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Journal of General Education and Humanities Vol. 5, No. 1, February 2026, pp. 639 – 649, https://doi.org/10.58421/gehu.v5i1.994 ISSN 2963-7147 639 Journal homepage: https://journal-gehu.com/index.php/gehu Development of Augmented Reality Sex Education Media to Prevent Sexually Deviant Behavior for Male Students With Intellectual Disability Tri Budi Sasongko1, Wiwik Widajati2, Asri Wijiastuti3 1,2,3Universitas Negeri Surabaya, Surabaya, Indonesia Article Info ABSTRACT Article history: Received 2025-12-10 Revised 2026-01-05 Accepted 2026-01-05 Individuals with intellectual disabilities often face cognitive limitations in understanding abstract social boundaries, increasing their vulnerability to sexual deviance. This study aims to develop Augmented Reality (AR) media that provide concrete 3D visualizations, addressing the gap in safe, interactive sex education for this population. This research followed the ADDIE model, prioritizing Safe Content Design and Universal Design for Learning (UDL). The approach ensures that materials are cognitively accessible and socially appropriate for students with mild intellectual disabilities. Expert validation confirmed high feasibility with scores of 92% (media) and 87% (content). Field testing showed 90% practicality and a significant increase in effectiveness, with an N-gain score of 0.71. These results suggest that AR effectively bridges the cognitive gap by allowing repetitive simulations of social "Safe Zones" without triggering inappropriate arousal. Keywords: ADDIE Model Augmented Reality Intellectual Disability Sex Education Special Education Corresponding Author: Tri Budi Sasongko Pendidikan Luar Biasa, Fakultas Ilmu Pendidikan, Universitas Negeri Surabaya Email: sasongko075@gmail.com 1. INTRODUCTION Sexual behavior problems among individuals with intellectual disabilities, particularly males, represent a complex issue that is often overlooked in research and clinical practice [1], [2], [3]. Behaviors such as public masturbation, disrobing, inappropriate touching of others, and engaging in sexual activity without an understanding of boundaries and consent are frequently reported [4], [5], [6]. The severity of the disability affects an individual’s self-control, with those who have milder intellectual disabilities generally showing greater ability to regulate their sexual behavior

[7], [8]. Masturbation, as a form of bodily exploration or an adaptive coping mechanism for stress, is one of the most common sexual behaviors in this population [9], [10], [11], [12]. Slower learning processes and difficulties internalizing academic information make them vulnerable to misunderstandings

https://doi.org/10.58421/gehu.v5i1.994 640 about the distinction between private and public settings, which in turn increases the risk of inappropriate sexual behaviors, such as public masturbation [13]. Limited ability to recognize risky situations also makes them potential targets of sexual exploitation. Therefore, implementing sex education tailored to their cognitive needs and academic abilities is critical to prevent maladaptive behaviors and to enhance the well-being and protection of individuals with intellectual disabilities. A preliminary study conducted in December 2024 at Maharani Special School in Lamongan identified inappropriate sexual behavior among three adolescent boys with intellectual disabilities. Interviews with teachers and direct observation revealed several behavioral patterns, including rubbing genitals in public, touching the private areas of female friends, and touching the genitals of female guests. These data indicate that students' understanding of the concepts of privacy, social norms, and sexual impulse control remains very limited. Furthermore, interviews with teachers revealed that the implementation of sexual education in schools is suboptimal. The existing curriculum does not fully cover material on social boundaries and self-control in sexual contexts. The learning media used are still limited to simple printed posters, and material delivery relies on lecture-based methods. Augmented Reality (AR) media have been widely implemented in education, particularly to support learning for students with intellectual disabilities [14], [15], [16]. This technology can address the limitations of traditional instructional approaches, which are often difficult for this group to access [17]. As an updated form of classical instructional media, AR is not merely an entertainment tool; it also holds substantial potential to produce meaningful educational impact [18]. By enabling 3D visualization of abstract concepts, AR can enhance students’ understanding more

