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THE PHILOSOPHY OF EQUAL OPPORTUNITIES: ASSISTIVE TECHNOLOGIES IN THE CONTEXT OF INCLUSIVE HIGHER EDUCATION IN KAZAKHSTAN

In the context of the digital transformation of higher education, assistive technologies have become a crucial tool for ensuring inclusivity and implementing the principles of equal opportunities. This article examines AT from a philosophical and anthropological perspective, analyzing their role in creating an accessible educational environment for students with special educational needs. The research employed survey methods, comparative analysis, content analysis of documents, and general logical methods.

The study identified key barriers to the integration of assistive technologies in inclusive higher education in Kazakhstan. Despite a moderate level of awareness of AT among faculty members, their practical application remains limited. The main obstacles to the use of AT in the educational process include the lack of specialized training for faculty, incompatibility of technologies with existing IT infrastructure, and limited access to necessary software.

The aim of this study is to analyze the role of AT in implementing the philosophy of equal opportunities in inclusive higher education in Kazakhstan, to identify AT used in Kazakhstani universities to support the inclusion of students with special educational needs, and to determine faculty perceptions of the effectiveness of AT in the context of inclusive education.

Key words: philosophy of equal opportunities, inclusive higher education, assistive technologies, integration, sustainability.

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Тең мүмкіндіктер философиясы: Қазақстанның инклюзивті жоғары білім беру контекстіндегі көмекші технологиялар

Жоғары білім берудің цифрлық трансформациясы жағдайында көмекші технологиялар инклюзивтілікті қамтамасыз етудің және тең мүмкіндіктер қағидаттарын іске асырудың маңызды құралына айналуда. Бұл мақала КТ-ны философиялық-антропологиялық тұрғыдан қарастырып, олардың ерекше білім беру қажеттіліктері бар студенттер үшін қолжетімді білім беру ортасын қалыптастырудағы рөлін талдайды. Зерттеуде сауалнама, салыстырмалы талдау, құжаттардың мазмұндық талдауы және жалпы логикалық әдістер қолданылды.

Зерттеу нәтижелері Қазақстандағы инклюзивті жоғары білімге көмекші технологияларды енгізудегі негізгі кедергілерді анықтады. Оқытушылар арасында КТ туралы орташа деңгейдегі хабардарлық болғанымен, олардың іс жүзіндегі қолданылуы шектеулі болып отыр. КТ-ны оқу үдерісінде қолдануға кедергі келтіретін негізгі факторлар: оқытушыларға арналған арнайы даярлықтың жеткіліксіздігі, технологиялардың қолданыстағы IT-инфрақұрылымымен үйлесімсіздігі және қажетті бағдарламалық қамтамасыз етуге шектеулі қолжетімділік.

Бұл зерттеудің мақсаты – Қазақстандағы инклюзивті жоғары білім беру контекстінде тең мүмкіндіктер философиясын іске асырудағы КТ-ның рөлін талдау, қазақстандық жоғары оқу орындарында ерекше білім беру қажеттіліктері бар студенттер үшін қолданылатын КТ-ны анықтау, сондай-ақ оқытушылардың КТ-ны инклюзивті білім беруде пайдалану тиімділігі туралы қабылдауын зерттеу.

Түйін сөздер: тең мүмкіндіктер философиясы, инклюзивті жоғары білім беру, көмекші технологиялар, интеграция, тұрақтылық.

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Философия равных возможностей: вспомогательные технологии в контексте инклюзивного высшего образования Казахстана

В условиях цифровой трансформации высшего образования вспомогательные технологии становятся важным инструментом обеспечения инклюзивности и реализации принципов равных возможностей. Данная статья рассматривает ВТ с философско-антропологической точки зрения, анализируя их роль в создании доступной образовательной среды для студентов с особыми образовательными потребностями. В исследовании применялись методы опроса, сравнительный анализ, контент-анализ документов, общелогические методы. По результатам исследования были выявлены ключевые барьеры на пути внедрения вспомогательных технологий в инклюзивное высшее образование Казахстана. Несмотря на наличие умеренного уровня осведомленности о ВТ среди преподавателей, их практическое применение ограничено. Основными препятствиями к использованию ВТ в учебном процессе являются нехватка специализированного обучения для ППС, несовместимость технологий с существующей IT-инфраструктурой и ограниченный доступ к необходимому программному обеспечению.

Целью данного исследования является анализ роли ВТ в реализации философии равных возможностей в высшем инклюзивном образовании Казахстана, выявление ВТ, используемых в вузах Казахстана для обеспечения инклюзии студентов с особыми образовательными потребностями, а также определение восприятия преподавателями эффективности использования ВТ в контексте инклюзивного образования.

Ключевые слова: философия равных возможностей, инклюзивное высшее образование, вспомогательные технологии, интеграция, устойчивость.

Introduction

The philosophy of equal opportunities is a concept aimed at ensuring fair and equal access for all individuals to social benefits, resources, and opportunities, regardless of their physical, social, cultural, or economic differences. This idea is based on the principles of justice, equality, and the recognition of human dignity, which are fundamental to the development of an inclusive society.

