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How Children with Complex Communication Needs Communicate Their Menstrual Needs: ICT-Based Alternative and Augmentative Communication

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ABSTRACT

The rapid development of ICT can be utilized in this innovation. Using Android-based technology, the Alternative and Augmentative Communication (AAC) system can be used to help children with complex communication needs (CCN) express their needs in their needs and realize the importance of reproductive health. This research aims to develop alternative and augmentative ICT-based communication designs for adolescent girls with CCN. The subject in this research was a teenage girl with CCN who had menstruated. The method in this research uses descriptive qualitative. This research involves one subject (single subject) which is used as a mode in developing applications. The results of this research are in the form of an application design to help teenage girls with CCN communicate to express their needs during menstruation. This application design is also equipped with a calendar to track the menstrual cycle. content of items needed during menstruation content will be appropriate for subjects who have difficulties expressing their wants and needs to family, teachers, or friends in the school environment. Menstrual calendar content can help subjects and parents identify the regularity of the subject's menstrual schedule. The design of this application is expected to help young women and CCN communicate, so that CCN can express their needs during menstruation.

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1. INTRODUCTION

Since we are social creatures, communication is essential to existence (Septiani, 2021). This flow of transmitting and receiving messages from the communicator to the communicant is what we refer to as the communication process (Damayanti & Purnamasari, 2019). If there are no barriers to communication, the demands will be met successfully throughout the delivery process. Children with special needs who experience obstacles in complex communication are also known as children with complex communication needs (CCN) (Sun et al., 2023; Taylor et al., 2021; Andzik & Chung, 2022). CCN is a condition where individuals experience obstacles to very complex verbal communication. CCN conditions can be treated with alternative and augmentative communication (AAC) (Simmons et al., 2021; Ngcobo & Bornman, 2024; Rizqita et al., 2022).

AAC is a medium to help children communicate well even if they do not communicate verbally. There are several types of AAC including without using technology (No Tech), low technology (Low Tech), and using high technology (High Tech) (Holyfiels & Lorah, 2023; Alzrayer, 2020; Gilroy et al., 2023). Alternative and augmentative communication systems can use high technology (High Tech) to utilize technology in everyday life. Alternative and augmentative communication systems that use high technology are flexible so that they are easily accessible anywhere and anytime. Android is an operating system for Linux-based mobile devices which includes operating systems, middleware, and applications (Tahel & Ginting, 2019).

For teenage girls who have experienced menstruation, there needs to be awareness in themselves to know how their menstrual cycle is, whether it is smooth or experiencing problems. The menstrual cycle is important because if there are problems it will indicate reproductive health problems (Critchley et al., 2020; Itriyeva, 2022; Bruinvels et al, 2022). Problematic reproductive health must of course be treated immediately by a doctor. In addition to menstrual difficulties, it is also important for girls to be aware of their menstrual schedule or cycle to prepare everything they need.

The development of children with special needs in adolescence will experience menstruation, so for children with special needs who experience CCN, reproductive health (menstruation) needs to be an important concern. We must first become aware of the items required during menstruation, recognize when the menstrual schedule is normal, and identify when the menstrual cycle is abnormal. These problems for CCN children can be overcome with AAC, which contains a set of communication systems used to replace verbal communication (Simmons et al., 2021; Ogletree, 2021; Archer & Hart, 2024; Kamonsitichai, 2023). AAC can help CCN to interact and communicate well and smoothly with individuals around them (Nnagbo, 2022; Berenguer et al., 2022).

Currently, several studies have developed AAC for CCN, as a preliminary study we analyze several studies. **Table 1** shows the results of the analysis of preliminary studies from several research articles. However, until now there have been no researchers who have developed developing AAC for adolescent girls with CCN to communicate their needs during menstruation and track their menstrual cycle. The novelty in this study i) Content that focuses on reproductive health, namely menstruation for CCN women who have menstruated ii) mages can be adjusted to images or objects that are familiar to CCN iii) There is a calendar to track the menstrual cycle every month (normal and abnormal phase) iv) There is a notification before menstruation v)There is a notification if the menstrual cycle is not smooth and requires medical services

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vi) There is a language change feature in the application, namely Indonesian and English vii) The name of the application is adjusted to the purpose of the application, namely WANTS (We Can Communicate Menstrual Needs).

Table 1. Previous studies on reproductive health (menstruation) for children with special needs.

