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Universal design for learning technologies as an essential component in preparing teachers for implementing inclusive practices

Abstract. In modern pedagogical practice, inclusive education is recognized as a key aspect both in the global and local context of education. In this regard, the preparation of teachers for working in inclusive education settings becomes significantly important. Particular emphasis is placed on the development of professional competencies, skills, and abilities to work with the individual characteristics and special needs of each student. This article discusses the features of applying the concept of Universal Design for Learning to enhance teachers' professional skills in an inclusive environment. The authors present the results of a study on the effectiveness of teachers in inclusive practice conducted within the framework of the program-targeted financing by the Ministry of Science and Higher Education of the Republic of Kazakhstan BR21882231 «Conceptual Model for Ensuring Inclusivity and Accessibility in the Secondary Education System of Kazakhstan» (2023–2025).

Keywords: inclusive education, children with special educational needs, Universal Design for Learning, professional training, professional competencies.

Introduction.

In Kazakhstan, as in many other countries, inclusive education is a crucial aspect of developing the educational system. The country's educational policy aims to achieve the United Nations Sustainable Development Goals, including providing inclusive and equitable quality education for all throughout life. Key strategic documents and regulatory acts outline the tasks needed to reach this goal [1–4]. In his Address to the People of Kazakhstan, President K.K. Tokayev emphasized that «our education system must be accessible and inclusive» [5]. Additionally, in the Address on September 1, 2023, he stated, «every child has an inalienable right to quality school education. The word «quality» is key. Therefore, we must consistently improve education quality and enhance teachers' competencies» [6]. The effective achievement of these objectives directly depends on the quality of teacher training in the country and the level of professional competencies among educators in providing high-quality and accessible education for all students.

The normative documents in the field of education in the country define the typical qualification characteristics of teaching positions. Among these, critical for subject teachers of all specializations are creating conditions for inclusive education, adapting curricula to meet the individual needs of students with special educational requirements, and participating in the development of individualized educational programs [7]. This raises the question of whether teachers are adequately prepared to fulfill these tasks. According to monitoring studies conducted by the Center for Inclusive Education of the National Academy of Education named after Y. Altynsarin, 70 % of teachers face difficulties in developing individualized educational plans and adapting curricula. Additionally, 40 % of the educational process does not consider the individual abilities and capacities of children [8]. This underscores the necessity of identifying specific skills, competencies, and

practical principles for effective work in an inclusive educational environment among the teaching staff. This article examines the features of applying Universal Design for Learning technology as one of the ways to enhance teachers' professional competencies in an inclusive setting.

The article also presents the findings of a study conducted under the program BR21882231 «Conceptual Model for Ensuring Inclusivity and Accessibility in the Secondary Education System of Kazakhstan» (2023–2025). The objective of this study is to develop scientific and methodological foundations, alongside a conceptual model, to ensure inclusivity and accessibility of quality education within Kazakhstan's secondary education system. The program includes the task of developing primary directions for a scientific and methodological support system aimed at preparing teachers for work in an inclusive environment. A main question of the program is to assess whether teachers are adequately prepared to implement inclusive practices at a professional standard and to evaluate the readiness of the educational environment and school entities to ensure inclusivity and accessibility in secondary education. To address these questions, the article presents the results of study conducted to evaluate the effectiveness of teachers' engagement in inclusive practices within the framework of the scientific program. Furthermore, the article elucidates the role of Universal Design for Learning (UDL) technology in enhancing teachers' professional competencies.

The objective of this study is to assess the effectiveness of educators in inclusive practice, identify the needs in their professional training, and explore methods and techniques for applying Universal Design for Learning (UDL) to enhance the quality of education, taking into account the individual abilities and special needs of all students. To achieve this objective, the following tasks were set: to study modern approaches to the application of Universal Design for Learning, the specifics of its use in the context of inclusive education, and to develop recommendations for the application of this technology to organize effective work for educators in diverse settings.

Researchers examined a range of international sources to address the question of the importance of using Universal Design for Learning (UDL) technology. Numerous studies demonstrate that applying this educational technology effectively enhances the success of all students in the learning process.

