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Enhancing Interaction: The Crucial Role of Eye-Tracking Technology in Assessing Children with Profound Intellectual and Multiple Disabilities in Poland

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Abstract

The Objective of the Research: This research focuses on the pivotal role of utilizing eye-gaze assistive technology (EGAT) in diagnosing individuals with profound intellectual and multiple disabilities (PIMD). The study included six children aged 5–12 with PIMD who do not use speech. The primary aim was twofold: first, to assess and validate diagnoses (certificates) issued by Psychological and Pedagogical Counselling Centres in Poland, which traditionally do not use eye-gaze assistive technology (NEGAT); second, to identify specific exercises from the *Look to Learn* and *eyeLearn* software that facilitate the examination of various cognitive abilities. These abilities include visual-spatial skills (e.g., perception ability, visual-auditory coordination, and precision of vision), language skills (both comprehension and expression), and logical thinking (ranging from cause-effect actions to making choices among multiple elements).

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Research Method: The study employed an action research approach with methodological triangulation, including:

- Analysis of medical and therapeutic documents (certificates from Psychological and Pedagogical Counselling Centres)
- Participant observation (both open and structured), and
- The multiple (collective) case study method.

Sessions using EGAT were developed, and exercises that could be used to verify specific skills were selected. The PCEye Mini Track & Learn tool—featuring Gaze Point & Gaze Viewer—was used in the research.

Structure of the Article: The article is organized into eight sections: introduction; a brief overview of the current diagnostic procedures in Poland; objectives; methods; results; discussion on improving access to EGAT; and conclusions.

Research Findings and their impact on the Development of Educational Sciences: The findings indicate that diagnoses provided by Psychological and Pedagogical Counselling Centres in Poland may require reconsideration. By incorporating eye-gaze assistive technology (EGAT) and re-diagnosing six children previously identified as having profound intellectual disabilities, we identified previously unrecognized abilities in speech comprehension, logical reasoning, visual-spatial skills, and learning pace. The research brings attention to the necessity for standardized tests using eye-tracking technology to assess the intellectual functioning of children with disabilities.

Conclusions and Recommendations: It is recommended that Psychological and Pedagogical Counselling Centres be equipped with EGAT to ensure more accurate diagnoses of children suspected of having profound intellectual disabilities. The study advocates discontinuing the issuance of certificates indicating profound intellectual disability and instead implementing functional assessments using EGAT.

***Keywords*:** profound intellectual multiple disabilities (PIMD), assistive technology (AT), eye-gaze assistive technology (EGAT), non-eye-gaze assistive technology (NEGAT), *eyeLearn* software, *Look to Learn* software, functional assessment

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Introduction

The WHO-UNICEF Global Report on Assistive Technology (2022) reveals that more than 2.5 billion people require one or more assistive products. For children with disabilities, access to assistive technology is often the first step toward development and education. In the *Digital Inclusion: White Paper,* the authors note, "At this moment still too many people worldwide are disabled by inaccessible technology, or do not have access to assistive technology (AT-based) solutions that could help them to participate on an equal footing in modern society" (Hoogerwerf et al., 2016, p. 4). Further, they caution that "The rapid rate of innovation in Information and Communication Technologies (ICT) brings the risk that some groups remain, often unwillingly, behind in the adoption of new technologies" (Hoogerwerf et al., 2016, p. 4).

The initial quote underscores the challenges faced by children with profound intellectual and multiple disabilities (PIMD), highlighting the regrettable reality that they often encounter obstacles in obtaining accurate diagnoses. This difficulty frequently arises from their limited access to cutting-edge diagnostic technologies. Our research reveals that this group is disproportionately affected by the lack of advanced and accurate tools in the Psychological and Pedagogical Counseling Centres in Poland. Children with PIMD represent a diverse population that includes individuals with severe to profound cognitive disabilities, statistically estimated IQs below 20–25, and developmental ages of 24 months or less. They also often exhibit significant motor limitations (Nakken & Vlaskamp, 2007). The second quote points to challenges encountered by educators and professionals whowork with this group. In Poland, many teachers remain unfamiliar with essential concepts such as "universal design" and "assistive technology" and lack proficiency in ICT-AT skills (Kochanowicz, 2023a).

