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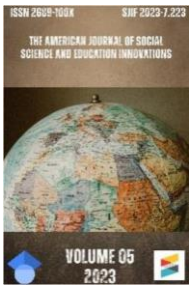

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Research Article

Organization of Correctional and Pedagogical Support for Children with Hearing and Speech Impairments in Inclusive Education

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ABSTRACT

This article explores the conceptual, methodological, and applied dimensions of educational support provided to children with hearing and speech disorders in inclusive school environments. Particular attention is given to the need for rethinking traditional corrective practices in light of contemporary social challenges, including crisis-related disruptions in access to education and the rapid integration of digital tools into teaching and rehabilitation processes. The study seeks to determine and classify effective models of interdisciplinary assistance that can improve communication, enhance participation in classroom interaction, and strengthen educational inclusion for learners with complex developmental needs. The research design combines a review of recent scholarly literature, an analysis of official Ukrainian educational statistics, and a case-based examination of institutional practices implemented in rehabilitation and educational settings of Dnipropetrovsk region. The findings demonstrate that the use of sign-supported instruction, technology-mediated communication, and coordinated teamwork among specialists contributes to better learning engagement, greater accessibility of instruction, and more stable social adaptation of children in inclusive settings. On the basis of the obtained results, the article formulates practical recommendations for improving teacher preparedness, expanding institutional support mechanisms, and reinforcing cooperation between educational, rehabilitative, and social sectors. The study may be useful for researchers and practitioners in special and inclusive education, communication disorders, school administration, and child-centered rehabilitation.

KEYWORDS

educational accessibility, sensory and communication disorders, interdisciplinary intervention, school inclusion, assistive support tools, teacher preparedness, learning participation, institutional support mechanisms, communication development, rehabilitative education, child-centered support.

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INTRODUCTION

The development of inclusive education in Ukraine has acquired particular significance under the conditions of the full-scale war, which has substantially complicated stable access to quality educational services for children with special educational needs. As of August 2023, only one third of children in Ukraine were expected to begin the 2023/2024 academic year in a full-time in-person format, while a considerable proportion continued studying either in a blender or fully online mode [1]. Such circumstances have created additional barriers for learners with hearing and speech impairments, for whom sustained direct interaction with teachers and specialists is a crucial condition for effective corrective and developmental support.

The problem is further intensified by the humanitarian consequences of the war. According to UNICEF's revised Humanitarian Action for Children appeal (August 2023), 5.3 million school-aged children in Ukraine required educational support, while 461 schools had been affected by attacks [2]. These conditions have increased the need for flexible organizational and pedagogical solutions capable of preserving the continuity of correctional assistance in mainstream educational settings.

At the same time, despite wartime disruptions, inclusive education in Ukraine continued to expand. According to data cited by the World Bank with reference to the Ministry of Education and Science of Ukraine, in the 2022/2023 academic year 54% of schools had inclusive classes, in which 33,861 learners with special educational needs studied with the support of 22,685 teacher assistants [3]. This confirms both the institutional relevance of inclusion and the practical need to improve correctional and pedagogical work with children who have hearing and speech impairments in general secondary education.

The aim of the study is connected with scientific substantiation and practical verification of the effectiveness of a set of correctional and pedagogical measures intended to reduce communicative and academic barriers among primary school learners with hearing and speech impairments in an inclusive educational environment.

Scientific novelty is defined through the development of the concept of "digital corrective support," interpreted as a coordinated synchronization of the visual and algorithmic structures of Ukrainian Sign Language with interactive assistive tools that maintain the continuity of the rehabilitation space within hybrid learning.

The author's hypothesis proceeds from the position that systematic integration of Ukrainian Sign Language in the function of a cognitive mediator, combined with multidisciplinary team-based strategies, contributes to reducing the negative consequences of social deprivation and creates prerequisites for achieving age-appropriate norms of speech development and auditory perception even when the physical presence of specialized professionals is limited.

Materials and Methods

The methodological design of the study was constructed with an orientation toward obtaining comprehensive information on correctional and pedagogical practice under conditions of high uncertainty and heterogeneity of educational settings. A systemic approach was selected as the conceptual foundation, within which the inclusive educational environment is interpreted as a dynamically changing configuration of legal and regulatory instruments,

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technological resources, and psychological–pedagogical determinants that, taken together, define the practical possibilities for implementing the corrective component.

