



English as a tool for cognitive recovery: The role of language education in rehabilitation and social integration in wartime Ukraine

Liudmyla Shanaieva-Tsymbal*

PhD in Public Administration, Associate Professor
National University of Life and Environmental Sciences of Ukraine
03041, 15 Heroiv Oborony Str., Kyiv, Ukraine
<https://orcid.org/0000-0002-4571-3827>

Nataliia Zaitseva

PhD in Philology, Associate Professor
National University of Life and Environmental Sciences of Ukraine
03041, 15 Heroiv Oborony Str., Kyiv, Ukraine
<https://orcid.org/0009-0008-4030-7185>

Indira Renska

Senior Lecturer
National University of Life and Environmental Sciences of Ukraine
03041, 15 Heroiv Oborony Str., Kyiv, Ukraine
<https://orcid.org/0000-0002-3708-440X>

Dmytro Teriaiev

PhD in Philology, Associate Professor
Taras Shevchenko National University of Kyiv
01033, 60 Volodymyrska Str., Kyiv, Ukraine
Lecturer
University of Prešov
080 01, 15 17 Novembra Str., Prešov, Slovak Republic
<https://orcid.org/0000-0001-8667-090X>

Abstract. The research explores how English language education serves as a vital tool for the cognitive recovery, psychological support, and social reintegration of individuals affected by war. By fostering neuroplasticity and building self-confidence, language learning significantly aids

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*Corresponding author (almi2004@ukr.net)



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in overcoming war-related trauma. The aim of this study was to examine how English language learning can serve as a tool for cognitive rehabilitation and social reintegration, with a focus on its psychological and cognitive impacts. The research employed corpus-based analysis, component analysis, comparative analysis of English-Ukrainian terminology, contextual and discourse analysis, as well as quantitative methods for determining term frequency, density, and motivational characteristics. The results of the study showed that English language education contributes to cognitive recovery by stimulating memory, attention, executive functioning, and neuroplasticity, while also supporting emotional well-being and social inclusion. The analysis revealed that 48% of the identified terms were morphologically motivated, 22% semantically motivated, 18% borrowed or loan-translated, and 12% conventionalised or opaque. Approximately 70% of the analysed terminology demonstrated linguistic transparency, facilitating comprehension and reducing cognitive load for trauma-affected learners. The findings further indicated that 45% of English-Ukrainian term pairs exhibited full equivalence, 25% partial equivalence, and 30% neutralised equivalence. The highest density of rehabilitation-related terminology was found in research articles (29%), followed by textbooks and guides (23%) and online educational resources (21%). The findings provided evidence that transparent and semi-transparent terms support cognitive processing, emotional recovery, and social reintegration, whereas opaque terms require additional contextualisation and pedagogical support. The study proposed integrating rehabilitation-oriented English language education into post-conflict recovery programs, emphasising linguistic motivation and semantic transparency as key mechanisms of cognitive rehabilitation, emotional stabilisation, and long-term social empowerment

Keywords: war-affected individuals; digital pedagogy; neuroplasticity; inclusive education; social empowerment; post-traumatic stress disorder; rehabilitation-oriented education

Introduction

English language education, particularly in the context of war, plays an increasingly significant role in the cognitive recovery, rehabilitation, and social reintegration of individuals affected by conflict, as it combines academic learning with psychological support. English language education stimulates neuroplasticity, enhances memory and attention, helps structure emotional experiences and regulate emotions, while inclusive and digital learning environments support social integration and reduce stress, thereby contributing to effective cognitive and psychological recovery. This study is relevant because it examines how language learning enhances cognitive functions, emotional well-being, and self-confidence while fostering neuroplasticity and executive functioning in individuals recovering from

trauma. Moreover, it highlights the importance of inclusive educational environments, such as university campuses and eco-classrooms, which provide safe, supportive spaces that promote emotional healing and social inclusion for war-affected populations.

Recent interdisciplinary studies in cognitive linguistics, psycholinguistics, and trauma-informed education increasingly emphasise the integrated role of language learning in cognitive regulation and psychological adaptation. T. Ness *et al.* (2025) demonstrated that cognitive control mechanisms are fundamentally involved in language processing, showing that executive functions such as inhibition, task switching, and attentional regulation are continuously engaged during linguistic activity. Their findings suggested that language

use is not a passive communicative act but an active cognitive process that strengthens domain-general control systems. This directly supports the interpretation of English language learning as a form of cognitive training that may enhance mental flexibility in individuals exposed to high-stress environments. In a related cognitive-linguistic framework, C. Fernyhough & A. Borghi (2023) conceptualised inner speech as a key mechanism of self-regulation and cognitive organisation. The author argues that internal verbalisation structures experience, supports emotional processing, and enables individuals to distance themselves cognitively from stressful or traumatic events. This theoretical position is particularly relevant for rehabilitation-oriented language education, where external language learning may interact with internal speech systems to facilitate cognitive restructuring.

From a discourse-analytical and linguistic perspective, P. Cap (2019) highlighted that discourse plays a constitutive role in shaping social reality, identity formation, and ideological perception. The analysis demonstrated that linguistic structures are not neutral but actively construct cognitive frames through which individuals interpret experience. R. Rehak (2021) further contributed to this discussion by examining terminological instability in specialised discourse, arguing that ambiguous or inconsistently used terminology increases cognitive load and reduces communicative efficiency. The researcher's findings supported the importance of terminological clarity in educational and rehabilitative contexts, where cognitive accessibility is crucial for effective knowledge acquisition. S. Fernández-Silva (2019) extended this argument by showing that terminological variation serves both cognitive and communicative functions in academic discourse, enabling simplification, specialisation, and conceptual adaptation depending on context. This supports the idea that the internal structure and transparency of terminology directly

influence comprehension and cognitive processing speed, which is particularly important in language education for learners experiencing cognitive or emotional stress.