Specialist knowledge is crucial for providing children with PIMD with the tailored support they need for holistic development in an increasingly digital and accessible world. This accentuates the urgent need for teachers to acquire both basic and advanced knowledge and to develop

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specialized skills, particularly in Information and Communication Technology for Assistive Technology (ICT-AT). Numerous scholars have extensively discussed the profound impact of the ongoing digital revolution, highlighting how it rapidly reshapes lifestyles, work dynamics, learning methodologies, social interactions, and community engagement (Guillén-Gámez et al., 2023).

In recent studies focusing on PIMD, researchers have actively sought avenues to integrate individuals with PIMD into scientific research (Skarsaune, 2023). There is limited knowledge about the quality of assessment methods used for diagnosing individuals with PIMD. Most tools currently employed are not specifically designed for this population, and information regarding their effectiveness is scarce. There is a pressing need for guidelines on developing and utilizing assessment methods tailored specifically to individuals with PIMD (Wessels et al., 2021). It is imperative to recognize that achieving social inclusion and accurate diagnosis requires a fundamental understanding of individuals with PIMD and direct engagement with this population. Such an approach enables researchers to gain comprehensive understanding of the challenges associated with this group (Maes et al., 2021). Inclusive research and knowledge production involving people with profound disabilities should be based on a fundamental understanding of individuals with PIMD as equal citizens and contributors to research (Gjermestad et al., 2023). Including individuals with PIMD in research is fundamental to ensuring their genuine participation and representation in studies focusing on profound intellectual and multiple disabilities (de Haas et al., 2022).

Eye-tracking technology has emerged as a powerful tool, enabling researchers to gain deeper insights into children's interactions with their surroundings. For instance, recent studies demonstrate that even short-term use of eye-gaze assistive technology (EGAT) can have a significant positive psychosocial impact (Andreassen et al., 2024). Eye-tracking technology proves to be highly suitable and effective as an assistive technology for enhancing learning environments, leisure activities, and communication for children with disabilities (Andreassen et al., 2024; Donmez, 2023; Kochanowicz, 2021).

To elucidate the utility of eye-tracking technology, researchers adopt a straightforward approach by posing fundamental questions about the information gleaned through this innovative tool. Questions such as, "What attracts the attention of users or learners?" and "Which elements in a user interface or educational material capture or divert their focus?" aid in unraveling the intricacies of visual engagement. Researchers also investigate factors influencing attention, ranging from identifying focal points to understanding distractions, and tracking the chronological sequence in which users or learners navigate information on a screen (Molina et al., 2024; Błeszyński et al., 2019).

The significance of this technology lies in its capacity to objectively and non-invasively measure various aspects of attention and cognitive processes. Through meticulous examination, researchers aim to discern how users or learners locate targeted elements in specific configurations, whether in an interface or instructional material. Additionally, the temporal aspect is scrutinized, encompassing the time required for users to find and recognize specific targets—a critical dimension explored in the 2024 study by Molina et al.

Research conducted in Sweden, involving a total population survey, demonstrates that eye-gaze control devices (EGCD) contribute to constructing new knowledge about individuals, both children and adults, with multiple disabilities (Hemmingsson & Borgestig, 2020). Additionally, comparative studies on the use of eye-gaze assistive technology (EGAT) for communication versus its absence (NEGAT) have been carried out in Sweden, Dubai, and the USA (Hsieh et al., 2021). In autism research, eye-tracking technology has proven to be an effective tool for evaluating social cognition, revealing associations between visual social attention and autism characteristics. Meta-analyses have been used to explore whether visual attention to socially salient regions (SSRs) of stimuli correlates with autism characteristics assessed by clinical tools (Jenner et al., 2023).

