

BREAKING BARRIERS IN INCLUSIVE EDUCATION – RESULTS OF TEACHERS’ READINESS TO IMPLEMENT INNOVATIONS IN THE WORK WITH CHILDREN WITH DISABILITIES

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Abstract. This study explores the relevance and urgency of ensuring barrier-free inclusion in educational practices for individuals with disabilities, particularly in the context of contemporary crises such as the war in Ukraine. The current state of the issue is examined through an analysis of scientific and pedagogical literature, alongside a review of practical developments in the educational field. The analysis reveals a number of persistent challenges, including deeply rooted psychological attitudes among educators, limited access to resources, insufficient levels of professional preparedness, and a lack of administrative, pedagogical, and community support for the implementation of inclusive innovations. Additionally, various institutional barriers continue to hinder progress in this area. It is established that the urgency of inclusive education has intensified in the context of current social disruptions, especially the war in Ukraine, which has resulted in the emergence of new categories of vulnerable children, such as those with psychological trauma, internally displaced status, or developmental disabilities. The article presents empirical findings from a survey of prospective teachers, aimed at assessing their readiness to implement inclusive innovations and support learners with special educational needs (SEN). The research was conducted within the framework of an experimental study at Ukrainian universities, comprising both ascertaining and formative stages. Comparative data are provided to illustrate shifts in future educators’ attitudes and levels of preparedness for overcoming inclusion-related barriers, particularly under the conditions imposed by martial law in Ukraine. The experimental study focused on assessing the professional readiness of future teachers to implement educational, digital, informational, and physical components of barrier-free practices. The author’s methodological framework, positioned as innovative and empirically validated, integrated digital tools and resources (such as immersive learning technologies, short educational videos, and animations on inclusion) with interactive teaching strategies, project-based learning, and case study analysis. The findings substantiate the critical necessity of implementing barrier-free education in its comprehensive sense, aimed at ensuring equitable access to quality education for all students, irrespective of their physical, cognitive, linguistic, social, or cultural characteristics. Emphasis is placed on the urgent need to adopt inclusive pedagogical strategies, adapt curricula and instructional methods, foster tolerance and acceptance of diversity, and cultivate a non-discriminatory and supportive educational environment.

Keywords: inclusive education, professional training of future teachers, barrier-free educational practices, pedagogical innovation, learners with disabilities, education in war conditions.

1. INTRODUCTION

Inclusive education constitutes a fundamental component of a democratic society (Jardinez & Natividad, 2024), wherein all individuals are guaranteed equal access to quality education regardless of their physical, cognitive, or social characteristics (Ashman & Elkins, 2012; Tichá, Abery & Kincade, 2018). In the context of ongoing global transformations within educational systems, there is an increasing imperative to enhance not only the theoretical foundations of inclusion (Rapp & Corral-Granados, 2021; Vasianovych & Budnyk, 2024) and its regulatory framework, but also the practical preparedness of educators to implement innovative pedagogical approaches when working with children with disabilities (Fernandez et al., 2023). This encompasses educators' ability to holistically comprehend the diverse needs of students with disabilities (Sydoriv, 2024), demonstrate cognitive flexibility, tolerance, and an inclusive attitude toward diversity (Diebold & Voneschenbach, 1991; Piekarski, 2024), and effectively employ contemporary pedagogical methodologies characterized by emotional sensitivity and a readiness to integrate innovative practices into the educational process (Zubiri-Esnaola et al., 2020).

The promotion of diversity and inclusion in education is a key priority within the framework of the Sustainable Development Goals and aligns with the strategic objectives of the European Union (EU). In the broader international context, considerable emphasis is placed on advancing gender equality, safeguarding the rights of persons with disabilities, and promoting cultural diversity as integral components of the global agenda for peacebuilding and the prevention of violence (OECD, 2013). The Strategy for Creating a Barrier-Free Space in Ukraine until 2030 outlines a comprehensive framework for the development and implementation of barrier-free policies across multiple domains, including physical, informational, digital, social and civic, economic, and educational spheres. The primary aim of this national policy is to create an inclusive environment that guarantees equal opportunities for all population groups by ensuring access to fundamental rights and essential services (National Strategy, 2021). This study focuses specifically on the educational dimension of the strategy, emphasizing the imperative of ensuring barrier-free access to quality education, particularly for individuals with disabilities, within the broader context of inclusive educational practices.

This issue becomes particularly critical during periods of crisis, especially in the context of war or armed conflict (Budnyk, 2024; Panchenko et al., 2022). Phenomena such as forced displacement of families, information warfare (Składanowski et al., 2025), disinformation campaigns (Łukasik-Turecka, 2023), the destruction of infrastructure, and widespread psychological trauma have markedly heightened the emotional and social vulnerability of children (Mazur, 2023; Nazaruk et al., 2024). In the context of armed conflict, inclusive education acquires not only pedagogical but also significant humanitarian relevance, as it pertains to the protection of the fundamental right to education for all individuals, including those with disabilities. According to a recent UNICEF report (2025), children with disabilities living in conflict-affected areas are twice as likely to face barriers in accessing educational services compared to their peers without disabilities. This finding highlights the critical urgency of establishing barrier-free educational environments that address physical, digital, and informational accessibility. Consequently, the importance of inclusive education during wartime extends beyond the fulfillment of legal and human rights obligations; it also plays a vital role in reinforcing social cohesion, promoting a more inclusive and solidaristic society, and supporting the psycho-emotional resilience of students impacted by crisis conditions.

From a theoretical perspective, a substantial corpus of scholarly literature has examined the principles of inclusive education and the strategies for addressing barriers to educational access and participation (Booth & Ainscow, 2011; Budnyk & Kotyk, 2024; Florian & Black-Hawkins, 2011; Horne & Timmons, 2009; Main, Chambers & Sarah, 2016; Tiernan, 2021). However, the practical realization of inclusive education continues to face persistent challenges that hinder the effective integration of children with disabilities into mainstream educational settings (Mazur, 2023). These challenges include

deeply rooted psychological attitudes among educators, inadequate material and human resources, insufficient methodological preparedness, and institutional limitations. In light of current societal disruptions – particularly the ongoing war in Ukraine – the issue of educational inclusion has acquired increased urgency. The system must now address the needs of a growing number of students experiencing new forms of vulnerability, such as psychological trauma, forced displacement, and developmental challenges. Within this context, the present study seeks to investigate the role of teachers' professional readiness to implement inclusive pedagogical innovations as a pivotal factor in overcoming educational barriers. This article offers a comprehensive analytical investigation of these issues based on empirical findings.

2. RESEARCH METHODS

2.1. Research Objectives and Methodology

This study was conducted with the following objectives: (1) to analyze the current state of barrier-free inclusive education as reflected in contemporary pedagogical discourse; (2) to evaluate the level of professional readiness among pre-service teachers to address and mitigate existing barriers in the education of children with special educational needs (SEN), particularly under crisis conditions such as wartime; and (3) to empirically substantiate the necessity of removing barriers to inclusion and implementing innovative pedagogical strategies for the effective education of learners with disabilities.