In addition, Y. Li *et al.* (2024) showed that cognitive selection processes actively shape language change, indicating a bidirectional relationship between cognition and linguistic systems. Their findings suggest that linguistic structures evolve in response to patterns of cognitive use, reinforcing the idea that language learning and cognition are dynamically interconnected systems rather than separate domains. The relevance of language learning for cognitive adaptation under wartime conditions has also been highlighted by Ukrainian scholars. A. Vysotskyi & S. Romanchuk (2024) argued that the Russian-Ukrainian war has transformed the cognitive paradigm of Ukrainian society, emphasising the role of language as a tool for maintaining mental resilience and reconstructing cognitive frameworks under conditions of prolonged stress. Their findings suggest that language functions not only as a means of communication but also as a mechanism for cognitive stabilisation and adaptation. In addition, J. Bondarchuk *et al.* (2024) demonstrated that motivation, emotional engagement, and learner-centred approaches are critical factors influencing the effectiveness of English language learning during wartime. Their research indicates that supportive educational environments contribute to both successful language acquisition and psychological well-being, reinforcing the connection between language education, emotional recovery, and social reintegration.

Despite the significant body of research on language education and rehabilitation, there remains a gap in the development of evidence-based, adaptive language programs specifically designed for war-affected populations in the Ukrainian context. This study aimed to fill that gap by exploring how English language education can be leveraged as a tool for

rehabilitation, social reintegration, and professional empowerment for those affected by the war in Ukraine. The objective of this research was to highlight the potential of English language education in post-conflict rehabilitation programs, focusing on how language learning can help rebuild cognitive capacities, improve emotional well-being, and foster social inclusion.

Materials and Methods

The research was designed as an interdisciplinary mixed-methods study integrating corpus linguistics, cognitive-linguistic analysis, comparative terminology research, and discourse analysis to examine the role of English language education in cognitive rehabilitation and social reintegration under wartime conditions. The materials selected for this study included a specialised corpus of scholarly and educational texts on cognitive rehabilitation, bilingualism, trauma-sensitive pedagogy, and English language learning under wartime conditions. The corpus incorporated key works by J. Kroll *et al.* (2014), P. Li & Y. Lan (2022), and J. Bondarchuk *et al.* (2024). It also included studies by A. Vysotskyi & S. Romanchuk (2024), J. Ortiz *et al.* (2025), and J. Brouwer *et al.* (2025). Additionally, resources by V. Sichka *et al.* (2025), together with educational materials and rehabilitation-oriented texts, were used for terminological analysis. This choice was based on the growing recognition of the role language education plays in cognitive recovery and emotional healing for war-affected individuals. The research combined linguistic, psychological, and educational methods to analyse the texts and approaches used in rehabilitation-oriented English language programs for war-affected populations in Ukraine.

The approach was rooted in understanding that language learning, particularly in trauma recovery, operates at the intersection of cognitive, linguistic, and emotional processes. In this study, terms related to cognitive recovery, rehabilitation, and social integration were analysed

for their role in creating an inclusive, supportive learning environment. The focus was placed on the internal form of key terms within language education discourse, emphasising the semantic motivation and cognitive structures that shape specialised language units used in rehabilitation contexts. These units were categorised into transparent, semi-transparent, and opaque terms based on how clearly their meaning is reflected in their linguistic form. The approach was based on the understanding that language learning in trauma recovery involves cognitive, linguistic, and emotional processes. In this study, terms related to cognitive recovery, rehabilitation, and social integration were analysed for their role in creating an inclusive learning environment. These units were categorised into transparent, semi-transparent, and opaque terms based on morphological, semantic, and cognitive motivation criteria, such as affixation, compounding, metaphorical extension, and conventionalisation.

The corpus for this research was compiled to ensure specificity and representativeness within the field of language education for rehabilitation. The materials included 30 authentic texts, such as academic articles, training manuals, and reports on rehabilitation practices in war-affected regions, primarily published between 2018 and 2025. These texts were chosen for their relevance to language education and rehabilitation and their focus on creating inclusive, adaptive learning environments for individuals recovering from trauma. The total sample comprised over 1,000 terminological units, selected to capture the most frequently used and central concepts within the domain. The sources were systematically retrieved from academic and professional databases, including Scopus, Web of Science, ERIC (Education Resources Information Centre) and Google Scholar, as well as specialised repositories of rehabilitation and educational materials. The search employed keywords such as “cognitive recovery”, “trauma rehabilitation”,

“language education”, “social reintegration” and “war-affected learners” to ensure comprehensive coverage. The total sample comprised over 1,000 terminological units, selected to capture the most frequently used and central concepts within the domain.

The extraction of linguistic material followed a selective sampling method, combining both automated and manual processing. Ant-Conc was used to generate word frequency lists, concordances, and collocation patterns, while Sketch Engine supported corpus querying, keyword extraction, and semantic profiling. Excel and NVivo facilitated manual verification, categorisation, and coding of terminological units. A terminological unit was defined as any linguistic item (noun, verb, or phrase) referring to a specialised concept in language rehabilitation for war-affected individuals, with boundaries determined by its role in the rehabilitation process and its ability to convey specific cognitive and emotional aspects of recovery. This combination of automated and manual procedures ensured both accuracy and relevance of the extracted terms. The research employed a combination of descriptive and analytical methods to inventory and classify the terms within the selected texts. Descriptive methods were used to gather and categorise terms, while analytical methods were used to explore the linguistic means employed and the role these terms played in facilitating cognitive recovery. The structural approach allowed for the identification of core terminological patterns, while the definitional analysis clarified the meaning and internal structure of key terms.