The results of a 2022 study confirm the feasibility and importance of using eye-tracking as a new theoretical and practical framework for studying profound intellectual and multiple disabilities (Cavadini et al., 2022). The authors noted that "through daily exposure to repeated perceptual

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events associated with subjective experience, PIMD individuals may have developed unsuspected cognitive skills that cannot be assessed with existing evaluation methods and instruments but that eye-tracking-based training programs could help to identify, thus contributing to better understanding the perceptual learning process in this population. This would be particularly important for the support persons who work with individuals with PIMD" (Cavadini et al., 2022, p. 23). Similar conclusions were drawn in recent studies conducted in Taiwan on children with disabilities (Hsieh et al., 2023; Hsieh et al., 2022).

At the 2023 AAATE conference in Paris, one of the authors of this article participated in a scientific session, contributing to the discussion on the important role of educators and teachers in uncovering the educational potential of children with PIMD through the use of eye-tracking technology (Kochanowicz, 2023b). Initially, research in this field was expected to direct efforts toward outlining the educational opportunities for non-speaking children with multiple disabilities using eye-tracking technology. This included identifying modern educational solutions—devices and software—that could transform the child's experience in learning, communication, and leisure activities (Andreassen et al., 2024; Hsieh et al., 2022; Kochanowicz, 2019).

Attempts have also been made to use EGAT in art therapy sessions for children with PIMD. Eye-tracking technology as an assistive tool (EGAT) in art therapy has been shown to provide children with PIMD a degree of autonomy and independence in their creative activities. It enables them to express emotions and often serves as their only means of independent activity. Participation in these sessions brought notable improvements in well-being and quality of life for the children involved (Kochanowicz, 2021).

Furthermore, during these art therapy sessions, children with PIMD were observed to display abilities that exceeded the descriptions in their certificates from the Psychological and Pedagogical Counseling Center. These abilities included enhanced visual-auditory coordination, comprehension and expression through augmentative and alternative communication (AAC), cognitive skills, and memory (Kochanowicz, 2021).

Diagnosing profound intellectual disabilities in children with conditions such as cerebral palsy or rare genetic disorders poses major barriers due to the absence of verbal communication. This difficulty is attributed to the lack of eye-tracking technology, which could optimize interaction during diagnostic processes at Psychological and Pedagogical Counseling Centres. The implementation of eye-gaze assistive technology (EGAT) can uncover unexpected intellectual abilities in non-speaking children, as highlighted by researchers such as Hemmingsson and Borgestig (2020). EGAT facilitates the assessment of eye movement patterns, visual attention, field of vision, preferences, and the ability to make selections using eye movements.

A Brief Overview of the Current Diagnostic Procedure in Poland

According to data from the Central Economic Information Center for 2023, there are 1,218 Psychological and Pedagogical Counseling Centres in Poland. These centres play a crucial role in supporting children with PIMD. Upon an assessment, a child diagnosed with profound intellectual disability typically receives a certificate confirming their condition, which serves as a gateway to lifelong educational paths. For compulsory schooling, children with PIMD can either participate in rehabilitation and educational classes or receive individualized instruction at home, as regulated by the Ministry of Justice and the Ministry of National Education (Regulation of the Minister of National Education of April 23, 2013).

Specialized diagnosticians within these centers primarily rely on information provided by parents to evaluate a child's development. However, these centers often lack the necessary devices or tests to verify the accuracy of this information. As of 2023, data from the Polish Data Portal indicates that 7,890 individuals under 25 years old (including 3,404 girls) hold certificates authorizing their participation in rehabilitation and educational classes due to a diagnosis of profound intellectual disability.

Children and young individuals with profound intellectual disabilities in Poland are excluded from the mainstream education system, despite the state's constitutional mandate to provide universal and equitable

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access to education for all citizens. Instead of being formally recognized as students, they are categorized solely as participants (without *student* status) in rehabilitation and educational classes (Zaorska, 2023). These classes lack divisions based on age groups or educational stages.