Equality of opportunity is a goal that must be achieved in modern society, as outlined in various sustainable development goals. The concept of equality of opportunity has been explored by the philosopher Peter Westen. Westen argues that opportunity is a three-way relationship between an individual, certain obstacles, and a desired goal. However, an individual can be said to have an opportunity only if they have a genuine chance of reaching that goal. If an individual faces insurmountable barrier that make achieving the goal impossible, they cannot be said to have a real opportunity (Westen, 1982).

In the article Equality of Opportunity and Education (Equality of Opportunity and Education, n.d.), it is asserted that different goals may carry different levels of significance. Some goals may be trivial, and the question of whether people have equal opportunities to achieve them may be of little importance. For example, the ability to tie shoelaces or grow a tree in one's garden is less significant than the ability to find a decent job or obtain a quality education. It is crucial to carefully consider which obstacles are morally significant and which are morally irrelevant in relation to a given goal. For instance, race, religion, and sexual orientation should not influence an individual's opportunity to enter college, whereas hard work and learning ability should. Consequently, learning ability would be a relevant factor in the distribution of opportunities for college admission, while sexuality, religion, and race would not.

Applying this analysis to the current study, it becomes evident that assistive technologies (AT) are essential for creating equal opportunities in education for individuals with special educational needs.

Justification for the Choice of Topic; Goals and Objectives

Researchers analyze the meaning of the term "equal opportunities" through a combination of historical textual studies and philosophical analysis (Hansson, 2020). The "equality" in equal opportunities refers to the equality of individuals belonging to different groups, while "opportunities" primarily concern access to desirable activities and resources that are essential for an individual's career and life prospects. The pursuit of equal opportunities is a crucial component of the broader pursuit of social

justice. The primary reason for this is that equal opportunities are incompatible with discrimination, which involves treating individuals unfairly due to their membership in certain groups. Discrimination is a particularly dangerous form of inequality, as each act of discrimination reinforces stereotypes that may persist across generations. In our view, the implementation of assistive technologies can serve as an effective means of counteracting discrimination in the educational process and ensuring equal opportunities for students with special educational needs.

Other researchers emphasize the widely accepted perspective that inclusive education guarantees the right of all individuals to education by ensuring presence, participation, and progress for all learners, with a primary focus on equal opportunities (Medina-García et al., 2020). However, this remains a complex and controversial issue today, as it is reflected in international and European strategic frameworks and objectives, yet its implementation and real development are still far from being fully guaranteed rights. Moreover, the concept of inclusivity remains central in most educational policies and strategies. Therefore, researchers seek to determine which integration measures effectively contribute to the realization of equal opportunities. Accordingly, in this study, we examine assistive technologies as a specific form of integration measures aimed at facilitating the inclusion of students with disabilities into the educational process.

In the field of education, the philosophy of equal opportunities plays a central role, as it implies the creation of conditions under which every individual, regardless of their characteristics, can fully realize their educational potential.

The right to education is a fundamental human right. Ensuring high-quality and accessible education is one of the priorities of sustainable development (SDG 4), while "effective access to education services" for children with disabilities is emphasized in both the Convention on the Rights of the Child (1989) and the Convention on the Rights of Persons with Disabilities (2006).

Modern global trends significantly influence the realization of the right to education. In this context, assistive technologies (AT) serve as a key factor in transforming the inclusive education system, enhancing both accessibility and quality in the educational process. According to a report by the World Health Organization (WHO), every third person on the planet (over 2.5 billion people) requires at least one assistive device (World Health Organization & United Nations Children's Fund, 2022). Despite the fact that the need for the development of AT was first highlighted by the United Nations General Assembly in 1993 (The Standard Rules on the Equalization of Opportunities for Persons with Disabilities, 1993), the term "assistive technologies" was officially introduced in the Assistive Technology Act of 1998. According to this legislation, AT encompasses technologies intended for use in any devices or equipment designed to increase, maintain, or improve the functional capabilities of individuals with disabilities (Public Law No: 105-394, 1998).

Since then, the concept of assistive technologies has remained largely unchanged. According to WHO, AT is a broad term that refers to assistive devices as well as the related systems and services necessary for their implementation (World Health Organization & United Nations Children's Fund, 2022).

The relevance and advantages of assistive technologies (AT) for students with special educational needs lie in their adaptability of learning methods (Yenduri et al., 2023), provision of equal opportunities (Therasa, 2023), ensuring safe and effective learning (Viner et al., 2020), and their positive psychological impact on students' self-esteem and competencies (McNicholl et al., 2023). For the effective integration of AT into the educational process, it is essential that educators possess adequate knowledge about their implementation (Maushak et al., 2001; McNicholl et al., 2021), and that institutional administration actively supports inclusive initiatives (Kowalewski & Ariza, 2022).