The empirical and analytical strategy relied on several mutually reinforcing procedures. First, a systematic review of specialized literature was conducted: sources indexed in Scopus and Web of Science, as well as materials available through Springer and IEEE collections over recent years, were analyzed. This made it possible to identify key international trends associated with assistive technologies and the development of inclusive didactics [4]. In addition, a comparative statistical analysis of datasets from the Ministry of Education and Science of Ukraine and the Ministry of Health was performed, which allowed the dynamics of inclusion-service coverage among children with sensory impairments to be traced and shifts in parameters of institutional support to be assessed [2]. Of substantial importance was the use of practical case analysis aimed at an in-depth reconstruction of organizational and methodological decisions and support practices implemented at the KZO "Multidisciplinary Educational and Rehabilitation Resource-and-Methodological Center for Correctional Work and Inclusive Education" of the Dnipropetrovsk Regional Council (previously, KZO "NRC 'Zorianyi'" of the DRC), as well as at Educational and Upbringing Complex No. 28 in the city of Dnipro [6]. The selection of these sites was determined by their status as regional support institutions demonstrating sustainable models of language support and inclusive integration for children with hearing impairments in the eastern part of Ukraine. To ensure analytical completeness, a content analysis of technical and regulatory documentation was additionally carried out, including the Ministry of Education and Science's methodological recommendations for 2023, updated rules governing the organization of education for persons with special educational needs under martial law, and the Universal Design for Learning (UDL) standards as a framework reference point for designing an accessible educational environment [8].

Results and Discussion

An analysis of current inclusive processes in Ukraine makes it possible to register a tense interdependence between the quantitative expansion of the network of inclusive classes and the intensification of qualitative difficulties that emerge when ensuring a robust corrective component. The reform launched in 2017 had, by 2023, reached a stage of institutional consolidation; however, the subsequent sustainability and effectiveness of practices proved to be substantially modified by exogenous wartime factors [16]. Data from the last years confirm the entrenchment of inclusion as the leading format of education for children with special educational needs: from an approximate cohort of about 25,000 learners in 2020.

For greater clarity, Table 1 presents indicators reflecting the development of inclusive education in Ukraine.

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Table 1. Summary indicators of inclusive education development in Ukraine (compiled by the author based on [2]).

Parameter	2020/21	2021/22	2022/23	2023/24 *	2024/25*
Number of learners with special educational needs (SEN) in inclusive classes	25,078	32,686	33,861	40,354	47,610
Number of inclusive classes	18,681	23,216	24,995	29,321	33,397
Number of teacher assistants	18,450	21,000	23,500	27,020	30,150
Number of Inclusive Resource Centers (IRCs)	635	667	680	694	712

The recorded dynamics point to a strengthening orientation among families raising children with hearing and speech impairments toward obtaining education in territorially accessible general education institutions. This contributes to a gradual shift in priorities away from schooling models embedded in specialized boarding structures and toward place-of-residence education. At the same time, such a transformation is not neutral with respect to the school's resource framework: it presupposes a fundamentally higher level of institutional readiness within mainstream education, expressed in the sufficiency of human resources and the availability of technological infrastructure that can support the stable implementation of corrective and developmental tasks and reduce communicative barriers.

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Figure 1 presents a graph of growth in the key indicators of Ukraine's inclusive system.

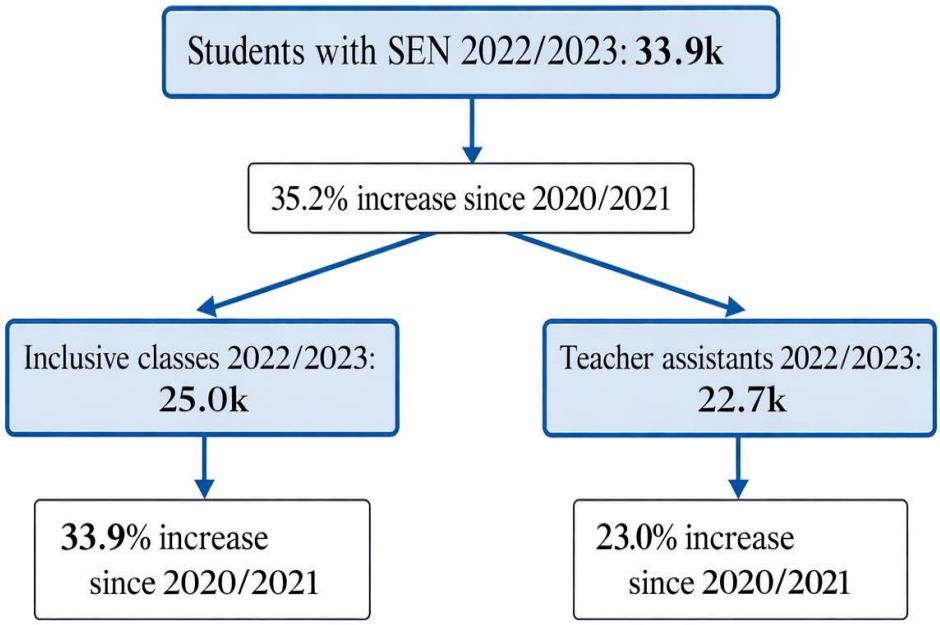

Fig. 1. Graph of growth in the key indicators of Ukraine's inclusive system (compiled by the author based on [2, 5]).