Based on the findings of neuroscientists, the fact that all students think differently due to the unique structure of their brains should not be seen as a chaotic process lacking order and structure. We can predict how this diversity will manifest in the learning process. It is important to note that learning differences do not always lead to difficulties; on the contrary, they often contribute to positive outcomes. UDL technology, which views learner diversity as a natural phenomenon, enables the optimal organization of the learning process for students with various interests, abilities, and learning styles [9].

Study results on the assessment of educational effectiveness show that employing UDL technology in the educational process enhances learning efficiency. This improvement is evidenced by increased student interest in new information, better levels of understanding, and the development of skills to convey information in various ways [10].

According to some researchers, when planning education with student diversity in mind and applying universal design for learning technology, it reduces barriers for children needing special education and creates conditions for their successful learning from the start [11].

Using UDL technology aids learners in assessing their learning outcomes, continually improving them, increasing engagement in learning, and fully participating in the educational process [12].

Summarizing researchers' opinions, the use of modern pedagogical methods and techniques, including UDL technology, emphasizes the importance of implementing an individualized approach to ensure access to quality education for all students.

Methods and organization of the study.

To ensure data validity during the study, we surveyed educators using a pre-developed and tested study instrument, following the country's current regulatory documents. We adhered to all ethical principles, including maintaining participants' anonymity. 6 186 respondents from 20 regions (17 regions and 3 cities of republican significance) participated in the survey. Most respondents were female schoolteachers with higher education, working in rural schools, and had 6 to 15 years of work experience. We conducted the survey using Google Forms.

The survey's main objective was to determine educators' confidence in their professional competence to create a comfortable educational environment that considers all students' individual abilities and special needs.

Study results and discussion.

During the study, 18 questions were asked to educators. We will focus on some of the key findings. The responses of educators to the statement, «I can use various assessment strategies (e.g., assessment, portfolio, modified tests, performance-based assessment, etc.)» are presented below (Figure 1).

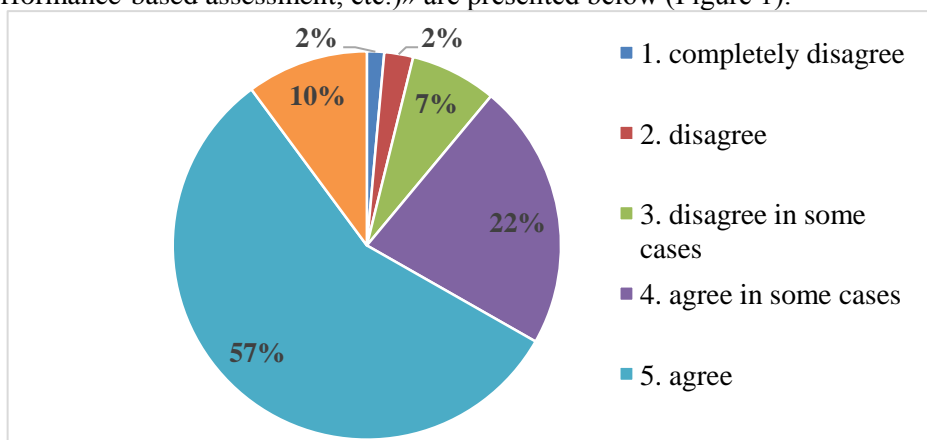


Figure 1. Teachers' responses to the statement: «I can use various assessment strategies (e.g., assessment, portfolios, modified tests, outcome-based assessments, etc.)» (Compiled by the authors based on the data obtained)

From the responses, it is evident that the majority of respondents use various assessment strategies in the educational process. However, the 11 % of respondents who did not respond positively to this statement are concerning. This figure underscores the necessity of organizing student performance assessments that consider the individual capabilities and special needs of each learner. It is noteworthy that, according to the order of the Minister of Education and Science of the Republic of Kazakhstan dated March 18, 2008, No. 125, when assessing students with special educational needs, teachers are required to use differentiated and/or individualized tasks and to modify assessment criteria based on the student's characteristics, including the implementation of individual educational programs [13].

If a student encounters difficulties with assignments, the teacher should propose an alternative approach and recognize that a single method does not suit all students. Beyond assessing the level of material comprehension among students, it is crucial for teachers to evaluate under which circumstances students assimilate the material. If a teacher can assess changes in students' skills, knowledge, and abilities during the learning process, they can also determine the causes of these changes. This means understanding not only the student's progress but also the factors influencing it. Therefore, it is essential to address the following questions: What does the student focus on? What strategies do they use? What motivates them? Which content is more engaging? What changes should be made to the content? What types of feedback and support foster skill development?