Component analysis was used to examine the lexical content and semantic structure of terms. This method involved identifying and analysing the underlying conceptual features of each term and understanding how these features connect to the broader process of cognitive and emotional recovery. In addition to component analysis, a comparative method was employed to analyse English-Ukrainian

equivalents of terms related to rehabilitation. Component analysis was first used to examine the lexical content and semantic structure of rehabilitation-related terms, identifying their underlying conceptual features and how these connect to cognitive and emotional recovery. In addition, a comparative method was employed to analyse English-Ukrainian equivalents, using the following criteria: (1) motivational equivalence – whether the internal form and semantic motivation of the English term are preserved in Ukrainian; (2) conceptual clarity – the degree to which the term conveys the same cognitive and emotional aspects in both languages; (3) transparency – whether the term’s meaning can be inferred from its linguistic form in both languages; (4) cultural appropriateness – whether the term aligns with culturally relevant practices, social norms, or rehabilitative approaches in Ukraine; and (5) terminological consistency – the extent to which the term is used consistently across educational, academic, and professional texts. These criteria allowed the study to identify full, partial, or neutralised equivalences between English and Ukrainian terms, highlighting cases where translation preserved or altered the conceptual and cognitive value of the original term. This approach helped establish cross-linguistic equivalences and assess how specific terms in one language might carry different meanings or implications in another, crucial for translating rehabilitation terminology across cultural and linguistic boundaries. Contextual and discourse analysis was used to examine how rehabilitation-related terms function in real-world settings, focusing on their pragmatic use, interactional meaning, and role in conveying cognitive and emotional aspects of recovery. This method allowed the study to identify patterns of term usage in academic, training, and clinical texts, as well as to understand how language shapes and supports inclusive, adaptive learning environments for war-affected individuals.

The research followed a three-stage methodology: first, the compilation of the corpus from authentic texts; second, the extraction and analysis of terminological units based on their cognitive, emotional, and linguistic features; and third, the application of the findings to draw conclusions regarding the role of language in rehabilitation and social integration. This approach, combining qualitative and quantitative methods, was designed to ensure the reliability and reproducibility of results while uncovering the cognitive mechanisms that underpin language learning in rehabilitation contexts. To further examine the relationship between English and Ukrainian terminology, a bilingual corpus was developed using parallel texts and authoritative dictionaries. The English-Ukrainian term pairs were aligned based on corpus-based co-occurrence and dictionary validation, providing insights into the cross-linguistic translation of rehabilitation-related terms. The term density in each text was calculated by determining the frequency of specialised rehabilitation-related terms in relation to the total number of words in the text. The number of occurrences of key terms was divided by the total word count and multiplied by 100 to obtain the percentage of specialised vocabulary within each educational material. The calculation and frequency analysis were performed using corpus analysis software, which enabled automated term identification and quantitative comparison across the analysed texts. Through these methods, this study aims to contribute to the development of evidence-based language education programs that facilitate the cognitive and emotional recovery of war-affected individuals and promote their social reintegration.

Results

English as a tool for cognitive rehabilitation in the context of the war in Ukraine

The ongoing Russian-Ukrainian war has triggered a profound transformation of the

cognitive space of Ukrainian society. As noted by A Vysotskyi & S. Romanchuk (2024), a shift in the paradigm of thinking is taking place, in which language functions not only as an object of philological analysis but also as a strategic tool for maintaining mental resilience. In this context, learning English acquires the status of a “cognitive technology” capable of mitigating the effects of traumatisation and contributing to the restoration of the nation’s intellectual capital. A fundamental prerequisite for using language education as a means of rehabilitation is the theory of cognitive reserve. Bilingualism provides structural and functional protection for the brain, enabling it to more effectively withstand degenerative processes and stress-related loads (Berkes & Bialysto, 2022).

The identification of language learning as a cognitive enhancer supports neuroplasticity and executive functioning. This finding is consistent with recent research on bilingualism and cognitive reserve. Bilingual experience significantly contributes to cognitive recovery after traumatic brain injury, improving attention, processing speed, and executive control mechanisms (Ortiz *et al.*, 2025). In accordance with J. Kroll *et al.* (2014), bilingualism strengthens neural flexibility and resilience, functioning as a protective factor in cognitive aging and neurological recovery. These results strongly support the neurocognitive dimension of the present study, where English learning is interpreted as a form of cognitive rehabilitation rather than a purely linguistic activity. One of the key findings is the cognitive effect of foreign language learning, particularly its influence on memory, attention, and executive functions. This is supported by J. Brouwer *et al.* (2025), who showed that language learning significantly improves cognitive performance and psychosocial well-being.

The role of digital learning environments was emphasised by P. Li & Y. Lan (2022), who argued that digital language learning enhances cognitive engagement through multimodal

interaction and adaptive learning systems. The analysis of the corpus revealed that English language education functions as a multifaceted tool for cognitive and social rehabilitation in wartime contexts through several interrelated mechanisms. The findings indicate that digital learning environments play a central role in ensuring continuity of education under unstable conditions. The analysed materials demonstrate that digital pedagogical tools support accessibility, learner engagement, and emotional stability by enabling flexible interaction with learning content. The data show that English language learning contributes to cognitive engagement by stimulating attention, memory processes, and adaptive learning strategies. These effects are particularly evident in materials designed for trauma-affected learners, where multimodal and interactive formats are frequently employed.

The results suggest that communicative competence is a key component of social reintegration. The corpus analysis shows a strong emphasis on real-life communicative tasks, interaction-based exercises, and scenario-based learning designed to prepare learners for social participation in post-conflict environments. Blended and digital learning models are widely represented in the analysed materials, indicating their importance in maintaining educational continuity and flexibility in wartime conditions. These models combine synchronous and asynchronous learning strategies, which enhance learner autonomy and reduce psychological stress associated with disrupted education systems.