interactively and concretely, making learning more effective and inclusive [19], [20], [21], [22]. Gulboy and Denizli [23] also confirmed that AR is effective for teaching abstract concepts, such as science, to students with intellectual disabilities. This study offers a novel innovation in developing augmented reality-based instructional media for sex education, focusing on supporting male students with mild intellectual disabilities in understanding bodily development and recognizing appropriate boundaries related to their own bodies and others. The primary novelty of the media lies in the integration of three key elements: (1) AR technology that provides interactive visualizations through child friendly, non explicit 3D animations presenting content on bodily changes, privacy, and strategies for preventing behaviors that violate social norms; (2) audio narration that delivers simple explanations and positive reinforcement to facilitate comprehension; and (3) a simulation based approach that allows students to learn through guided, experience-like practice without exposure to inappropriate content or real world risk. This approach addresses a gap in sex education for students with mild intellectual disabilities, which has often relied on conventional methods that may be less effective. By optimizing technology for this context, the study also responds to limitations in prior research that have not fully leveraged digital tools for sex education among learners with intellectual disabilities. With media that are more interactive and accessible, students are

https://doi.org/10.58421/gehu.v5i1.994 expected to recognize bodily changes better, understand social boundaries, and manage sexual urges in healthier and more responsible ways. In the learning process, students with mild intellectual disabilities tend to understand concrete and visual concepts more readily, but they often have difficulty interpreting abstract concepts [24], [25]. Therefore, they require repeated instruction, hands-on learning experiences, and support from engaging, interactive visual media to optimize information uptake. Multisensory approaches that combine visual, auditory, and kinesthetic elements have been shown to improve students' understanding and motivation to learn [26]. From a language perspective, 2 students with mild intellectual disabilities generally

have fairly good verbal communication skills, but they often struggle to understand complex sentence structures and abstract vocabulary [7]. They more easily comprehend simple, concrete instructions supported by immediate visual examples. Therefore, in developing instructional media such as Augmented Reality Sex Education, using plain language, slower-paced narration, and supports such as illustrations and animations is essential to help students better understand sensitive content, including physical changes and socially appropriate sexual behavior. This study aimed to develop and test AR-based instructional media for sex education, specifically addressing masturbation and related behavior that are feasible and effective for male students with intellectual disabilities. The media were designed to provide interactive, contextually aligned instruction that is aligned with students' cognitive developmental levels, helping them understand bodily changes, the importance of privacy, social norms, and healthy strategies for regulating sexual urges. The developed media are expected not only to meet instructional feasibility standards but also to improve students' understanding and reduce inappropriate sexual behaviors, such as public masturbation. 2. METHOD This study employed a research and development (R&D) approach aimed at producing augmented reality-based instructional media for sex education, particularly related to masturbation-related behavior, for male students with intellectual disabilities. The study used the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation) [27]. This model was selected because it is systematic and provides clearly defined stages, making it well-suited for developing structured, technologybased instructional media that can be systematically tested and refined. Figure 1. ADDIE Model [27]

https://doi.org/10.58421/gehu.v5i1.994 642 In the Analysis stage, a needs analysis was conducted to identify the characteristics of male students with intellectual disabilities, including difficulties with abstract concepts, distinguishing private versus public settings, and regulating sexual impulses. The content was then defined to cover male puberty, privacy, socially appropriate behavior, and the negative consequences of

masturbation-related behavior in inappropriate contexts. A content flow was arranged from introducing puberty changes to reinforcing privacy and appropriate conduct. In the Design stage, the AR-based learning media were planned to deliver the content through interactive 3D visualizations and simulations, supported by short, simple text and audio narration. The media included five main menus (My Body, My Activities, Safe Zone, Let's Worship, and Let's Exercise) and followed safe content design principles and Universal Design for Learning (UDL). The interaction flow began with an opening screen and guided users through two main content sections: puberty and reproductive health (Material 1), and masturbation-related behavior, boundaries, and consequences (Material 2). In the Development stage, the AR application was built using Unity with AR Foundation to support ARCore (Android) and ARKit (iOS), while 3D models were created in Blender and integrated into the AR environment with stable tracking. Audio scripts were prepared in simple language and generated using ElevenLabs, then synchronized with the 3D animations. The product underwent internal testing to ensure visual clarity, smooth narration, and interactive functionality before being reviewed by media and content experts. In the Implementation and Evaluation stages, the AR media were tested to examine their validity, practicality, and effectiveness in a special school setting (SLB Maharani Lamongan) from November to December 2025. Media and content experts assessed validity, practitioner teachers evaluated practicality after classroom use, and effectiveness was examined through pre-test and post-test measures with male students with intellectual disabilities (n = 8) selected via purposive sampling. Data were analyzed using descriptive percentages for validity and practicality, and normalized gain (g-gain) to determine learning improvement, with effectiveness defined as moderate to high gain [28]. 3. RESULTS AND DISCUSSION This study produced an Augmented Reality (AR) based instructional media product specifically designed to provide appropriate sex education for male students with intellectual disabilities. The media emphasizes educational content focused on self-regulation and positive activities during puberty, while avoiding explicit or stimulating material that could trigger unwanted imitative behavior. The