No	Title	Result
1	Navigating Puberty with Special Needs Teenagers: Empowering Parents Through a Sexuality Education Workshop	The results of this study showed that before and after the workshop, participants showed significant improvements in knowledge, perception, dedication, and willingness to provide sexual information to their children. The study involved 69 participants who completed pre- and post-workshop questionnaires.
2	Impacts of menstrual hygiene management workshop on adolescent females with special needs	This study emphasizes that education about menstrual hygiene is essential to help adolescent girls with special needs to better navigate the transition to adulthood.
3	Satisfaction with hormonal treatment for menstrual suppression in adolescents and young women with disabilities.	This research shows that menstruation experienced by teenagers and young women with disabilities shows various patterns and challenges in their menstrual cycles
4	Investigation of menstrual hygiene and self-care skills of adolescent girls with autism spectrum disorder: mother views	The results of the study showed that adolescent girls diagnosed with ASD were unable to perform self-care skills independently.
5	Knowledge and Practice on menstrual hygiene among specially abled (Deaf & Dumb) adolescent Girls at selected centres in Bhubaneswar, Odisha State-A Pilot Project	The results of this study indicate the availability of reproductive hygiene and sanitation facilities during the menstrual cycle using sign language for deaf and mute adolescents in India.
6	Training female adolescent students with intellectual disabilities about genital hygiene skills using peer training	Peer training was shown to be helpful, and the study showed that the menstrual care skills of female adolescent students with intellectual disabilities increased following training. When utilized as ongoing training to assist people in reaching a higher standard of competence, peer training can be beneficial.

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Table 1 (Continue). Previous studies on reproductive health (menstruation) for children with special needs.

No	Title	Result
7	Imparting genital hygiene skills to adolescents with intellectual disabilities attending a special education Centre: a quasi-experimental study on effect of short education	Healthcare professionals should implement the program training and practices for adolescents with intellectual disabilities and their parents at the same time, according to a study that evaluated the short-term effects of genital hygiene education given to female students attending a special education center.
8	"They had the lunch lady coming up to assist": The experiences of menarche and menstrual management for adolescents with physical disabilities	Every parent mentioned that their daughters had difficulties during menarche, from coping with the lack of access to personal care items to experiencing emotional discomfort. Managing school periods was very difficult. Although they had a harder time locating knowledgeable, helpful caregivers, parents who knew more about what to expect were better equipped to prepare their daughters. For the treatment of menstruation symptoms, health care practitioners should offer both proactive advice and comprehensive, considerate, and fair solutions.
9	Knowledge and practices about menstrual hygiene management among adolescent girls with vision impairment (AGWVI)-a case study	The current study concludes that there is a disconnect between the relationships between teachers and students. The fact that they are disabled prevents them from learning about and practicing menstrual hygiene management. It is advised that all students in special schools receive health education and instruction for managing menstrual hygiene. Every school should give a pamphlet to help students stay informed about the most crucial aspects of managing menstrual hygiene, and all students should have access to ongoing training to keep their skills up to date.

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Table 1 (Continue). Previous studies on reproductive health (menstruation) for children with special needs.

No	Title	Result
10	'Flower of the body': menstrual experiences and needs of young adolescent women with cerebral palsy in Bangladesh, and their mothers providing menstrual support.	The results of this study encourage disability services in Bangladesh to incorporate the menstrual needs of young adolescent women with cerebral palsy into their service delivery by incorporating value into concepts like "interdependence" and offering menstrual education. Furthermore, it is necessary to implement interventions aimed at reducing menstruation discomfort in young adolescent women with CP and reducing distress in moms who provide menstrual care. Lastly, regulatory changes are necessary to guarantee that "inclusive development" takes menstruation women with disabilities' demands into account.

The results of the observations found that there were strong reasons for developing AAC for subjects with menstrual content. This can be observed when the subject cannot communicate that she is menstruating to the communicant. Because the communicant does not understand what the subject wants to convey, the subject finally opens her skirt and shows that she is menstruating and needs a pad. To obtain comprehensive information, this study uses a descriptive qualitative approach. The subjects of this study were children with complex communication barriers that require alternative and augmentative communication to accommodate communication needs, especially in terms of menstruation. This study found that technology-based media can be an alternative and augmentative communication that is in accordance with technological developments. The content in this alternative and augmentative communication has been adjusted to the needs of children who have difficulty communicating, especially in communicating menstrual needs. The results of this study indicate that "Wants" can help CCN to communicate their needs during menstruation and can track the subject's menstrual schedule. These "wants" are expected to be useful for other children who experience communication barriers.