Researchers and practitioners suggest revisiting the educational provisions for individuals with PIMD to facilitate their integration into the mainstream education system. Children and youth aged 3 to 25 with PIMD participate in rehabilitation and educational classes tailored to their specific needs through individually designed programs. However, unlike mainstream students, there is no legal requirement to develop standardized curricula or frameworks for these programs for each school year. The regulations only outline a few broad areas that such classes should address over their entire duration, which can span up to 22 years (Kopeć, 2021).

Findings at the macrosystem level indicate a lack of transparency in legal provisions, while at the microsystem level, there is a pressing need to establish applicable standards for the education of children with PIMD (Kopeć, 2020). Furthermore, there is an urgent need to create a comprehensive and detailed account of the legal diagnostic procedure for children with PIMD in Poland. This need arises because these children were first formally recognized within the Polish education system from a legal perspective only in 1997 (Regulation of the Minister of National Education of January 30, 1997). However, carrying out this task necessitates dedicated scientific research focused on this particular aspect. Such research should identify the obstacles to accessing education for this group of children in Poland based on the last regulation from 2013 and formulate recommendations and solutions accordingly.

Objectives

The primary aim of this research is diagnostic and exploratory, aimed at assessing and validating the diagnoses (certificates) issued by Psychological and Pedagogical Counseling Centres in Poland that do not utilize eye-gaze assistive technology (NEGAT). The practical objective is to iden-

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tify types of exercises from the *Look to Learn* and *eyeLearn* software that facilitate the assessment of visual-spatial skills (e.g., perception ability, visual-auditory coordination, precision of vision), language skills (e.g., comprehension and expression), and logical thinking (e.g., cause-effect actions and choosing from multiple elements). As part of this research, sessions using EGAT were developed and applications and exercises that could be used to verify specific skills were selected.

Methods

The study employed the action research method with methodological triangulation, which included:

1. Analysis of medical and therapeutic documents (certificates from the Psychological and Pedagogical Counseling Centres),
2. Participant observation techniques (both open and structured), and
3. The multiple (collective) case study method.

The research began with a fundamental question: *How could eye-tracking technology be used to re-diagnose children with profound intellectual disabilities?*

The PCEye Mini Track & Learn tool—featuring Gaze Point & Gaze Viewer—was used in the research. This tool records gaze and sound, or sound alone, and allows playback and basic data analysis using heat maps and gaze plots. It facilitates the assessment of physical capabilities and cognitive understanding. However, the software is not used for making medical diagnoses, such as identifying neurological diseases.

The first software used in this research, *eyeLearn*, was developed by combining academic knowledge with practitioners' experience in Poland (AssisTech). From the 170 available exercises, 4 were selected for this study:

- **Locating (bee),**
- **Horizontal tracking (snails),**

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- **Developing thinking (toys),**
- **Visual perception (blocks)**

Additionally, a simple communication board (yes/no; stop/more) was included.

The second software, *Look to Learn*, was used to examine activities in five key areas of learning and development (Tobii Dynavox). From this software, 40 exercises were selected, categorized into:

- **Sensory**
- **Exploration**
- **Purpose**
- **Selecting**, and
- **Control**

The research was conducted at the Rehabilitation and Education Center in Poland and involved 73 participants aged 3 to 25 years with diagnoses of profound intellectual disability. Six children aged 5 to 12 years were selected for the study.

Case Descriptions (Ch= child; G-girl; B-boy):

- **Ch1G**: Born in 2010; diagnosed with cerebral palsy, increased muscle tone (lower limbs), and features of cerebellar ataxia (Dandy-Walker syndrome).
- **Ch2B**: Born in 2012; rare genetic defect (lack of white matter myelination in the brain) and a tracheostomy tube.
- **Ch3G**: Born in 2013; diagnosed with Rett syndrome and reliant on PEG enteral feeding.
- **Ch4B**: Born in 2013; syndrome of birth defects, pontocerebellar hypoplasia, and severe amblyopia (retinopathy of prematurity, stage III, post-laser therapy).
- **Ch5G**: Born in 2014; diagnosed with cerebral palsy (quadriplegia), drug-resistant epilepsy (West's syndrome).
- **Ch6G**: Born in 2015; diagnosed with a cyst in the right frontal lobe, cerebral palsy (quadriplegia), regressed changes from retinopathy of prematurity, myopia, and drug-resistant epilepsy.

