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Speakezio Application as an Alternative and Augmentative Communication Media for Cerebral Palsy Students

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ABSTRACT

The obstacle experienced by most children with cerebral palsy is limited communication skills. This is due to disorders of the speech organs or limitations in receptive and expressive language abilities experienced by children with cerebral palsy. So, when communicating, you need alternative augmentative media or communication systems (AAC) that can help you communicate. This research aims to develop the Speakezio application as AAC media. The method used is the R&D (Research and Development) research method with a qualitative approach. This research involves one subject (single subject) which is used as a model in developing applications. This research obtained results in the form of the Speakezio application which was developed based on the results of assessments on target subjects and trials of the application as a media for the AAC system. The trial results show that this application can improve children's receptive and expressive language skills. Apart from that, this application can help communication between children and parents so that parents can more easily understand the messages conveyed by children.

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1. INTRODUCTION

Communication is the main capital for humans as social creatures to socialize with their environment. The communication process is established between individuals and individuals or individuals and groups with the aim of achieving desires, conveying, and receiving information, or expressing opinions (Sapari, 2018; Iskandar, 2020; Abdillah & Sukri, 2022). Communication can be done using various approaches, both verbal and nonverbal, such as body movements, gestures, eye contact symbols and facial expressions (Pohan & Fitria, 2021). For communication to be meaningful, a common understanding is required between the communicator (message giver) and the communicant (message recipient), so that the message or information given can be conveyed and received well. In this case, language becomes a tool in determining the success of communication so that individuals must have good expressive and receptive language skills as well. Failure in communication caused by low language skills can affect delays or obstacles in various aspects of development such as cognitive, sensory, motoric, emotional, and social development (Aditama, 2018; Husna & Eliza, 2021). However, for some children with special needs, language skills often experience obstacles, especially for children with cerebral palsy.

Children with cerebral palsy experience conditions that impact aspects of their communication and language. according to Hardman (in Karyana, 2013), 45% of children with cerebral palsy experience cognitive barriers, limited cognitive abilities, which is also one of the causes of communication difficulties, they have difficulty translating what they hear and see so they cannot receive complete information. Apart from that, the stiffness of the motor organs experienced by children with cerebral palsy results in hampered development and movement of the speech organs so that the articulations produced are not clear, which becomes an obstacle for children with cerebral palsy in communicating (Dewi, Assjari, & Tjasmuni, 2019). In fact, quite a few children with cerebral palsy are only able to make sounds in the form of moans, cries, screams, laughter, or sounds that do not form word patterns or other syllables (Aditama, 2018). This condition makes it difficult for children with cerebral palsy to be able to communicate their desires or even their daily needs such as eating, drinking, etc. (Saffanah, 2019). Therefore, it is necessary to have a replacement communication system that can be used by children with cerebral palsy to convey messages and can be understood by the recipients of the message, especially parents. This kind of communication system is called an alternative and augmentative communication system (AAC).

Currently there are several studies that discuss the development of alternative and augmentative communication systems, including research entitled Android-Based Technology: Development of Alternative and Augmentative Mi-Says Communication Systems for Children with Intellectual Disabilities (Rizqita et al, 2022), Assessment research As a guide to the development of an alternative and augmentative communication system Mi-Says for children with complex communication needs (Qisthi et al, 2023), Development of alternative and augmentative communication media system for Autism Spectrum Disorder with Complex Communication Needs (Rezkiani & Diana, 2023), Demands associated with an augmentative and alternative communication system in relation to alternative forms of access for individuals with motor impairments (Sowers & Wilkinson, 2023), and PicTalky: Augmentative and Alternative Communication for Language Developmental Disabilities (Park et al, 2022). However, until now there has been no research discussing the development of Alternative and Augmentative Communication Media for Cerebral Palsy Students: Speakzio Application

Augmentative and alternative communication (AAC) is all forms of communication (other than verbal speech) that are used to express thoughts, needs, desires (Erlani, Bachtiar, & Taboer, 2022). AAC consists of two types, including unaided (without assistance) and aided (with assistance from both low tech and high tech). According to Riswari, Ediyanto, Efendi, and Sunandar (2022), alternative and augmentative systems exist as media that help children with cerebral palsy express their desires and needs using the communication modalities they have and it will be easier for people around them to understand the child. Therefore, the media or tools used in the AAC system must be adapted to the child's needs, abilities, and obstacles without giving up its ergonomic and practical value. However, unfortunately, so far the media that has been found still requires quite large operational costs to provide AAC media so that it is still considered not ergonomic for some children. Apart from that, according to suggestions from previous research, the development of AAC media can be more flexible and easily accessible. Thus, this research article explains the development of the Speakezio application as a AAC medium for children with cerebral palsy.

