

Assistive Technologies in Inclusive Education: A Comprehensive Analysis of Contemporary Research in Kazakhstan

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Abstract:- This article provides a comprehensive analysis of contemporary Kazakhstani research in the field of assistive technology application in inclusive education. The relevance of this issue is driven by the lack of necessary conditions for the full participation of students with special educational needs (SEN) or disabilities, as well as the use of ineffective teaching methods, which result in the majority of individuals in this category being unable to obtain a quality education, a profession, and prepare for life in society. Clarifying the conceptually significant meaning of "assistive technologies," the authors examine the state of the problem of using assistive technologies in inclusive education through the lens of modern Kazakhstani scientific research.

Keywords: *assistive technologies, inclusive education, disabilities, special educational needs.*

1. Introduction

Assistive (adaptive) technologies are a broad term encompassing systems and services related to the provision of supportive products and services that enhance or improve an individual's functioning and independence, thereby contributing to their well-being [1]. This term includes assistive, adaptive, and rehabilitative devices for individuals with disabilities. In other words, it encompasses virtually anything that can be used to compensate for the lack of certain abilities [2], ranging from low-tech devices such as crutches or specialized pen holders to more advanced items like hearing aids and glasses, as well as high-tech devices like computers with specialized software to assist individuals with dyslexia in reading. Also commonly used in the academic literature are terms like "assistive equipment" or "assistive devices", which include information and communication technologies (ICT), universal technologies, educational technologies, new and innovative technologies, and accessible technologies; they can be "a device or a computer-based accommodation that help an individual with special needs work around or compensate for a disability by supporting individual strengths" [3], enabling them to participate in everyday life. This article places particular emphasis on the research conducted by Kazakhstani scholars, examining various aspects of the issue of applying assistive technologies in inclusive education.

The aim of this review article is to analyze contemporary Kazakhstani research on the role and application of assistive technologies in inclusive education.

Based on the article's aim, the primary *research question* was formulated: What is the role and practice of utilizing assistive (adoptive) technologies in inclusive education in Kazakhstan?

Hypothesis of the research in question: Despite the significant increase in the role of assistive technologies in inclusive education in recent years, the provision and use of assistive technologies in Kazakhstan are not at the level they should be.

2. Materials

In conducting the research at hand, the authors adhered to the "Assistive Product Specifications and How to Use Them" [4], as well as the "Priority Assistive Products List" (Priority Assistive Products List, 2016) developed by

the GATE initiative [5], which aims to expand access to high-quality, cost-effective assistive devices for everyone worldwide. The GATE initiative is coordinated by the World Health Organization (WHO).

The discussion of issues related to assistive technologies in inclusive education involved the works of Kazakhstani practitioner-researchers Abdykaimov Z. [6], and Gabdreshov G.E. [7].

The authors of the article actively participated in discussions on the research topic at various academic forums and platforms. They presented their work and engaged in scholarly discourse at the following events:

- in 2015, at the 7th Russian Philosophical Congress [8];
- from 2016 to 2018, at international and republican scientific conferences [9-10];
- in 2018, their work was published in a Scopus-indexed journal [11];
- in peer-reviewed scientific publications in Kazakhstan [12].

3. Methods

The authors used comparative methods, conceptual and hermeneutic analysis of scientific papers and official documents, general logical methods.

4. Discussion

On May 26, 2018, at the 71st session of the World Health Assembly, a resolution on “Improving Access to Assistive Technologies” was adopted, in which it is stated, among other things: “there are more than 1 billion people who would benefit from one or more assistive products..., this number is likely to rise above 2 billion by 2050. Those who most need assistive technology include, among others: people with disability, older people, people with noncommunicable diseases, people with mental health conditions including dementia and autism, and people with gradual functional decline”. But “only 1 in 10 people in need have access to assistive products, owing to high costs and a lack of financing, availability, awareness and trained personnel” [13].

Based on the analysis of domestic scientific publications, it is worth noting the limited number of studies conducted on the role and practices of using assistive technologies in inclusive education in Kazakhstan. Researchers primarily focus on the implementation and mechanisms of distance learning, which has become highly relevant not only for inclusive education but for education as a whole in recent years. In one of her publications, the inclusive education expert Z.A. Movkebayeva analyzes the peculiarities of the historical development of distance learning for students with disabilities in Kazakhstan, starting from the 1980s, and identifies four stages, with the fourth stage being the mass transition to distance learning prompted by the pandemic in 2019. Characterizing the latest stage of distance learning development, the researcher notes that insufficient attention was paid to students with disabilities in providing them with special conditions considering their pathologies (use of information and communication, technical, and assistive tools, adaptation of educational materials, teaching methods, approaches to the psychophysical characteristics of students with disabilities. According to the results of the conducted research, individuals with visual and hearing impairments, as well as those with musculoskeletal impairments, began to experience certain difficulties in completing the significantly increased number of independent assignments and demonstrated unpreparedness to transition from individual consultations to participation in frontal and group classes [14, 284].