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Sessions were conducted once a week for 30 minutes per child, from September 2022 to March 2023, in a speech therapy office. When strategizing and designing experiments involving eye-tracking technology, it is imperative to consider several critical factors. These include meticulous attention to:

1. **Configuration**: Thoughtful setup and arrangement are crucial to optimizing the functionality of the eye-tracking technology.
2. **Calibration**: Accurate calibration is essential for reliable and precise tracking, requiring meticulous attention.
3. **Equipment Selection**: Selecting appropriate equipment that aligns with the research objectives plays a pivotal role in the success of the experiment.
4. **Environmental Factors**: It is vital to consider the physical properties of the environment, such as lighting conditions, noise levels, and potential distractions.
5. **Testing Environment**: Deliberate planning of the testing location is crucial and should account for layout and potential variables that might impact results.
6. **Child's Sensory and Motor Capabilities**: The experimental design should be adapted to accommodate and respect the unique sensory and motor abilities of the child participants.

This comprehensive approach ensures methodological soundness and reliability in experiments using eye-tracking technology, ultimately enhancing the credibility of research results (Brunyé et al., 2019).

Creating the right atmosphere and preparing the room appropriately (e.g., darkening the space) were important steps. Given that the children had significant motor impairments and problems with auditory and/or visual perception, it was necessary to properly position both the child and the computer screen equipped with the PCEye Mini camera. This process required additional competencies from the therapist, tailored to each child's individual needs and capabilities.

Results

During sessions utilizing EGAT, children with PIMD discover their potential for creative tasks and new ways of engaging in activities. The research demonstrated that EGAT is an effective intervention for diagnosing children with complex communication and developmental needs. It also brought to light that the diagnoses issued by Psychological and Pedagogical Counselling Centres in Poland could be reconsidered. Through the implementation of eye-gaze assistive technology (EGAT) and the re-diagnosis of six children previously classified as having profound intellectual disabilities, higher levels of skills in speech understanding, logical thinking, visual-spatial abilities, and learning speed were identified.

Figure 1. Example of *eyeLearn* Video Featuring Gaze Point & Gaze Viewer—Ch6G

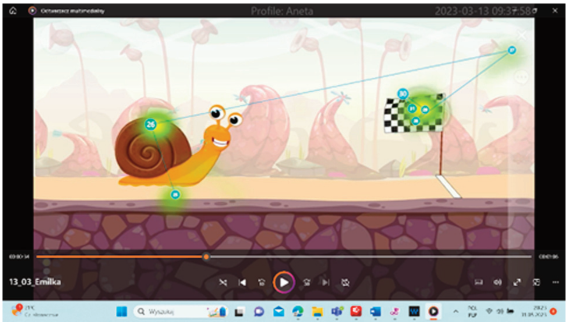

Figure 2. Example of *eyeLearn* Video Featuring Gaze Point & Gaze Viewer—Ch1G

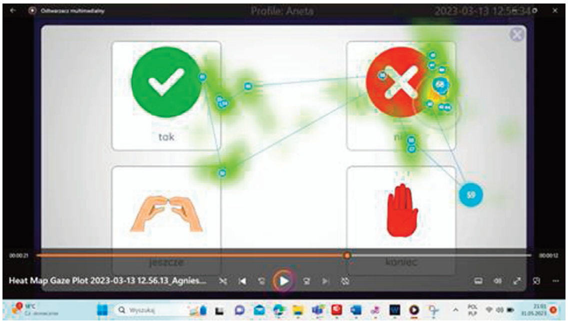

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Table 1. Research Sessions Using *Eyelearn* Software