2. METHODS

The research method used in this research is a qualitative approach with an R&D (research and development) research design. In this research, AAC media was developed for children with cerebral palsy with an application model that can be accessed via smartphones, both Android and iOS, namely the Speakezio application. The media development process is carried out based on the R&D model. This research model is used in developing or validating products used to support education and learning such as learning media. The product resulting from this research is an application product whose usability has been tested.

The development process goes through 3 research stages, namely preliminary studies, development, and trials. Preliminary research was carried out with the aim of obtaining initial data regarding the results of child assessments and literature studies related to AAC and the development of children with cerebral palsy. The development stage was carried out by developing the Speakezio application based on the needs of the assessment results and literature review. Lastly, the trial stage was carried out to see the efficiency of using the application when used in daily communication. The data collection techniques used were in-depth interviews and observation. The research subjects involved in this study were eight-year-old children with cerebral palsy who had barriers to verbal communication and limited body movements.

3. RESULTS AND DISCUSSION

The result of this research is the AAC media in the form of the Speakezio application to make it easier for children with cerebral palsy to communicate and convey their desires to the people around them, especially to parents at home. This media aims to provide an overview regarding the development of media used in the AAC system and can also be used to improve children's language skills, both expressive and receptive. This development is based on the results of preliminary studies, namely field studies, and literature studies. Field studies were carried out to analysed children's needs regarding their communication skills. Meanwhile, literature studies are carried out to obtain theories from relevant sources as a basis for application development. From the results of the preliminary study, media design was then carried out and trials were carried out.

3.1. Subject Demographic

Based on **Table 1.** the results of the assessment carried out on the subjects, it was found that the child's development in the language aspect, the child's receptive language abilities were at the age of two years and his expressive language abilities were still at the age of one year. In terms of social, emotional, and cognitive aspects, the subject is still at the age of two years. In the motor aspect, children have limited and rigid reflex movements, basic movements, joint movements, and manipulative movements. In more detail, the subject profile is based on the assessment results in the following table.

Table 1. Subject assessment results.

Aspect	Ability	Obstacle
Receptive language	<ul style="list-style-type: none"> - Able to direct gaze in the direction of sound and make eye contact - Able to respond to sounds with gestures (such as nodding or shaking his head) - Can follow simple commands 	<ul style="list-style-type: none"> - Not understanding the meaning of nouns, verbs or adjectives
Expressive language	<ul style="list-style-type: none"> - Able to make sounds (like crying) when expressing his desires 	<ul style="list-style-type: none"> - Not yet able to communicate verbally
Social emotions	<ul style="list-style-type: none"> - Cry when you are in an uncomfortable situation - Laugh when you feel happy - Can interact with the environment 	<ul style="list-style-type: none"> - Still relying on parents to fulfill daily needs (such as eating, drinking, bathing, etc.)
Motor	<ul style="list-style-type: none"> - Able to move simple reflexes such as blinking - Able to perform fine motor movements on the left arm and rigid movements on the right arm. - Able to move body positions (tilted, supine, prone and rolling) 	<ul style="list-style-type: none"> - Unable to stand or walk
Cognitive	<ul style="list-style-type: none"> - Able to recognize sounds from around him - Know objects commonly used every day (such as plates, spoons, etc.). - Get to know his family 	<ul style="list-style-type: none"> - Not yet able to group, sort, or differentiate objects

Based on these findings, it can be concluded that the child's abilities are still far from chronological age, however this decline can still be developed, especially in his receptive and expressive language abilities because based on the results of the assessment the child is able to interact with his environment and is able to distinguish and recognize the sounds around him. According to [Husna and Eliza \(2021\)](#), the development of receptive language is a starting point in the development of expressive language, starting from the ability to understand and differentiate sounds. Then, in the development of children's expressive language, children can be developed by expressing words or gestures aimed at expressing their [desires \(Fitriani, et al., 2023\)](#). However, due to the condition of children who are still unable to communicate verbally, and children's gestural abilities are still limited, other alternative communication systems are needed that can be used by children, such as using picture cards or other similar things. Thus, this has implications for the design of the media used in the AAC system.

3.2. Application Development

The AAC media development carried out refers to [Blacktone & Hunt Berg's \(2003\) Table 2](#). AAC system development theory which reveals that in developing AAC media it is necessary to consider several things, namely 1) what the child's communication needs are; 2) whether the AAC system is structured based on the child's abilities; how children use the AAC system; and 4) how the child's cognitive and visual abilities are. Therefore, based on this theory, an application development framework is prepared as follows.