AT in education are inextricably linked to the processes of digitalization and computerization. AT play an essential role in the remote learning of students with special educational needs (Hamitova, 2021). The development of artificial intelligence (Nikolaev et al., 2024) and the application of neuro-digital technologies in inclusive education (Malinichev et al., 2023) have also become integral components of the modern education system.

AT have demonstrated effectiveness in teaching children with diverse educational needs. They have been successfully applied in the education of children with Down syndrome (Krasniqi et al., 2022), hearing impairments (Alsalem & Alzahrani, 2024; Bell & Foiret, 2020), visual impairments (Kisanga & Kisanga, 2022), as well as those with dyslexia, dysgraphia, and dyscalculia (Thapliyal & Ahuja, 2023), among others. However, a systematic review of scholarly publications conducted by Sánchez et al. (2024) revealed a research imbalance in the study of AT applications for different categories of dis-

abilities. The majority of studies focus on hearing and visual impairments, while other forms of disabilities, such as cerebral palsy and cognitive impairments, remain insufficiently explored.

The implementation of AT in education is also complicated by issues of limited accessibility, the complexity of mastering these technologies, as well as technical challenges and device limitations (Hoskin et al., 2024).

An analysis of scientific publications by Kazakhstani researchers (Abdina et al., 2023) has shown that the topic of assistive technologies (AT) in the higher education system remains underexplored, with existing studies being sporadic. To address this research gap, the authors of this article conducted a quantitative study aimed at assessing the current state of AT use in Kazakhstani universities, determining the level of awareness of AT, and evaluating their effectiveness in inclusive education practices.

The objective of this study is to analyze the role of assistive technologies (AT) in implementing the philosophy of equal opportunities in inclusive higher education in Kazakhstan. Additionally, the study aims to identify the AT used in Kazakhstani universities to support the inclusion of students with special educational needs and to assess faculty perceptions of the effectiveness of AT in the context of inclusive education.

The philosophy of equal opportunities entails access to quality education, the removal of barriers related to physical limitations, economic status, cultural background, or geographic location, and the provision of tools that enable the adaptation of the educational process to individual needs. Based on this framework, the study seeks to answer the following *research questions*:

- What is the role of assistive technologies in implementing the philosophy of equal opportunities in inclusive higher education in Kazakhstan?
- Are assistive technologies being used in Kazakhstani universities to support the inclusion of students with special educational needs? If so, which technologies are being implemented?
- How do university faculty members in Kazakhstan perceive the effectiveness of assistive technologies in the context of inclusive education?

Research methodology

In this study, various research methods were employed, including comparative analysis, content analysis of documents, general logical research methods, and a sociological survey method.

The quantitative study was conducted using an online survey in higher education institutions in Kazakhstan from September to December 2023 through the OneClickSurvey platform (https://www.1ka.si/). The survey included N = 308 respondents, all of whom were university faculty members. Among them, 84.7% were women, 14.3% were men, and 1% did not indicate their gender identity. The mean age of participants was Mage = 45.4 (SD = 12.4). When completing the survey, 68.5% of respondents selected Russian as their preferred language, while 31.5% chose Kazakh.

Participants represented nine regions of Kazakhstan, with the highest number of respondents from Almaty (50%), Northern Kazakhstan (20.8%), and Astana (12%). Faculty members who participated in the survey were encouraged to share information about the study with their colleagues to increase the sample size, leading to the use of the snowball sampling method in participant recruitment.

The online survey addressed respondents' understanding of the principles of inclusive education and their professional experience in using assistive technologies.

The survey was developed in Kazakh and Russian and consisted of structured questions divided into several thematic blocks. The assistive technology section was specifically covered in questions 22 to 29.

Ethical approval for conducting the study was obtained from the Research Ethics Committee of Astana IT University (August 20, 2023, Protocol No. 1). Participants were fully informed about the research objectives and provided informed consent before participating in the study.

Results and discussion

The first section of the survey examined how faculty members assess their awareness of inclusive education principles and their experience working with students with special educational needs (SEN).

The frequency distribution indicates that the majority of respondents possess moderate awareness of inclusive education principles (57.5%) and strategies for working with students with SEN (56.8%). A small proportion of participants reported being unfamiliar with the topic (3.2% and 4.2%, respectively), whereas approximately one-quarter of respondents demonstrated a high or complete level of awareness (28.6% and 25.7%).

These findings align with previous research, which suggests that educators often acquire basic

knowledge of inclusive education but require additional support for effective implementation in practice (Ainscow, 2020; Florian, 2014). Notably, the level of awareness regarding specific strategies for working with students with SEN is lower than the general understanding of inclusive education principles. This underscores the need for targeted professional development initiatives and confirms the importance of continuous training in fostering an inclusive educational environment (Avramidis & Norwich, 2002; Sharma et al., 2012; Slee, 2011).

In addition to general awareness, this study examined respondents' personal experience interacting with individuals with SEN and their participation in specialized training. These factors significantly influence educators' confidence and readiness to implement inclusive practices (de Boer et al., 2011).