Organizing correctional and pedagogical work with children who have hearing impairments (deaf and hard of hearing) in an inclusive setting objectively entails a shift in emphasis away from a narrowly medical logic of "fixing a deficit" and toward socio-pedagogical facilitation oriented to accessible communication, participation, and educational attainment. Studies published in 2022–2023 indicate that a decisive condition for success is the use of Ukrainian Sign Language (USL) as the first or anchor language of instruction, providing a stable linguistic base for mastering curricular content and constructing interaction in the classroom [7, 17]. Within this frame, the bilingual model treats USL not as an auxiliary channel for transmitting information, but as a fundamental resource for cognitive development and the formation of learning activity. This position also emerged clearly in professional discussions initiated by the Ukrainian Society of the Deaf (UTOG) in 2023, where it was emphasized that the absence of guaranteed access to sign language in inclusive practice effectively turns declared inclusion into isolation [9, 18]. The technological support contour aligns with the task of increasing the clarity and stability of speech perception in the typically "noisy" classroom environment: the use of FM systems and Roger solutions, combined with interactive displays, contributes to more reliable access to the teacher's speech for children using cochlear implants or hearing aids [19, 23]. A substantial component is the visualization of instructional material and communication, including the use of automatic real-time captions during lessons; empirical evidence suggests that the presence of visual supports reduces

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cognitive load and allows the pace of learning to remain closer to the class norm without disproportionate losses in comprehension [4].

The practical feasibility of these strategies is, to a significant extent, determined by the quality of staffing and methodological support at the level of specific institutions. In the city of Dnipro, the KZO "Multidisciplinary Educational and Rehabilitation Resource-and-Methodological Center" ("Zorianyi") has piloted an outreach-support model in which the center's specialists provide systematic support to teachers in inclusive classes, building their basic competencies in sign-based communication and rehearsing techniques for visualizing the educational process [6]. Such an organizational scheme becomes especially consequential given that, in 2023, only 22% of teachers in inclusive classes demonstrate USL proficiency at a level evaluated as sufficient for full pedagogical interaction [20].

Table 2 below presents the results of a comparative analysis of the effectiveness of communication methods for deaf learners.

Table 2. Comparative analysis of the effectiveness of communication methods for deaf learners (compiled by the author based on [4, 6; 17–21]).

Method	Advantages	Limitations	Effectiveness (10-point scale)
Oral communication (lip-reading)	Maximum integration into a hearing environment.	High fatigue; comprehension typically no more than 30–40% of information.	4/10
Sign language only (within inclusion)	Full access to meaning.	Communication barrier with peers and teachers who do not know USL.	6/10
Bilingual model + technologies	Cognitive development through USL + text supports + auditory access.	Requires high qualification of the entire team.	9/10

Corrective and developmental support for primary school students with severe speech disorders (alalia, aphasia, pronounced forms of dysarthria) in an inclusive educational environment carries a pronounced developmental potential. Regular interaction with typically developing peers produces additional communicative stimuli, expands speech practice, and increases motivational involvement in learning activity. At the same time, in the absence of specialized corrective support, the probability of secondary impairments and complications increases, including the formation of developmental delays and heightened social anxiety as outcomes of persistent communicative failures and limited self-realization within the group.

Empirical findings from 2023 emphasize the importance of purposeful formation of the sound–