Table 2. Application development framework

Communication needs	AAC system that makes it possible	How to use	Cognitive and visual abilities	Symbol system display	Settings and goals
Expressing desires and needs that can still be understood by other people, but not in verbal, written or gesture form.	To help express desires, the AAC system uses communication techniques with the help of a symbol system consisting of images that resemble real objects.	1) The child presses a picture of himself on the application. 2) Child chooses family icon. 3) Children choose icons of needs that are categorized based on certain contents 4) Children choose yes and no as approval	Cognitive abilities can recognize objects around them, and children do not have visual impairment s.	Visualization of nouns and verbs is the use of images based on their function, such as plates for eating and glasses for drinking. This display is loaded into the smartphone application.	Setting: at home and at school Target: parents

Based on the mapping results, it was then determined that the type of AAC used in this development was a high-tech AAC aided system, namely supported by high-tech software and hardware devices, namely applications and smartphones. The Speakezio (speak electronic zio) application developed is a AAC system that contains communication symbol icons in the form of images which are a form of visualization of everyday nouns and verbs.



Figure 1. Speakezio application icon and image of the application's initial display

This application provides 2 operating modes, namely sliding mode and click mode. Users can choose the mode according to comfort when using the application. In sliding mode, users can slide the image icon until they find the desired image. In this mode, users can only express one expression with a simple sentence structure, such as "I want to eat", "I'm sleeping", and so on. This mode is also suitable for users who have low expressive or receptive language skills because in this mode users are presented with structured sentences, so they only need to move the icon according to the word in question.



Figure 2. Sliding mode display

In click mode, users can press buttons or icons on the screen to select or trigger the desired message or words. In this mode, the user is presented with various image icons, then the user can press the image icon in question, each icon that is pressed will produce a sound in the form of the meaning of the icon. The icon that is pressed will automatically move to the communication box at the top of the screen and then form a series of words. Users must press the icons one by one to form one sentence containing the message they want to convey.



Figure 3. Click mode display.

The Speakezio application also has several features that can be used in the application, namely the Let's talk, Topics, Conversation recording, Settings, Send and Progress features.

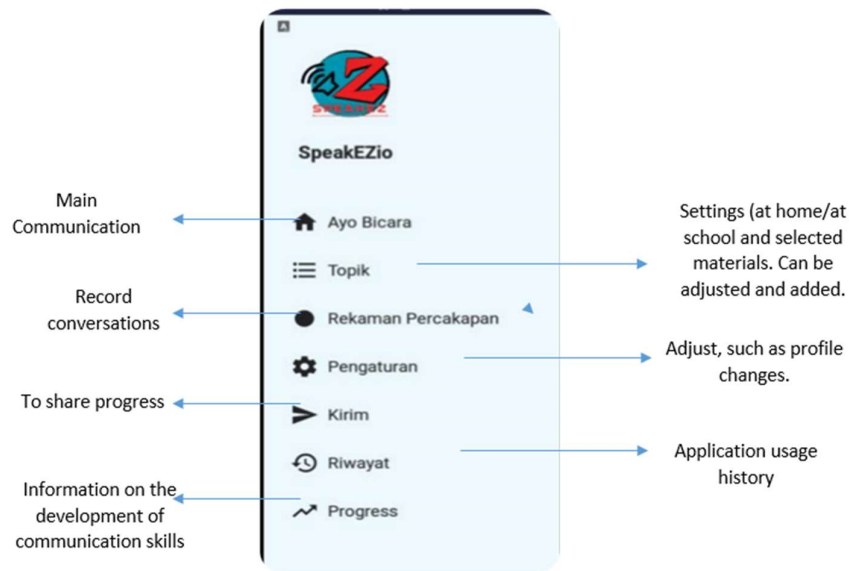


Figure 4. Application features.

3.2. Trials Application

The next stage, after the application is developed, is then tested on subjects and parents. Based on **Table 3**, the results of observations and interviews of application trials, the following results were obtained.

Implementation	Target	Results
Introduction to applications and symbols on the AAC Speakezio system	Parent	Know and understand how to use and operate the application
	Child	Know how to operate the application, get to know, and familiarize yourself with the features contained in the application.

Implementation	Target	Results
Use of the Speakezio application	Parent	Parents can respond appropriately to the meaning of what their child conveys through the application
	Child	Children are happy and enthusiastic when they can use the Speakezio application to communicate with their parents. Children can communicate by expressing words and sentences using applications, such as "I'm defecating" and "I want to drink"

4. CONCLUSION

Communication is a basic need for us as social creatures. Communication is effective if both have the same understanding, namely language. Generally, people communicate verbally, however, not everyone is able to communicate verbally, including children with cerebral palsy. Cerebral palsy is a condition where there is weakness in the muscles which causes them to have complex obstacles, for example, physical and motor obstacles. In this case, the child's condition affects the communication aspect so that the child is unable to speak verbally and has difficulty understanding language or instructions from those closest to him. So brands have complex communication needs. Alternative and augmentative communication is a medium that helps someone with complex communication needs to be able to communicate according to the communication modality or approach they have. The Speakezio application is a AAC system designed based on the results of identification and assessment to determine children's needs. This application has been implemented by children 4-5 times. As a result, this media can be used by children to communicate their desires.

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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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