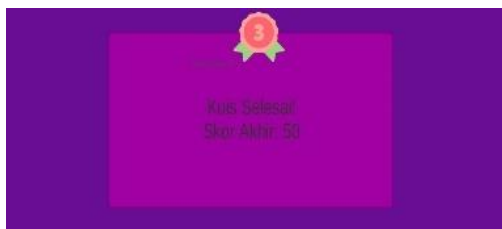


Figure.19. Final Score Display

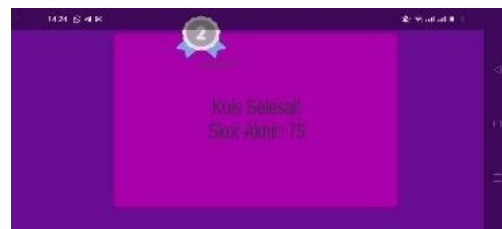


Figure.20. Final Score Display



Figure.21. Material Video Display

Furthermore, to assess the effectiveness of the media, measurements were taken using a pre-test before intervention and a post-test after the use of learning media. The summary of the pre-test and post-test results showed a significant increase in students' understanding of the material delivered through augmented reality 'AKUBERANI' media. A comparison graph of pre-test and post-test scores is presented in Figure 22 as evidence of this improvement.

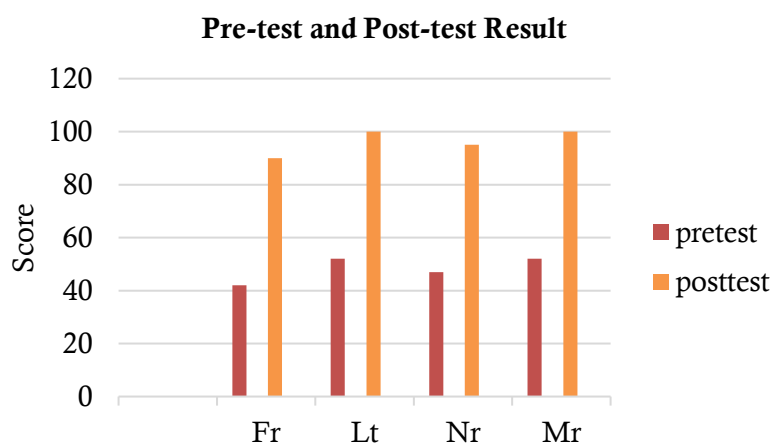


Figure.22. Comparison Chart of Pre-test and Post-test Values

In addition to improving learning outcomes, the effectiveness of the media was also reviewed through an implementation test involving teachers and four parents of students. Based on the questionnaire results, the average percentage of implementation was 97.5%, which indicates that this media is very feasible to use in learning for children with mild mental retardation. This finding aligns with the criteria for the feasibility of learning media according to Yulianti and Pramudiani (2021), and following the recommendations for using educational media in inclusive education (Nistrina, 2021).

4.2. Discussion

The results of data analysis show an increase in the understanding of mildly disabled students on the concept of body boundaries and consent after the application of AKUBERANI augmented reality technology-based learning media at SLBN Duri, Riau. This improvement can be seen from the post-test scores, which are consistently higher than the pre-test results before the intervention was carried out, especially for learners in phase D. This finding is in line with the opinion of Masrurroh and Rianto (2017), which states that AR-based media can visualize abstract concepts more concretely, making it easier for students to understand. In addition, presenting material through augmented reality allows the systematic structuring of learning objects to support learning effectiveness.

Before AKUBERANI media is implemented in the classroom, the development process begins with the validation stage by material experts and media experts. The validation results show that this media has a very high level of validity, with an average score of 92%. This score indicates that both in terms of content and appearance, the media is suitable for use with children with mild disabilities. However, the validation process also produced several inputs that were then followed up by researchers, such as simplifying the narration in some scenes, reducing text that was too dense, and adjusting the background color to be more friendly to children's visual sensitivity.

After revising, the media was tested for practicality through a limited trial with teachers and students. The results of the practicality test showed a score of 90%, which indicates that this media is classified as very practical for use in learning. Teachers reported that AKUBERANI media is

easy to operate, does not require special technical training, and can be integrated into routine learning activities in the classroom. On the other hand, students showed high enthusiasm and active involvement during the learning process, indicating the media's attractiveness and ease of use.

Nonetheless, several technical obstacles were encountered during the research implementation. One of the main challenges was the limited technological infrastructure at school, such as the limited number of devices and unstable internet connection. This required the implementation process to be carried out alternately and in offline conditions. In addition, additional time is also needed to familiarize children with disabilities in operating the augmented reality feature, especially when they have to point the device camera at certain markers or symbols in the application.

Other research supports these results, showing that augmented reality media can stimulate imagination, increase curiosity, and strengthen children's learning motivation (Kurniawan & Avianto, 2023). Educational media such as AKUBERANI are also considered more interesting and accessible to children so that they can encourage active involvement during the learning process (Hardiyantari & Fatmawati, 2021). The use of Android-based digital devices is considered following current technological developments. It provides a learning experience that is fun and adaptive to the needs of students with special needs.

From the perspective of teachers and parents, AKUBERANI media received a positive response, mainly because of its attractive appearance and ability to motivate children with disabilities to understand material about body boundaries and consent in a fun and efficient way. However, this study has several limitations that need to be observed. First, the limited number of participants means that the results of this study cannot be widely generalized. Second, the relatively short duration of the intervention did not allow us to evaluate the long-term impact of using AKUBERANI media on students' understanding of concepts. Therefore, further research with a wider range of participants and continuous observation is needed to obtain a more in-depth and comprehensive picture (Nanga et al., 2023).

5. Conclusion

AKUBERANI augmented reality-based learning media has proven effective in improving mildly impaired learners' understanding of body boundaries and consent. This media is easily accessible, visually appealing, follows children's learning styles, and is responsive to visual and auditory stimuli. Despite technical constraints and a limited number of participants, preliminary findings suggest that AKUBERANI has great potential as an adaptive, inclusive, and relevant learning medium for the education of children with special needs. Further research with a broader scope and longer intervention time is recommended to measure the long-term impact and develop features for tracking learner development.

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