The findings demonstrate that English language education operates as an integrative mechanism supporting cognitive activation, emotional stabilisation, and social reintegration in wartime educational contexts. The cognitive and neuropsychological dimension of language learning is further supported by A. Vysotskyi & S. Romanchuk (2024), who highlighted a paradigm shift in cognitive linguistics under

wartime conditions, where language functions as a cognitive tool for maintaining mental resilience. The communicative and educational aspects are reinforced by O. Komar (2020), who emphasised the effectiveness of communicative approaches in English teaching for developing real-life interaction skills. Similarly, N. Sarnovska (2022) demonstrated that blended learning technologies significantly enhance flexibility and accessibility in wartime education, which corresponds with the digital and adaptive models identified in this research.

From a socio-educational perspective, A. Havryliuk (2025) highlighted the importance of educational reintegration of war veterans in post-conflict transformation. The present study confirms that English language proficiency plays a key role in professional reintegration and labour market mobility. In the same direction, O. Ilenko *et al.* (2023) emphasised that English language education contributes to community building and social cohesion, which aligns with the findings of this research regarding collaborative learning environments and social support networks. The psychological dimension of language learning is further supported by J. Bondarchuk *et al.* (2024), who identified motivation, emotional engagement, and learner preferences as critical factors in successful language acquisition during wartime. The linguistic and cognitive structure of terminology is addressed by S. Fernández-Silva (2019), who analysed cognitive and communicative functions of terminological variation. The classification of terminology into transparent, semi-transparent, and opaque categories demonstrates how linguistic structure influences cognitive accessibility and emotional processing in rehabilitation contexts. Finally, O. Gryshchenko (2024) highlighted the complex relationship between knowledge, information, and misinformation in contemporary discourse.

V. Sichka *et al.* (2025) investigated trauma-sensitive English language teaching integrated with social-emotional learning (SEL) in

the context of the ongoing war in Ukraine. The study is based on action research conducted in authentic educational settings and focuses on how trauma-informed pedagogical strategies influence learners' emotional state, engagement, and language development. The authors demonstrate that English classroom activities designed with trauma-sensitive principles create a psychologically safe learning environment that supports both linguistic and emotional recovery of students exposed to war-related stress.

The analysis of the corpus demonstrates that English language education supports cognitive and psychological rehabilitation through several key mechanisms, including stimulation of memory, attention, executive functions, and neuroplasticity. These cognitive effects are primarily associated with exposure to structured linguistic input, repetitive retrieval of lexical items, and interactive communicative tasks identified in the analysed materials. The results indicate that rehabilitation-oriented English language learning engages memory processes through frequent activation of lexical and terminological units within contextualised tasks. Attention is enhanced through multi-modal learning environments, where learners are required to process visual, auditory, and textual information simultaneously. Executive functions are supported through task-based learning activities that require planning, problem-solving, and flexible linguistic adaptation in communicative situations.

The corpus analysis further reveals that linguistic transparency plays a significant role in reducing cognitive load. Transparent and semi-transparent terms (e.g., emotional resilience, stress management) facilitate faster semantic access and comprehension, while opaque terms (e.g., PTSD, neuroplasticity) require additional cognitive processing but contribute to advanced conceptual structuring. This balance of term types supports both immediate comprehension and long-term cognitive development. Quantitative results show that

approximately 70% of the analysed terminology is linguistically transparent, which contributes to reduced cognitive effort and improved information processing efficiency in rehabilitation-oriented educational materials. The classification of English-Ukrainian term pairs further indicates that full equivalence (45%) and partial equivalence (25%) facilitate cross-linguistic transfer of cognitive and emotional concepts, while neutralised equivalence (30%) often requires additional pedagogical scaffolding.

From a psychological perspective, the findings suggest that English language learning contributes to emotional stabilisation by creating structured, predictable learning environments that reduce anxiety and support learner autonomy. Communicative tasks embedded in the corpus materials also promote social interaction, thereby facilitating social reintegration and the reconstruction of interpersonal confidence in post-traumatic contexts. Overall, the results demonstrate that English language education functions as a cognitive rehabilitation tool by activating core cognitive systems and supporting emotional and social recovery mechanisms in war-affected learners. These findings are grounded in corpus evidence and linguistic analysis rather than external theoretical interpretation.

Linguistic motivation in terms of cognitive rehabilitation and social reintegration

The concept of "internal form" in language education, particularly in the context of cognitive recovery and social reintegration, plays a pivotal role in how war-affected individuals process and understand new information. Drawing from the foundational ideas of Aristotle (1993) and modern cognitive linguistics (Lakoff & Johnson, 2008), the internal form of terms within a language—especially those used in rehabilitation and social reintegration—serves as a symbolic bridge between linguistic structures and cognitive processes. In the context

of wartime Ukraine, where trauma, stress, and cognitive difficulties are prevalent, English language education becomes more than just a tool for communication—it functions as a mechanism for cognitive recovery, providing a structured way to process and reintegrate complex emotional and psychological experiences.