To address these objectives, a set of research methods was employed at each stage of the study, selected following the nature and aims of the investigation.

Stage I comprised a comprehensive review, synthesis, and generalization of scientific literature and pertinent media sources related to the research topic. This phase focused on exploring the nature and current status of innovation implementation, the fulfillment of inclusion-related objectives within educational institutions, and the multidimensional characteristics of barrier-free education within the pedagogical framework.

Stage II involved the design and validation of diagnostic tools, notably questionnaires, aimed at assessing the professional readiness of pre-service teachers to identify and overcome various barriers encountered in inclusive education under wartime conditions.

Stage III encompassed the deployment of empirical research methodologies, including surveys, the ascertaining phase, and a formative pedagogical experiment, to investigate participants' attitudes and preparedness regarding barrier-free education.

Stage IV utilized statistical analysis techniques to perform a rigorous quantitative and qualitative evaluation of the empirical data. These analyses supported the visualization of findings and informed the development of pedagogical strategies to facilitate the integration of innovative approaches for educators working with children with disabilities in the context of armed conflict.

2.2. Participants

The pedagogical experiment was conducted involving students from Ukrainian higher education institutions specializing in teacher training, specifically Bohdan Khmelnytsky National University of Cherkasy, Hryhorii Skovoroda University in Pereiaslav, and Zhytomyr Ivan Franko State University. The sample comprised 363 students enrolled in both full-time and part-time programs. Participants were allocated into two groups: a control group ($n = 184$) and an experimental group ($n = 179$). All participants were master's degree candidates with prior practical experience in inclusive classroom settings.

2.3. Tools and Procedures

The pedagogical experiment was conducted throughout the 2024–2025 academic year, during which the implementation of the author's innovative methodological framework was undertaken. This

framework incorporated a range of digital tools and resources – such as immersive learning technologies, short educational videos, and animations centered on inclusion – integrated with interactive pedagogical techniques, project-based learning, and case study analysis to enhance the efficacy of inclusive education practices.

Both the control group (CG) and the experimental group (EG) were evaluated to establish baseline levels and subsequent changes in the professional readiness of future teachers to address barriers within inclusive educational environments. Empirical data were collected using a specially designed questionnaire administered anonymously via Google Forms. The instrument comprised both open- and closed-ended items and aimed to assess prospective teachers' preparedness to operate in inclusive settings under crisis conditions, with particular emphasis on wartime contexts.

The survey was administered at two points: before and following the completion of participants' pedagogical practice in school settings. The collected data underwent rigorous mathematical analysis. The evaluation process comprised two phases – initial assessment and post-intervention measurement. To determine the statistical significance and reliability of the observed changes, the Kolmogorov-Smirnov test (λ) was utilized.

It should be noted that the study was based solely on participants' subjective perceptions of barrier-free inclusive education; therefore, the findings may not be fully generalizable to the broader population of future educators. Nonetheless, the results revealed discernible patterns in the attitudes and perspectives of prospective teachers concerning inclusive education. These findings highlight the critical importance and timeliness of implementing pedagogical recommendations aimed at overcoming existing barriers and fostering innovative, inclusive education practices, particularly within crisis contexts such as those currently prevailing in Ukraine.

3. RESULTS AND DISCUSSION

3.1. Scientific Concept of the Study

The multifaceted nature of inclusive education has been extensively examined within the international scholarly community (Norwich & Avramidis, 2002; Booth & Ainscow, 2011). Research has addressed diverse topics, including the governance and management of inclusive schools (Nikolaesku et al., 2021), the critical role of educators in cultivating supportive learning environments for students with disabilities (de Shalit, 2021), and the promotion of tolerance as an integral component of inclusive practices (Chen, 2021). Furthermore, significant scholarly attention has been directed toward the universalization of inclusive approaches, emphasizing their benefits for all learners, regardless of disability status (Molina Roldán et al., 2021).

As articulated by Florian and Black-Hawkins (2011), inclusive education transcends the mere physical integration of students with disabilities into mainstream classrooms. It demands a profound transformation of pedagogical culture and a reconceptualization of "diversity" within a global context. Fundamentally, inclusive education aims to foster understanding and acceptance, facilitate genuine integration, and ensure equitable access to quality educational opportunities for all learners (Gillard, 2009).

In his 2021 study, B. Tiernan delineates a critical distinction between the concepts of inclusion and full inclusion, a differentiation that holds particular significance for contemporary research addressing barriers within the educational sphere. Traditionally, inclusion in education is conceptualized as the integration of students with SEN into mainstream educational institutions, supported by the provision of appropriate auxiliary services. This understanding also extends to the organization of specialized classes or schools where targeted support is delivered, thereby reflecting an inclusive framework in a broader context.

However, as Tiernan (2021) highlights, while this model upholds the fundamental right to education for all and facilitates barrier-free access, it simultaneously engenders systemic challenges related to

educational equity. Specifically, it promotes equal access to learning opportunities while requiring individualized assessments of students with disabilities to determine their degree of participation within general education settings. This inherent duality can inadvertently perpetuate discriminatory practices against students with SEN, underscoring the complexity of implementing truly equitable, inclusive education. In this context, the concept of full inclusion – which implies the complete integration of all students, regardless of the severity or complexity of their disabilities, into general education settings – is not universally accepted. Its feasibility and legitimacy as a service delivery model for students with profound or multiple disabilities in regular schools continue to be subjects of critical debate and scrutiny (Tiernan, 2021).

Teachers' attitudes toward inclusive education remain a focal point of scholarly inquiry, especially about the challenges inherent in its effective implementation. These attitudes are influenced by multiple factors, including the extent of professional training, prior experience working with students with disabilities, and the level of institutional support from school administration, colleagues, and the wider community (Kefallinou et al., 2020). Empirical evidence underscores the critical importance of access to specialized training and ongoing professional development in enhancing teachers' readiness to adopt and implement innovative pedagogical approaches within inclusive educational environments (Norwich & Avramidis, 2002).

Within the academic literature, the concept of barrier-free education is interpreted through diverse theoretical frameworks and pedagogical perspectives. The subsequent section presents a succinct overview of these principal interpretations as they relate to the educational domain.

Physical barrier-free access refers to the condition of the spatial and material environment within an educational institution, where all physical infrastructure – such as ramps, elevators, accessible school transportation, training facilities, and sports grounds – is designed to be usable by all students, regardless of their physical or sensory abilities. This also encompasses the inclusive design and adaptation of classrooms, laboratories, and other learning spaces to accommodate the specific needs of individuals with musculoskeletal, visual, or auditory impairments. Ensuring such accessibility is fundamental to upholding the principle of equality in education (Ainscow, 2020; Piekarski, 2024).

