Assistive Technology in Improving Daily Living Activities of Children with Intellectual Disabilities

Nika Rizki Nur Prawitasari[✉], Asri Wijiastuti, and Budiyanto Budiyanto

Universitas Negeri Surabaya, Surabaya, Indonesia
`nika.210006@mhs.unesa.ac.id`

Abstract. This study aims to describe the impact of assistive technology on the self-development ability of children with intellectual disabilities. The method used in this study is a literature study with research data sources obtained from relevant literature such as scientific articles and books. The data collection technique in this study was documentation and continued with data analysis using content analysis techniques. The result of this research is the compilation of a study on the use and abuse of assistive technology as an effort to improve self-development skills in children with intellectual disabilities.

Keywords: Assistive Technology · Self-Development · Intellectual Barriers

1 Introduction

Activities of daily living is a term used to describe the basic abilities required by a person to carry out daily activities such as eating, bathing, and mobility independently. Dependency on other people and/or on certain tools [1]. Activities of daily living or activities of daily living are also referred to as self-development. Self-development can be defined as a process of improving oneself for the better [2]. Thus, self-development is an effort to build oneself as an individual or social being through education at school, at home, and in the community to foster an attitude of independence in daily living activities [3].

The self-development program has a very important role in providing provisions for students to carry out treatments related to self-development for themselves in daily life, such as taking care of themselves [4]. Through the implementation of the self-development program, it is hoped that students can actualize and develop the ability to take care of themselves so that they can live independently and others around them are not burdened [5]. In general, children will be able to carry out activities of daily living independently following the growth and development of the child's age [6]. However, children with intellectual disabilities, or those who can be referred to as mentally retarded, will experience obstacles in the development process so mentally retarded children will have difficulty in carrying out activities related to self-development even into adulthood [7].

People with intellectual disabilities, also called mental retardation, tend to be less independent and dependent on others around them [8]. This is due to their intellectual abilities being below average and their less adaptive behavior. Mental retardation is when a person's intelligence is much lower than average and they don't change their behavior as they get older [9]. The American Association on Mental Deficiency (AAMD) defines mental retardation as general intellectual functioning that is markedly below average and continues in development [6].

Children with intellectual disabilities have a limited ability to care for themselves [10]. Children with intellectual disabilities require handling related to aspects of self-care so that they can live independently and not always depend on the people around them [11]. One of the efforts that can be given to children with intellectual disabilities is related to the conditions described, namely the provision of programs or education. build yourself. Self-development is one of the special programs included in the curriculum for children with intellectual disabilities. The provision of self-development programs is intended so that children with intellectual disabilities have the skills to take care of themselves [12].

Daily living activities that need to be mastered by children with intellectual disabilities include cleaning and tidying themselves, wearing their clothes, eating and drinking alone, and avoiding danger [13]. In more detail, the self-development program contains various aspects or materials that must be mastered and owned by children with intellectual disabilities, so that every child with intellectual disabilities can live independently following the function of independence. These materials include self-care, self-care, self-help, communication, socializing, adapting, life skills, and filling spare time. Self-development material includes components and abilities including self-care including eating, drinking, and hygiene; self-care including dressing and make-up; self-help includes maintaining safety and overcoming danger; communicating includes communicating verbally, in writing, signs, and pictures; adapting includes adapting to the family, school, or community environment; and playing or working together [6].

Based on the observations that have been made, it was found that the self-development learning process was carried out conventionally or not based on technology. The self-development learning process tended to use the lecture and demonstration method by the teacher directly, which caused the child during the learning process to tend to be passive, not listening to the teacher's explanation. Therefore, by utilizing learning that uses technology, we will be able to help students with intellectual disabilities understand objects concretely. Apart from that, the learning process will also be more interesting so that learning is easily understood by students. Utilizing technology for self-development learning is not limited to material explanations, but the delivery of material can also be conveyed through games or simple games related to children's self-development. This, of course, will make children more interested and not feel they are learning but playing. This study will be related to the analysis of the types of assistive technology that can be used as a supporting medium in the learning process, especially in self-development learning, so that self-development learning can be more meaningful.