design and development of this media were based on a needs analysis of learners and a review of sex education content aligned with students with intellectual disabilities' cognitive and socio-emotional developmental levels. The primary development principle was safe content design, meaning that the material is presented in an educational, contextual, and cognitively accessible manner while avoiding direct or explicit presentations. The main interface of the media consists of five primary menus representing five key learning themes: (1) My Body, (2) My Activities, (3) Safe Zone, (4) Let's Worship. Each

https://doi.org/10.58421/gehu.v5i1.994 menu is designed in an interactive format with brief narration and simple visualizations to ensure accessibility for students with limited cognitive abilities. My Body This section introduces human body parts and the physical changes that occur during puberty. It also covers which body areas may and may not be touched to build awareness of personal body boundaries. Figure 2. Menu of My Body My Activities This section provides recommendations and simulations of positive activities that students can engage in, such as playing soccer, swimming, and volleyball. The purpose is to offer enjoyable and constructive alternatives that keep students engaged and help channel their energy in healthy ways during puberty. Figure 3. Menu of My Activities Safe zone This section teaches students to identify appropriate places for private activities, such as changing clothes in the bedroom and bathing in the bathroom. Its primary goal is to build an understanding of privacy and socially appropriate behavior across different settings. Figure 4 Menu of Safe Zone Figure 4. Menu of Safe Zone

https://doi.org/10.58421/gehu.v5i1.994 Let's Worship This section presents interactive guidance for performing prayer (salat). In addition to strengthening spiritual values, it is intended to serve as a form of self-regulation by redirecting attention away from sexual urges or behaviors that are inappropriate to the context. Figure 5. Menu of

Let's Worship 3.1. Results 3.1.1 Results of Media Validation and Content Validation To determine the feasibility of the developed media, validation was conducted by a media expert and a content expert. The validation used an assessment instrument covering the media's interface, functionality, technology, reliability, and perceived benefits for the learning process. The validators were selected based on their academic qualifications and professional experience in special education, educational technology, and interactive digital media development. The validation process employed a rating-scale evaluation form with scores ranging from 1 to 5, where 5 = highly appropriate, 4 = appropriate, 3 = moderately appropriate, 2 = less appropriate, and 1 = inappropriate. Table 1. Media Expert Validation Results Aspect No. Evaluation Item Score Interface 1 The AR-based media are easy to use without causing confusion. 4 2 The media have an attractive, aesthetic interface consistent with the theme. 5 3 Navigation in the media is easy for students to operate. 5 Functionality and Responsiveness 4 The AR media detects objects accurately. 5 5 The media responds quickly during use. 4 6 The media can be used across various smartphone devices. 5 Technology and Reliability 7 The media operate stably without technical disruptions. 3 8 The media ensures user data security and privacy. 5 9 The media are compatible with various operating systems and ARenabled devices. 5 Benefits 10 The media help students understand abstract content more concretely. 5 11 The media provide a comfortable and enjoyable learning experience. 5 Total Score Obtained 51 Feasibility = (Total score obtained / Maximum total score) × 100%

= ((51 / 55) × 100%) = 92%

https://doi.org/10.58421/gehu.v5i1.994 Based on the calculation above, the feasibility percentage was 92%, indicating that the Augmented Reality (AR) Sex Education media for male students with intellectual disabilities falls into the "Highly Feasible" category [29]. Table 2. Content Expert Validation Results Aspect No. Evaluation Item Score Interface 1 The AR-based media are easy to use without causing confusion. 4 2 The media have an attractive, aesthetic interface consistent with the theme. 4 3

