

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

НАУКОВИЙ ВІСНИК

МУКАЧІВСЬКОГО ДЕРЖАВНОГО
УНІВЕРСИТЕТУ

СЕРІЯ
«ПЕДАГОГІКА ТА ПСИХОЛОГІЯ»

Науковий журнал

ТОМ 11, № 1
2025

МУКАЧЕВО
2025

Засновник:

Мукачівський державний університет

Рік заснування: 2015

Періодичність випуску: щоквартально

*Рекомендовано до друку та поширення
через мережу «Інтернет» Вченою радою
Мукачівського державного університету
(протокол № 13 від 26 березня 2025 р.)*

Ідентифікатор медіа: R30-04570

(Рішення Національної ради України з питань телебачення і радіомовлення
№ 1564, протокол № 15 від 9 травня 2024 р.)

Журнал включено

до Переліку наукових фахових видань України (Категорія «Б»)

з педагогічних наук (наказ Міністерства освіти і науки України № 1643 від 28 грудня 2019 р.),
психологічних наук (наказ Міністерства освіти і науки України № 109 від 17 березня 2020 р.)

Журнал представлено

в таких наукометричних базах даних, репозитаріях та пошукових системах:

Google Академія, Фахові видання України, Національна бібліотека України імені
В.І. Вернадського, CiteFactor, Directory of Open Access Journals (DOAJ), Scientific Journal Impact
Factor (SJIF), UCSB Library, ERIH PLUS, Dimensions, Polska Bibliografia Naukowa (PBN),
German Union Catalogue of Serials (ZDB), Leipzig University Library, University of Oslo Library,
University of Hull Library, Search Oxford Libraries Online (SOLO), European University Institute
(EUI), Cambridge University Library, Crossref, Naver Academic, Open Ukrainian Citation Index
(OUCI), Worldcat, CORE

Науковий вісник Мукачівського державного університету. Серія «Педагогіка та психологія» / Ред. кол.:
В. Й. Бочелюк та ін. Мукачево : Вид-во МДУ, 2025. Т. 11, № 1. 126 с.

Адреса редакції:

Мукачівський державний університет
89600, вул. Ужгородська, 26, м. Мукачево, Україна
Тел. +380 (31) 312-11-09
E-mail: info@pp-msu.com.ua
<https://pp-msu.com.ua>

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

SCIENTIFIC BULLETIN
OF MUKACHEVO STATE UNIVERSITY

**SERIES “PEDAGOGY
AND PSYCHOLOGY”**

Scientific Journal

VOL. 11, No. 1
2025

MUKACHEVO
2025

ISSN 2413-3329
E-ISSN 2520-6788

Founder:
Mukachevo State University

Year of foundation: 2015

Frequency: quarterly

*Recommended for printing and distribution
via the Internet by the Academic Council
of Mukachevo State University
(Minutes No. 13 of March 26, 2025)*

Media identifier: R30-04570
(Decision of the National Council of Television and Radio Broadcasting of Ukraine
No. 1564, Minutes No. 15 of May 9, 2024)

**The journal is included in the List of professional scientific
publications of Ukraine (Category “B”)**
in pedagogical sciences (Order of the Ministry of Education and Science
of Ukraine No. 1643 of December 28, 2019),
psychological sciences (Order of the Ministry of Education and Science
of Ukraine No. 409 of March 17, 2020)

The journal is presented in the following scientometric databases:
Google Scholar, Professional Publications of Ukraine, Vernadsky National Library of Ukraine,
CiteFactor, Directory of Open Access Journals (DOAJ), Scientific Journal Impact Factor (SJIF),
UCSB Library, ERIH PLUS, Dimensions, Polska Bibliografia Naukowa (PBN), German Union
Catalogue of Serials (ZDB), Leipzig University Library, University of Oslo Library, University of Hull
Library, Search Oxford Libraries Online (SOLO), European University Institute (EUI),
Cambridge University Library, Crossref, Naver Academic, Open Ukrainian Citation Index (OUCI),
Worldcat, CORE

Scientific Bulletin of Mukachevo State University. Series “Pedagogy and Psychology” / Editorial Board:
V. Bocheliuk et al. Mukachevo : MSU Publishing House, 2025. Vol. 11, No. 1. 126 p.

Editors office address:
Mukachevo State University
89600, 26 Uzhhorodska Str., Mukachevo, Ukraine
Tel. +380 (31) 312-11-09
E-mail: info@pp-msu.com.ua
<https://pp-msu.com.ua/en>

Головний редактор	Віталій Бочелюк – доктор психологічних наук, професор, Національний університет «Запорізька політехніка», Україна
Заступник головного редактора	Тетяна Щербан – доктор психологічних наук, професор, Мукачівський державний університет, Україна
Національні члени редколегії	
Леся Височан	кандидат педагогічних наук, доцент, Прикарпатський національний університет імені Василя Стефаника, Україна
Ігор Гевко	доктор педагогічних наук, професор, Тернопільський національний педагогічний університет імені Володимира Гнатюка, Україна
Інокентій Корнієнко	доктор психологічних наук, доцент, Мукачівський державний університет, Україна
Наталія Михальчук	доктор психологічних наук, професор, Рівненський державний гуманітарний університет, Україна
Надія Федчишин	доктор педагогічних наук, професор, Тернопільський національний медичний університет імені І.Я. Горбачевського Міністерства охорони здоров'я України, Україна
Наталія Пазюра	доктор педагогічних наук, професор, Національний авіаційний університет, Україна
Наталія Бахмат	доктор педагогічних наук, професор, Кам'янець-Подільський національний університет імені Івана Огієнка, Україна
Наталя Цибуляк	кандидат психологічних наук, доцент, Бердянський державний педагогічний університет, Україна
Олег Кокун	доктор психологічних наук, професор, Інститут психології імені Г. С. Костюка Національної Академії педагогічних наук України, Україна
Міжнародні члени редколегії	
Рената Оросова	кандидат філософських наук, Університет Павла Йозефа Шафарика в Кошиці, Словачка Республіка
Нуржан Сартбекова	доктор педагогічних наук, професор, Міжнародний університет інноваційних технологій, Киргизька Республіка
Ніна Стукаленко	доктор педагогічних наук, АТ «Національний центр підвищення кваліфікації «Өрлеу», Казахстан
Фаділь Ельменфі	доктор філософії з літературного перекладу, доцент, Університет Атіліма, Туреччина
Санія Нургалієва	кандидат педагогічних наук, доцент, Університет Агри імені Ібрагіма Чечена, Туреччина
Катрін Пум-Валіцкіс	доктор педагогічних наук, професор, Талліннський університет, Естонія
Мілан Куб'ятко	доктор філософії, Університет Яна Євангеліста в Усті-над-Лабем, Чеська Республіка
Енгін Карадаг	кандидат педагогічних наук, професор, Акденізський університет, Туреччина