2. METHODS

2.1. Research subject and research location

This study was conducted in one of the special schools in Bandung City, Indonesia. The subjects in this study were 17-year-old students with complex communication disabilities. Subjects of the study and research location. This subject has a need for alternative communication but until now there has been no intervention to meet his needs. The needs of this subject need to be met to meet his needs, especially in communicating needs and early detection of menstrual problems.

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2.2 Research design and research procedure

This study uses descriptive qualitative metode to design and develop alternative and augmentative communication for children with communication and alternative disabilities. Figure 1 is the procedure in this study. The procedure in this study includes identification and analysis, and design of alternative and augmentative communication development, to obtain data on development results.

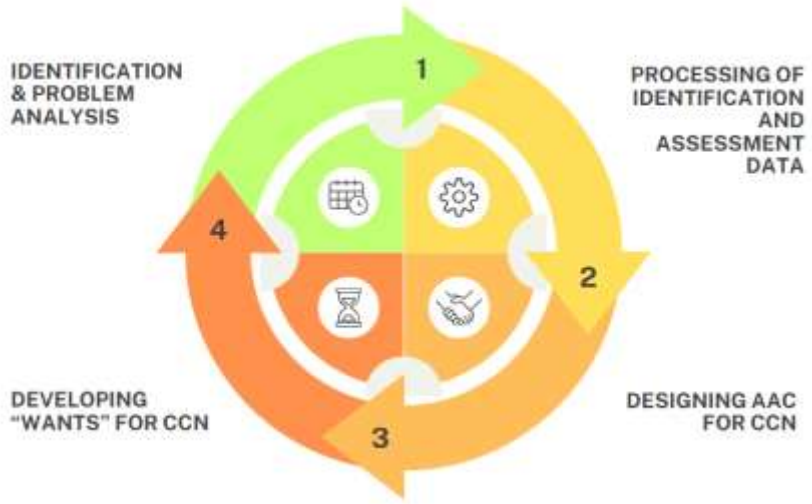

Figure 1. Research flow.

The first stage contains identification and analysis of problems based on objective CCN conditions obtained based on assessment results containing profiles of abilities, constraints, and needs. Analysis of interview results and observations of children, parents, and teachers as a complement. Thus, the data obtained is comprehensive. The first stage is complemented by an analysis of solutions to overcome communication barriers and an analysis of potential communication alternatives. The second stage contains the design of AAC as a solution for CCN subjects to communicate. This design is based on the results of the analysis of problems and communication opportunities for CCN subjects. The third stage is the development stage based on the design in the second stage. This stage develops the AAC design into an application so that CCN subjects can communicate to express their needs in menstrual ham. The fourth stage is the reflection stage to perfect what has been designed through limited trials.

3. RESULTS AND DISCUSSION

3.1. Identification and Problem Analysis

Children with complex communication needs (CCN) are individuals who have significant developmental disabilities that affect their ability to communicate and interact socially (Jhonston et al., 2020; Rizqita et al., 2022; Qisthi., 2023). These disabilities are usually associated with neurological conditions such as autism, Down syndrome, or a combination of several other developmental disabilities. Children with CCN often have significant difficulty producing and understanding verbal speech, as well as interpreting non-verbal symbols. They may be unable to speak clearly, repeat words meaninglessly (echolalia), or even be unable to respond to stimuli from others. To overcome these communication barriers, specific systems, media, or programs such as Augmentative and Alternative Communication (AAC) are needed.

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The goal is to improve the communication skills of children with CCN, facilitate them to convey their desires, feelings, and reactions to others, and help them integrate better into the social community (McCarty & Light, 2022; Rangel-Rodriguez et al., 2021; Denny et al., 2022).

Designing an AAC system is through an assessment process, to uncover the needs of children with CCN. Through the assessment, we can find out in detail what the abilities, weaknesses (Juhanaini et al., 2024; Juhanaini et al., 2024; Qisthi et al., 2023), and communication need of children with CCN are to build an AAC system for children with CCN. **Table 2.** explains he test tools tested on children are only child development assessment instruments in cognitive, motor, language, and social communication aspects. Because researchers want to measure children's abilities in these aspects. Researchers assume that these four aspects of development are important as guidelines for developing the AAC system for CCN children.

Based on the assessment results, the subject received a cognitive ability presentation of 75%, which means that the subject's cognitive ability is less than optimal. In the motor aspect, the subject received a score of 90%, which means that the subject has good gross and fine motor skills. The results of the language assessment, both receptive and expressive, found that the subject's ability was not optimal with a presentation of 10.5%. The social communication results were the lowest presentation obtained by the subject, which was only 5%. The results of this assessment found that the subject needed an AAC for language and social communication accommodation, especially in the aspect of menstruation.