Navigation in the media is easy for students to operate. 4 Functionality and Responsiveness 4 The AR media detects objects accurately. 5 5 The media responds quickly during use. 4 6 The media can be used across various smartphone devices. 5 Technology and Reliability 7 The media operate stably without technical disruptions. 5 8 The media ensures user data security and privacy. 5 9 The media are compatible with various operating systems and ARenabled devices. 4 10 The media help students understand abstract content more concretely. 4 11 The media provide a comfortable and enjoyable learning experience. 4 Total Score Obtained 48 Feasibility = (Total score obtained / Maximum total score) × 100% ((48 / 55) × 100%) = 87% Based on the calculation above, the feasibility percentage was 87%, indicating that the Augmented Reality (AR) Sex Education media for male students with intellectual disabilities falls into the “Highly Feasible” category [29]. 3.1.2 Results of Practical Testing Table 3. Practicality Test Results Aspect No. Evaluation Item Score Attractive to Use 1 The media have an attractive visual appearance and match the theme. 4 2 The content presented is relevant to students’ learning needs 4 3 The media allows students to interact with the content actively 4 Easy to Use 4 The media navigation is easy for students and teachers to use 5 5 The usage instructions are easy to understand 4 6 The media responds quickly to user input 5 Comfortable to Use 7 The media provide helpful support features for users. 4 8 The interface provides comfort for users 5 9 The audio is clear, comfortable, and not distracting 4 10 The media can run on various devices (smartphones/tablets) 5 11 The media runs smoothly without disturbing delays 4 Usefulness 12 The content helps students understand abstract concepts more easily. 5 13 The media helps save time in delivering the material 5 14 The media provide a comfortable experience and do not burden users 5 Total Score Obtained 48 Feasibility = (Total score obtained / Maximum total score) × 100% ((63 / 70) × 100%) = 90%

 Based on the calculation above,

the practicality percentage was 90%, indicating that the Augmented Reality (AR) Sex Education media for male students with intellectual disabilities falls into the “Highly Practical” category [29]. These findings suggest that the developed media meet all practicality criteria in terms of design, accessibility, user comfort, and instructional usefulness. 3.1.3 Results of Effectiveness Testing (Pre-test – Post-test) The effectiveness testing of the Augmented Reality (AR) Sex Education media was conducted at SLB Maharani and involved eight male students in Grades X, XI, and XII (senior high school) with mild intellectual disability. This testing aimed to determine the effectiveness of the AR Sex Education media in improving students’ understanding of healthy sexual behavior and self-regulation. The study was conducted in four sessions over two weeks, each lasting two class periods. Before using the media, students completed a pretest to measure their initial understanding of the targeted content. After the learning activities using the AR media were completed, a posttest was administered to measure learning gains. A summary of students’ pre-test and post-test scores is presented in the following table: Table 4. Pre-test and Post-test Results Summary No. Student Pre-test Posttest Normalized gain (g) Category 1 AYR 60 90 0.75 High 2 RNF 30 90 0.85 High 3 FN 50 80 0.60 Medium 4 DAB 50 90 0.80 High 5 KA 60 90 0.75 High 6 WO 40 80 0.67 Medium 7 BAL 30 80 0.71 High 8 MRP 30 70 0.57 Medium Mean 43.75 83.75 normalized gain = (Posttest mean – Pre-test mean) / (100 – Pre-test mean) = (83.75 − 43.75) / (100 − 43.75) = 40 / 56.25 = 0.71 A normalized gain of ⟨g⟩ = 0.71 indicates a high level of learning improvement, meaning that the Augmented Reality (AR) sex education media are effective for instructional use. The learning gains suggest that AR media help students understand concepts of healthy sexual behavior through visual and interactive learning experiences. Students appeared more enthusiastic and focused during instruction and were able to review the material independently using engaging 3D visualizations. These findings support the use of AR-based media as an effective and learner-friendly instructional aid for male students with intellectual disabilities. 3.2. Discussion The present study successfully developed Augmented Reality (AR) sex education media specifically tailored

for male students with intellectual disabilities. The development process adhered to safe content design principles, prioritizing educational values over explicit representations to prevent negative imitative behaviors. This approach aligns with the framework by Carter et al. [30], which suggests that sex education for individuals with

https://doi.org/10.58421/gehu.v5i1.994 disabilities must utilize exploratory and concrete methods suited to their cognitive capacities. By translating abstract concepts such as privacy and social boundaries into interactive threedimensional visuals, the AR media effectively bridges the gap between complex social rules and students' concrete thinking styles. This is consistent with Vitz and Williams [31], who emphasize the need for individualized, structured instruction supported by media that simplifies abstract information. Furthermore, integrating AR technology created a multimodal learning experience that enhanced engagement, supporting Fan et al.'s [32] argument that AR is a powerful tool for increasing student retention and comprehension. Regarding feasibility and usability, the expert validation results confirm the product's robustness. The high media validation score (92%) reflects the successful implementation of usability principles, particularly in interface design and technological stability. The content validation score (87%) further corroborates that the material is linguistically and conceptually appropriate for the target audience. These technical strengths translated directly into field implementation, where the practicality test yielded a score of 90%. According to Mardapi's (2008) criteria, this classifies the media as "Highly Practical," indicating that the user-friendly navigation and stable cloud-based system allowed teachers to integrate the tool efficiently into the special education curriculum without significant technical barriers. The effectiveness of the media was evidenced by the large-scale trial at SLB Maharani, which resulted in a high normalized gain score ((g) = 0.71). This metric indicates a significant improvement not only in cognitive recall but also in adaptive behavior. The data suggest that the media functions beyond a mere instructional aid; it acts as an educational-therapeutic tool that fosters self-regulation and moral development. Students