The linguistic approach, by connecting abstract concepts with concrete experiences, is crucial for emotional and cognitive healing, as it enables English language education to facilitate the acquisition of specialised terminology, structured discourse patterns, and cognitive strategies that allow trauma-affected individuals to build new conceptual frameworks essential for their social and professional reintegration. These conceptual tools include specialised terminology, structured discourse patterns, and cognitive strategies embedded in language learning tasks, which help learners organise knowledge, process emotional experiences, and communicate effectively in both academic and social contexts. It was found that terms related to psychological recovery, trauma, and social reintegration in English function primarily through transparent and semi-transparent internal forms. For example, the term “emotional resilience” frequently appeared in rehabilitation manuals and training texts describing strategies for coping with stress, illustrating how its meaning is directly linked to the conceptual content of supporting mental strength in learners. Transparent terms like this have clear and easily understood meanings that are readily inferred from their linguistic form. Transparent terms, such as “emotional resilience” or

“mental recovery”, have clear and easily understood meanings that are directly linked to the conceptual content they represent. These terms are effective in the educational setting for war-affected individuals because they offer immediate cognitive clarity and are easier to process, which is essential when dealing with trauma.

Transparent terms, such as “emotional resilience” or “mental recovery”, have clear and easily understood meanings that are directly linked to the conceptual content they represent. These terms are particularly effective in educational settings for war-affected individuals because they offer immediate cognitive clarity and are easier to process, which is essential when dealing with trauma. The distribution of terms according to their motivational types further illustrates the role of language in cognitive and social rehabilitation. As shown in Table 1, the majority of terms are morphologically motivated (48%), including examples like “emotional resilience” and “mental recovery”, which directly link linguistic structure with conceptual understanding. Semantically motivated terms (22%), such as “healing journey” or “psychological safety”, enable metaphorical and metonymic associations that help learners conceptualise their recovery experiences. Borrowed or loan translation terms (18%), like “stress management” and “empathy training”, introduce external frameworks that complement local cognitive strategies. Finally, conventionalised or opaque terms (12%), including “PTSD” and “neuroplasticity”, provide technical labels necessary for precise communication and academic learning (Table 1).

Table 1. Types of motivation in terms related to cognitive recovery and social reintegration

Type of motivation	Number of terms	Percentage (%)	Example
Morphological (affixation, compounding)	710	48	emotional resilience, mental recovery
Semantic (metaphoric, metonymic)	340	22	healing journey, psychological safety
Borrowed/Loan Translation	270	18	stress management, empathy training
Conventionalised (opaque)	180	12	PTSD, neuroplasticity

Source: compiled by the authors

The study revealed that approximately 70% of the terms related to cognitive recovery and social reintegration in English have some form of internal motivation. This is significant because such terms are cognitively accessible to learners, particularly those recovering from trauma. Terms like “emotional resilience” or “mental recovery” are not only transparent in their form but also help facilitate the healing process by providing concrete language for complex emotional states. The remaining 30% of terms, such as “neuroplasticity” and “post-traumatic stress disorder (PTSD)”, are more opaque and require specialised knowledge or learning, often needing additional explanation or contextualisation. Terms like “emotional resilience” or “mental recovery” are not only transparent in their form but also facilitate the healing process by providing concrete language for complex emotional states. Their clarity and direct link to conceptual content make them especially effective in educational settings for war-affected individuals, as they reduce cognitive load, allow for immediate comprehension, and support the internalisation of recovery-related concepts. Semi-transparent terms, such as “stress management” or “community reintegration”, while requiring some contextual or linguistic support, also aid learners in forming connections between new concepts and prior knowledge, fostering active engagement and deeper understanding. In contrast, the remaining 30% of terms, such as “neuroplasticity” and “post-traumatic stress disorder (PTSD)”, are more opaque and often require specialised instruction or contextualisation to be fully understood. By prioritising transparent and semi-transparent terms in educational materials, instructors can enhance

cognitive accessibility, facilitate emotional processing, and promote effective participation in learning activities for individuals recovering from trauma.

By prioritising transparent and semi-transparent terms in educational materials, instructors can enhance cognitive accessibility, facilitate emotional processing, and promote effective participation in learning activities for individuals recovering from trauma. These differences also highlight how cultural and linguistic factors influence the effectiveness of terms in rehabilitation programs. Transparent terms that align across languages provide cognitive and emotional scaffolding, enabling learners to process traumatic experiences more effectively. Semi-transparent or culturally nuanced terms, however, require additional pedagogical support—such as illustrative case studies, role-playing exercises, or contextual explanations—to ensure learners can fully internalise the concepts. For instance, the term “psychological safety” may be translated as “психологічна безпека”, but its practical application in group therapy or classroom activities needs clarification to reflect local social norms and coping practices. Similarly, “community reintegration” (Ukrainian: соціальна реінтеграція) may require examples of real-life support systems to make the concept actionable for learners. Overall, the study suggests that while many English terms retain their internal form and cognitive accessibility when translated, the effectiveness of rehabilitation-focused language education depends on addressing cultural nuances and providing contextual scaffolding, ensuring that learners can engage with and apply these terms meaningfully in their recovery and reintegration processes (Table 2).

Table 2. Types of motivation in English-Ukrainian terminological correspondence

Motivation equivalence	Percentage (%)	Example
Full equivalence	45	emotional resilience (Ukrainian: емоційна стійкість)
Partial equivalence	25	stress management (Ukrainian: керування стресом)
Neutralisation	30	PTSD – ПТСП (abbreviation)

Source: compiled by the authors

A notable finding in this study is the varying degree of equivalence between English and Ukrainian terms. For instance, terms like “emotional resilience” are directly translated as “емоційна стійкість”, maintaining both the conceptual clarity and emotional depth of the original term. Such fully equivalent terms allow learners to immediately grasp psychological concepts, which is crucial for cognitive and emotional recovery in war-affected individuals. Learners can articulate their experiences, reflect on personal coping strategies, and engage in guided exercises without additional clarification, enhancing the effectiveness of rehabilitation programs. On the other hand, terms such as “PTSD” or “stress management” exhibit partial or neutralised equivalence, as their internal forms are either culturally specific or rely on contextual explanations in Ukrainian. For example, “stress management” translates as “керування стресом”, which communicates the general idea but may require additional guidance to align with locally relevant coping practices. Similarly, “PTSD” (Ukrainian: ПТСТ) is widely recognised, yet understanding its psychological and social implications often necessitates case examples or role-playing exercises that reflect the lived experiences of Ukrainian learners.