Daily living activities need to be given to children with mental retardation to provide early provisions for children in the future [14]. Self-development is not only in

the form of lessons that complete certain materials within a certain time, but self-development has principles and functions, especially for mentally retarded children and also as general knowledge for the general public [15]. Several previous studies related to self-development for people with intellectual disabilities include [6]; the influence of self-development programs on the independence of mentally retarded children; (Rudita, Huda, & Pradipta, 2021); the relationship between parenting patterns and children's self-awareness, intellectual barriers and (Mufidah & Susilawati, 2019); self-development module to improve teacher teaching skills. However, there are not many studies that provide a clear description and description of assistive technology that can be used as a supporting medium in carrying out daily activities for people with intellectual disabilities. So that people with intellectual disabilities will be more independent and assisted in being able to perform daily activities.

2   Method

This study uses the literature review method. According to Cresswell (in Novialassafitri et al., 2021) Literature review is the activity of summarizing articles in journals or proceedings, books, and other documents relevant to the chosen topic, the library method is used to provide an overview of assistive technology on self-development abilities for children with intellectual disabilities. In this study, the data needed is in the form of information relevant to the topic of study. Sources of research data are obtained through literature such as scientific articles, books and other documents, the data collection technique used in the research is documentation with data analysis techniques in the form of content analysis.

3   Result and Discussion

The technology that supports the application of self-development programs for mentally retarded children, with the SSR research method, and experiments, shows the following picture:

1. Computer Assisted Instruction (CAI) technology provides effective support in improving the understanding of self-development materials for mentally retarded children.
2. The application of self-development tutorial videos (wearing pads without wings) for the mentally retarded results in a more effective improvement.
3. The provision of animated videos shows a significant effect on the self-development ability of mentally retarded children.
4. Digital game technology demonstrates its efficacy in the intervention of self-development and tooth brushing in mentally retarded children.
5. Video support increases independence in completing self-development tasks.
6. The use of smartphones helps the daily activities of people with intellectual disabilities.
7. Increasing the independence of mentally retarded adults through video modeling with the help of AR (Augmented Reality).

8. The application of daily applications and technological devices increases the independence of adults with mental retardation in daily activities.
9. Support for mental retardation through CBI (Computer Based Intervention).
10. Self-development promotion videos are more effective than self-development modeling videos for mentally retarded children.
11. Research states that the use of videos can improve the ability to develop self-eating in mentally retarded children.
12. The video tutorial for brushing teeth was shown to improve tooth brushing skills in moderately mentally retarded children in an eight-meeting classroom action research. Self-development learning videos can improve the ability to brush their teeth in moderately mentally retarded children
13. Game development based on UX technology. Serious games contain games that sequence daily activities, starting from washing hands, getting up, taking a shower, and going to school.
14. The development of video media can improve the ability to brush their teeth in mentally retarded children (Table 1).

The application of self-development programs for mentally retarded children is following the classical conditioning theory developed by Ivan P. Pavlov, which states that learning is a behavior change. According to the theory developed by Pavlov, learning in principle follows a law that is the same for all humans and even all living things. This theory was developed through the observation of visible learning behavior. Pavlov's theory is also called respondent conditioning or respondent conditioning. It says that learning happens when the stimulus and the response are linked.

Pavlov's theory is suitable to be applied to learning related to the assignment of skills through training or to learning that requires a bias or the formation of certain behaviors. In addition, using this theory will make it easier for educators to control learning because individuals do not realize that they are being controlled by stimuli that come from outside themselves Based on the articles that have been reviewed, technology can provide effective support for the implementation and development of self-development programs that are carried out. Several technologies have been used in providing self-development programs, including Android-based games, IT-based games, game development related to Kinect2Scratch, and other technological support.

Technological support can also be called assistive technology. According to the technology-Related Assistance for Persons with Disabilities Act (1988) of the United States (Sugiarmin, 2012), assistive technology devices are any item, place of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities. It can be interpreted that assistive technology is all objects, places, equipment, or systems that are either obtained through modifications or adjustments that are used to improve the functional abilities of individuals with special needs. Sugiarmin stated that assistive technology is all kinds of objects or tools that have been modified or directly used to improve or maintain the ability of individuals with disabilities or special needs.