Editor-in-Chief	Vitalii Bocheliuk – Doctor of Psychology, Professor, National University “Zaporizhzhia Polytechnic”, Ukraine
Deputy Editor-in-Chief	Tetiana Shcherban – Doctor of Psychology, Mukachevo State University, Ukraine
National Members of the Editorial Board	
Lesia Vysochan	PhD in Pedagogy, Associate Professor, Vasyl Stefanyk Precarpathian National University, Ukraine
Ihor Hevko	Doctor of Pedagogy, Professor, Ternopil Volodymyr Hnatiuk National Pedagogical University, Ukraine
Inokentiy Kornienko	Doctor of Psychology, Associate Professor, Mukachevo State University, Ukraine
Nataliia Mykhalchuk	Doctor of Psychology, Professor, Rivne State University of the Humanities, Ukraine
Nadiya Fedchyshyn	Doctor of Pedagogy, Professor, I. Horbachevsky Ternopil State Medical University, Ukraine
Nataliia Paziura	Doctor of Pedagogy, Professor, National Aviation University, Ukraine
Nataliia Bakhmat	Doctor of Pedagogy, Professor, Kamianets-Podilskyi Ivan Ohiienko National University, Ukraine
Natalia Tsybuliak	PhD in Psychology, Associate Professor, Berdyansk State Pedagogical University, Ukraine
Oleg Kokun	Doctor of Psychology, Professor, G.S. Kostyuk Institute of Psychology, National Academy of Pedagogical Sciences of Ukraine, Ukraine
International Members of the Editorial Board	
Renata Orosova	PhD, Pavol Jozef Šafárik University in Košice, Slovakia
Nurjan Sartbekova	Doctor of Pedagogy, Professor, International University of Innovative Technologies, Kyrgyz Republic
Nina Stukalenko	Doctor of Pedagogy, JSC “NCPD “Orleu” Institute of Professional Development of Pedagogical Workers in Akmola region”, Kazakhstan
Fadil Elmenfi	Philosophy Doctor in Literary Translation, Associate Professor, Atilim University, Turkey
Saniya Nurgaliyeva	PhD in Pedagogy, Associate Professor, Ağrı Ibrahim Chechen University, Turkey
Katrin Poom-Valickis	PhD in Education, Professor, Tallinn University, Estonia
Milan Kubiátko	PhD in Philosophy, University of Jan Evangelista in Ústí nad Labem, Czech Republic
Engin Karadağ	PhD in Education, Professor, Akdeniz University, Turkey

ЗМІСТ

ПЕДАГОГІКА

О. Косовець

Аналіз навчального матеріалу з вебтехнологій для учнів базової школи 9

Т. Ямчук

Резильєтність студентського колективу в умовах війни 19

М. Горват, М. Кузьма-Качур

Розвиток просторового мислення в процесі формування
у здобувачів початкової освіти картографічної грамотності 32

І. Корнієнко, Б. Барчі

Розвиток адаптивності кар'єри через імерсивну віртуальну реальність тренінговими засобами 41

О. Дягилева, О. Кононова, А. Юрженко, В. Свирида

Формування професійної компетентності майбутніх фахівців
управління судновими технічними системами і комплексами засобами LMS MOODLE 51

М. Ч. Екех

Диференційована педагогіка для учнів молодших класів
з проблемами виконавчої функції та візуальної обробки інформації 60

Г. Коберник

Інноваційні підходи до формування математичної компетентності
майбутніх учителів початкової школи 71

ПСИХОЛОГІЯ

С. Шевченко, Г. Варіна

Особливості реадаптації військовослужбовців після виходу з зони бойових дій 82

О. Григор'єв

Психологічні особливості різновидової психічної депривації особистості,
яка довготривало перебуває в інтернатних закладах 91

К. Справцева

Цифровий нарцисизм: психоаналітичні механізми прояву особистості
в соціальних медіа та їх вплив на психологічне благополуччя 104

К. Аль-Хлейфат

Вплив вокальних занять на когнітивний та емоційний розвиток дітей раннього віку 113

CONTENTS

PEDAGOGY

O. Kosovets

Analysis of educational materials on web technologies for secondary school pupils 9

T. Yamchuk

The resilience of the student community in wartime 19

M. Horvat, M. Kuzma-Kachur

Development of spatial thinking in the process
of cultivating cartographic literacy in primary education learners..... 32

I. Korniienko, B. Barchi

Enhancing career adaptability through immersive virtual reality training..... 41

O. Diahyleva, O. Kononova, A. Yurzhenko, V. Svyryda

Development of professional competence of future specialists
in the operation of shipboard technical systems and complexes using LMS MOODLE..... 51

M.Ch. Ekeh

Differentiated pedagogy for early-grade learners
with executive function and visual processing challenges 60

H. Kobernyk

Innovative approaches to the formation of mathematical competence
of future primary school teachers..... 71

PSYCHOLOGY

S. Shevchenko, H. Varina

Specific features of re-adaptation of military personnel after leaving the combat zone..... 82

O. Hryhoriev

Psychological characteristics of various types of mental deprivation
in individuals with prolonged stays in residential institutions 91

K. Spravtseva

Digital narcissism: Psychoanalytic mechanisms of personality manifestation..... 104

K. Al-Khleifat

The effects of vocal training on the cognitive and emotional development of young children..... 113

UDC 37.02:004
DOI: 10.52534/msu-pp1.2025.09

Olena Kosovets*

Phd in Pedagogical Sciences, Associate Professor
Vinnytsia Mykhailo Kotsiubynskyi State Pedagogical University
21000, 32 Ostrozkiy Str., Vinnytsia, Ukraine
<https://orcid.org/0000-0001-8577-3042>

Analysis of educational materials on web technologies for secondary school pupils

Article's History:

Received: 21.10.2024
Revised: 28.02.2025
Accepted: 26.03.2025

Suggested Citation:

Kosovets, O. (2025). Analysis of educational materials on web technologies for secondary school pupils. *Scientific Bulletin of Mukachevo State University. Series "Pedagogy and Psychology"*, 11(1), 9-18. doi: 10.52534/msu-pp1.2025.09.