The results indicate that 67.2% of respondents had no personal experience interacting with individuals with SEN, while 10.1% reported having a family member with SEN, and 17.2% noted acquaintances or friends with such conditions. Only 5.5% of respondents indicated having colleagues with SEN. Limited personal contact may hinder the development of positive attitudes and effective teaching strategies for students with special educational needs (Van Mieghem et al., 2020).

Regarding formal training, only a small proportion of respondents had completed comprehensive courses (2.3%) or attended specialized seminars (8.8%). Additionally, 7.5% acquired knowledge through informal channels such as colleagues or online resources. Notably, almost half of the respondents (45.8%) had not received any training but considered it a mandatory component of professional development. Meanwhile, 19.2% had neither participated in training nor expressed interest in such courses, indicating a gap between the recognition of the importance of inclusive education and actual engagement in professional learning.

Among those who had completed specialized courses on teaching students with SEN, 68.0% rated their effectiveness as moderate, 18.7% found them more useful than not, while 13.3% considered them highly effective.

These findings indicate that, despite the perceived benefits of such courses, many educators feel that they lack a strong practical component. This conclusion aligns with previous research emphasizing the importance of continuous professional development that focuses on bridging theoretical knowledge with practical application in educational settings.

Awareness and Use of Assistive IT Technologies in Inclusive Education

After examining the effectiveness of professional training, attention is now directed toward respondents' familiarity with assistive IT technologies. Descriptive statistics show that among 261 respondents, the average level of awareness of such technologies remains low ($M = 1.36$, $SD = 1.08$ on a 0-4 scale). Specifically, 28.0% are not familiar with these technologies at all, while only 14.5% consider themselves well or very well informed. This suggests that despite a moderate level of awareness (33.0%), overall knowledge of assistive tools remains limited.

Continuing the analysis of educators' knowledge of assistive IT technologies, it is essential to examine the actual frequency of their use in teaching. Frequency distribution analysis shows that 26.8% of respondents never use such tools, and 21.1% use them rarely, whereas only 22.2% apply them frequently or very frequently. These results indicate that, despite the existing awareness, the practical application of technologies in the educational process remains limited. Previous research emphasizes that effective use of technologies in inclusive education requires not only knowledge but also systematic support and continuous professional development (Okolo & Diedrich, 2014).

The results concerning teacher training in the use of assistive IT technologies for students with special educational needs (SEN) reveal a significant gap in professional development. Only a small percentage of respondents reported having received specialized training, with just 0.8% and 5.0% indicating that they had undergone extensive or specialized training, respectively.

This lack of preparation is a serious concern, especially considering that almost half (49.0%) of respondents believe such training should be mandatory, while 18.4% have not received any training and do not intend to pursue it.

This situation underscores the urgent need for structured professional development programs aimed at enhancing educators' confidence and competence in effectively using assistive technologies (Botha & Mihai, 2024).

The moderate confidence demonstrated by the majority of participants (58.6%) in the effectiveness of these tools, along with 34.5% of respondents expressing a higher level of confidence, indicates potential for improvement through targeted training initiatives.

Research suggests that when learning opportunities are accessible and supported at the policy level, educators are more likely to effectively integrate assistive IT tools, thereby fostering a more inclusive educational environment (Ali, 2023). Furthermore, the integration of assistive technologies into educational processes has proven effective in minimizing learning barriers for students with disabilities, emphasizing the importance of systematic training and increased teacher awareness (Botha & Mihai, 2024).