According to the principles of UDL technology, teachers should avoid limiting assessment to a single response option to ensure that the student has genuinely understood the material. It is important to provide diverse opportunities for demonstrating learned material based on various tools. Digital tools can assist teachers in this process. Only through flexible assessment that considers the diversity of students can the level of understanding of each student be adequately assessed [14].

Furthermore, it is essential for assessments to focus on assessment knowledge and skills. Often, many factors unrelated to the main purpose of assessment can negatively affect its accuracy. For example, requiring students to write answers by hand. A child may possess knowledge of the subject, but their writing abilities may be limited. Similarly, conducting a specific test in a short period can induce stress and hinder material comprehension.

According to UDL, assessment should serve as a foundation for dialogue between the teacher and the student regarding their strengths and weaknesses. Subsequent open feedback helps jointly determine effective learning methods. Continuous performance monitoring provides the student with various opportunities to demonstrate their understanding, knowledge, and skills. If, through this feedback, the student identifies their strengths and weaknesses and begins additional work on their performance, the teacher analyzes their progress and makes corresponding adjustments to the teaching strategy [14].

According to monitoring conducted by the CAST organization, student’s exhibit increased motivation to improve their performance when they receive feedback on their work. Similarly, teachers can make positive changes to their strategies if they receive feedback [15].

Teachers' responses to the statement: «I can provide alternative explanations or examples if students are struggling» are as follows: (Figure 2).

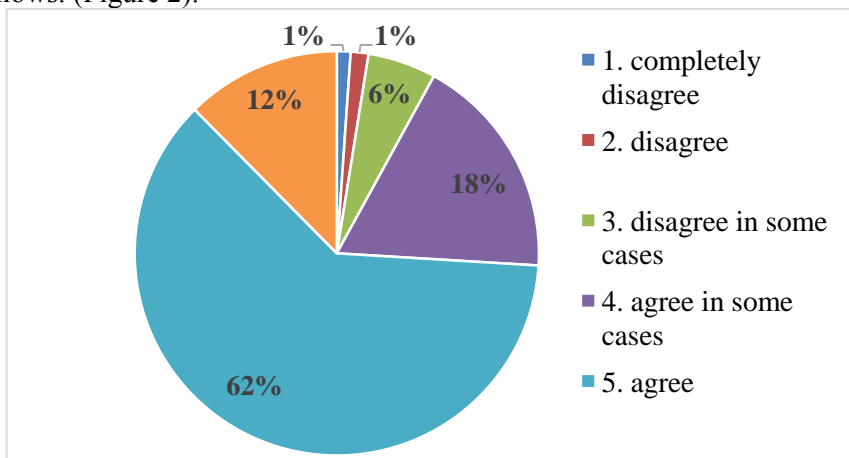


Figure 2. Teachers' responses to the statement: «I can provide alternative explanations or examples if students are struggling» (Compiled by the authors based on the data obtained)

The results from teachers' responses to the statement «I can provide alternative explanations or examples if students are struggling» demonstrate a high level of confidence in their competencies (74 %). This indicates the importance of implementing principles of differentiation and individualization to create a comfortable educational environment in the classroom. In the process of inclusive practice, to fully integrate children with different educational needs into the learning process, teachers develop individual educational plans, considering the capabilities and characteristics of each student. Consequently, many teachers express confidence in their ability to provide alternative explanations or examples in situations where students are struggling.

When developing educational materials, it is essential to consider their diversity and flexibility. Materials should be presented comprehensively, taking into account cultural and social aspects, as well as considering the age characteristics and abilities of children. Educational activities should be aimed at a real audience and define goals that are clear to the participants in the learning process [14].

According to the principles of Universal Design for Learning (UDL), educational materials should be accessible through various devices and include support (e.g., glossary, links, reference information, technical support, etc.). When selecting educational material, the focus should not be on finding the «right» material but on choosing material that meets the diverse needs of learners.

Teachers' responses to the statement «I can organize students' work in pairs or small group» are presented below (Figure 3).