Abstract. In the modern information society, websites serve as a powerful tool for education, communication, and user interaction. The inclusion of web technologies in the school informatics curriculum is a relevant aspect of developing digital competence, as it prepares young people for life in a digital world and contributes to national economic growth. This study aimed to analyse informatics textbooks and identify key trends in the methodology of teaching web technologies to secondary school pupils. To achieve this objective, a set of theoretical methods was employed, including analysis, systematisation, and synthesis of scientific, methodological, and educational literature, as well as the study of teaching methods and the application of modern digital tools in the process of learning web technologies. The analysis of educational materials on "Creating and Publishing Web Resources" in 8th-grade computer science textbooks showed that the educational content is adequate and up-to-date for building foundational knowledge in this area. It was found that the competencies and practical skills acquired by pupils enable them to realise their potential in developing web pages and websites – ranging from basic projects created using the HTML markup language to complex websites with integrated elements, developed through automated website builders employing current technologies. Significant emphasis was placed on practical tasks, which reinforced theoretical knowledge and fostered essential digital skills in web page creation. The authors actively incorporated modern technologies such as QR codes, online services, and interactive resources, enhancing pupils' motivation and interest in the subject. The findings of this study may be applied in the educational process both in comprehensive schools and specialised institutions to prepare pupils for working with web technologies

Keywords: computer science teaching methodology; computer science textbook; functions of an educational textbook; digital technologies; learning process

*Corresponding author

INTRODUCTION

The evolution of digital technologies is driving a constant transformation of the labour market. Among the new professions that have emerged as a result, those related to the creation and development of websites and web applications stand out. Web developers, front-end developers, and similar roles have been among the most in-demand and highly paid in the IT market for several years. Web technologies are rapidly advancing, and

developed websites offer extensive learning opportunities, and user-friendly interfaces for both professional use and everyday life. Consequently, the ability to develop engaging, functional, and user-friendly websites has become an integral part of the professional competence of information technology specialists. The effective implementation of web projects in the global digital space is a key factor in a successful professional career.



In computer science lessons, pupils can explore roles such as graphic designer, web developer, programmer, and more. Pupils begin learning the fundamentals of web technologies in the 8th grade of secondary school, with the “Creating and Publishing Web Resources” section, and continue their education in upper secondary school through the elective module “Web Technologies”. The computer science textbook is a crucial tool in teaching web technologies to pupils in general secondary education institutions. It provides quick access to theoretical educational material, fosters the development of practical skills, implements the teaching methodology, motivates pupils, and guides them towards future professional pursuits.

K.O. Buts & A.S. Popovkina (2022) investigated the representation of gender stereotypes in contemporary computer science textbooks. The authors proposed an evaluation methodology based on analysing the quantitative ratio of male and female images, gender-sensitive illustrations and texts, their role stereotyping, and the use of gender-neutral language. Research on textbooks from various publication years revealed a positive trend towards reducing gender stereotypes, and expanding the range of professional roles for women, although traditional perceptions of their activities in different spheres of life still persist.

Researchers K.S. Reshevska *et al.* (2024) conducted a comprehensive comparative analysis of computer science textbooks for 10th-11th grade pupils in general secondary education institutions in Ukraine. The purpose of the study was to evaluate the content, methodological approaches, structure, accessibility, and compliance with current educational programme requirements. Particular attention was paid to developing recommendations for the optimal use of textbooks in various educational contexts. The analysis of the textbooks identified certain features of each, namely: the textbooks include self-assessment questions and algorithmic exercises that promote the development of critical thinking; they contain a significant number of practical assignments using modern software; and the educational materials focus on the analysis and creation of information products, which develop pupils' analytical skills and digital competencies. The authors concluded that teachers (in collaboration with pupils, parents, and other educators) should choose the textbook that best suits the teacher's methodological approach and best meets the needs of the pupils in a specific class.

The study of O.M. Yatsko (2023) and O.P. Kosovets *et al.* (2024a) explored the methodological system of teaching computer science, specifically the elective module “Web Design”, as a component of the “Computer Science” subject in 10th-11th grades. The methodological system of teaching computer science was considered as a subsystem, the functioning of which is determined by several factors, including the social demands of modern information society, pupils' computer science competencies, and the goals, principles, and content of education. The article provides a comparative analysis of computer science curricula and textbooks for 10th-11th grade pupils in

general secondary education institutions at both advanced and standard levels, and identifies the specific features of teaching the elective module “Web Technologies”. The conducted analysis of teaching methodology allows for the identification of key aspects of lesson planning, such as time allocation, lesson structure, and the development of practical tasks. O.M. Yatsko (2023) emphasised the crucial role of creating and developing a methodological system for teaching computer science in the establishment of the school computer science course. In this regard, it was relevant to analyse the elements of the methodological system and identify problematic areas that need to be addressed for its further development. O.P. Kosovets *et al.* (2024b) noted that the study of web technologies in schools not only provides pupils with basic knowledge of creating websites and web applications but also fosters the development of critical thinking, creative approaches, and technical skills necessary in today's digital world.

Researchers A. Kholmatov (2023) and A.E. Minarno *et al.* (2021) emphasised the importance of pupils acquiring knowledge and skills in web programming in the context of the rapid development of web technologies. Their studies include an overview of pedagogical technologies and innovative approaches that teachers can use to effectively teach web programming to pupils. Traditional teaching methods often fail to keep pace with the dynamic changes in web development. In this regard, researchers are exploring the integration of modern pedagogical technologies aimed at improving the learning process. Web technology education involves not only learning programming languages, frameworks, and tools but also developing the ability to navigate a dynamic and competitive industry.

Y.-T. Kuo & Y.-C. Kuo (2023) investigated the learning success of African American pupils in a web design course, as well as their attitudes towards programming. In a 14-week web design course, African American pupils learned HTML, CSS, and JavaScript. The study, conducted using a pretest–posttest design on a single group of African American pupils, examined the impact of the course on their academic self-efficacy, web programming self-efficacy, and attitudes towards programming in general. The results showed a significant increase in academic self-efficacy and web programming self-efficacy after completing the course. Most pupils also began to perceive programming positively.