Information accessibility refers to the provision of equal access to information for all students, taking into account their diverse communication needs. In the pedagogical context, this entails delivering educational content in formats that are accessible to individuals with visual, auditory, speech, cognitive, or other types of disabilities. Such formats may include Braille, audio materials, simplified language, sign language interpretation, and other adaptive communication tools that support inclusive learning.

Digital inclusion has become increasingly significant in the contemporary technological era, as it ensures equitable access to digital tools, resources, and services for all learners, regardless of their physical abilities, age, socio-economic status, or level of digital literacy (Remote Learning, 2020). In this context, educational systems at all levels must provide adapted online platforms, electronic content, and digital learning environments that accommodate a wide spectrum of users, including individuals with disabilities and those facing limited access to technology (Budnyk & Kotyk, 2024). In regions affected by military conflicts, such as the frontline areas of Ukraine, specific initiatives have been implemented to support digital inclusion. For instance, mobile teams have been deployed to conduct comprehensive psychological and pedagogical assessments of children with disabilities. Additionally, *Digital Learning Centers* have been established to deliver remedial education, catch-up programs, and social-emotional learning, thereby addressing the urgent educational needs of vulnerable student populations (UNICEF, 2023).

Social and civic inclusion refers to the establishment of conditions that enable every individual to participate fully in public and civic life, including involvement in decision-making processes, access to public services, and the exercise of civil rights (Council of Europe, 2016). In the pedagogical context, this concept encompasses the development of students' civic competencies, critical thinking, and social responsibility, as well as the cultivation of respect for human rights, diversity, and the principles of

equality and non-discrimination within the educational environment.

This concept is closely linked to *economic inclusion*, which encompasses efforts to combat child poverty globally – a key factor that impedes access to educational resources, financial services, and social protection mechanisms (Global Annual Results Report, 2021). Within the framework of this study, economic inclusion is understood as the process of reducing socioeconomic barriers to quality education by mitigating the impact of economic disadvantage on learning outcomes. This includes targeted support for students from low-income backgrounds through scholarships, social assistance programs, international educational initiatives, as well as the provision of free textbooks, digital devices, and other essential learning tools.

The implementation of *barrier-free educational practices* involves ensuring equitable access to education through an inclusive organizational approach. This encompasses the provision of lifelong learning opportunities, professional retraining, and continuous development aimed at acquiring supplementary competencies (National Strategy, 2021). Such measures require institutional guarantees that uphold access to quality education for all individuals, including those with disabilities, regardless of their physical, cognitive, linguistic, social, or cultural characteristics. Fundamental to this process are the adoption of inclusive pedagogical strategies, curriculum adaptation, modification of instructional methodologies, the promotion of tolerance, and the creation of a non-discriminatory and supportive educational environment (Main et al., 2016).

Within contemporary educational discourse, addressing barriers to inclusion necessitates the utilization of structured evaluative frameworks such as the Index for Inclusion. This framework comprises a comprehensive set of practical strategies designed to assess the level of inclusivity within educational institutions and to identify targeted areas for development. Its application facilitates not only the transformation of the educational environment but also fosters the cultivation of educators' innovative capacities and adaptability to systemic change (Booth & Ainscow, 2011). Complementing this framework, the Teacher Efficacy for Inclusive Practices (TEIP) scale was developed to quantitatively assess teachers' perceived effectiveness in inclusive educational settings. This instrument is predicated on the notion that teachers' self-efficacy – their confidence in their capacity to effectively instruct students with diverse learning needs – is a critical determinant of successful inclusive practice (Sharma et al., 2012). Empirical validation of the TEIP scale, conducted with extensive samples of pre-service teachers across Canada, Australia, Hong Kong, and India, has demonstrated that targeted professional development interventions designed to enhance inclusive teaching competencies substantially improve educators' attitudes toward students with disabilities and reinforce their acknowledgment of these students as equal participants within the educational process.

3.2. Results of the Empirical Study

Within the framework of this study, a specialized questionnaire was developed to evaluate the professional readiness of prospective secondary school teachers, including teacher assistants in inclusive classroom settings, to implement innovative inclusive education practices. The instrument was systematically constructed around core dimensions pertinent to the establishment of a barrier-free environment at both the societal and institutional levels, as delineated in the study's conceptual framework.

Concurrently, the research delineated four categorical levels of readiness among prospective teachers to adopt inclusive education practices within school contexts: high, satisfactory, medium, and low (refer to Table 1). These levels were operationalized based on critical criteria such as the availability of didactic materials adapted for learners with diverse needs, the integration of digital supports facilitating inclusive educational processes, the accessibility of customized instructional resources, and the existence of a barrier-free physical infrastructure within educational institutions.

Tab. 1

Levels of future teachers' readiness to create a barrier-free educational environment in school practice

Levels of development	Development indicators
<i>High level</i>	Demonstrates the ability to design and implement a didactic environment that guarantees accessibility for students with diverse educational needs; effectively employs digital technologies to enhance instructional delivery within inclusive classrooms; possesses practical expertise in the systematic adaptation of instructional materials to ensure clarity and accessibility for all students with SEN; and proactively addresses deficiencies in the physical infrastructure of educational institutions to align with barrier-free standards.
<i>Satisfactory level</i>	Possesses a foundational understanding of the challenges associated with organizing a didactic environment that facilitates accessibility for students with diverse educational needs, yet demonstrates limited practical application of this knowledge. Exhibits basic familiarity with digital tools for supporting instruction in inclusive classrooms, utilizing them sporadically. Attempts to adapt instructional materials for students with SEN, though, encounter challenges in effective implementation. Acknowledges shortcomings in the physical infrastructure regarding compliance with barrier-free standards and responds to such issues occasionally.
<i>Medium level</i>	Demonstrates a fundamental understanding of organizing a didactic environment that supports accessibility for students with diverse educational needs, yet exhibits limited practical initiative in this regard. Possesses rudimentary theoretical knowledge of digital tools applicable to inclusive classroom instruction, which remains largely unimplemented in practice. Acknowledges the importance of adapting instructional materials for students with SEN, though it shows limited confidence in the effectiveness of such adaptations. Sporadically identifies deficiencies in the physical infrastructure of educational institutions relative to barrier-free accessibility standards but refrains from undertaking corrective measures.
<i>Low level</i>	Exhibits inadequate knowledge concerning the organization of a didactic environment that ensures accessibility for students with diverse educational needs. Demonstrates a lack of digital competencies essential for effective instruction in inclusive classroom settings. Lacks both theoretical understanding and practical experience in adapting educational materials to accommodate the accessibility requirements of students with SEN. Furthermore, fails to identify deficiencies in the physical infrastructure of educational institutions regarding compliance with barrier-free accessibility standards.