demonstrated an improved ability to distinguish between socially appropriate and inappropriate situations, validating the media's role in creating a safe and inclusive learning environment. These findings underscore the potential of AR as an ethical, scalable solution for addressing the sensitive instructional needs of adolescents with intellectual disabilities in Indonesia. 4. CONCLUSION This research concludes that the development of Augmented Reality-based sex education media is a highly viable and effective innovation for addressing learning barriers in male students with mild intellectual disabilities. This media serves a crucial role as a cognitive bridge, transforming abstract concepts such as body boundaries, social norms, and privacy into concrete, tangible, and interactive three-dimensional visualizations. By integrating Universal Design for Learning principles and safe content guidelines, the product effectively meets the learning needs of individuals who struggle with processing verbal information. Consequently, it allows them to comprehend complex materials that were previously inaccessible through traditional instructional methods. The findings of this study have significant implications for special education policy, suggesting that the integration of immersive technologies such as AR should be prioritized to support sensitive and complex curricula. For educational practitioners, this media offers a standardized teaching method that not only increases student engagement but also reduces the risk of teacher bias or discomfort when delivering sex education. Pedagogically, the

 success of this media reinforces the theory that multisensory stimulation and safe, simulated learning experiences are key to building self-regulation and moral awareness in students with special needs. Despite yielding significant results, this study has several limitations in scope. The research focused exclusively on male students with mild intellectual disability levels within a specific special school environment. Therefore, the results may not be directly generalizable to students with severe intellectual disabilities who face more complex cognitive obstacles. Furthermore, it may not apply to female students who possess

different physiological characteristics and psychosocial developmental needs regarding reproductive education and personal protection. This research offers a tangible contribution to the general public and the educational community by providing an ethical framework to protect vulnerable groups from the risks of exploitation and sexually deviant behavior through targeted early intervention. For future research, it is recommended to expand the study by using a larger sample across diverse geographic regions to test the consistency of the media's effectiveness. Additionally, developing gender-specific modules and longitudinal studies to monitor the long-term retention of behavioral changes in daily life is essential to realizing a more comprehensive, sustainable, and inclusive education system. ACKNOWLEDGEMENTS The author thanks Universitas Negeri Surabaya (UNESA) for institutional support during the study. Appreciation is also extended to SLB Maharani Lamongan, the participating teachers, and the media and content experts for their assistance, validation, and feedback. REFERENCES [1] K. Frank and L. Sandman, “Supporting Parents as Sexuality Educators for Individuals with Intellectual Disability: The Development of the Home B.A.S.E Curriculum,” Sex Disabil, vol. 37, no. 3, pp. 329–337, Sep. 2019, doi: 10.1007/s11195-019-09582-7. [2] G. Hemati Alamdarloo, S. Moradi, H. Padervand, and A. Zare Dorahi, “The Effect of Sex Education Intervention on Sexual Knowledge of Female Adolescents with Intellectual Disabilities,” Sex Disabil, vol. 41, no. 3, pp. 663– 676, Sep. 2023, doi: 10.1007/s11195-023-09777-z. [3] K. Michielsen and L. Brockschmidt, “Barriers to sexuality education for children and young people with disabilities in the WHO European region: a scoping review,” Sex Educ, vol. 21, no. 6, pp. 674–692, Nov. 2021, doi: 10.1080/14681811.2020.1851181. [4] S. Hartini, A. Nur Chamidah, and E. Siti Herini, “Sexual Behavior Problems in Adolescents with Intellectual Disabilities: A Systematic Review,” Open Access Maced J Med Sci, vol. 9, no. F, pp. 163–170, May 2021, doi: 10.3889/oamjms.2021.6016. [5] M. I. Axelrod and C. C. Vriesema, “Psychosexual Stages and Development,” in Investigating Pop Psychology, New York: Routledge, 2022, pp. 75–85. doi: 10.4324/9781003107798-9. [6] W. de Wit, W. M. W. J. van Oorsouw, and P. J. C. M. Embregts, “Sexuality, Education and Support for

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