Enhancing AAC Systems Through Artificial Intelligence: Parent and Family Perspective on Limitations and Solutions

Aryav Dube

Supporting Information Document

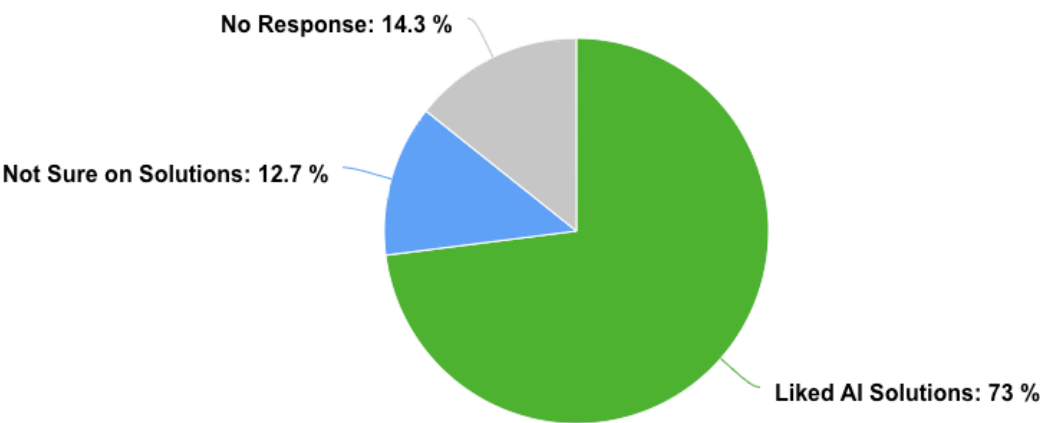Chart S1: Results of Participants Response to AI Solutions:

Table S1. Interview Questions to Parents
1) Tell us about your early experiences when you first started using the AAC device with your child. What worked well right away, and what took more time to figure out?
2) How easy or challenging is it for your child to navigate through different simple pages and categories on the AAC device?
3) Do the available words and symbols on the device meet your child's communication needs?
4) During a typical day, are there times when your child can't express what they want because they can't find the right picture or word on their device?
5) Tell us about your child's conversations when using their device. Does the time needed to create messages affect how they join in or stay involved in the discussion? In what ways?
6) How well can you set up or adjust your child's device for different situations (like school, home, or outing)? What makes these easy or difficult?
7) Tell us about any challenges that limit how much your child can practice with their device throughout the day. This could include times at home, school, or other places. What gets in the way of using it more regularly?
8) Tell us about your child experience when sharing their emotions (like being happy, sad, or frustrated) through their device. What makes it easy or difficult?
9) Tell us about your child's ability to show their different feelings in their device. Are they able to find and use symbols that match their emotions? What works well and what's missing?
10) When your child has trouble getting the message across using their device, what typically happens? How do you and your child handle these moments?
11) When you need to personalize your child's device, such as adding personal photos, creating custom messages, changing button sizes or adjusting voice settings. How manageable are these tasks? What aspects are straightforward or challenging.

Table S2. AI Solutions for Enhancing AAC Competence				
Competence	Sub-Themes	Explanation	Solution	AI Understanding
Operational	Overwhelming list of words and pictures to choose from	Users struggle to navigate many symbols.	Personalized Interface and Navigation	An AI-powered interface adjusts the layout to prioritize commonly used symbols for quicker access.
	Locating specific vocabulary within the AAC system	Finding specific words can be difficult.	AI-powered recommendations	AI analyzes selection patterns and predicts the user's most likely vocabulary choices, optimizing symbol organization.
Linguistic	Limited Symbol Sets	Fewer symbols limit expression.	Personalized Vocabulary Learning & Prediction	AI recommends new vocabulary based on user history, improving language acquisition.
	Limited Practice Opportunities	Fewer chances for users to practice.	Interactive vocabulary games	AI-driven games help users practice vocabulary in an engaging and dynamic way.
	Speed to construct relevant phrases	Slow phrase construction can hinder communication.	Integration with environmental context	AI suggests relevant symbols or phrases based on the user's surroundings, speeding up phrase construction.
Social	Limited communication speed	Slower speech impacts conversation flow.	Predictive sentence building for social contexts	AI suggests context-appropriate greetings and conversation starters, aiding social interactions.
	Difficulty expressing emotions	Emotions are hard to convey with symbols.	Emotional Expression and Understanding	AI identifies the user's emotional tone and offers symbols that reflect their feelings, enhancing clarity and connection.
Strategic	Dealing with breakdowns in conversation	Users may lack symbols for needed words.	AI-powered prediction of communication needs	AI anticipates needs based on context and suggests words or phrases, preventing breakdowns.
	Cognitive demands	Strategic planning can be hard for some users.	Personalized communication strategy tutorials	Interactive AI tutorials teach communication strategies to help users handle various social situations.
	Confidence and social anxiety	Communication difficulties cause anxiety in social settings.	AI-powered environmental scanning & suggestion	AI analyzes the environment and suggests symbols to help users respond confidently in real-life scenarios, reducing anxiety.