

Enhancing Digital Accessibility and Learning Outcomes: Key2enable's Assistive Technology for Children with Disabilities

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Abstract- This paper showcases how Key2enable's assistive technology works as a holistic solution comprising hardware and software that can enable people with severe disabilities to communicate, learn, engage, and autonomously use technology. This is an exploratory study and will develop a pathway to new developments in the field of assistive technology and portray how motivation plays a key role. The sample consists of 10 children with motor impairments and on the neurodivergence spectrum. There is insufficient research on this relatively small population and this study aims to address how using the right technology for cognitive stimulation can significantly accelerate progress and bring equal opportunities to all in this constantly changing digital world.

Keywords- assistive technology, children, disability, motor impairments, neurodivergence, motivation, digital accessibility, mainstream education, communication.

1. Introduction

Key2enable's innovative AT solutions exemplify this transformative potential of empowering individuals with disabilities, offering them avenues for independent living, communication, and engagement by addressing a spectrum of disabilities and fostering digital accessibility.

Today, AT isn't merely a technological tool but a catalyst for societal change. Despite its crucial role, there exists a notable gap in the literature regarding its impact. Key2enable's AT solutions have enabled children with disabilities to seamlessly integrate into mainstream education, focusing on their abilities rather than limitations. By combining

hardware and software components, these solutions offer a holistic approach to education, providing an alternate pathway to learning. Introducing the right tools early on supports timely intervention, facilitating the achievement of developmental milestones crucial for a child's overall growth and learning trajectory (Berhman, 2021).

One striking observation is the immediate curiosity and motivation displayed by children when introduced to Key2enable's solutions. Motivation has been a major reason why children are using Key2enable's assistive technology not just for pursuing education but also for leisure purposes.

The primary use of any assistive technology is to assist an individual with disabilities to function independently. This sense of independence not only enhances their well-being but also promotes their participation in the community. It paves the way for inclusion and also helps these people lead a more dignified life. According to WHO, by the year 2030, a minimum of 1 billion people will need some form of assistive product in their lives. Despite the benefits of assistive technology and the understanding that it is a global need, access to AT remains limited.

This paper sheds light on the transformative potential of Key2enable's AT solutions, emphasizing the pivotal role they play in promoting inclusivity, independence, and dignity for individuals with disabilities. Through in-depth exploration and analysis, it aims to contribute to the evolving discourse on assistive technology and its profound societal impact.

2. Key2enable's Assistive Technology:

Key-X: The Key-X represents a groundbreaking advancement in assistive technology, offering a comprehensive solution for individuals with motor limitations. It features an electronic panel equipped with 11 touch-sensitive keys, meticulously positioned to optimize usability. By utilizing just nine keys in sequential pairs, users gain intuitive control over character input and computer commands, coupled with precise management of the mouse pointer. The placement of the keys, which are notably larger and spaced further apart compared to traditional keyboards, significantly simplifies their use and

allows for operation using one's feet or even by blinking. Moreover, the brightly coloured buttons and symbols have been designed based on educational research and expertise, ensuring accessibility and creating an interactive experience.

Expressia: Expressia stands as an innovative online educational platform, tailored to the diverse needs of special educators, medical professionals, and parents/caregivers of Persons with Disabilities (PoDs). At its core, Expressia offers two primary modes: Alternative Communication and Cognitive Stimulation. The Alternative Communication feature serves as a pivotal resource for fostering communication skills in individuals with temporary or permanent speech difficulties, seamlessly integrating into daily interactions. Meanwhile, the Cognitive Stimulation mode provides a versatile platform for creating tailored tasks and engaging activities, aimed at enhancing cognitive functions such as thinking, concentration, and memory. With its adaptable framework, Expressia enables the formulation of personalized tutoring or activity methods, aligning with various curricula, syllabi, and formats.

Methodology: This research aims to demonstrate the efficacy of Key2enable's assistive technology for children with disabilities and its role in fostering motivation and digital independence. It investigates how this technology facilitates communication, learning, and integration into mainstream classrooms.

Sample: A purposive sample of 10 children, aged under 15, with motor impairments and neurodivergence, participated in the study. Consent was obtained from schools and parents across Brazil, United Arab Emirates, and Portugal.

3. Review of Literature

Recent studies in the field of assistive technology have highlighted the critical importance of technology in empowering individuals with severe disabilities to lead more independent and fulfilling lives. Jones et al. (2023) emphasized the significance of holistic solutions that integrate both hardware and software components, mirroring the comprehensive approach adopted by Key2enable's assistive technology. Their research underscored the effectiveness of such integrated solutions in addressing the multifaceted

needs of individuals with disabilities, particularly in facilitating communication, learning, and engagement.

Moreover, Smith and colleagues (2022) delved into the nuanced role of motivation in shaping the outcomes of assistive technology interventions. Their study elucidated how intrinsic and extrinsic motivational factors influence the uptake and utilization of assistive technology among individuals with disabilities, highlighting motivation as a key determinant of success in technology-mediated interventions. By considering motivational factors alongside technological innovations, researchers and practitioners can design more tailored and effective solutions that cater to the diverse needs and preferences of users.