Table 2. quantitative assessment results.

No.	Development Aspect	Percentage	Description
1	Cognitive	75%	Suboptimal development
2	Motoric	90%	Optimal development
3	Language	10,5%	Development is not optimal
4	Social Communication	5%	Development is not optimal

3.2. AAC Media Design

The design in WANTS refers to the picture exchange communication system (PECS). PECS is one of the methods in the KAA used for CCN who have obstacles in expressing their desires, needs and thoughts (Da Fonte et al., 2020). The use of PECS basically uses image media in communication. In this WANTS application, in addition to image media, sound output is also used when the name of the item is "clicked". The WANTS innovation for female CCN who menstruating can be used to communicate. The WANTS application has two contents, namely items needed during menstruation such as: sanitary napkins, underwear, plastic bags, and soap to express what is needed. As well as calendar content to record and track normal and abnormal menstrual cycles. With the calendar feature, CCN will be aware of their reproductive health when the menstrual cycle is abnormal. The calendar feature has been set as the normal menstrual period, which is 21-35 days. And an abnormal menstrual cycle if it is less than 21 days and/or more than 35 days.

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3.2. Wants Design

This product design is intended for special needs children of the female gender who have experienced menstruation and have very complex communication barriers (CCN) so that they need an AAC system to meet their needs during menstruation. The development of children with special needs in adolescence will experience menstruation so that for children with special needs who experience CCN, reproductive health (menstruation) needs to be an important concern. Starting from awareness of what items are needed during menstruation, when the menstrual schedule is (in a normal cycle), and when the menstrual cycle is not normal. These problems for CCN children can be overcome with AAC which contains a set of communication systems used to replace verbal communication.

This development is based on the results of the subject's needs analysis. The subject is currently menstruating and experiencing CCN. When menstruating, the subject finds it difficult to communicate it to parents/teachers/or friends. So, to express their needs, the subject often opens their pants to let them know that they are menstruating. This is the basis for the importance of designing alternative and augmentative systems that can meet the needs of individuals with disabilities who have complex communication needs (Riswari et al., 2022).

The content in this design consists of 2 parts. The content is adjusted to the subject's needs in communicating (Aprilia, 2023). Content 1 is related to the menstrual cycle. Content 1 is determined on the basis that the subject and her parents often do not remember and do not even record their menstrual cycle, so the subject often has difficulty communicating with friends/teachers that she needs sanitary napkins and so on. Content 1 can also be an early warning when the subject's menstrual cycle is irregular, of course it can be an indication of a problem with her reproductive health (Safriana & Sitaresmi, 2022). Content 2 contains items needed when the subject is menstruating. These items use a PECS basis through original photos because the subject cannot recognize the items if the items are in animated form. Content 2 includes items needed including sanitary napkins, underwear, soap, plastic bags, and trash cans. Table 3. explains the design and characteristics of the desired design..

Table 3. Design and features of the wants design.

No	Wants desain	Description
1		Initial view of the application design

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Table 3 (Continue). Design and features of the wants design.

No	Wants desain	Description
2		Content consists of two parts in the application, namely goods and calendar.
3		The contents of the goods consist of sanitary napkins, underwear, plastic bags, and soap.
4		Menstrual content contains a calendar to record and track menstrual cycles. In this application, you can track your menstrual cycle because it has been adjusted to the length of the normal menstrual cycle, which is 21-35 days, while abnormal is >21 and/or more than <35 days
5		There is a settings feature with the option to change the language, application notification permissions for menstrual schedule alerts and permissions to output sound.

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Table 3 (Continue). Design and features of the wants design.

No	Wants desain	Description
6	 (A)	Notification feature to remind you of your menstrual cycle that might start on that day (Figure A) and a warning if there is an abnormal menstrual cycle (Figure B).
7	 (B)	

4. CONCLUSION

Communication is a primary need for every human being, including children with complex communication difficulties. This study aims to develop an alternative and augmentative communication system called "wants" by utilizing technology to help CCN children communicate. The information disclosed in depth in this study is to produce the development of an alternative and augmentative communication system that is appropriate for the subject. The type of AAC in this study uses high technology in the form of this application that can help CCN children communicate. The application developed contains content needed by the subject, especially when the subject is in a school environment. This alternative and augmentative communication system "wants" can help research subjects communicate in everyday life.

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6. AUTHORS' NOTE

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

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