Table 1. Evidence of Findings of Supporting Technology for Self.Development for Persons with Intellectual Disabilities

Instruction Topics	Writer	Application
Development of Computer-Assisted (Cai) Media About Self-Development Ability of Mild Mentally Impaired Children At SLB Tunas Kasih Surabaya	Aprita, 2014	Development of Computer Assisted Instruction technology in producing multimedia elements [16]
Improving Self-Development Ability Through Audio Visual Media Pada Mild mentally retarded child	Hendri, 2019	Video tutorial technology support [17]
The Effect of Animated Videos on Children's Self-Development Ability Mild mental retardation in self-development learning at SLB Tunas Love Surabaya	Aziz, 2018	Animation video technology support [18]
Using A Kinect-Based Game To Teach Oral Hygiene In Four Elementary Students With Intellectual Disabilities	Kang, Chang, & Howell, 2021	Use of Kinect V2 software and Kinect2Scratch software in interactive game development [19]
Using 21st Century Video Prompting Technology To Facilitate The Independence Of Individuals With Intellectual and Developmental Disabilities	Cullen, Simmons-Reed, & Weaver, 2017	Design and manufacture of self-directed videos using the MyPicsTalk application on iPad [20]
Using Smartphones To Help People With Intellectual And Sensory Disabilities Perform Daily Activities	Lancioni, 2017	Smartphone usage support [21]
Augmented Reality: Teaching Daily Living Skills for Adults With Intellectual Disabilities	Bridges et al., 2020	Video modeling technology with AR system support [22]
Adults with intellectual disabilities: Case studies using everyday technology to support daily living skills	Golisz, Waldman-Levi, Swierat, & Toglia, 2018	Everyday technology app and device support [23]

(continued)

Table 1. (*continued*)

Instruction Topics	Writer	Application
Use of Computer-Based Interventions to Promote Daily Living Skills in Individuals with Intellectual Disabilities: A Systematic Review	Ramdoss et al., 2012	CBI support for mental retardation [24]
Teaching Daily Living Skills to Seven Individuals With Severe Intellectual Disabilities: A Comparison of Video Prompting to Video Modeling	Cannella-Malone et al., 2011	Prompting videos are more effective for the six mentally retarded than modeling videos [25]
Improving the ability to develop self-eating through video media for grade IV mentally retarded children at the National Level Pembina SDLB Section C Lawang	Maharani, 2022	The use of video media can improve self-development skills [26]
Self-Development of Brushing Teeth Through Video Tutorials for Children with Intellectual Requirements in Medium Category VIII SMPLB Bina Bangsa Padang	Wiyantini, 2021	The use of video tutorials can improve teeth-brushing skills in children with moderate mental retardation [27]
The Use of Self-Development Learning Videos in Improving the Toothbrushing Skills of Class V Mentally Impaired Students at SLB Negeri Somba Opu, Gowa Regency	Ayse, 2019	The ability to brush the teeth of the mentally retarded can be increased through vivio learning [28]
Utilization of Serious Games as Learning Media to Introduce Self-Development Activities for Children with Special Needs	Bluem, 2015	UX technology-based games can improve mental retardation self-development skills [29]
Development of Learning Videos in the Teeth Brushing Self Development Program for Class III mentally retarded students at the Karanganyar State Special Education School, Kebumen	Suharja, 2019	video media can improve the ability to brush their teeth in mentally retarded children [30]

4   Conclusion

Based on the explanation, it can be concluded that the implementation of the self-development program for students with mental retardation is that: the findings from articles related to supporting technology in self-development provide an overview of the design and development of computer-assisted instruction technology, digital games with Kinect2strethc and Kinect V2 devices, prompting videos, video tutorials, animation videos, augmented reality, computer-based intervention. And the findings from articles related to the self-development program describe the strategies used to improve the self-development abilities of people with mental retardation through backward chaining methods, task analysis, client center approaches, guidance, and demonstrations. Suggestions for further research could be to conduct further research related to the level of effectiveness of self-development support programs and technologies through the provision of interventions and surveys so that they can provide more in-depth information related to self-development support programs and technologies for people with mental retardation.