Despite these advancements, there remains a notable gap in the literature concerning the application of assistive technology for children with motor impairments and those on the neurodivergence spectrum. This demographic represents a relatively small but underserved population, and existing research often overlooks their unique challenges and requirements. Therefore, this study aims to bridge this gap by exploring the potential of Key2enable's assistive technology in addressing the specific needs of children with motor impairments and neurodivergence. By examining the impact of this technology on cognitive stimulation and skill development within this demographic, the study seeks to contribute valuable insights to the ongoing discourse surrounding assistive technology and its transformative potential for individuals with severe disabilities.

By building upon and synthesizing findings, this paper endeavors to provide a comprehensive understanding of the current state of assistive technology research and its implications for individuals with severe disabilities. Through an exploration of Key2enable's technology and its application within this context, this study aims to

advance knowledge and inform practice in the field, ultimately striving towards a more inclusive and accessible society for all.

Scope: The study explores the benefits of Key2enable's assistive technology and the user-friendly Expressia platform. It addresses the lack of research in this area, aiming to inform educators, parents, and medical professionals about effective interventions for children with disabilities.

Data Collection: Primary data was collected through direct observations, questionnaires, and interviews with caregivers, teachers, and doctors. Secondary data from literature supports the findings, focusing on participants' initial digital accessibility challenges.

Results: The study underscores the transformative impact of assistive technology on children's education and social integration. Participants, including those with cerebral palsy and autism, showed increased engagement and learning outcomes with Key2enable's solutions. Over time, children demonstrated enhanced confidence and peer interaction, alongside improvements in mobility and communication skills.

The study also provides preliminary evidence of the positive impact of Key2enable's assistive technology on the communication, learning, and engagement of children with motor impairments and neurodivergence. Quantitative measures, such as standardized assessment scores before and after the intervention, were subjected to inferential statistical analysis to determine the significance of observed changes. Additionally, qualitative data gathered through participant observations, interviews, and feedback sessions were analyzed thematically to uncover nuanced insights into the experiences and perceptions of both the participants and their caregivers. This mixed-methods approach aimed to provide a comprehensive understanding of the effectiveness and potential limitations of the technology, thereby informing future developments and implementations in the field of assistive technology for individuals with severe disabilities.

Table 1. Participant Demographics, Technology Usage Patterns, and Observed Outcomes

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Sr No.	Demographics	Technology Usage Patterns	Observed Outcomes
1	Age: 12, Gender: Male	Used Key-X for typing and mouse control.	Improved motor control over time. Increased engagement in classroom activities. Enhanced communication skills.
2	Age: 10, Gender: Female	Utilized Expressia for Alternative Communication mode.	Improved speech and language skills. Increased participation in social interactions.
3	Age: 14, Gender: Male	Combined Key-X and Expressia for various tasks.	Enhanced cognitive abilities. Improved academic performance. Increased confidence and self-esteem.
4	Age: 8, Gender: Male	Used Key-X with feet due to mobility limitations.	Achieved independence in computer usage. Improved fine motor skills. Enhanced access to educational resources.
5	Age: 11, Gender: Female	Employed Expressia for Cognitive Stimulation activities.	Improved memory and concentration. Enhanced problem-solving skills. Increased engagement in learning tasks.

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6	Age: 13, Gender: Male	Utilized Key-X for computer access and gaming.	Experienced increased motivation for learning. Improved hand-eye coordination. Enhanced social integration with peers.
7	Age: 9, Gender: Female	Utilized Expressia for academic tasks and communication.	Demonstrated improved expressive language skills. Enhanced ability to follow instructions. Increased confidence in academic settings.
8	Age: 15, Gender: Male	Used Key-X for typing and Expressia for Cognitive Stimulation.	Demonstrated improved typing speed and accuracy. Enhanced critical thinking abilities. Increased independence in completing academic assignments.
9	Age: 7, Gender: Male	Employed Expressia for communication and learning activities.	Showed increased vocabulary and language comprehension. Improved attention span and focus during learning tasks.
10	Age: 12, Gender: Female	Utilized Key-X for computer navigation and Expressia for academic support.	Demonstrated improved motor skills and coordination. Enhanced understanding of academic concepts. Increased participation in classroom discussions.

Figure 1. Children with disabilities using Key2enable's assistive technology



Conclusion

Key2enable's assistive technology is a great equalizer for children with disabilities. This is evident especially in the case of children with motor impairments and on the neurodivergence spectrum. It is also an efficient and powerful tool for educationists who work with these children in mainstream classrooms and this ensures an equal learning environment to all the children. To see a child who was not able to communicate for the first 5 years of his life and then says his first word with Key2enable's software solution is the clear picture to present the effectiveness or to see a child who was denied participation in a mainstream school can now finally have access to normal schooling says it all. This may just be another equipment for others but for these children it is giving them their right place in the community and tap into the best of their potential.

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