This article aimed to analyse educational textbooks and investigate the methodological features of teaching web technologies to secondary school pupils. The research employed theoretical methods such as analysis, systematisation, and generalisation of scientific, methodological, and educational literature on the studied issues and an analysis of the use of modern digital tools in the methodology of teaching web technologies to secondary school pupils. An analysis of computer science textbooks by authors Y.Y. Ryvkind *et al.* (2021) and N.V. Morze & O.V. Barna (2021) on the topic “Creating and Publishing Web Resources” was conducted.

THE CONCEPT OF "WEB TECHNOLOGIES" IN THE SCHOOL COMPUTER SCIENCE CURRICULUM

The educational topic chosen for analysis is closely related to a modern area of personal and professional development for pupils. The rapid development of web technologies indicates that contemporary website developers are gaining increasingly new opportunities for implementing various projects through the adoption of modern technologies, leading to the full integration of individuals into the modern world of technology and professional development. Therefore, the concepts of web technologies, web design, websites, and web development are fundamental components of a web developer's knowledge. These knowledge bases will determine how web developer can realise their projects related to the creation of websites and web applications.

The term "web technologies" is used to denote a range of internet technologies and online services within the network. Researcher H. Tkachuk (2011) states that "web technologies are information technologies whose use enables the processing of web resources located in the web space of computer networks (local or global)". Authors O.V. Korshunova *et al.* (2021) believe that "the web is not just an environment for storing web pages, but also the foundation upon which internet services exist". Academician V.Y. Bykov *et al.* (2019) considered web technologies as network-based information and communication technologies that support electronic communications in local networks. Web technologies are a fundamental component of the Internet, containing a system for accessing interconnected documents on various computer devices connected to the Internet.

O.V. Korshunova *et al.* (2021) in their 8th-grade computer science textbook note that the Hypertext Markup Language (HTML) serves to structure the content of web pages, defining the layout and visual presentation of user interface elements. A browser interprets HTML code and displays the web page in a user-friendly format. According to N.V. Morze & O.V. Barna (2021), a website represents a virtual space in the global network. Web design is a comprehensive process of creating and maintaining websites, which includes the development of the web interface's structure, design, and functionality. Using HTML, users structure the content of web pages, format text, create hyperlinks, and integrate multimedia elements.

Thus, web technologies are a means of computers and various devices communicating with each other through the use of markup languages. This is network communication created and managed with web content using Hypertext Markup Language (HTML) and dynamic and interactive objects implemented with web programming languages. Web development is the process of constructing interactive web applications and websites, characterised by a high level of dynamism and providing a broad range of functional capabilities. Examples of such developments include social networks, e-commerce platforms like Amazon, corporate portals, and blogs.

THE ROLE OF TEXTBOOKS IN MODERN EDUCATION

The quality of teaching and the organisation of the educational process depend on many factors, one of which is the educational textbook. According to N.Y. Moyseyuk (2007), a textbook is a multifunctional educational book that is a key element of the learning process. An educational textbook contains structured and systematised material, supplemented by various didactic elements, which not only convey knowledge but also guide the learning process. Through various elements (text, illustrations, tasks), the textbook develops specific cognitive skills in pupils, engages them in the learning process, and stimulates cognitive activity. It acts as a kind of lesson plan, where learning objectives, content, and methods of knowledge assessment are clearly defined.

Authors J.R. Rodriguez & M.A. Moreira (2017) analysed how digital technologies are changing school textbooks in Latin America and Europe. In modern digital world, education also actively utilises digital tools: online platforms, websites, and more. Their research focuses on the creation and distribution of digital learning materials at various levels (international, national, regional), as well as their technological and pedagogical features. A.K. Mohar's (2019) research analysed Slovenian textbooks from different periods. The author emphasises that the successful use of electronic textbooks in the educational process requires an understanding of their specific characteristics and requirements from all members of the educational community. He notes that effective use of electronic textbooks requires knowledge of their structure, functionality, and the requirements of the learning environment.

In the research of N. Rodríguez-Regueira & J. Rodríguez-Rodríguez (2022), an analysis of 30 digital textbooks used in Spanish primary schools was conducted. One of the key contributions of this study is the development of a specialised guide for evaluating digital learning materials. This guide enables a comprehensive assessment of such materials, considering their technological characteristics, pedagogical capabilities, and functional purpose in the context of the constant evolution of the digital educational environment. It allows for the consideration of dynamic changes in the digital educational resources market and ensures a more objective assessment of the quality of such materials. This research is a new step in the study of digital learning materials, as the market for such materials is constantly changing.

In the article by O. Kosovets *et al.* (2024b), it is stated that during the educational process, the textbook fulfils the following functions: informational (scientific presentation of subject information, modern data processing methods, creation of reference materials), developmental (development of professional thinking, language, independence, construction of parts of scientific theory), formative (a large number of tasks, including applied ones, demonstration of the real effect of applying scientific methods to them), managerial (preference for active learning methods, increased speed of access to educational and scientific

information), and the application of digital technologies (modern tools, visualisation, infographics, interactive elements). The digital transformation of education has led to radical changes in the role of the textbook. Modern digital textbooks offer new opportunities for interactive learning and personalisation of the educational process. However, the effective use of digital textbooks requires not only modern technologies but also well-designed educational materials and professional teacher training.

PRESENTATION OF EDUCATIONAL MATERIAL IN THE "CREATING AND PUBLISHING WEB RESOURCES" SECTION

Consider applying the aforementioned functions of the textbook to the analysis of the "Creating and Publishing Web Resources" section of computer science textbooks. The chosen textbook section is a new topic for 8th-grade pupils, including in the subject content line of information technologies for creating and processing information objects (Zhaldak *et al.*, 2017; Semenovska *et al.*, 2023). The study of web technology fundamentals involves the development of practical skills in creating websites using popular site builders such as Google Sites, Wix, Weebly, and Strikingly. Pupils are introduced to the basic principles of ergonomically placing information on a web page, learning to create links, and positioning graphical and multimedia elements on website pages. According to the computer science curriculum for general secondary education institutions, 8th-grade pupils should master the following content in the "Creating and Publishing Web Resources" section (Zhaldak *et al.*, 2017):

- automated tools for creating and publishing web resources;
- the concept of Hypertext Markup Language;
- principles of ergonomically placing information on a web page.