References

1. P. F. Edemekong; D. L. B. Caroline, S. Sukumaran; and C. Schoo, *Activities of Daily Living*. 2022. DOI: https://doi.org/10.1007/978-1-4419-1428-6_3065.
2. L. A. Tiasari, M. Efendi, and A. Samawi, "Effects of TEACCH Model towards the Eating Skills on Student with Autism," *J. Penelit. dan …*, vol. 7, no. 1, pp. 1–6, 2021, [Online]. Available: http://journal2.um.ac.id/index.php/jppplb/article/view/9231
3. M. G. Lloyd, D. Peel, and L. B. Janssen-Jansen, "Self-build in the UK and Netherlands: mainstreaming self-development to address housing shortages?," *Urban, Plan. Transp. Res.*, vol. 3, no. 1, pp. 19–31, 2015, DOI: https://doi.org/10.1080/21650020.2014.987403.
4. E. Lejonberg, E. Elstad, L. V. Sandvik, T. Solhaug, and K. A. Christophersen, "Developmental relationships in schools: pre-service teachers' perceptions of mentors' effort, self-development orientation, and use of theory," *Mentor. Tutoring Partnersh. Learn.*, vol. 26, no. 5, pp. 524–541, 2018, DOI: https://doi.org/10.1080/13611267.2018.1561011.
5. Rahmah, E. Rouns, and A. Luck, "The Effect of Self-Development Program for Improving Independence in Defective Students in SLB N 1 Lima Kaum Batusangkar," *World Psychol.*, vol. 1, no. 2, pp. 46–53, 2022. DOI: https://doi.org/10.55849/wp.v1i2.96.
6. Maulani Nurul Sofyan, M. Muktiarni, and Jonah Mupita, "Analysis of the Impact of Online Learning on Self-Development Students with Intellectual Disability in Family Perspective," *J. Asesmen Dan Interv. Anak Berkebutuhan Khusus*, vol. 22, pp. 61–68, 2021.
7. R. F. Pradipta and D. A. Dewantoro, "Origami and fine motoric ability of intellectual disability students," *Int. J. Innov. Creat. Chang.*, vol. 5, no. 5, pp. 531–545, 2019.
8. R. Bennett, R. Vijaygopal, and R. Kottasz, "Willingness of people with mental health disabilities to travel in driverless vehicles," *J. Transp. Heal.*, vol. 12, no. November 2018, pp. 1–12, 2019, DOI: https://doi.org/10.1016/j.jth.2018.11.005.
9. D. Desiningrum, "Psychology of children with special needs." p. 384, 2016.
10. N. Mitter, A. Ali, and K. Scior, "Stigma experienced by families of individuals with intellectual disabilities and autism: A systematic review," *Res. Dev. Disabil.*, vol. 89, no. August 2017, pp. 10–21, 2019, DOI: https://doi.org/10.1016/j.ridd.2019.03.001.
11. Kitson *et al.*, "Towards a unifying caring life-course theory for better self-care and caring solutions: A discussion paper," *J. Adv. Nurs.*, vol. 78, no. 1, pp. e6–e20, 2022, DOI: https://doi.org/10.1111/jan.14887.

12. G. Karya, "Development of Eating Ability in Moderate Intellectually Disabled Children at Wisma Gondosuli 8 Bhakti Luhur Orphanage, Malang," vol. 6, no. 1, pp. 42–49, 2015.

13. D. Diana, S. Sunardi, G. Gunarhadi, and M. Yusufi, "Reviewing the life skills activity program for children with special needs during the COVID-19 pandemic," *Cypriot J. Educ. Sci.*, vol. 16, no. 6, pp. 3240–3254, 2021, doi: https://doi.org/10.18844/cjes.v16i6.6543.

14. J. Light, D. McNaughton, and J. Caron, "New and emerging AAC technology support for children with complex communication needs and their communication partners: State of the science and future research directions," *AAC Augment. Altern. Commun.*, vol. 35, no. 1, pp. 26–41, 2019, doi: https://doi.org/10.1080/07434618.2018.1557251.

15. N. Lamatenggo, I. Haris, R. Hadija, and I. A. Razak, "Need-Based Learning Management at State Exceptional School in Gorontalo City," *international Res. Educ. J.*, vol. 4, no. 8.5.2017, pp. 175–188, 2022, [Online]. Available: https://www.who.int/news-room/fact-sheets/detail/autism-spectrum-disorders

16. C. Aprita, "Development of Computer Assisted Instruction (CAI) Media Concerning The Self-Development Capability Of Middle Intellective Children At Tunas Kasih Slb Surabaya. Unesa," *Unesa Student J.*, vol. 9, no. 2, pp. 1–6, 2014, [Online]. Available: http://journal.stainkudus.ac.id/index.php/equilibrium/article/view/1268/1127

17. S. Hendri, M. Marlina, and D. Damri, "Improving Self-Development Ability Through Audio Visual Media In Mild Mentally Impaired Children," *J. Spec. Needs Educ.*, vol. 3, no. 1, pp. 1–19, 2019, [Online]. Available: http://www.scopus.com/inward/record.url?eid=2-s2.0-84865607390&partnerID=tZOtx3y1%0Ahttp://books.google.com/books?hl=en&lr=&id=2LIMMD9FVXkC&oi=fnd&pg=PR5&dq=Principles+of+Digital+Image+Processing+fundamental+techniques&ots=HjrHeuS_

18. (2018). Aziz, "The Effect Of Animation Videos On The Self-Development Ability Of Mild Dead Children In Self-Development Learning," *Spec. Educ.*, vol. 1, pp. 1–16, 2018, [Online]. Available: https://www.fairportlibrary.org/images/files/RenovationProject/Concept_cost_estimate_accepted_031914.pdf

19. Y. Kang, Y. Chang, and S. Howell, "Using A Kinect-Based Game To Teach Oral Hygiene In Four Elementary Students With Intellectual Disabilities," *J. Appl. Res. Intellect. Disabil.*, vol. 34, no. 2, pp. 606–614, 2021.