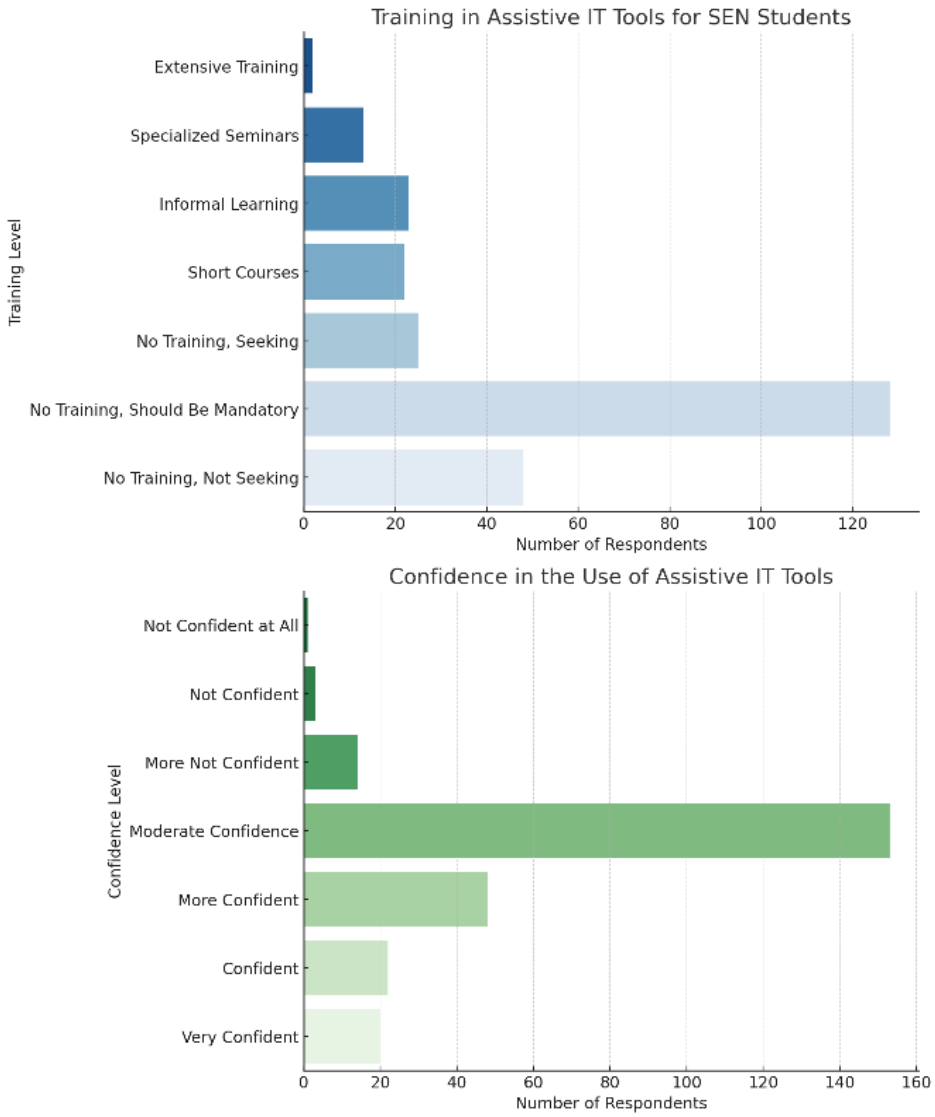

Figure 1

The analysis of information sources on assistive IT technologies among educators revealed a significant reliance on internet resources (44.5%), followed by seminars and training sessions (27.9%) and collaboration with colleagues (23.4%). This trend suggests that educators primarily engage in self-directed learning and leverage professional development opportunities to stay updated on technological innovations. Research indicates that educators are increasingly utilizing online resources for continuous professional development, highlighting the importance of digital access in enhancing pedagogical practices (Li & Wong, 2019).

Conversely, the relatively low engagement with academic materials, such as textbooks and scholarly articles (15.9%), points to a potential gap in integrating formal theoretical knowledge into practice. This finding aligns with existing research emphasiz-

ing the need for greater educator engagement with academic literature to enhance technological competence (Kennedy, 2016).

Furthermore, the use of trial-and-error methods (12.0%) among educators reflects a practical, experience-based approach to technology integration. Studies confirm that experiential learning methods contribute to improved educational outcomes (Qu et al., 2021).

Finally, the fact that only 3.6% of educators cite alternative sources of information suggests a tendency toward personalized learning methods, which may positively influence teaching quality and instructional effectiveness (Aderibigbe, 2021).

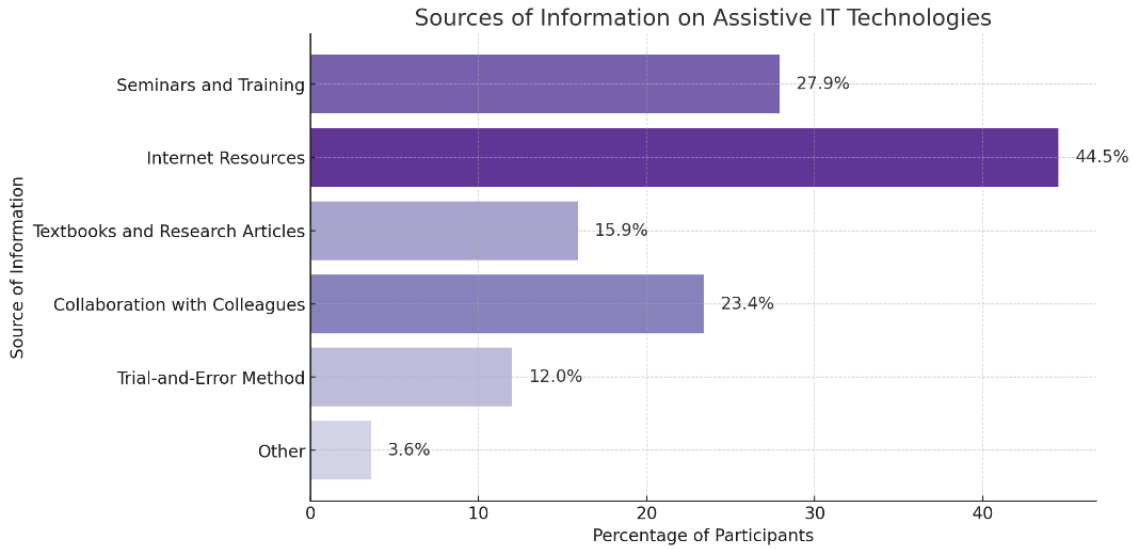

Figure 2

The Importance of Assistive Technologies

The majority of respondents (60.2%) adopted a neutral stance regarding the role of assistive technologies in creating an inclusive educational environment. However, 35.6% of participants expressed agreement, with 22.6% "somewhat agreeing" and 13.0% "strongly agreeing". Only 4.2% of respondents disagreed with this statement.