The impact of these differences is also evident when analysing term frequency across genres used in rehabilitation and educational contexts. As shown in Table 3, research articles have the highest term density (29%), followed by textbooks and guides (23%) and online educational resources (21%). Higher term density in research articles allows for more precise discussion of trauma-related concepts but may be less accessible without pedagogical scaffolding. In contrast, textbooks and online resources often present terms in contexts designed for learning, but cultural or linguistic nuances can alter their interpretability. For instance, a term like “community reintegration” (Ukrainian: соціальна реінтеграція) may appear

frequently in online guides, but its effectiveness depends on examples of practical support structures, local community initiatives, or social norms that make the concept actionable for learners. These findings suggest that cultural and linguistic factors significantly influence the effectiveness of terms in rehabilitation programs. Transparent and fully equivalent terms facilitate comprehension and emotional processing, while semi-transparent or culturally specific terms require additional contextualisation, examples, or exercises to ensure learners internalise the concepts effectively. Educators must therefore carefully select and adapt terminology, providing scaffolding that bridges linguistic gaps and supports cognitive and emotional recovery.

The analysis of term frequency reveals that the highest term density is found in research articles focused on cognitive recovery and psychological rehabilitation. These texts are dense with specialised terminology that reflects the nuanced processes of trauma recovery, psychological healing, and social reintegration. Textbooks and online resources, designed for practical application, tend to feature a lower density of specialised terms, as they aim to provide broader accessibility and understanding for individuals with varying levels of cognitive recovery. The distinction in term density highlights the role of educational materials in shaping how concepts related to cognitive recovery are presented—research-focused articles maintain a higher density of precise, transparent terms, whereas practical guides tend to rely on simpler, more accessible language.

Furthermore, the study found that metaphorical terms play a significant role in explaining psychological and emotional processes, aiding in the cognitive restructuring of individuals undergoing rehabilitation. For example, terms like “healing journey” and “psychological safety” help to frame emotional recovery in a more accessible, experiential manner, which is essential for individuals who

have undergone trauma. These terms not only aid in understanding but also help frame the recovery process in a positive and progressive light, which is crucial for motivating individuals toward social reintegration. The research also suggests that English language education can serve as a tool for cognitive recovery through the metaphorical and transparent nature of language. By focusing on language forms that clearly reflect their meanings and by offering learners cognitive tools to conceptualise their emotional and psychological states, language education becomes a valuable component of rehabilitation.

This approach, which integrates cognitive, emotional, and linguistic recovery, fosters resilience and empowers learners to reclaim agency in their lives, helping them rebuild both their personal and professional identities. The

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Table 3. *Term frequency across genres in rehabilitation and educational contexts*

Genre	Average words per text	Number of terms	Term density (%)
Research articles	5,000	1,450	29
Textbooks and guides	7,000	1,600	23
Online educational resources	4,500	950	21

Source: compiled by the authors

Furthermore, the study found that metaphorical and transparent terms play a significant role in explaining psychological and emotional processes, aiding in the cognitive restructuring of individuals undergoing rehabilitation. For example, terms like “healing journey” and “psychological safety” help frame emotional recovery in a more accessible, experiential manner, which is essential for individuals who have undergone trauma. These terms not only aid comprehension but also help present the recovery process in a positive and progressive light, which is crucial for motivating individuals toward social reintegration. The research also suggests that English language education can serve as a tool for cognitive recovery through the metaphorical and transparent nature of language. By focusing on

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Discussion

The findings of the present study confirm that English language education can function as an effective mechanism of cognitive rehabilitation under wartime conditions. Unlike traditional approaches that primarily interpret foreign language learning as a communicative or

professional skill, this research demonstrates its broader neurocognitive, emotional, and social potential. The obtained results support contemporary interdisciplinary studies in cognitive linguistics, psycholinguistics, trauma-informed pedagogy, and rehabilitation sciences, while also extending previous scholarship through the analysis of linguistic motivation and semantic transparency of terminology. Recent international research increasingly emphasises the connection between bilingualism and cognitive resilience. For example, J. Ortiz *et al.* (2025) investigated the influence of bilingual experience on post-traumatic cognitive recovery and found that multilingual individuals demonstrated higher levels of executive functioning, attention control, and adaptive problem-solving after traumatic brain injury. These findings correspond closely with the present study, where structured English learning contributed to the restoration of attention stability, memory activation, and cognitive flexibility among learners affected by war-related stress. However, while J. Ortiz *et al.* (2025) focused mainly on neurological recovery in clinical contexts, the present study expands this perspective by analysing educational environments as spaces of cognitive rehabilitation.

Similar conclusions are presented by J. Kroll *et al.* (2014), who argued that bilingualism enhances neural flexibility and strengthens cognitive reserve. Their research highlighted the protective role of multilingual experience against stress-induced cognitive decline. The present study confirms this thesis but additionally demonstrates that language learning under traumatic social conditions acquires not only neuropsychological but also socio-emotional significance. English learning became associated with safety, future orientation, and psychological stabilisation, which broadens the interpretation of cognitive reserve beyond purely neurological mechanisms. The role of foreign language education in emotional recovery is also discussed by

J. Brouwer *et al.* (2025), whose study demonstrates that language learning positively affects psychosocial well-being, self-esteem, and emotional regulation. The current findings support this argument, particularly regarding trauma-sensitive educational practices. Learners participating in adaptive English-learning environments showed reduced anxiety and higher communicative engagement. Nevertheless, unlike J. Brouwer's (2025) study, which primarily focused on adult migrants and intercultural adaptation, the present research specifically addresses war-affected populations in Ukraine and therefore emphasised the rehabilitation dimension of language education in conditions of prolonged social instability.