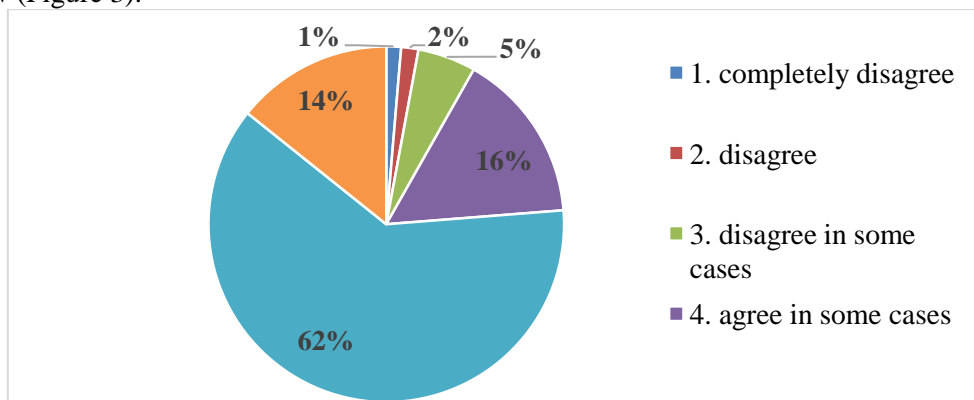


Figure 3. Teachers' responses to the statement: «I can organize students' work in pairs or small groups» (Compiled by the authors based on the data obtained)

From the responses presented, it can be concluded that there are no significant issues with organizing students' work in pairs or small groups by teachers. However, the proportion of teachers who either disagree with this statement or have expressed an ambiguous opinion is concerning.

The UDL technology is based on three main principles (Figure 4) [13]:

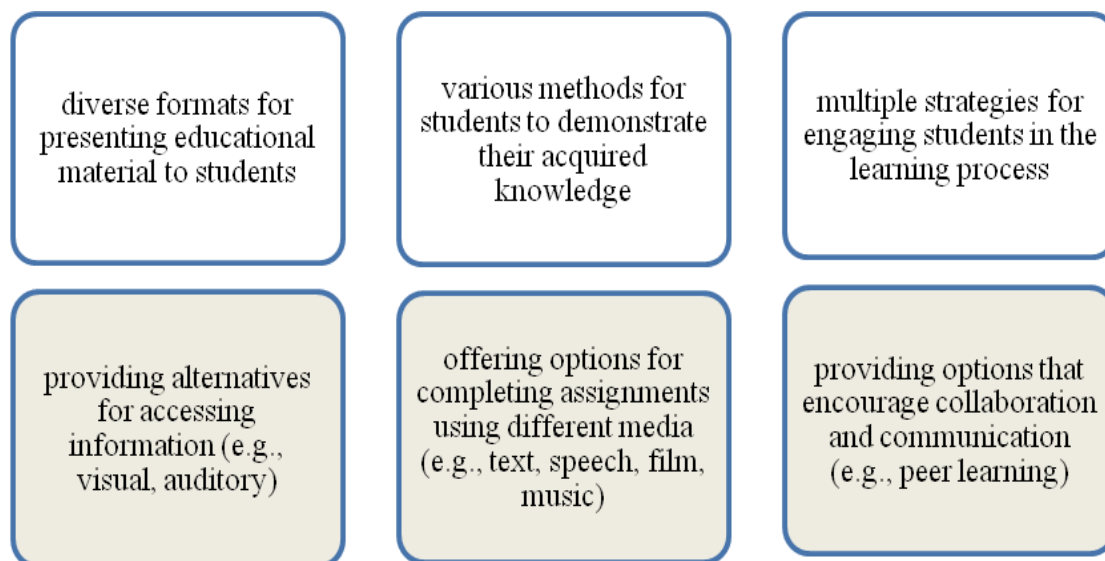


Figure 4. Fundamental Principles of Universal Design for Learning [13]

According to the fundamental principles outlined above, it is important to recognize that students' preferences may vary: some prefer individual work, while others excel in-group assignments. Researchers of UDL technology note that an individual's abilities change in a complex dynamic balance when interacting with others. All these factors should be considered by the teacher during the learning process, especially when organizing collaborative work. According to the Center for Applied Special Technology (CAST), the developer of Universal Design for Learning, the learning process and environment should be designed in advance, before the student enters the classroom, taking these aspects into account [16].