In another publication, Z.A. Movkebayeva [15] examines the activities of the Resource Consultative Center for Inclusive Education at Abai Kazakh National Pedagogical University, which contributes to the realization of the rights and the professional and personal development of students with disabilities. According to her, the activities of the Resource Consultative Center for Inclusive Education include two main areas of activity: organizing psychological and pedagogical support for the educational process in higher education institutions of the Republic of Kazakhstan for students with disabilities and their subsequent employment; organizing and coordinating the activities of higher education institutions in the Republic of Kazakhstan for training pedagogical staff to work in the conditions of inclusive education [15, 63].

Additionally, Z.A. Movkebayeva emphasizes the need to improve the educational programs of higher education institutions with consideration for the needs of students with disabilities. She proposes a set of conditions (requirements) that should be considered when developing educational programs, including “the inclusion of an additional section, ‘Conditions for the Implementation of the Model Basic Educational Program for Persons with Disabilities’ in the structure of educational programs for all specialties” [16, 24], in which she includes special material and technical support tailored to the specific requirements of the educational programs.

Z.A. Movkebayeva considers it expedient to develop and implement special mandatory courses in higher education institutions, such as “Inclusive Education” and “The Rights of Persons with Disabilities”. However, there is no scientific research by this scholar on the use of assistive technologies in the implementation of inclusive education.

There are several scientific publications on the use of digital technology in the education of children with disabilities and the preparation of teachers for this process [17].

K.N. Darkulova [18], in her publication, presented an analytical review of the research by Kazakhstani researchers from 2010 to 2021 on the use of information and communication technologies and digital technologies in corrective work with children with disabilities (including those with speech, vision, hearing impairments, children with intellectual disabilities, and developmental delays). The review also covers the professional development of special education teachers through the use of ICT in secondary education, rather than higher education.

At the initial stage, there is research into augmented and virtual reality in inclusive education, as well as an evaluation of the accessibility of university websites for students with disabilities [19].

Several publications by domestic practitioner-researchers are available in this area. For instance, M.U. Mukasheva describes the special features and functions of using Windows 7 for people with hearing, visual, and mobility impairments that can be used in the learning process [20].

In his scientific article, the scientist and founder of the Public Association of People with Disabilities SEZUAL, G.E. Gabdreshov, provides a brief comparative analysis of foreign scientific research in the field of assistive technologies, where the majority of works are dedicated to methodological aspects of teaching blind individuals to read Braille. He, along with colleagues, has also developed an electronic tactile self-tutor for Braille and implemented this invention in a school for blind students in Atyrau, Kazakhstan [7]. This team has also developed the “SEZUAL BioLocator”, an assistive device for blind and visually impaired individuals, which enables complete orientation in open spaces without external assistance. The device emits specific high-pulse clicks that bounce off reflective objects to provide information about their shape, material, and distance. The returning echo activates the visual processing area in the trained echolocator's brain (official website). However, the implementation of these inventions requires significant financial investments, and the scientists and inventors are seeking investors and sponsors for their research project.

Ziyat Abdykaimov, an expert manager on assistive technologies and accessibility at Nazarbayev University, focuses on the issue of digital space accessibility in Kazakhstan. He points out the difficulty of obtaining government services online for people with disabilities, a challenge that became particularly pronounced during the pandemic. He also notes that Kazakhstan’s legislation does not promote the adherence to the UN Convention on the Rights of Persons with Disabilities, which the country ratified in 2015. The “Digital Kazakhstan” state program, adopted in 2017, also lacks provisions regarding digital environment accessibility for people with disabilities. Notably, Abdykaimov’s publications and interviews provide a comprehensive analysis from the perspective of a blind person, along with recommendations and solutions to the analyzed problems. In addition to his scientific publications [6], Ziyat is active on social media platforms such as Instagram and Facebook, where he discusses various aspects of inclusion in Kazakhstan, including the digital dimension.

Regarding the material and technical equipment of university classrooms with special devices for inclusive education, Nazarbayev University, most likely, was one of the first institutions to acquire the necessary equipment. In 2018, they opened an assistive technology room equipped with a computerized Braille complex for blind

students. The room also contains necessary equipment, furniture, and technical aids for students with mobility impairments and low vision [21].

During the analysis of existing domestic research, it was noted that there is a lack of scientific publications focusing on the analysis of websites and documents of Kazakhstan's universities regarding the adaptation program for WHO students to the educational process and social life of universities. Specifically, there is a lack of publications that detail an algorithm or mechanism for supporting students with disabilities in the inclusive higher education environment and the development of an accessibility passport for facilities and services for people with disabilities. Such documents are often seen in foreign universities, for example, in Cherepovets State University since 2012 or at Novosibirsk State Technical University (Institute of Social Technologies) [22].

5. Conclusion

The research confirmed the hypothesis that, despite the increased role of assistive technologies in inclusive education in recent years, their adoption and use in Kazakhstan are not at an adequate level. The COVID-19 pandemic led to a rapid increase in the need for the use of distance education technologies. As for assistive technologies, the analysis of existing scientific publications allows the authors to assert that they are limited in their use in inclusive education. This is due, first, to the absence of comprehensive research in the practical application of assistive technologies, and second, to the inadequate technical equipment of educational institutions.

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