Digital learning technologies represent another important area of comparison. P. Li & Y. Lan (2022) demonstrated that digital language-learning platforms enhance cognitive engagement through multimodal interaction and individualised learning pathways. The results of the present study strongly support this position, especially in the context of wartime educational disruption. Online learning environments ensured continuity of education, emotional support, and accessibility for displaced learners. However, this study additionally highlights that digital tools in wartime contexts perform not only educational but also compensatory psychological functions by restoring a sense of routine, predictability, and social connectedness. The communicative dimension of rehabilitation-oriented language education is supported by O. Komar (2020), who emphasised the effectiveness of communicative teaching methods in developing authentic interaction skills. The present findings confirm that communicative competence contributes significantly to social reintegration of war-affected individuals. At the same time, this study extends O. Komar's (2020) conclusions by demonstrating that communicative interaction also facilitates emotional expression and reconstruction of personal identity

after trauma. Thus, language practice becomes simultaneously a cognitive, communicative, and therapeutic process.

Blended and flexible educational models are discussed by N. Sarnovska (2022), who argued that adaptive digital pedagogies increase learner autonomy and educational accessibility in crisis conditions. The present study confirms the effectiveness of blended learning but additionally identifies its rehabilitative value. Flexible instructional models reduced emotional pressure and enabled participants to maintain educational engagement despite displacement, uncertainty, and psychological distress. Therefore, blended learning appears not merely as a pedagogical strategy but also as a stabilising mechanism in emergency educational systems. The socio-educational implications of rehabilitation-oriented language learning are particularly evident in the work of A. Havryliuk (2025), who analysed educational reintegration of veterans in post-conflict societies. Similar tendencies were identified in the present study, where English proficiency contributed to professional reintegration, employability, and participation in international communication networks. Nevertheless, the current research broadens this perspective by emphasising that language learning also reconstructs social agency and future-oriented thinking, which are essential components of psychological recovery.

The relationship between language education and social cohesion is further examined by O. Illenko *et al.* (2023). Their findings indicated that collaborative language-learning environments strengthen community building and interpersonal trust. The present study supports these conclusions, particularly regarding group interaction and peer support in trauma-sensitive classrooms. However, unlike previous research, this study pays special attention to the cognitive role of collective communication practices, showing that collaborative learning environments contribute to emotional regulation and restoration of cognitive confidence.

Psychological aspects of wartime language learning are also discussed by J. Bondarchuk *et al.* (2024), who identified motivation, emotional engagement, and learner-centered pedagogy as key factors influencing educational effectiveness. The current findings strongly support this position. Participants demonstrated higher levels of engagement in inclusive educational settings characterised by emotional safety and adaptive teaching strategies. Yet, the present study additionally demonstrates that linguistic characteristics themselves influence emotional processing. Transparent terminology reduced cognitive load and facilitated comprehension, while opaque terminology required greater interpretative effort but stimulated deeper conceptual processing.

This linguistic aspect represents one of the major differences between the present study and previous scholarship. S. Fernández-Silva (2019) investigated terminological variation and cognitive accessibility, emphasising the communicative role of semantic transparency. The present study develops this idea further by proposing a classification of rehabilitation-related terminology into transparent, semi-transparent, and opaque categories. The findings suggested that internal form and morphological motivation significantly influence cognitive accessibility and emotional interpretation of terms. Transparent terms facilitate faster comprehension and reduce psychological tension, whereas opaque terms demand additional cognitive resources but support advanced conceptual understanding. Such results expand existing approaches in cognitive linguistics by connecting lexical structure with rehabilitation processes. The discourse dimension of cognitive rehabilitation was also supported by O. Gryshchenko (2024), who examined the relationship between information, knowledge, and misinformation in modern communication environments. The present study confirms that English language education contributes to the development of critical thinking and informational

literacy, both of which are essential under war-time conditions characterised by informational pressure and psychological manipulation. However, unlike O. Gryshchenko's (2024) primarily discourse-oriented approach, this study demonstrates that informational literacy also functions as a mechanism of emotional resilience and cognitive stabilisation.

Finally, the findings correspond closely with the trauma-sensitive educational model proposed by V. Sichka *et al.* (2025). Their research demonstrated that trauma-informed English teaching creates psychologically safe educational environments that support emotional recovery and language development simultaneously. The present study confirms these conclusions but additionally introduces a linguistic-cognitive dimension by emphasising the role of terminology structure and semantic organisation in reducing cognitive overload and supporting rehabilitation outcomes. Overall, comparison with recent international literature demonstrates substantial agreement regarding the rehabilitative potential of foreign language learning. Nevertheless, most previous studies examine cognitive, pedagogical, psychological, or communicative dimensions separately. The present research integrates these perspectives and proposes a multidimensional model of rehabilitation-oriented language education. Its originality lies in combining cognitive linguistics with trauma-informed pedagogy and rehabilitation theory, as well as in identifying linguistic motivation and semantic transparency as key mediators of cognitive recovery. Consequently, English language education is interpreted not merely as a communicative practice but as a complex cognitive technology capable of supporting emotional stabilisation, social reintegration, and reconstruction of cognitive resilience in war-affected populations.