Conclusion.

Recent scientific discoveries in neurobiology cast doubt on the existence of clear boundaries between «normality» and «abnormality», as the human brain is constantly changing. In this regard, teachers should adapt the curriculum, considering possible differences among students and ensuring flexibility in learning. The Universal Design for Learning (UDL) technology provides an opportunity to create a flexible educational process that fosters the development of all children's abilities and overcomes the challenges they may face in the process of education.

The use of Universal Design for Learning provides educators with the opportunity to identify challenges in organizing the educational process and find creative ways to overcome them. This approach enables educators to define their development trajectory and plan improvement strategies, fostering both professional and personal growth.

The results of a study assessing the effectiveness of teachers' work in inclusive practice, conducted as part of a scientific program, underscore the need to enhance the professional competence of teachers nationwide. The article's authors view this as a basis for developing educational programs for university lecturers to better prepare future teachers for work in inclusive environments. Additionally, the authors concluded that the content of professional development programs for teachers needs to be reviewed to more effectively implement inclusive practices.

These measures aim to enhance teachers' professional competence, improve the country's professional development system for educators, and increase the readiness of future teachers to create inclusive educational environments in schools. Overall, these actions will establish a solid foundation for transitioning from a medical model of inclusive education to a socio-pedagogical model, shifting the focus from a child's diagnosis to their special needs and individual capabilities.

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Оқытудың әмбебап дизайны технологиялары педагогтерді инклюзивті тәжірибені жүзеге асыруға дайындаудың қажетті құрамдас бөлігі ретінде

Андатпа. Қазіргі заманғы педагогикалық практикада инклюзивті білім беру әлемдік контекстте де, жергілікті контекстте де маңызды аспектілердің бірі ретінде қарастырылуда. Сол себепті инклюзивті білім беруді іске асырудың маңызды шарттарының бірі ретінде педагогтердің инклюзивті жағдайда жұмыс істеуге дайындығы мәселелері өзектілене түсуде. Педагогтердің кез келген білім алушының жеке мүмкіндіктері мен ерекше қажеттіліктерін ескере отырып жұмыс істеуге кәсіби құзыреттіліктерін, біліктері мен дағдыларын дамытуға назар аударылуда. Берілген мақалада педагогтердің инклюзивті ортадағы кәсіби құзыреттіліктерін жетілдірудегі оқытудың әмбебап дизайны тұжырымдамасын қолдану ерекшеліктері қарастырылған. Мақала авторларымен Қазақстан Республикасы Ғылым және жоғары білім министрлігінің BR21882231 «Қазақстанның орта білім беру

жүйесінде инклюзивтілік пен колжетімділікті қамтамасыз етудің тұжырымдамалық моделі» (2023–2025 жж.) бағдарламалық-нысаналы қаржыландыруы аясында педагогтердің инклюзивті практикадағы тиімділіктерін анықтау бойынша жүргізілген зерттеу нәтижелері келтірілген.

Кілт сөздер: инклюзивті білім беру, ерекше білім беруді қажет ететін балалар, оқытудың әмбебап дизайны, кәсіби даярлық, кәсіби құзырет.

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Технологии универсального дизайна обучения как необходимый компонент в подготовке педагогов к реализации инклюзивной практики

Аннотация. В современной педагогической практике инклюзивное образование признается одним из ключевых аспектов как в глобальном, так и в локальном контексте образования. В связи с этим существенное значение приобретают вопросы подготовки педагогов к работе в условиях инклюзивного образования. Особый акцент делается на развитии профессиональных компетенций, навыков и умений работы с индивидуальными особенностями и особыми потребностями каждого обучающегося. В данной статье рассматриваются особенности применения концепции универсального дизайна обучения для совершенствования профессиональных навыков педагогов в инклюзивной среде. Авторами статьи приведены результаты проведенного исследования по определению эффективности педагогов в инклюзивной практике в рамках программно-целевого финансирования Министерства науки и высшего образования Республики Казахстан BR21882231 «Концептуальная модель обеспечения инклюзивности и доступности в системе среднего образования Казахстана» (2023–2025 гг.).

Ключевые слова: инклюзивное образование, дети с особыми образовательными потребностями, универсальный дизайн обучения, профессиональная подготовка, профессиональные компетенции.

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