Source: Own elaboration

The following section presents the survey findings collected from prospective teachers during the ascertaining and formative stages of the experiment for both the control group (CG) and the

experimental group (EG), encompassing the domains of barrier-free accessibility: educational, digital, informational, and physical (see Figures 1-4)

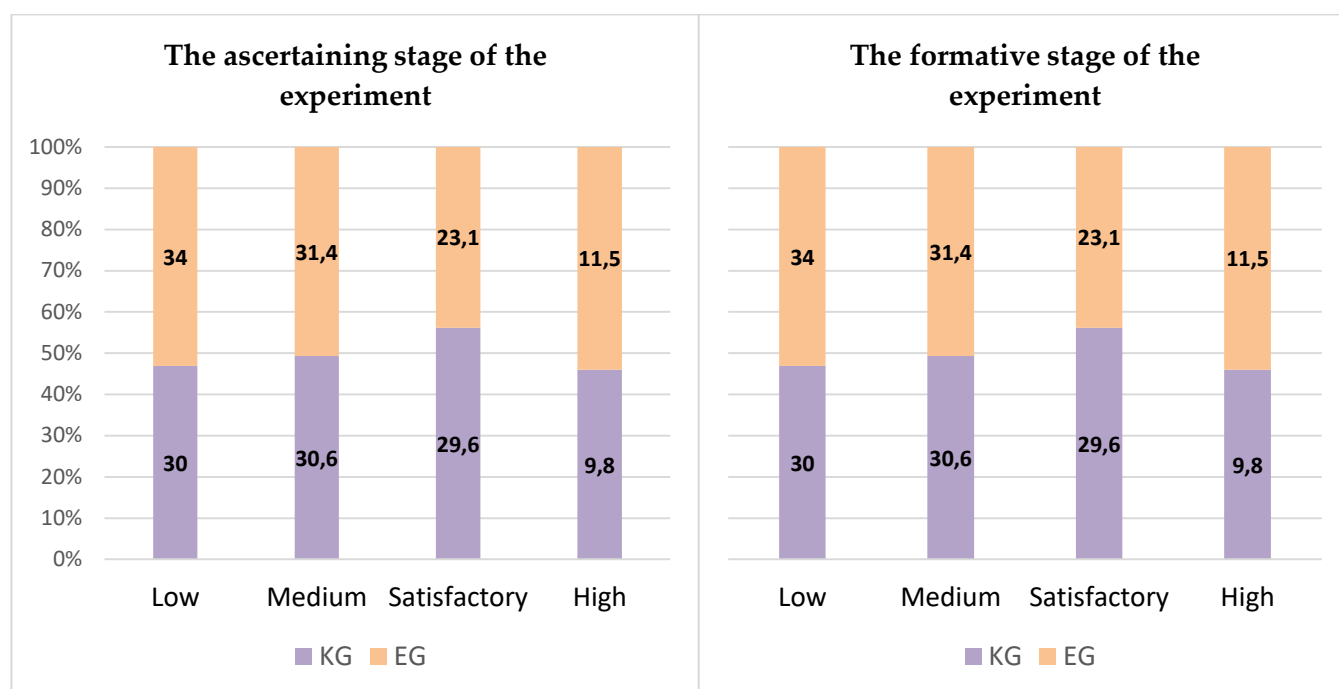


Fig 1. Educational accessibility: availability of teaching aids for students with SEN

Source: Own elaboration

As illustrated in Figure 1, prospective teachers demonstrate a predominantly positive attitude – particularly within the context of the Ukrainian education system during wartime – regarding the accessibility of teaching aids for children with disabilities in the institutions where they are currently employed or have previously worked. The data indicate a progressive trend in the enhancement of their professional readiness in the domain of educational barrier-free practices. Specifically, this readiness pertains to their capacity to adapt existing didactic tools or implement novel ones to facilitate inclusive education for students. At the initial, ascertaining phase of the pedagogical experiment, approximately one-third of respondents exhibited a low level of readiness, with 30.0% in the CG and 34.0% in the EG. Upon completion of the formative stage, these proportions shifted to 26.2% in the CG – reflecting a negligible change – and 15.0% in the EG, indicating a substantive reduction in low-level readiness and thus a meaningful improvement.

A similar pattern was observed across other assessed proficiency levels. For instance, at the onset of the experiment, the proportion of respondents demonstrating a satisfactory level in the CG was 29.6%, compared to 23.1% in the EG. By the conclusion of the study, these figures had increased to 33.2% in the CG and notably to 43.0% in the EG. Quantitative analysis of these changes reveals increases of 3.4% in the CG and 14.8% in the EG at the high proficiency level; 3.6% in the CG and 19.9% in the EG at the satisfactory level; and 0.8% in the CG and 15.7% in the EG at the average level. These results suggest that the control group exhibited no statistically significant improvement following the implementation of targeted innovations in professional training, particularly in the development of skills related to organizing communicative activities and fostering partnerships within an inclusive classroom environment, whereas the experimental group demonstrated marked progress.