The expected outcomes of the cognitive learning activities of 8th-grade pupils indicate that the pupil should master the following components:

- knowledge-based: provide examples of automated tools for creating web pages; understand the concept of Hypertext Markup Language;
- activity-based: create web pages using automated tools and publish them on the internet; use hypertext, graphical, and multimedia elements on web pages;
- value-based: recognise the importance of participating in the global internet community; adhere to the principles of ergonomically placing materials on a web page.

The components of the expected outcomes of cognitive learning activities correspond to the six levels of Bloom's taxonomy. For example, the knowledge-based component covers the lower levels of knowledge acquisition and information comprehension, the activity-based component corresponds to pupils' abilities to use and analyse information, and the value-based component represents the levels of evaluation and synthesis. The analysis of educational textbooks was conducted following the research of

O. Kosovets *et al.* (2024a) to ensure they fulfil the functions of a textbook and achieve the expected outcomes of pupils' cognitive learning activities during the study of this section.

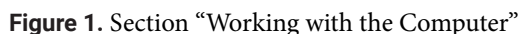
Authors Y.Y. Ryvkind *et al.* (2021) proposed studying the "Creating and Publishing Web Resources" section of the textbook with the following topics: 1) the structure of web pages and the concept of HTML; 2) automated tools for creating and publishing web resources; and a practical task of creating websites using online site construction systems. Pupils learn about: the Hypertext Markup Language (HTML); the use of hypertext, graphical, and multimedia elements on web pages; the principles of ergonomically placing objects on a web page; the stages of creating a website using online site construction systems; methods for creating web pages and placing objects of various types on them; and website publication.

The textbook, within its informational component, provides definitions for concepts such as content, navigation elements, design, ergonomics, Hypertext Markup Language, tags, ergonomic website, site map, and hierarchy. Pupils are given a clear list of recommendations for developing the structure of web pages and are provided with rules for the ergonomic placement of objects on pages. In the section "Concept of HTML", pupils are introduced to basic tags and their attributes for marking up and formatting text, inserting images into a web page, and creating hyperlinks. The "Key Points" section concentrates on the main ideas of the topic, allowing pupils to recall and quickly review the educational material.

The "Answer the Questions" section contains questions at the basic, intermediate, and advanced levels of learning achievement. The list of questions will help the computer science teacher to ascertain the expected outcomes of activity in the knowledge-based component (whether pupils name components on a web page; understand what constitutes an ergonomic website; know tags and their attributes; understand how to create conveniences for users with special needs on a website), in the activity-based component (whether pupils adhere to the rules of ergonomic placement of materials on a web page; create web pages with images and links using markup language), and in the value-based component (whether pupils analyse each group of web pages; analyse the page source; independently create web pages). The use of high-level questions in lessons – for analysis, synthesis, and evaluation – will enable the computer science teacher to effectively develop pupils' critical thinking skills. The textbook includes a training practical exercise, which can be accessed via interactive elements (Fig. 1), serving as evidence of data processing using modern methods. The authors have included two ways to access the exercise: a QR code or a hyperlink, allowing pupils to access it from either the printed or electronic version of the textbook.

The proposed practical exercise aims to teach pupils to analyse a prepared web page based on its appearance, fulfilling the knowledge-based component of the expected outcomes of cognitive learning activities: identifying page

understand (value-based component) the transformation of the HTML markup code into a web page with text, images, and links (Fig. 2).





Головна

Історія

Сучасність

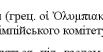
Олімпійські ігри

Олімпійські ігри (грец. *Ὀλυμπιακοί Αγώνες*) – міжнародні спортивні змагання, які проводяться під егідою Міжнародного олімпійського комітету.

Олімпіади проводяться під гаслом **"Citius, altius, fortius"**, запропонованим католицьким ченцем Агрієм Дідоном. Іншим популярним гаслом олімпіади є вираз *«Головне не перемога, а участь»*.

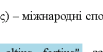
В програмі Олімпійських ігор входять 33 види спорту, що включають 52 дисципліни. Загалом в окремих змаганнях розігрується біля 400 медалей.

Види спорту, які входять до програми Олімпійських ігор називаються **олімпійськими**. Переможці змагань отримують довічне звання олімпійського чемпіона. Олімпійські ігри діляться на літні й зимові.



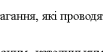
Зимові ігри

Літні Олімпійські ігри проводяться кожні чотири роки, крім першого.



Зимові ігри

Зимові Олімпійські ігри відомішіші від літніх, починаючи з 1924 року.



Паралімпіади

Паралімпіади ігри – міжнародні спортивні змагання для осіб з інвалідністю.

Source: a fragment of the textbook's template file by the authors Y.Y. Ryvkind *et al.* (2021)

The authors describe the sequence and various methods for creating a website using the Google Sites service. Working with this resource requires an account, which pupils created in 7th grade. This implements the interconnectivity of the educational material. Template files are available for practical tasks via QR code or hyperlink. The textbook material contains a detailed and structured description of the Google Site control elements (Fig. 3). Figure 3 shows a table explaining the purpose of the control elements in the “Insert” tab of the web page editor. It includes elements such as “Text Box” for entering and formatting text, “Images” for inserting pictures from Google Drive, URLs, or a computer, and “Embed” for adding objects via HTML code or links. There is also “From Drive” for inserting documents, “Layouts” for selecting the arrangement of objects, “Table of Contents” for automatically creating a list of headings on the page, “Image Carousel” for slideshows, and “Divider” for adding horizontal lines. The table serves as a guide for working with these tools while editing web pages. The authors have focused on the practical component of the topic’s study and, in the end, propose completing a comprehensive practical task. The following discusses the textbook on information technology by N.V. Morze & O.V. Barna (2021). The educational material in the “Creating and Publishing Web Resources” section is presented in two topics: 1) automated systems for creating and publishing web resources; 2) creating a web page using Hypertext Markup Language (Fig. 4).