These findings suggest that, while assistive technologies are generally recognized as beneficial, many educators may lack the necessary knowledge and/or practical experience to confidently implement them. Previous research indicates that positive perceptions of assistive technologies are often linked to professional development opportunities and institutional support (Seale, 2014).

Barriers to the Implementation of Assistive Technologies

Despite the recognition of their importance, respondents identified several key barriers to the implementation of assistive IT technologies.

The most frequently mentioned issue was the lack of awareness among students and faculty regarding available tools, reported by 35.2% of respondents. This finding suggests that many participants in the educational process are unfamiliar with existing technologies, which limits their integration into the learning environment.

Among technical barriers, the most significant were:

- Incompatibility with the existing IT infrastructure of educational institutions (27.9%);
- Limited access to necessary software and equipment (27.4%).

These challenges indicate systemic constraints that hinder the adoption of assistive technologies. Additionally, financial limitations (18.8%) and technical failures (17.6%) further complicate the use of assistive tools.

Another notable challenge is the lack of training and support, cited by 19.5% of respondents, suggesting that professional development opportunities in this area may be insufficient. Furthermore, 9.2% of participants pointed to delays in receiving technical assistance, meaning that even when technologies are available, their effective use may be hindered by the absence of timely technical support.

These findings align with existing research emphasizing the importance of institutional investments, targeted training, and accessible support systems in overcoming barriers to the implementation of assistive technologies (Botha & Mihai, 2024; Van Mieghem et al., 2020). If these structural issues remain unaddressed, the potential of assistive technologies to create an inclusive educational environment will remain underutilized.

Conclusion and Findings

Based on the results of the conducted survey, the authors conclude that while faculty members in higher education institutions demonstrate a moderate level of awareness of assistive technologies (AT), their practical application in the educational process remains limited. This is primarily due to insufficient professional training in this area, as professional development courses on inclusive education tend to cover general aspects rather than specialized training on AT implementation.

Despite recognizing the importance of AT, respondents identified several key barriers to the implementation of assistive IT technologies, including:

- Lack of awareness among students and faculty about available tools (35.2%);
- Incompatibility with the existing IT infrastructure of educational institutions (27.9%);
- Limited access to necessary software and equipment (27.4%).

Thus, the philosophy of equal opportunities aims to eliminate barriers and promote the development of an educational system in which every individual has the opportunity to develop their potential regardless of external circumstances. To address these barriers, it is essential to increase institutional investments in the development of assistive technologies, implement targeted faculty training programs focusing on the effective integration of AT, and expand collaborative networks to foster knowledge exchange and best practices.

Only a comprehensive approach that integrates technical, pedagogical, and cultural transformation will enable the achievement of genuine inclusivity in higher education in Kazakhstan.

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References

Abdina, A., Uyzbaeva, A., & Zhanarstanova, M. Philosophy of independent living: the state of inclusive education in Kazakhstan (overview analysis of modern research). // Bulletin of the L.N. Gumilyov Eurasian National University. Historical Sciences. Philosophy. Religion Series. – Astana, 2023. – № 142(1). – pp. 135–157. https://doi.org/10.32523/2616-7255-2023-142-1-135-157

Aderibigbe, S. A. Can online discussions facilitate deep learning for students in General Education? // Heliyon. – 2021. – Volume 7, Issue 3. https://doi.org/10.1016/j.heliyon.2021.e06414

Ainscow, M. Promoting inclusion and equity in education: lessons from international experiences. // Nordic Journal of Studies in Educational Policy. – 2020. – VOL. 6, NO. 1. – pp. 7–16. https://doi.org/10.1080/20020317.2020.1729587

Ali, S. Quality of Academic Environment in Relation to Availability and Usage of Technology, Teachers' Awareness and Leadership of Principals in Schools for Hearing Impaired. // Siazga Research Journal. – 2023. – Vol. 2 No. 4. – pp. 292-299. https://doi.org/10.58341/srj.v2i4.37

Alsalem, M. A., & Alzahrani, H. A. In search of language development for students who are hard of hearing: measuring the effectiveness of assistive technologies through teaching practices. // Assistive Technology. – 2024. – Volume 36. – pp. 3–10. https://doi.org/10.1080/10400435.2023.2193761

Avramidis, E., & Norwich, B. Teachers' attitudes towards integration / inclusion: a review of the literature. // European Journal of Special Needs Education. – 2002. – Vol. 17. – Issue 2. – pp. 129–147. https://doi.org/10.1080/08856250210129056

Bell, D., & Foiret, J. A rapid review of the effect of assistive technology on the educational performance of students with impaired hearing. // Disability and Rehabilitation: Assistive Technology. – 2020. – Volume 15. – p. 838–843. https://doi.org/10.1080/17483107.2020.1775317