eyeLearn/ Children	Locating (a bee)	Horizontal Tracking (snails)	Developing Thinking (toys)	Visual Perception (blocks)	A Simple Communication Board (yes/no; stop/more)
Ch1G	1,2,3 levels of difficulty done	1,2 levels of difficulty done	1 level of difficulty done	1,2,3 levels of difficulty done	answer impossible to interpret
Ch2B	1 level of difficulty done	1 level of difficulty done	1 level of difficulty done	1 level of difficulty done	intentional response
Ch3G	1,2,3 levels of difficulty done	1,2 levels of difficulty done	1 level of difficulty done	1,2,3 levels of difficulty done	answer impossible to interpret
Ch4B	1,2 levels of difficulty done	1,2 levels of difficulty done	1 level of difficulty done	1 level of difficulty done	intentional response
Ch5G	1,2 levels of difficulty done	1,2 levels of difficulty done	1 level of difficulty done	1 level of difficulty done	intentional response
Ch6G	1,2,3 levels of difficulty done	1,2 levels of difficulty done	1 level of difficulty done	1,2,3 levels of difficulty done	intentional response

1. All the children successfully completed exercises in the categories of *Locating* (finding a bee), and *Horizontal Tracking* (tracking snails) using the *eyeLearn* software. Each child also engaged in activities targeting cognitive development (using toys) and visual perception (using blocks) with the *eyeLearn* software. Additionally, three children (Ch1, Ch3, Ch6) demonstrated proficiency not only at the initial difficulty level but also at two or even three higher difficulty levels.
2. Four children (Ch2, Ch4, Ch5, Ch6) were able to answer closed-ended, yes-or-no questions on a simple communication board by pointing with their eyes using EGAT.

Table 4. Research Sessions Using *Look To Learn* Software

Look to Learn/ Children	Sensory (Magic Mouse)	Explore (Classroom)	Target (Fruit punch)	Choose (Dinner time)	Control (Woodland/Forest)
Ch1G	done	done	done	difficulty completing the task	exercise not done
Ch2B	done	done	sometimes done to the end	difficulty completing the task	exercise not done
Ch3G	done	done	done	difficulty completing the task	exercise not done
Ch4B	done	done	done	sometimes done to the end	exercise not done
Ch5G	done	done	done	sometimes done to the end	exercise not done
Ch6G	done	done	done	sometimes done to the end	exercise not done

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3. The children mastered basic skills such as looking at the screen, tracking, understanding the principles of eye control (e.g., cause-and-effect relationships), experimenting, early exploration, and making simple choices. However, they were unable to move and hold elements with their eyes, as required in the *Control (Forest)* exercise from *Look to Learn*. Exercises in this category proved to be too difficult.

It was noted that the children preferred sessions with a speech therapist over the research sessions recorded as part of the study. During the research sessions, it was necessary to interrupt the exercises to save recordings on the computer, which required selecting a different exercise for the child. This interruption often caused surprise and discomfort among the children, as they were unable to choose their exercises, and felt that their "classes" were disrupted.

For four children (Ch2B, Ch4B, Ch5G, Ch6G), generalization of skills was observed in arranged therapeutic situations that examined language skills (comprehension and expression), and logical thinking (from cause-and-effect actions to making choices among multiple elements). However, for two girls (Ch1G, Ch3G), the level of speech comprehension and expression in communication situations using augmentative and alternative communication (non-EGAT) was difficult to interpret. These two girls demonstrated high precision in solving tasks using EGAT, but this precision and understanding were not consistently observed in everyday life communication situations.

The results were influenced by several factors, including the child's health condition, medications taken, and general well-being on a given day. The best performance in exercises was achieved by two children (Ch4B, Ch6G), who always participated in a seated position, answered many closed-ended yes-or-no questions, using a communication board, and had stable health conditions.

Two other children (Ch2B, Ch5G), who also exhibited high skills in speech comprehension, logical thinking, and memory, showed variability in their active participation depending on their well-being on a given day. Their performance was impacted by additional medical conditions

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(including pain) and difficulties with positioning due to quadriplegia and the need for a lying position during sessions.