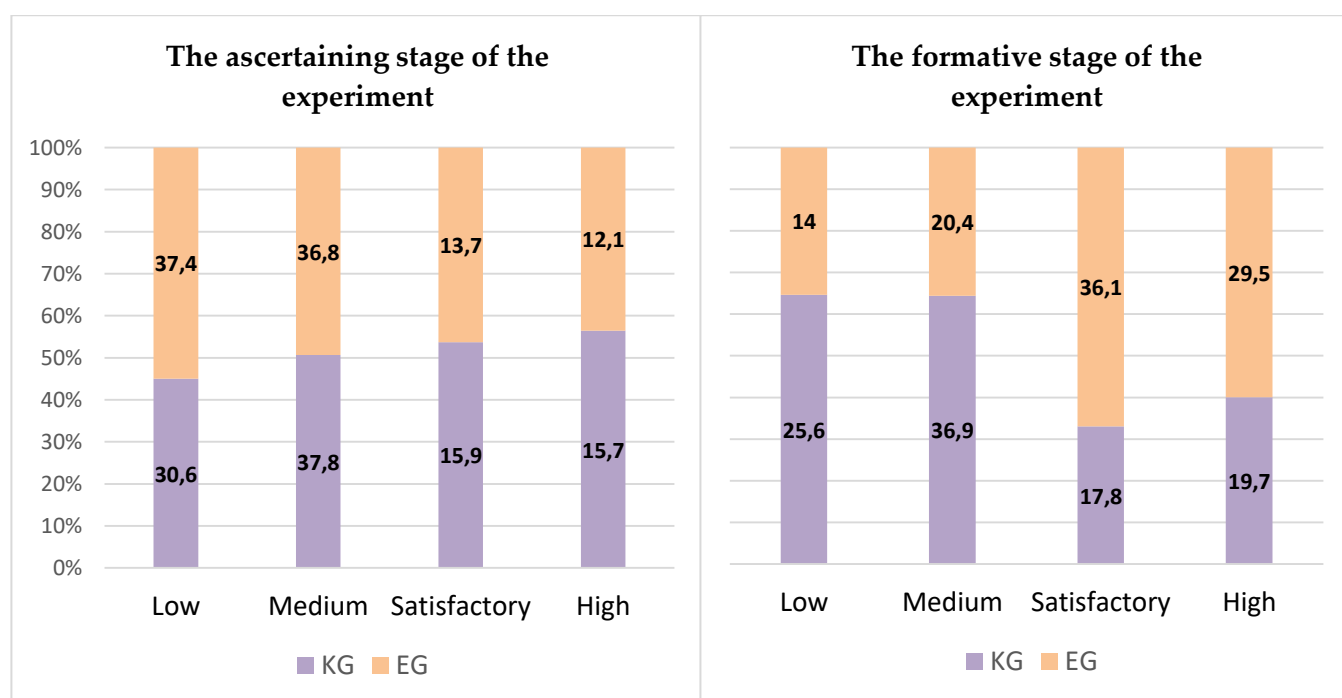


Fig. 2. Digital inclusion: providing digital support for the inclusive process

Source: Own elaboration

In the domain of digital inclusion and the preparedness of future educators to integrate digital tools within inclusive educational settings (Fig. 2), notable positive shifts were primarily observed in the EG. These shifts were reflected in a marked increase in the proportion of participants exhibiting satisfactory and high levels of digital competence. In the CG, the percentage of respondents demonstrating a satisfactory level of professional readiness increased slightly from 15.9% at the ascertaining stage to 17.8% at the formative stage. Conversely, the EG exhibited a more substantial improvement, with the proportion of participants at the satisfactory level rising from 13.7% to 36.1%, indicating a 22.4% gain. Additionally, the share of respondents in the EG classified as having a high level of readiness increased significantly from 12.1% to 29.5%, while the percentage of those at a low readiness level decreased by 23.4%. These findings suggest that the introduction of digital tools – despite contextual challenges posed by wartime conditions, including power outages and internet disruptions – had a positive impact on the development of digital competencies among future teachers and did not negatively affect the overall effectiveness of the intervention.

Figure 3 illustrates the dynamics of prospective teachers' readiness to address the challenges of information accessibility, with a focus on the adaptation of educational materials to meet the needs of all learners, irrespective of functional limitations or communication abilities. The data reveal a marked improvement in overcoming informational barriers related to access to learning resources and the facilitation of educational communication, particularly within the EG.

In the CG, only marginal changes were observed across all levels of readiness, suggesting the possibility of random variation rather than a direct effect of intervention. In contrast, the EG exhibited significant progress. The proportion of respondents demonstrating low levels of readiness declined sharply from 37.7% to 14.5%, and those with medium readiness decreased from 36.6% to 15.5%. Concurrently, participants with satisfactory levels of readiness increased from 14.5% to 41.8%, while those at the high readiness level rose from 11.2% to 28.7% between the initial and final phases of the experiment.

These outcomes underscore the growing competence among future teachers in designing educational materials that are accessible by default, eliminating the need for individualized adaptations. Furthermore, they reflect enhanced proficiency in the application of communication technologies, the

integration of accessible digital content, and the effective use of learning management systems (LMS) and other educational platforms tailored to support diverse learners in inclusive environments.

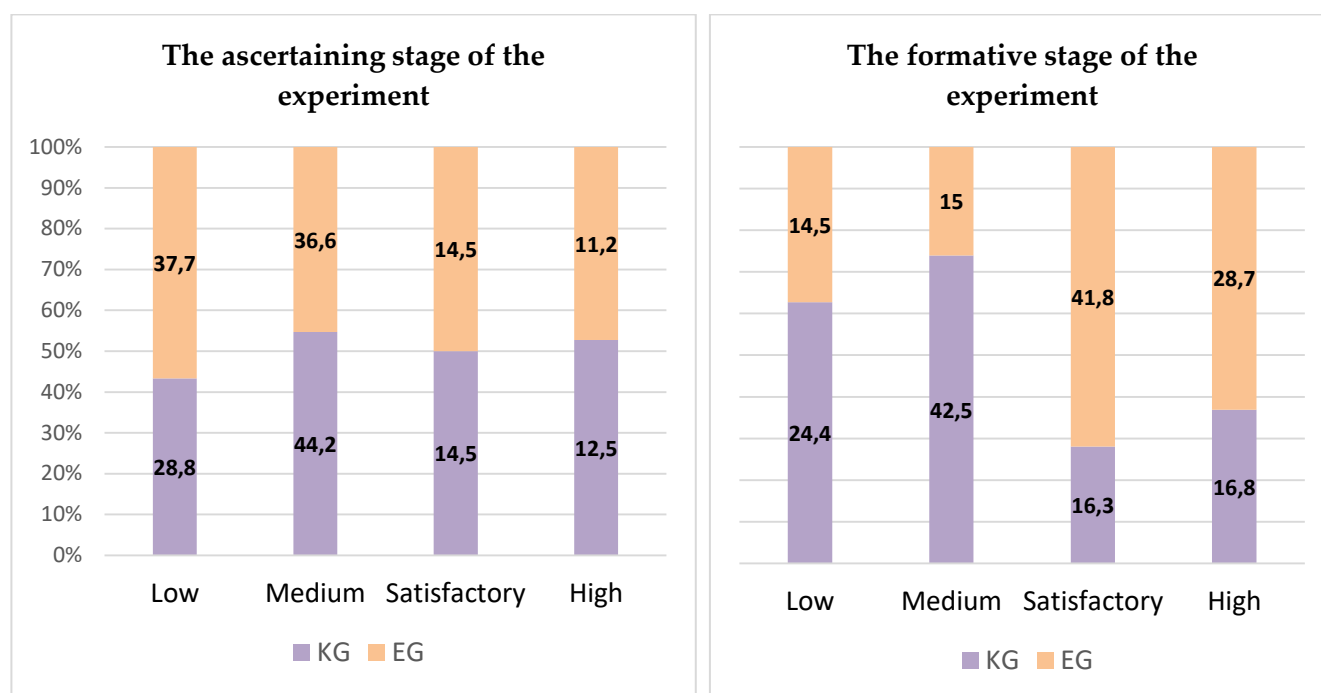


Fig. 3. Information accessibility: the adaptation of educational materials to ensure equitable access for all students, irrespective of their functional impairments or communication abilities

Source: Own elaboration

The issue of physical barrier-free access was addressed in this study in a somewhat indirect manner, given that its primary resolution often falls within the purview of educational administrators. Nevertheless, teachers, as key agents of change in advancing inclusive education, must also be attuned to the presence of physical barriers within educational institutions and actively contribute suggestions for improving the built environment in alignment with the needs of students with disabilities. Numerous national and international programs aimed at enhancing inclusive physical spaces provide opportunities for the creative involvement of young educators in such efforts.

The data presented in Figure 4 reflect the degree of readiness among future teachers to engage in these processes and highlight a positive shift in the EG following the pedagogical intervention. Notably, 30.0% of EG participants exhibited a low level of readiness to address physical accessibility issues at the ascertaining stage of the study, while 29.8% demonstrated a medium level. By the conclusion of the formative phase, these figures had declined to 12.9% and 14.9%, respectively. Concurrently, there was a marked increase in the proportion of respondents who achieved satisfactory and high levels of readiness. In contrast, the CG did not exhibit comparable progress.