Botha, S., & Mihai, M. A. The use of assistive technology to minimise educational learning barriers for learners with cerebral palsy. // Journal of Education. – 2024. – Vol. 93. – pp. 23–42. https://doi.org/10.17159/2520-9868/i93a02

de Boer, A., Pijl, S. J., & Minnaert, A. Regular primary schoolteachers' attitudes towards inclusive education: a review of the literature. // International Journal of Inclusive Education. – 2011. – Vol. 15. – Issue 3. – pp. 331–353. https://doi.org/10.1080/13603110903030089

Equality of Opportunity and Education. (n.d.). [Electronic resource]: URL: https://edeq.stanford.edu/

Florian, L. What counts as evidence of inclusive education? // European Journal of Special Needs Educationю – 2014. – Volume 29. – pp. 286–294. https://doi.org/10.1080/08856257.2014.933551

Hansson, S. O. Equal Opportunity. In M. Sardoč (Ed.). // Handbook of Equality of Opportunity. – Springer International Publishing, 2020. https://doi.org/10.1007/978-3-319-52269-2

Hoskin, E. R., Coyne, M. K., White, M. J., Dobri, S. C. D., Davies, T. C., & Pinder, S. D. (2024). Effectiveness of technology for braille literacy education for children: a systematic review. // Disability and Rehabilitation: Assistive Technology. – Taylor and Francis Ltd., 2024. – Vol. 19. – Issue 1. – pp. 120–130. https://doi.org/10.1080/17483107.2022.2070676

Kennedy, M. M. How Does Professional Development Improve Teaching? // Review of Educational Research. – 2016. – Volume 86(4). – pp. 945–980. https://doi.org/10.3102/0034654315626800

Kisanga, S. E., & Kisanga, D. H. The role of assistive technology devices in fostering the participation and learning of students with visual impairment in higher education institutions in Tanzania. // Disability and Rehabilitation: Assistive Technology. – 2022. – Volume 17(7). – pp. 791–800. https://doi.org/10.1080/17483107.2020.1817989

Kowalewski, S. J., & Ariza, H. H. How assistive technology impacts college students and faculty. // The Business and Management Review. – 2022. – Volume 13(01). https://doi.org/10.24052/BMR/V13NU01/ART-04

Krasniqi, V., Zdravkova, K., & Dalipi, F. Impact of Assistive Technologies to Inclusive Education and Independent Life of Down Syndrome Persons: A Systematic Literature Review and Research Agenda. // Sustainability. – Switzerland, 2022. – Vol. 14, Issue 8. https://doi.org/10.3390/su14084630

Li, K.-C., & Wong, B. T.-M. The professional development needs for the use of educational technology. // Interactive Technology and Smart Education. – 2019. – Volume 16(2). – pp. 159–171. https://doi.org/10.1108/ITSE-10-2018-0089

Malinichev, D. M., Arpentieva, M. R., Khoteeva, R. I., & Koptyaeva, S. V. Neurodigital technologies in inclusive education: A theoretical review. // Pedagogy. Theory & Practice. – 2023. – Volume 8(7). – pp. 721–731. https://doi.org/10.30853/ped20230116

Maushak, N., Kelley, P., & Blodgett, T. Preparing Teachers for the Inclusive Classroom: A Preliminary Study of Attitudes and Knowledge of Assistive Technology. // The Journal of Technology and Teacher Education. – 2001. – Vol. 9. – pp. 419-431.

McNicholl, A., Casey, H., Desmond, D., & Gallagher, P. The impact of assistive technology use for students with disabilities in higher education: a systematic review. //Disability and Rehabilitation: Assistive Technology. – Taylor and Francis Ltd., 2021. – Vol. 16, Issue 2. – pp. 130–143. https://doi.org/10.1080/17483107.2019.1642395

Mcnicholl, A., Desmond, D., & Gallagher, P. Assistive Technologies, Educational Engagement and Psychosocial Outcomes among Students with Disabilities in Higher Education. // Disability and Rehabilitation: Assistive Technology. – Taylor and Francis Ltd., 2023. – Vol. 18(1). – pp.50-58. DOI: 10.1080/17483107.2020.1854874

Medina-García, M., Doña-Toledo, L., & Higueras-Rodríguez, L. Equal opportunities in an inclusive and sustainable education system: An explanatory model. // Sustainability. – Switzerland, 2020. – Volume 12(11). https://doi.org/10.3390/su12114626.