Призначення елементів керування вкладки Вставити

Елемент керування	Призначення
 Текстове поле	Створення блока введення тексту. Текст може бути оформлений як Назва, Заголовок, Підзаголовок, Звичайний текст і Малий
 Зображення	Уставлення зображення з Google Диска, за URL-адресою з Інтернету, з носіїв даних комп'ютера тощо
 Вставити	Уставлення об'єктів різних типів з Інтернету за їх URL-адресою або вставлення фрагментів HTML-коду
 З Диска	Уставлення документів різних типів з Google Диска
 Макети	Вибір макета розміщення об'єктів на сторінці
 Зміст	Створення змісту сторінки. Зміст формується автоматично із заголовків, розміщених у текстових полях на сторінці, та призначений для швидкого переходу до вибраного заголовка на поточній сторінці
 Карусель зображень	Створення слайд-шоу з вибраних зображень
 Роздільник	Уставлення горизонтальної роздільної лінії

Figure 3. Structured description of educational material

Source: excerpt from the textbook by Y.Y. Ryvkind *et al.* (2021)

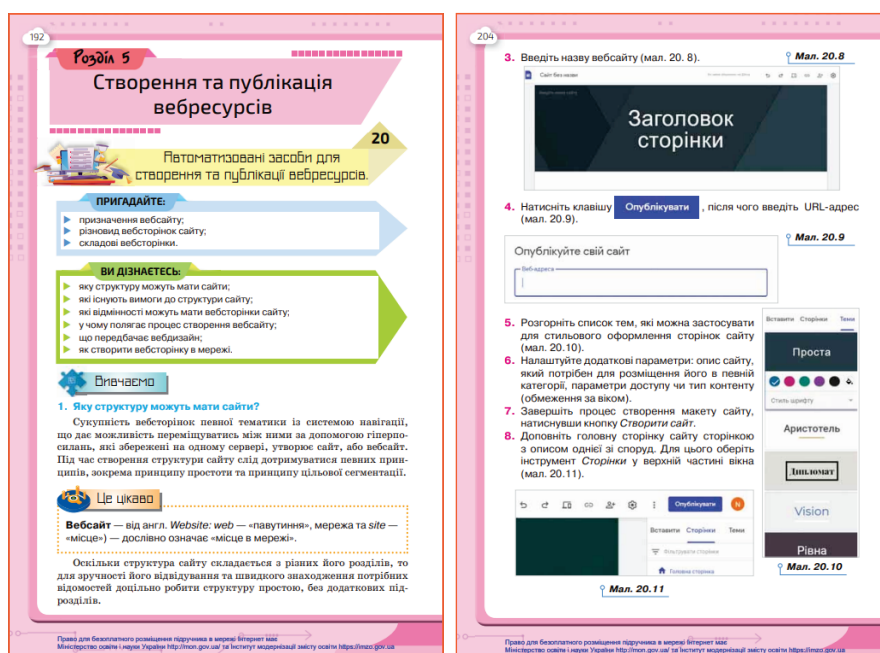


Figure 4. Structured description of educational material

Source: excerpt from the textbook by N. V. Morze & O.V. Barna (2021)

The lesson topics are presented in the form of questions, such as what structure websites can have, how to create a simple HTML document, and the answers to which pupils will receive in the lesson. Authors N.V. Morze & O.V. Barna (2021) propose, in the informational component of the educational section, the study of the following terms: website; internal and external website structure; linear, hierarchical, and arbitrary internal website structure; banner; ergonomic website; web design; content; HTML; static and interactive (dynamic) web pages; site management system; website section page; script; SEO,

SMO. In the first topic, pupils learn the answers to the questions: what structure websites can have; what are the requirements for website structure; what differences can website pages have; what is the process of creating a website; what does web design involve; and how to create a web page on the internet.

The website structure is considered as a complex system of several key components: directory structure, navigation structure, and the necessity of a website splash page. As an example of an arbitrary internal website structure, pupils are directed to the website of the Library of

Ukrainian Literature, and as an example of a web directory, to a website with a library of audiobooks, thus fulfilling the value-based function of the textbook (Listen, 2024). In explaining the ergonomic requirements for a website, the authors highlighted the importance of the main page and its role among other pages of the site. For example, “the main page of the website should satisfy the “3 by 3” rule, that is, three paragraphs of three sentences about the theme and content, authors, and purpose of the website” (Onyshchenko & Moroz, 2024).

In the “Take action” section, the authors have developed detailed instructions for creating a website about amazing structures using Google Sites, through which pupils, by engaging in activity, master the basic principles of working with modern digital tools and recognise the importance of participating in the development of virtual space as a full-fledged member of the global digital community. The “Work in Pairs” section contains tasks using the words “formulate”, “discuss”, “exchange opinions”, and “is it possible to assert”, which promotes the development of pupils’ creativity, encourages analysis, synthesis, drawing conclusions, and expressing their own opinions. Pupils demonstrate acquired knowledge, analyse the characteristics of professional and amateur websites, provide examples of website designs, reflect on website popularity, and more.

In the “Work Independently” section, tasks are provided to find websites of educational institutions located near your school or websites of online stores that sell computer equipment online. There are also tasks to create personal websites using the Google Sites service about pupils’ hobbies, rare animals and plants, or a website about a project implemented by your class during lessons or

extracurricular activities. In the second topic, educators explore the questions: what does the markup code of a web page look like in HTML; how to create a simple HTML document; how to format text in an HTML document; how to work with lists in an HTML document; how to work with images in an HTML document; and how to build hypertext links in an HTML document.

It is worth noting that pupils, using the textbook materials, will gain practical skills in using text formatting tags, placing images and links, and will also become familiar with creating numbered and bulleted lists, and internal links within a web page. The authors have focused on the topic of creating links, which is difficult for pupils to understand, namely: how to correctly write the path to a page located in the current folder, what a relative address is, and how to write a label name and link it to a link for navigation within the page. The team of authors provides pupils with a list of colours for ease of completing practical tasks, explaining the correspondence between the font size measurement units of the “size” attribute in numerical values and points. The text size in web design is measured in whole numbers from 1 to 7, which does not provide an understanding of how large the text will be on a web page. The correspondence in points, presented in the textbook, which are used as text size measurement units in text editors, allows pupils to understand which number to write to achieve the desired size. In the “Work in Pairs” section (Fig. 5), pupils are encouraged to familiarise themselves with and compare an online guide (Introduction, n.d.) and a practice tool (HTML Examples, n.d.); a valuable resource for exploring web page formatting examples (HTML Editor, 2015) is also provided (fulfilling the managerial function).