For the two girls (Ch1G, Ch3G), despite their precise eye-pointing skills, interest in tasks, stable health conditions, and correct performance of many exercises using EGAT, their results were difficult to interpret due to the lack of skill generalization to everyday life situations.

Certainly, this type of research session has inherent limitations, especially when there is no control group for comparison and when the children participating in the study are familiar with one of the researcher-practitioners who understands their communication abilities as well as their therapeutic and educational contexts. It is important to note that even during regular therapy sessions using EGAT, valuable data about a child with PIMD can be obtained by observing and analyzing exercises, even without using Gaze Viewer software. However, in such cases, it is not possible to record, systematically compare, or interpret the results.

Discussion: Improving Access to EGAT

The implementation of eye-gaze assistive technology (EGAT) has proven to be particularly beneficial for children with cerebral palsy, rare genetic disorders, neurodegenerative diseases, muscle atrophy, and multiple disabilities. These include children with intellectual disabilities combined with mobility problems, sensory impairments, and communication disorders, for whom sight is the primary communication channel. EGAT has also shown remarkable benefits for children who do not use their hands intentionally and find interaction with a computer both engaging and predictable, enabling their first intentional actions.

Eye-tracking technology has been shown to positively impact the well-being and quality of life of children participating in the study (Kochanowicz, 2021; Kochanowicz, 2019). For these children, EGAT revealed previously unmeasurable abilities such as information acquisition and processing, memory utilization, and conscious, controlled, and intentional visual attention, as opposed to unconscious, automatic, or reflexive

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responses. Furthermore, it allowed for the generalization of these skills to everyday life contexts (Erhard & Falcomata, 2023). The aesthetic appeal of interactive digital programs such as *eyeLearn* and *Look to Learn* captures the attention of children with multiple disabilities and helps them develop entirely new skills. These range from spontaneous "cause-and-effect" actions and screen exploration to precise pointing, intentional looking, and even computer control.

It is recommended that Psychological and Pedagogical Counseling Centres be equipped with EGAT to ensure more accurate diagnoses of children suspected of having profound intellectual disabilities. The research also advocates discontinuing the issuance of certificates indicating profound intellectual disability and instead adopting a functional assessment model (Vlaskamp, 2005) that incorporates EGAT.

Conclusions

In Poland, the educational future of a child with multiple disabilities—including the place of education and the ability to obtain student status—continues to depend on certification from a Psychological and Pedagogical Counseling Centres. Eye-tracking technology is progressively gaining traction in educational research and has the potential to fundamentally transform the diagnostic process. As outlined in the *Digital Education Action Plan 2021–2027*, Member States will receive support to secure assistive technology and provide accessible digital learning environments and content.

Standardized tests for assessing intellectual and adaptive functioning are generally difficult to administer to very young children, and their results may lack reliability and validity (American Psychiatric Association, 2013; Patel et al., 2020). Understanding and supporting children with PIMD can therefore be viewed as a co-production effort that combines the experiential, embodied knowledge of parents with the expertise of professionals (Kruithof et al., 2020). Despite the limitations of this study, it offers crucial foundational information for future research in this area.

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The results undoubtedly illuminate the necessity of gaining a deeper understanding of the barriers and facilitators associated with using eye-tracking technology in diagnosing children with disabilities (Cavadini et al., 2022). Our research underscores the pivotal role of access to assistive technology, primarily in facilitating accurate diagnoses to uncover the abilities of children with PIMD.

The children in this study had prior and subsequent experience using eye-tracking technology at the rehabilitation and education center, extending beyond the scope of this study. Thus, a more in-depth individual case study is warranted to fully characterize their learning abilities. Moreover, the study highlights the imperative of revising educational regulations to better accommodate the unique needs of children with PIMD in Poland. These children represent one of the most vulnerable groups in society, who often encounter significant challenges in accessing awareness of their fundamental rights. The evaluation of access to accurate diagnoses and assistive technology outlined in this study also reveals deficiencies in the legal framework governing the Polish education system.

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Conflicts of Interest: The authors declare no conflict of interest.

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