Okolo, C. M., & Diedrich, J. Twenty-Five Years Later: How is Technology Used in the Education of Students with Disabilities? Results of a Statewide Study. // Journal of Special Education Technology. – 2014. – Volume 29(1). – pp. 1–20. https://doi.org/10.1177/016264341402900101

Public Law No: 105-394. Assistive Technology Act of 1998 (1998). [[Electronic resource]: URL: https://www.congress.gov/bill/105th-congress/senate-bill/2432/text

Qu, G., Hu, W., Jiao, W., & Jin, J. Application of Deep Learning-Based Integrated Trial-Error + Science, Technology, Reading/Writing, Engineer, Arts, Mathematics Teaching Mode in College Entrepreneurship Education. // Frontiers in Psychology. – 2021. – Vol. 12. https://doi.org/10.3389/fpsyg.2021.739362

Sánchez, J., Reyes-Rojas, J., & Alé-Silva, J. What Is Known about Assistive Technologies in Distance and Digital Education for Learners with Disabilities? // Education Sciences. – Multidisciplinary Digital Publishing Institute (MDPI), 2024. – Vol. 14, Issue 6. https://doi.org/10.3390/educsci14060595

Seale, J. E-learning and Disability in Higher Education Accessibility Research and Practice. – Routledge, 2014. – Vol. 2nd Ed. – 280 p.

Sharma, U., Loreman, T., & Forlin, C. Measuring teacher efficacy to implement inclusive practices. // Journal of Research in Special Educational Needs. – 2012. – Vol. 12(1). – pp. 12–21. https://doi.org/10.1111/j.1471-3802.2011.01200.x

Slee, R. The Irregular School: Exclusion, Schooling and Inclusive Education. – Taylor & Francis, 2011. – 232 p.

Thapliyal, M., & Ahuja, N. J. Underpinning implications of instructional strategies on assistive technology for learning disability: a meta-synthesis review. // Disability and Rehabilitation: Assistive Technology. – 2023. – Volume 18(4). – pp. 423–431. https://doi.org/10.1080/17483107.2020.1864669

Therasa, M. M. Adapting Assistive Technology to Diverse Learning Needs in Inclusive Education. // Shanlax International Journal of Arts, Science and Humanities. – 2023. – Volume 11(S1). – pp. 63–66. https://doi.org/10.34293/sijash

The Standard Rules on the Equalization of Opportunities for Persons with Disabilities (1993). [Electronic resource]: URL: https://social.desa.un.org/issues/disability/resources/disability-resources/rules/standard-rules-on-the-equalization-of

Van Mieghem, A., Verschueren, K., Petry, K., & Struyf, E. An analysis of research on inclusive education: a systematic search and meta review. // International Journal of Inclusive Education. – 2020. – Volume 24(6). – pp. 675–689. https://doi.org/10.1080/13603116.2018.1482012

Viner, M., Singh, A., & Shaughnessy, M. F. Assistive Technology to Help Students With Disabilities. In Book: Special Education Design and Development Tools for School Rehabilitation Professionals. – IGI Global Scientific Publishing, 2020. – pp. 240-267. https://doi.org/10.4018/978-1-7998-1431-3.ch012

Westen, P. (1982). The Empty Idea of Equality. // Harvard Law Review. – The Harvard Law Review Association, 1982. – Volume 95. – No. 3. – pp. 537-596. https://doi.org/10.2307/1340593

World Health Organization & United Nations Children's Fund. Global Report on Assistive Technology. World Health Organization. – World Health Organization & United Nations Children's Fund, 2022. – 140 p.

Yenduri, G., Kaluri, R., Rajput, D. S., Lakshmanna, K., Gadekallu, T. R., Mahmud, M., & Brown, D. J. From Assistive Technologies to Metaverse: Technologies in Inclusive Higher Education for Students with Specific Learning Difficulties. – IEEE Access, 2023. http://arxiv.org/abs/2305.11057

Convention on the Rights of Persons with Disabilities. – 2006. [Electronic resource]: URL: https://www.un.org/ru/documents/decl_conv/conventions/disability.shtml (In Russian).

Convention on the Rights of the Child, Pub. L. No. – Resolution 44/25, 20 November, 1989. – [Electronic resource]: URL: https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_44_25.pdf

Nikolaev, A. A., Kuznecov, M. YU., & Nikolaev, V. A. Mezhdunarodnyj opyt i perspektivy ispol'zovaniya iskusstvennogo intellekta v obrazovanii. // Upravlenie Obrazovaniem: Teoriya i Praktika. – 2024. – Tom 14. – № 5–11. – ss. 125–138. [Nikolaev, A. A., Kuznecov, M. YU., & Nikolaev, V. A. International Experience and Prospects for the Use of Artificial Intelligence in Education. // Educational Management: Theory and Practice. – . – 2024. – Volume 14. – № 5–11. –pp. 125–138.] https://doi.org/10.25726/e8567-8724-8003-k (In Russian).

Hamitova, D. S. (2021). Pedagogicheskie usloviya organizacii distancionnogo obucheniya studentov s invalidnost'yu v vuze. – Dis. na sois. st. doktora filosofii PhD. 6D010500 – Defektologiya – Almaty, 2021. – 146 S. [Khamitova, D. S. (2021). Pedagogical Conditions for Organizing Distance Learning for Students with Disabilities in Higher Education. – Dissertation for the Degree of Doctor of Philosophy (PhD). 6D010500 – Defectology – Almaty, 2021. – 146 p.] (In Russian).

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