These findings suggest that the experimental intervention fostered a heightened awareness among prospective teachers regarding the significance of physical accessibility and their potential role in advocating for inclusive infrastructure improvements. This enhanced readiness signifies a growing capacity to support progressive innovations in the creation of inclusive educational environments.

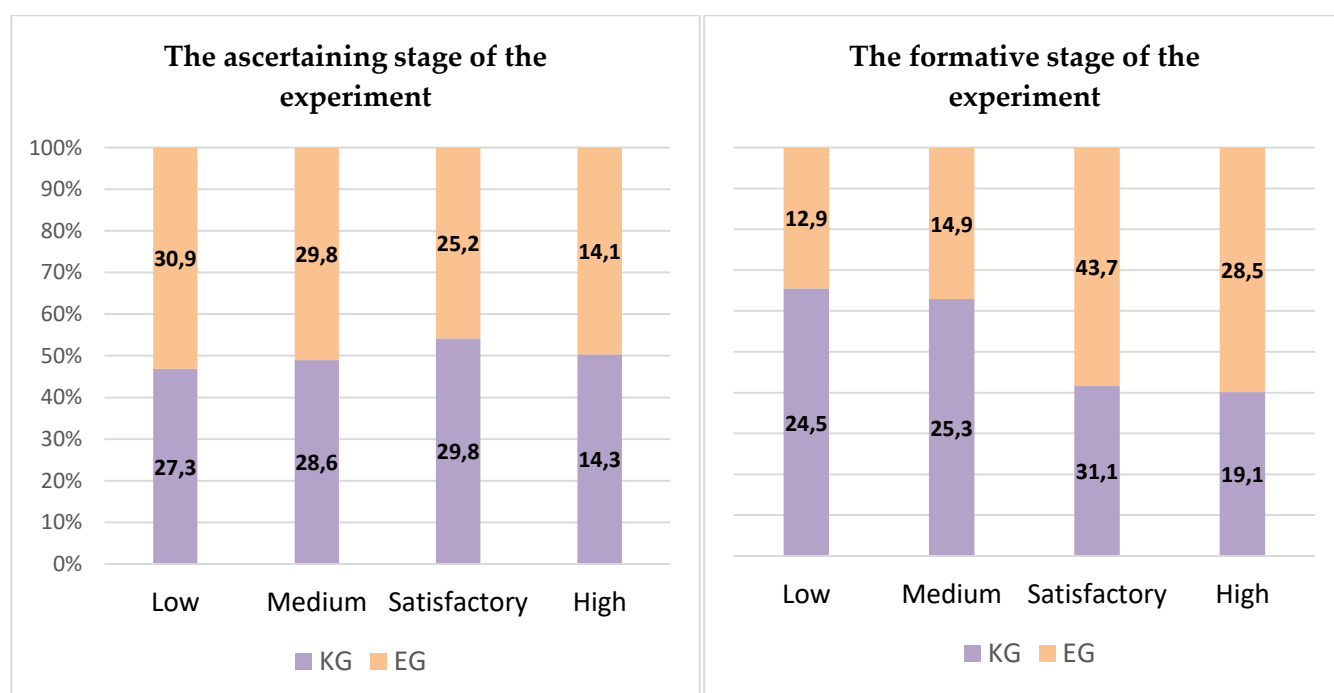


Fig. 4. Physical barrier-free environment: the modification of the educational institution's physical infrastructure to accommodate individuals with special educational needs (SEN)

Source: Own elaboration

The statistical significance of changes in the distributions of CG and EG respondents across levels of readiness to overcome inclusion barriers within educational institutions – measured at the beginning and end of the experiment – was evaluated using the Kolmogorov-Smirnov λ -test. This procedure followed standard methodology, as detailed in Table 2.

Tab. 2

Empirical values of the Kolmogorov-Smirnov λ statistic derived from the pedagogical experiment data

Criteria for barrier-free accessibility in educational institutions	CG before and after the experiment	EG before and after the experiment	CG and EG – the Ascertaining Experiment	CG and EG – Formative Experiment
Accessibility of teaching aids for students with different needs	0.49	3.49	0.55	2.28
Digital support for the inclusive process	0.48	3.89	0.65	2.77
Ability to adapt teaching materials	0.42	4.46	0.94	3.56
Barrier-free physical space of the educational institution	0.46	3.23	0.46	2.19

Source: Own elaboration

The experiment yielded observable changes in the distribution of indicators reflecting future teachers' readiness to establish a barrier-free educational environment in school practice. Statistical analysis corroborates these findings, demonstrating that: (a) at the initial (ascertaining) stage, no statistically significant differences were detected between the CG and EG concerning the levels of the assessed parameters; and (b) following the completion of the formative stage, the EG exhibited a notable increase in the level of formation of specific indicators, particularly concerning the adaptation of educational materials for students with disabilities and the integration of digital technologies within the inclusive classroom setting, (c) in the CG, minor changes in the levels of formation were observed following the formative experiment. However, these changes were not systematic and are likely attributable to random variation.

4. CONCLUSIONS

The analysis of the literature indicates that the successful overcoming of barriers in inclusive education is contingent upon a high level of teacher preparedness, which is developed through comprehensive professional training, accumulated practical experience, and adequate institutional support. Within this framework, the integration of innovative practices emerges as both a necessary and effective strategy to enhance educators' capacity to work with children with disabilities and to address various pedagogical barriers. The conducted pedagogical experiment demonstrated a positive trend in the increased readiness of prospective teachers to implement such innovations in the context of barrier-free education. Consequently, based on the comparison of the calculated empirical values of the λ -criterion with the corresponding critical values, the following conclusions were drawn.

Before the experiment, all empirical values calculated for each indicator when comparing the distributions of the CG and EG during the formative stage were below the critical thresholds for significance levels of $p < 0.05$ and $p < 0.01$. This signifies that, before the intervention, there were no statistically significant differences between the CG and EG in the levels of the measured indicators, indicating a high degree of comparability between the groups.

The empirical criterion values calculated from the data on the distributions of the CG at the formative experiment stage for each indicator were also below the critical thresholds for significance levels of $p < 0.05$ and $p < 0.01$. This suggests that the observed changes in the CG distributions are random and lack statistical significance.

Following the formative experiment, a comparison of the empirical criterion values calculated from the distributions of students in the CG and EG, as well as the EG's pre- and post-experiment data for the levels of the selected indicators, revealed the following relationship: $\lambda_e > \lambda_c$. This indicates the presence of statistically significant differences between the CG and EG in the levels of the measured parameters after the intervention. Specifically, the readiness level of future teachers in the EG exceeded that of the CG, demonstrating the effectiveness of the specialized training received by the EG. These differences are therefore statistically significant and not due to chance. Consequently, it can be concluded that the implementation of pedagogical strategies aimed at overcoming barriers in inclusive education and enhancing future teachers' readiness in this domain represents a relevant, critical, and necessary component of teacher education, particularly in light of contemporary challenges, including those posed by military conditions.