20. J. Cullen, E. Simmons-Reed, and L. Weaver, "Using 21st Century Video Prompting Technology To Facilitate The Independence Of Individuals With Intellectual And Developmental Disabilities," *Psychol. Sch.*, vol. 54, no. 9, pp. 956–978, 2017.

21. "Lancioni, Ge, Singh, Nn, O'reilly, Mf, Sigafoos, J., Alberti, G., Zimbaro, C., & Chiariello, V. (2017). Using Smartphones To Help People With Intellectual And Sensory Disabilities Perform Daily Activities. Frontiers In Public Health, 5(October), 1–8," vol. 5, p. 2017, 2017.

22. S. Bridges, O. Robinson, E. Stewart, D. Kwon, and K. Mutua, "Bridges, Sa, Robinson, Op, Stewart, Ew, Kwon, D., & Mutua, K. (2020). Augmented Reality: Teaching Daily Living Skills To Adults With Intellectual Disabilities," *J. Spec. Educ. Technol.*, vol. 35, no. 1, pp. 3–14, 2020.

23. K. Golisz, A. Waldman-Levi, R. Swierat, and J. Toglia, "Adults With Intellectual Disabilities: Case Studies Using Everyday Technology To Support Daily Living Skills," *Sage J.*, vol. 81, no. 9, pp. 514–524, 2018, [Online]. Available: https://doi.org/10.1186/s13662-017-1121-6%0A. https://doi.org/10.1007/s41980-018-0101-2%0A. https://doi.org/10.1016/j.cnsns.2018.04.019%0A. https://doi.org/10.1016/j.cam.2017.10.014%0A. https://doi.org/10.1016/j.apm.2011.07.041%0A. http://arxiv.org/abs/1502.020

24. S. Ramdoss *et al.*, "Use Of Computer-Based Interventions To Promote Daily Living Skills In Individuals With Intellectual Disabilities: A Systematic Review," *J. Dev. Phys. Disabil.*, vol. 24, no. 2, pp. 197–215, 2012.

25. H. I. Cannella-Malone, C. Fleming, Y. C. Chung, G. M. Wheeler, A. R. Basbagill, and A. H. Singh, "Teaching daily living skills to seven individuals with severe intellectual disabilities: A comparison of video prompting to video modeling," *J. Posit. Behav. Interv.*, vol. 13, no. 3, pp. 144–153, 2011, doi: https://doi.org/10.1177/1098300710366593.

26. Maharani, "Development of Modeling Video Learning Media to Improve Self-Development Skills Clothing for Children with Retardation Mental at Yamet CDC," vol. 7, no. 6, pp. 638–642, 2022.

27. T. Wiyatini, D. Fatmasari, and Nursing, "Increasing Teeth Brushing Skills for Mentally Retarded Children with Application of ' Educational Media Modification Puzzle ' 3D Gosgi," *Eur. J. Mol. Clin. Med.*, vol. 08, no. 03, pp. 2588–2594, 2021.

28. Kilincaslan, S. Kocas, S. Bozkurt, I. Kaya, and S. Derin, "Daily living skills in children with autism spectrum disorder and intellectual disability : A comparative study from Turkey," *Res. Dev. Disabil.*, vol. 85, no. July 2017, pp. 187–196, 2019, DOI: https://doi.org/10.1016/j.ridd.2018.12.005.

29. H. P. Bluem *et al.*, "First Lasing From a High-Power Cylindrical Grating Smith – Purcell Device," *IEEE Trans. Plasma Sci.*, vol. 43, no. 9, pp. 3176–3184, 2015, DOI: https://doi.org/10.1109/TPS.2015.2464074.

30. E. S. Suharja, "Interactive Video Improve the Brushing Skills of Mild Mentally Disabled Students Interactive Video Improve the Brushing Skills of Mild Mentally Disabled Students," *J. Phys. Conf. Ser. Pap.*, pp. 1–4, 2019, doi: https://doi.org/10.1088/1742-6596/1179/1/012062.