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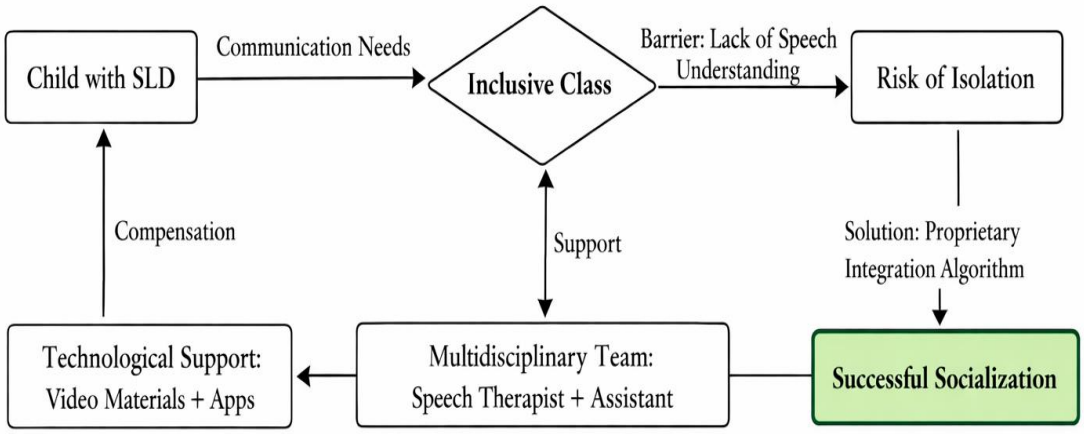
syllabic structure of words through interactive exercises that provide variable presentation of material and systematic rehearsal of speech units [10]. In inclusive instruction in the city of Dnipro (Educational and Upbringing Complex No. 28), effective solutions are expected to be those aligned with the logic of digital speech therapy, which implies the algorithmization of corrective influence and its transfer into a hybrid format while maintaining diagnostic and training orientation.

A model of corrective influence in a digital environment is conceptualized as the integration of interrelated procedures aimed at overcoming the leading mechanisms of speech deficit and accompanying learning difficulties. The phonemic component is implemented through the use of mobile applications that provide visualized feedback on articulatory actions, increasing the precision of self-monitoring and the stability of skills for phoneme discrimination and production [24, 25]. A multisensory contour is ensured through tactile–visual schemes that allow sound differentiation with support from additional modalities and reduce the load placed on exclusively auditory–speech mechanisms of information processing. A separate direction concerns compensatory algorithms for manifestations of dyscalculia. Because children with severe speech disorders often display mathematics difficulties mediated by deficits in verbal–logical operations, methodological solutions of psychological and pedagogical support were developed in 2023 that integrate speech correction into the content of mathematics lessons, thereby ensuring coordinated development of language and learning-and-cognitive components [10].

For greater clarity, Figure 2 will present the author's concept of "Digital Corrective Support" for children with severe speech disorders.

Fig. 2. The author's concept of "Digital Corrective Support" for children with severe speech disorders (compiled by the author based on [11]).



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The updated methodological reference points of the Ministry of Education and Science of Ukraine for 2023 formalize the position that the central organizational and functional mechanism of inclusive schooling is the psycho-pedagogical support team, which ensures coordination between educational instruction and corrective–developmental interventions for learners with special educational needs. The composition of this team includes the teacher, the teacher assistant, a child assistant (when such a need is present), a speech and language therapist, a special education teacher (teacher of the deaf / surdopedagogue), a psychologist, and parents. This reflects both the interprofessional nature of support and an orientation toward continuity of assistance across school and family environments [8].

An empirical reflection on practices accumulated by the author in the Multidisciplinary Center in Dnipro and in Educational and Upbringing Complex No. 28 makes it possible to state that the effectiveness of correctional and pedagogical measures is to a considerable degree determined by the quality of within-team collaboration and by the alignment of roles. In 2022–2023, against the background of personnel shortages driven by migration processes and the reduced availability of in-person services, a format of tele-inclusion acquires particular weight. This format implies remote consultation of teaching staff by specialists from rehabilitation institutions and resource centers, thereby partially compensating for deficits in specialized expertise and maintaining continuity of support under conditions of limited physical presence of professionals [3].

Table 3 presents a description of the structure of functional interaction among specialists in the inclusive space.

Table 3. Structure of functional interaction among specialists in an inclusive space (compiled by the author based on [8, 11, 12]).

Specialist	Key function in 2022–2023	Tools and instruments
Teacher	Adaptation of the general education curriculum.	Universal Design for Learning (UDL), differentiated assignments.
Teacher assistant	Direct in-class support for the child; adaptation of materials.	Visual schedules, text simplification, assistive devices.
Teacher of the deaf / Speech and language therapist	Corrective–developmental sessions (outside the core lesson).	Probe massage, USL, speech-correction applications.
Child assistant	Social and daily-life support; physical safety in shelters.	Evacuation algorithms, visual alerting tools.