Працюємо в парах

- Обговоріть, які відомості, подані на сайті за адресою <https://goo.gl/bC3WD4>, доповнюють матеріал підручника.
- Обговоріть, як можна застосувати онлайнний підручник (https://www.w3schools.com/html/html_intro.asp) та онлайнний тренажер (https://www.w3schools.com/html/html_examples.asp) з мови HTML у своєму навчанні. Наведіть одне одному свої пропозиції. У чому відмінність цих ресурсів?
- Обговоріть, як можна використати приклад форматування веб-сторінки (мал. 21.6) на сайті <https://htmlg.com/html-editor/> для створення власних вебсторінок. Хтось висловлює припущення, а хтось — перевіряє його. Потім міняєтесь ролями.



The screenshot shows the HTML Editor website. On the left, there is a text editor with the text "You can edit this demo text!". Below it, there is a table with two columns: "Tag" and "Description". The table lists various HTML tags and their uses, such as "Active styles", "Setting margins", and "Using active styles". On the right, there is a code editor showing the HTML code for the demo text editor.

Figure 5. Section “Work in Pairs”

Source: excerpt from the textbook by N.V. Morze & O.V. Barna (2021)

Pupils are provided with a list of group projects, such as “Professions of the Future” and “Famous People of Our Region”, for creation in HTML. The task suggests collaboratively creating a website and deciding, for example, who will create a web page for which profession. The proposed educational projects contribute to the development of computer science competencies through the knowledge-based, activity-based, and value-based components of the expected learning outcomes for 8th-grade pupils.

ANALYSIS OF AUTHORIAL METHODOLOGIES FOR TEACHING WEB TECHNOLOGIES IN 8TH GRADE

A comparative analysis will be made of the presentation of teaching material in the previously discussed informatics textbooks for 8th-grade pupils. Developers N.V. Morze & O.V. Barna (2021) present educational material on the topic “Creating and Publishing Web Resources” per the curriculum: pupils first study automated tools for creating and publishing web resources and then become acquainted with the concept of Hypertext Markup Language. Authors Y.Y. Ryvkind *et al.* (2021) propose constructing the educational process in a different order: first, study Hypertext Markup Language, and then automated web page creation tools. These are methodologically different approaches to teaching web technologies to pupils. In the authors’ opinion, it is important to explain to pupils how a page is created using tags, and then use Google Sites to construct complex websites with embedded elements.

Both author teams begin explaining the educational material with structure. Y.Y. Ryvkind *et al.* (2021) focus on the structure of a web page, describing the web page through navigation, design, and content elements, while N.V. Morze & O.V. Barna (2021) focus on the structure of a website, teaching the internal and external structure of the site, examining static and dynamic pages, and dwelling on the concept of “home page” in detail; they introduce pupils to website markup, content, and publication, the main components of web design (style, layout, technologies, presentation, purpose); and provide advice to novice web designers, in which role 8th-grade pupils find themselves.

The author teams have different approaches to explaining website ergonomics: they present rules and recommendations, such as placing no more than three columns of content on a page, preventing the appearance of horizontal scroll bars on web pages, etc.; or they explain ergonomics through specific characteristics of website visitors: expectations, age, habits, technical capabilities, and level of knowledge. All authors have chosen Google Sites for practical work on creating and publishing websites using automated systems. This is a free and simple builder that allows pupils to customise website templates, select colour schemes and font styles, and insert objects on web pages.

When teaching pupils the Hypertext Markup Language, the author teams emphasise the ability to view and analyse the page source to understand HTML tags and their attributes. The educational materials contain a large number of examples of Ukrainian websites, highlighting

the importance of pupils’ participation in the activities of the global internet community of Ukraine and the world. Y.Y. Ryvkind *et al.* (2021) have developed a convenient table with brief explanations of the actions performed by the control elements on Google Sites (Fig. 3). N.V. Morze & O.V. Barna (2021) have covered more Hypertext Markup Language tags, which allow for diversifying practical tasks, making them interesting and useful. In the “Work in Pairs” section, the authors have provided pupils with useful practical advice on familiarising themselves with an online textbook and practice tool, and a virtual resource with page formatting examples. It is worth noting that the authors use the terms “parameters” and “attributes” interchangeably when referring to tag properties; a summary at the end of the topic and a list of questions are not provided. Educational online resources are an effective supplement and expansion of educational opportunities in teaching web technologies. These web resources include virtual learning environments and online courses, which can significantly improve the efficiency of organising and conducting the educational process, activate pupils’ independent learning, and facilitate blended and distance learning. For 8th-grade pupils, the following online resources are recommended:

1. Educational channel by O. Pasichnyk (2022) on site builders “Creating a Website on Weebly.com” and “Online Website Builder Strikingly”. This resource will be useful for both pupils and teachers who want to quickly and efficiently create their own educational web resource.

2. Educational videos by A. Bukach (2024) on creating and publishing web resources using Google Sites.

Thus, the educational content of the “Creating and Publishing Web Resources” topic, presented in the reviewed computer science textbooks for 8th-grade pupils, covers the main aspects of creating and publishing websites and promotes the development of pupils’ practical web development skills. Using textbooks in web technology lessons in conjunction with modern digital tools will contribute to the development of pupils’ critical thinking, creative abilities, and responsible attitudes towards internet use, as well as successful preparation for pupils’ professional self-determination.

CONCLUSIONS

The author of this article has analysed a range of scientific and educational-methodological publications on innovations and trends in computer science teaching methodology in general secondary education institutions at the current stage, particularly focusing on the use of digital textbooks. The analysis has identified and summarised psychological and pedagogical factors and highlighted relevant tasks for the transformation of the content and procedural components of computer science education in secondary school, which is a fundamental aspect of computer literacy.

The analysis of educational material from the “Creating and Publishing Web Resources” section for 8th-grade pupils indicated that the educational content is sufficient and

up-to-date for pupils to acquire basic knowledge on this topic. The competencies and practical skills obtained enable pupils in general secondary education institutions to realise their potential in developing web pages and websites, from simple HTML markup language designs to complex websites with embedded elements developed using automated site builders with modern technologies.

Textbook authors used a variety of educational methods to present the educational material, ranging from the theoretical foundations of HTML to creative projects involving website creation using online builders. Significant emphasis is placed on practical tasks that help pupils master theoretical knowledge and develop useful digital skills for creating their own web pages. Authors actively use

modern technologies, such as QR codes, online services, and interactive resources, which contribute to increasing pupil motivation and interest in the subject. The prospects for further research are aimed at studying the possibilities of implementing modern digital educational technologies in the computer science education process through the creation of new educational environments and the development of methodologies for their application.