Further research is needed to examine the implementation of barrier reduction strategies within additional domains – namely, economic, social, and civic accessibility – within the pedagogical framework of ensuring equitable access to quality education, accounting for diversity and contextual differences.

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REFERENCES

- [1] Ainscow, M. (2020). Inclusion and equity in education: Making sense of global challenges. *Prospects*, 49, 123–134. <https://doi.org/10.1007/s11125-020-09506-w>
- [2] Ashman, A., & J. Elkins, eds. (2012). *Education for Inclusion and Diversity*. 4th ed. French's Forest: Pearson Australia.
- [3] Booth, T. & Ainscow, M. (2011). *Index for Inclusion: Developing Learning and Participation in Schools*. Centre for Studies on Inclusive Education, Bristol.
- [4] Budnyk, O. (2024). Problems of Professional Activity of Teachers Working with Students with Disabilities: Challenges of the Russian-Ukrainian War. In O. Budnyk & S. Sydoriv (Eds.), *The Space of Inclusive Education: Voices from Ukraine and Beyond*. Editors: Series: Studies in Inclusive Education, 53. The Netherlands: Brill. Leiden (pp. 272–281). https://doi.org/10.1163/9789004688131_029
- [5] Budnyk, O., & Kotyk, M. (2024). Information and Communication Technologies in Teaching Students with Special Educational Needs. In O. Budnyk & S. Sydoriv (Eds.), *The Space of Inclusive Education: Voices from Ukraine and Beyond*. Editors: Series: Studies in Inclusive Education, 53. The Netherlands: Brill. Leiden (pp. 224–233). https://doi.org/10.1163/9789004688131_024
- [6] Chen, X. (2021). Tolerance and Inclusion. In: *The Essentials of Habermas*. Springer, Cham. https://doi.org/10.1007/978-3-030-79794-2_7
- [7] Council of Europe, 2016. *Competences for democratic culture – Living together as equals in culturally diverse democratic societies – Executive summary (2016)*, Council of Europe. France. <https://coilink.org/20.500.12592/5mp091> on 08 Jun 2025. COI: 20.500.12592/5mp091
- [8] Diebold, M. H., & Voneschenbach, J. F. (1991). Teacher Educator Predictions of Regular Class Teacher Perceptions of Mainstreaming. *Teacher Education and Special Education*, 14(4), 221–227. <https://doi.org/10.1177/088840649101400402>
- [9] Fernandez, I. L., Dosil-Santamaria, M., Idoiaga Mondragon, N., & Ozamiz-Etxebarria, N. (2023). Teachers' Involvement in Inclusive Education: Attitudes of Future Teachers. *Education Sciences*, 13(9), 851. <https://doi.org/10.3390/educsci13090851>
- [10] Florian, L., & Black-Hawkins, K. (2011). Exploring Inclusive Pedagogy. *British Educational Research Journal*, 37, 813–828. <https://doi.org/10.1080/01411926.2010.501096>
- [11] Gillard, D. (2009). Us and Them: a history of pupil grouping policies in England's schools, *FORUM*, 51(1), 49–72. <https://doi.org/10.2304/forum.2009.51.1.49>
- [12] Global Annual Results Report 2021: Every child has an equitable chance in life. Goal Area 5: Progress, results achieved, and lessons from 2021. (2022). *UNICEF for every child*. <https://www.unicef.org/reports/global-annual-results-2021-goal-area-5>
- [13] Horne, P. E., & V. Timmons (2009). Making it Work: Teachers' Perspectives on Inclusion. *International Journal of Inclusive Education*, 13(3), 273–286. doi:10.1080/13603110701433964
- [14] Jardinez, M. J., & Natividad, L. R. (2024). The Advantages and Challenges of Inclusive Education: Striving for Equity in the Classroom. *Shanlax International Journal of Education*, 12(2), 57–65. <https://doi.org/10.34293/education.v12i2.7182>
- [15] Kefallinou, A., Symeonidou, S., & Meijer, C. J. W. (2020). Understanding the value of inclusive education and its implementation: a review of the literature. *Prospects* 49, 135–152. <https://doi.org/10.1007/s11125-020-09500-2>