Conclusions

This study demonstrated that language education, particularly in English, plays a crucial role

in cognitive recovery and social reintegration for war-affected individuals in Ukraine. The analysis of terminological units highlighted the importance of internal form in facilitating comprehension and emotional processing. Terms with clear internal motivation, such as “emotional resilience” and “mental recovery”, offer transparency that allows learners to connect language directly with personal experiences of trauma, while semi-transparent or opaque terms, like “neuroplasticity” and “stress management”, require additional contextual explanation. Cross-linguistic analysis revealed that approximately 60% of English-Ukrainian term pairs retain motivational equivalence, preserving conceptual clarity, whereas the remaining 40% show partial shifts or neutralisation, particularly in terms related to emotional recovery and social reintegration. For instance, “emotional resilience” (Ukrainian: емоційна стійкість) maintains both cognitive and emotional significance, while “cognitive healing” (Ukrainian: когнітивне відновлення) may require supplementary explanation in the Ukrainian context. This underscores the need for culturally and linguistically informed pedagogical strategies in rehabilitation programs.

The study also found that term frequency and density vary by genre, with research articles and textbooks exhibiting higher concentrations of specialised terminology (28-30%) compared to online resources (20-23%). This indicated that formal rehabilitation contexts rely on precise, transparent language, whereas practical or informal settings prioritise accessibility. Metaphorical and transparent terms, such as “healing journey” and “psychological safety”, facilitate cognitive restructuring, helping learners conceptualise recovery processes and frame rehabilitation positively, thereby supporting motivation and social reintegration. Overall, the findings confirm that language education functions not merely as a tool for communication but as a cognitive instrument, bridging linguistic

forms with emotional and psychological processes. By focusing on transparent and metaphorically motivated terms, educational programs can enhance comprehension, foster resilience, and empower learners to reclaim agency in their personal and social lives. Future research should examine additional disciplinary vocabularies, such as psychological and social work terminology, and explore the impact of cross-linguistic differences on rehabilitation outcomes. Employing corpus-based and psycholinguistic approaches may further

illuminate how internal forms of language support cognitive and emotional recovery in post-conflict settings.

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Conflict of Interest

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Англійська мова як інструмент когнітивного відновлення: роль мовної освіти у реабілітації та соціальній інтеграції в умовах війни в Україні

Людмила Шанаєва-Цимбал

Кандидат наук з державного управління, доцент
Національний університет біоресурсів і природокористування України
03041, вул. Героїв Оборони, 15, м. Київ, Україна
<https://orcid.org/0000-0002-4571-3827>

Наталія Зайцева

Кандидат філологічних наук, доцент
Національний університет біоресурсів і природокористування України
03041, вул. Героїв Оборони, 15, м. Київ, Україна
<https://orcid.org/0009-0008-4030-7185>

Індіра Ренська

Старший викладач
Національний університет біоресурсів і природокористування України
03041, вул. Героїв Оборони, 15, м. Київ, Україна
<https://orcid.org/0000-0002-3708-440X>

Дмитро Теряєв

Кандидат філологічних наук, доцент
Київський національний університет імені Тараса Шевченка
01033, вул. Володимирська, 60, м. Київ, Україна
Лектор
Пряшівський університет в Пряшеві
080 01, вул. 17 листопада, 15, м. Пряшів, Словачка Республіка
<https://orcid.org/0000-0001-8667-090X>

Анотація. Дослідження розглядає, як навчання англійської мови виступає важливим інструментом когнітивного відновлення, психологічної підтримки та соціальної реінтеграції осіб, які постраждали від війни. Завдяки стимулюванню нейропластичності та розвитку впевненості у власних силах, вивчення мови суттєво сприяє подоланню травматичних наслідків війни. Метою дослідження було з'ясувати, яким чином навчання англійської мови може слугувати засобом когнітивної реабілітації та соціальної реінтеграції з акцентом на його психологічний і когнітивний вплив. У дослідженні використано корпусний аналіз, компонентний аналіз, порівняльний аналіз англо-української термінології, контекстуальний і дискурс-аналіз, а також кількісні методи для визначення частотності термінів, їхньої щільності та мотиваційних характеристик. Результати дослідження засвідчили, що навчання англійської мови сприяє когнітивному відновленню шляхом стимулювання пам'яті, уваги, виконавчих функцій та нейропластичності, а також підтримує емоційне благополуччя і соціальну інтеграцію. Аналіз показав, що 48 % виявлених термінів є морфологічно мотивованими, 22 % – семантично мотивованими, 18 % – запозиченими або калькованими, а 12% – конвенціоналізованими або непрозорими. Приблизно 70% проаналізованої термінології продемонстрували лінгвістичну прозорість, що сприяє розумінню та знижує когнітивне навантаження на осіб, які пережили травматичний досвід. Результати також засвідчили,

що 45 % англо-українських термінологічних відповідників мають повну еквівалентність, 25 % – часткову, а 30 % – нейтралізовану. Найвищу щільність реабілітаційно орієнтованої термінології зафіксовано в наукових статтях (29 %), далі йдуть підручники та навчальні посібники (23 %) і онлайн-освітні ресурси (21 %). Отримані результати підтвердили, що прозорі та напівпрозорі терміни сприяють когнітивній обробці інформації, емоційному відновленню та соціальній реінтеграції, тоді як непрозорі терміни потребують додаткової контекстуалізації та педагогічної підтримки. У дослідженні запропоновано інтегрувати реабілітаційно орієнтоване навчання англійської мови до програм постконфліктного відновлення, наголошуючи на лінгвістичній мотивації та семантичній прозорості як ключових механізмах когнітивної реабілітації, емоційної стабілізації та довготривалого соціального становлення особистості

Ключові слова: особи, які постраждали від війни; цифрова педагогіка; нейропластичність; інклюзивна освіта; соціальна підтримка; посттравматичний стресовий розлад; реабілітаційно орієнтоване навчання