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The analysis makes it possible to distinguish a set of factors that objectively constrain both the pace and the depth of inclusive strategy implementation while simultaneously increasing the vulnerability of the correctional and pedagogical component. One of the most significant is an infrastructure risk associated with the fact that most school shelters lack systems for visual duplication of alarm signals. Under such conditions, learners with hearing impairments can find themselves in a state of informational uncertainty during sudden evacuation, which may provoke panic reactions and behavioral disorganization because critically important information is not accessible in a visual format [12]. Alongside this, an institutional barrier is observed, rooted in the insufficient preparedness of mainstream school teachers to use Ukrainian Sign Language in educational interaction. The formal presence of an assistant does not always produce a compensatory effect, because when professional competence is lacking, the assistant's role is often reduced to functions of everyday assistance rather than qualified communicative mediation that is needed to sustain the child's learning activity and participation [20, 22]. An additional layer of constraints is formed by psychological risk: manifestations of "digital fatigue" and stress, reported among 80% of teachers and 14% of learners with disabilities, are associated with reduced efficiency of correctional sessions and an overall decline in the resource capacity of participants in the educational process [1].

In response to these challenges, a model of "Expanded Inclusion" is proposed, implying the organization of "Spilno" zones in schools with UNICEF support, where corrective and developmental work is integrated into play activity and elements of psychological decompression. This arrangement makes it possible to maintain motivational engagement while also reducing emotional strain [13, 14]. The overall results of the study provide grounds to argue that correctional and pedagogical practice within Ukraine's inclusive system in 2022–2023 has shifted from a predominantly declarative level of support to a stage of technological and methodological adaptation oriented toward the sustainability of solutions in a crisis environment. A substantial conclusion is that inclusion under conditions of systemic crisis does not reach adequate effectiveness without reliance on developed civil-society mechanisms and international partnership. Initiatives such as UPSHIFT, within which adolescents independently develop sign-language courses for peers, demonstrate an acceleration of social integration through a "bottom-up" logic compared with exclusively directive managerial measures [26, 27].

The significance of resource hubs as institutional "nodes" of resilience within the inclusive system is also confirmed. Institutions such as KZO "NRC Zorianyi" accumulate professional expertise in the areas of USL and support for severe speech disorders, functioning as practical points of support for a considerable number of inclusive classes across the oblast [6]. In the context of implementing the biopsychosocial model, the functional role of such centers predictably expands: alongside their educational mission, a coordination dimension strengthens, ensuring alignment of the medical, educational, and social-protection domains within a unified logic of child support [3].

Separate consideration is required for language dynamics that influence the content and toolkit of correctional and pedagogical work. The strengthening position of the Ukrainian language in the school environment—visible in an increased share of learners who, in 2023, were 10% more likely to begin using exclusively Ukrainian at home—creates a demand for

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an operational update of didactic and methodological provision for correctional educators, taking into account language practice and instructional norms [15]. A substantial resource step in this direction is the publication of 535,000 copies of textbooks for learners with special educational needs in 2023, which expands access to adapted materials and increases the potential for targeted pedagogical support [2].

Conclusion

The present study, focused on analyzing correctional and pedagogical support for children with hearing and speech impairments within Ukraine's inclusive educational system, made it possible to formulate a set of generalizations that reflect both institutional dynamics and the methodological–technological foundations of effective support.

The inclusive model in Ukraine demonstrated institutional expansion even under wartime conditions; in the 2022/2023 academic year, 33,861 learners with SEN studied in inclusive classes with the support of 22,685 teacher assistants. The stated research task—connected with ordering and systematizing effective support strategies—was addressed through an analytical description of multidisciplinary formats of specialist interaction that ensure alignment between the instructional contour and the corrective–developmental contour of educational work.

The critical significance of Ukrainian Sign Language in the role of a tool of cognitive compensation has been confirmed, alongside assistive digital technologies as a mechanism that supports the continuity of the corrective process. The developed algorithms of "digital corrective support" conceptualize a practical possibility for reducing risks generated by the distance component of learning and by personnel shortages, through the structuring of visual and interactive support tools and their deliberate coordination with the tasks of corrective and developmental work.

The applied value of the results is defined by the possibility of transferring the proposed models into the activity of Inclusive Resource Centers and general secondary education institutions. Implementing recommendations related to the bilingual approach and to the use of technological visualization instruments (including Speech-to-Text solutions) creates conditions under which the target benchmarks of inclusion become attainable, where inclusion is interpreted as ensured participation of each child in educational and social practices without systemic barriers and without communicative marginalization.

The study materials have high relevance for correctional educators, speech and language therapists, specialists of Inclusive Resource Centers, and the managerial staff of educational institutions responsible for designing and maintaining an accessible environment under the circumstances of the wartime and postwar period.

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