- [16] Łukasik-Turecka, A. (2023). Disinformation in the Polish Media Space in the First Year of Russia's Full-Scale Aggression against Ukraine. *Przegląd Strategiczny*, 16, 251-260. <https://doi.org/10.14746/ps.2023.1.18>
- [17] Lyons, W. E., Thompson, S. A., & Timmons, V. (2016). We are inclusive. We are a team. Let's just do it: commitment, collective efficacy, and agency in four inclusive schools. *International Journal of Inclusive Education*, 20(8), 889-907. <https://doi.org/10.1080/13603116.2015.1122841>
- [18] Main, S., Chambers, D. J., & Sarah, P. (2016). Supporting the transition to inclusive education: teachers' attitudes to inclusion in the Seychelles. *International Journal of Inclusive Education*, 20(12), 1270-1285. <https://doi.org/10.1080/13603116.2016.1168873>
- [19] Mazur, P. (2023). The meaning of life and the noetic dimension of existence – a case study [Sens życia i noetyczny wymiar egzystencji – studium przypadku]. *Scientific Bulletin of Chelm*, 1, 97-108. https://scientific.panschelm.edu.pl/wp-content/uploads/S_23_01_07_Mazur.pdf (in Polish)
- [20] Molina Roldán, S., Marauri, J., Aubert, A. & Flecha, R. (2021). How Inclusive Interactive Learning Environments Benefit Students Without Special Needs. *Frontiers in Psychology*, 12, 661427. <https://doi.org/10.3389/fpsyg.2021.661427>
- [21] National Strategy for Creating a Barrier-Free Space in Ukraine until 2030. Approved by the Order of the Cabinet of Ministers of Ukraine of April 14, 2021, No. 366 (as amended by the Order of the Cabinet of Ministers of Ukraine of March 25, 2025, No. 294-p). <https://zakon.rada.gov.ua/laws/show/366-2021-%D1%80#Text> (in Ukrainian)
- [22] Nazaruk, S., Ruszkowska, M., Budnyk, O., Dąbrowska, I., & Sokołowska, B. (2024). Experiences of the Polish teachers of primary schools in working with war refugee students from Ukraine – selected problems, limitations, and implications for pedagogical practice. *Education 3-13* (Taylor & Francis), 1–14. <https://doi.org/10.1080/03004279.2024.2336968>
- [23] Nikolaesku, I., Budnyk, O., Bondar, V., Tepla, O., & Berezovska, L. (2021). Pedagogical Management in the Inclusive Process of the Educational Institution. *Amazonia Investiga*, 10(39), 76-85. <https://doi.org/10.34069/AI/2021.39.03.7>
- [24] Norwich, B., & Avramidis, E. (2002). Teachers' attitudes towards integration/inclusion: A review of the literature. *European Journal of Special Needs Education*, 17(2), 129-147. <https://doi.org/10.1080/08856250210129056>
- [25] OECD (2013). OECD Review of Policies to Improve the Effectiveness of Resource Use in Schools – Design and Implementation Plan for the Review. <https://www.oecd.org/education/school/School-Resources-Review-Design-andImplementation-Plan.pdf>
- [26] Panchenko, O., Shynkarova, V., Maistryk, T., Budnyk, O., Nikolaesku, I., Matsuk, L., & Fomin, K. (2022). Pedagogical innovations in Ukrainian educational institutions: social challenges and realities of war. *Revista Brasileira De Educação Do Campo*, 7, e14557. <https://doi.org/10.20873/uft.rbec.e14557>
- [27] Pantic, N. (2021). Teachers' Reflection on their Agency for Change (TRAC): A tool for teacher development and professional inquiry. *Teacher Development*. <https://doi.org/10.1080/13664530.2020.1868561>
- [28] Piekarski, G. (Ed.) (2024). *Discourses (on) equality education [Dyskursy (o) edukacji równościowej]*. Kraków: Oficyna Wydawnicza Impuls. (in Polish).
- [29] Rapp, A. C., & Corral-Granados, A. (2021). Understanding inclusive education – a theoretical contribution from system theory and the constructionist perspective. *International Journal of Inclusive Education*, 28(4), 423–439. <https://doi.org/10.1080/13603116.2021.1946725>
- [30] Remote learning, distance education, and online learning during the COVID-19 pandemic: Public Disclosure Authorized Public Disclosure Authorized Public Disclosure Authorized a Resource List by the World Bank's EdTech Team. 2020. <https://surl.li/hxwbem>
- [31] Sharma, U., Loreman, T., & Forlin, C. (2012). *Teacher Efficacy for Inclusive Practices Scale (TEIP)* [Database record]. APA PsycTests. <https://doi.org/10.1037/t76434-000>
- [32] Sydoriv, S. (2024). Implementing an inclusive learning environment globally: Legislation and practices. In O. Budnyk & S. Sydoriv (Eds.), *The Space of Inclusive Education: Voices from Ukraine and Beyond*. Editors: Series: Studies in Inclusive Education, 53. The Netherlands: Brill. Leiden (pp. 174-185). https://doi.org/10.1163/9789004688131_019
- [33] Składanowski, M., Smuniewski, C., & Łukasik-Turecka, A. (2025). The Media's Role in Preparing Russian Society for War with the West: Constructing an Image of Enemies and Allies in the Cases of Latvia, Poland, and Serbia (2014–2022). *Journalism and Media*, 6(2), 79. <https://doi.org/10.3390/journalmedia6020079>
- [34] Tichá R., Abery B., & Kincade L. (2018). Educational practices and strategies that promote inclusion: Examples from the U.S. *Sociální pedagogika/Social Education*, 6(2), 43–62. <https://doi.org/10.7441/soced.2018.06.02.03>

- [35] Tiernan, B. (2021). Inclusion versus full inclusion: implications for progressing inclusive education. *European Journal of Special Needs Education*, 37(5), 882–890. <https://doi.org/10.1080/08856257.2021.1961197>
- [36] Ukraine Humanitarian Situation Report No. 50, 1 to 31 March 2025. UNICEF. <https://surl.li/iceqym>
- [37] Vasianovych, H., & Budnyk, O. (2024). Philosophy of Research in Inclusive Education. In O. Budnyk & S. Sydoriv (Eds.), *The Space of Inclusive Education: Voices from Ukraine and Beyond*. Editors: Series: Studies in Inclusive Education, 53. The Netherlands: Brill. Leiden (pp. 9-21). https://doi.org/10.1163/9789004688131_003
- [38] Zubiri-Esnaola, H., Vidu, A., Rios-Gonzalez, O., & Morla-Folch, T. (2020). Inclusivity, participation, and collaboration: Learning in interactive groups. *Educational Research*, 62(2), 162–180. <https://doi.org/10.1080/00131881.2020.1755605>

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Ніколаєску Інна, Малашевська Ірина, Литвин Інна, Вінарчук Наталія, Власенко Руслана, Сівкович Галина, Мазур Піотр. Подолання бар'єрів в інклюзивній освіті – результати готовності педагогів до впровадження інновацій у роботі з дітьми з інвалідністю. *Журнал Прикарпатського університету імені Василя Стефаника*, 12 (3) (2025), 134-149.

У статті обґрунтовано актуальність проблеми безбар'єрності в інклюзії під час організації освітньої діяльності з особами з інвалідністю з урахуванням сучасних викликів, зокрема навчання в умовах кризи (війни). Охарактеризовано стан цієї проблеми в науковій педагогічній літературі і освітній практиці, на основі чого визначено деякі труднощі, як: психологічні установки педагогів і вчителів; обмежене ресурсне забезпечення; недостатній рівень професійної підготовки й підтримки інклюзивних інновацій з боку адміністрації, вчителів чи громади; інституційні перешкоди тощо. З'ясовано, що в умовах сучасних суспільних викликів, зокрема війни в Україні, проблема інклюзії стала ще більш нагальною, адже до освітнього процесу долучаються діти з новими формами вразливості – психотравмовані, переміщені з інших регіонів, з порушеннями розвитку та ін. Презентовано результати опитування майбутніх учителів щодо вивчення рівня їхньої готовності до впровадження інновацій та роботи з дітьми з особливими освітніми потребами (ООП) на етапі констатувального і формувального експерименту, який проводився на базі українських університетів. Подано порівняльні показники щодо динаміки ставлення здобувачів вищої освіти до подолання бар'єрів у роботі з учнями з інвалідністю, зокрема в умовах воєнного стану в Україні. Експериментальна робота передбачала дослідження професійної готовності майбутніх учителів до впровадження в практику освітньої, цифрової, інформаційної та фізичної безбар'єрності. Авторське методичне забезпечення, що позиціонується як інноваційне і було предметом апробації, включало поєднання цифрових інструментів і ресурсів (імерсивне навчання, короткі відео та анімації на теми інклюзії тощо) з інтерактивними методами, проєктною діяльністю та кейс-технологіями. Доведено необхідність імплементації у практику освітньої безбар'єрності у найширшому розумінні цього поняття, що має на меті створення рівних можливостей для відкритого доступу до якісної освіти для усіх учнів (студентів), незалежно від їхніх фізичних, когнітивних, мовних, соціальних та/або культурних особливостей. Акцентовано на потребі реалізації інклюзивних педагогічних стратегій, адаптації програм і методів навчання, формування толерантності, прийняття різноманітності та створення недискримінаційного освітнього середовища.

Ключові слова: інклюзивна освіта, професійна підготовка майбутніх педагогів, безбар'єрність, педагогічні інновації, діти з інвалідністю, освіта в період війни.