ACKNOWLEDGEMENTS

None.

CONFLICT OF INTEREST

None.

REFERENCES

- [1] Bukach, A. (2017). *How to create a website?*. Retrieved from <https://surl.li/beorle>.
- [2] Buts, K.O., & Popovkina, A.S. (2022). *Gender analysis of school textbooks*. *Scientific Notes of Young Scientists*, 9.
- [3] Bykov, V., Burov, O., Gurzhiy, A., Zhaldak, M., Leshchenko, M., Litvinova, S., Luhovyi V.I., Oliynyk, V.V., Spirin, O.M., & Shishkina, M.P. (2019). *Theoretical and methodological foundations of informatization of education and practical implementation of information and communication technologies in the educational sphere of Ukraine*. Kyiv: Komprint.
- [4] HTML Editor. (2015). Retrieved from <https://htmlg.com/html-editor/>.
- [5] HTML Examples. (n.d). Retrieved from https://www.w3schools.com/html/html_examples.asp.
- [6] Kholmatov, A. (2023). *Pedagogical technologies in teaching students about web programming*. *Journal of Pedagogical Inventions and Practices*, 25, 40-44.
- [7] Korshunova, O.V., Zavadskyi, I.O., & Stasiuk, Z.R. (2021). *Informatics: Textbook for 8th grade of general secondary education*. Kyiv: Osvita Publishing House.
- [8] Kosovets, O.P., Soia, O.M., & Krupskiy, Y.V. (2024b). Methods of teaching computer science in a specialized school: Analysis of web technology manuals. *Mathematics, Informatics, Physics: Science and Education*, 1(1), 56-62. doi: 10.31652/3041-1955-2024-01-08.
- [9] Kosovets, O., Kovtoniuk, M., Soia, O., & Koval, D. (2024a). Integration of digital technologies in modeling the educational environment of a bachelor in the conditions of martial law. In *Proceedings of the 12th international conference on applied innovations in IT (ICAIIIT)* (pp. 51-57). Germany: Anhalt University of Applied Sciences. doi: 10.25673/115641.
- [10] Kuo, Y.-T., & Kuo, Y.-C. (2023). African American students' academic and web programming self-efficacy, learning performance, and perceptions towards computer programming in web design courses. *Education Sciences*, 13(12), 1-17. doi: 10.3390/educsci13121236.
- [11] Listen. (2024). Retrieved from <https://sluhay.com.ua/>.
- [12] Minarno, A.E., Syafa'ah, L., & Rahayu, D. (2021). Science and technology for community: Improving web programming skills using laravel framework. *Dedication Journal*, 18(1), 21-26. doi: 10.22219/dedikasi.v18.i1.15590.
- [13] Mohar, A.K. (2019). The materiality of textbooks: From black-and-white textbooks to the digital textbook. *Logos*, 30(2), 26-34. doi: 10.1163/18784712-03002005.
- [14] Morze, N.V., & Barna, O.V. (2021). *Informatics. Textbook for 8th grade. Institutions of general secondary education*. Kyiv : UOVC "Orion".
- [15] Moyseyuk, N. (2007). *Pedagogy*. Kyiv: OJSC "Bila Tserkva Book Factory".
- [16] Onyshchenko, N., & Moroz, N. (2024). Methodological approaches to the formation of information literacy of future primary school teachers using computer-based learning technologies. *Scientia et Societas*, 3(2), 19-27. doi: 10.69587/ss/2.2024.19.
- [17] Pasichnyk, O. (2022). *Creating a website on Weebly.com*. Retrieved from <https://www.youtube.com/playlist?list=PLqrtuwUbDyenOn34MqUCxezkacDv-wCWO>.
- [18] Reshevskaya, K.S., Zimmerman, G.A., & Lapkin, A.I. (2024). *Analysis of computer science textbooks for grades 10(11)*. *Topical Issues in Modern Science*, 8(26), 932-941.
- [19] Rodríguez, J.R., & Moreira, M.A. (2017). Introduction: From textbooks to digital teaching materials. *Latin American Journal of Educational Technology – RELATEC*, 16(2), 9-12. doi: 10.17398/1695-288X.16.2.9.
- [20] Rodríguez-Regueira, N., & Rodríguez-Rodríguez, J. (2022). Analysis of digital textbooks. *Educational Media International*, 59(2), 172-187. doi: 10.1080/09523987.2022.2101207.

- [21] Ryvkind, Y.Y., Lysenko, T.I., Chernikova, L.A., & Shakotko, V.V. (2021). *Informatics: Textbook for 8th grade. Institutions of general secondary education*. Kyiv: Genesis.
- [22] Semenovska, L., Vazhenina, I., & Fazan, V. (2023). Individualization of learning as a development actuality information technological society. *Pedagogical Sciences*, 6(2), 30-34. doi: 10.33989/2524-2474.2023.82.295073.
- [23] Tkachuk, H. (2011). *Methods of using educational web resources in the process of training future teachers of computer science*. Uman: Sochinsky Publisher.
- [24] Yatsko, O.M. (2023). Analysis of teaching the elective module "Web technologies" in grades 10-11 of secondary school. *Education. Innovation. Practice*, 11(3), 52-59. doi: 10.31110/2616-650X-vol11i3-008
- [25] Zhaldak, M.I., et al. (2017). *Informatics. Curriculum for students of grades 5-9 of general education institutions*. Retrieved from <https://mon.gov.ua/static-objects/mon/sites/1/zagalna%20serednya/programy-5-9-klas/onovlennya-12-2017/8-informatika.docx>.

Олена Косовець

Кандидат педагогічних наук, доцент

Вінницький державний педагогічний університет імені Михайла Коцюбинського

21000, вул. Острозького, 32, м. Вінниця, Україна

<https://orcid.org/0000-0001-8577-3042>

Аналіз навчального матеріалу з вебтехнологій для учнів базової школи

Анотація. У сучасному інформаційному суспільстві вебсайти є потужним інструментом для навчання, комунікації та взаємодії користувачів. Наявність у шкільній освітній програмі з інформатики теми з вебтехнологій є актуальним аспектом опанування інформатичної компетентності, оскільки готує молодь до життя в цифровому світі та сприяє розвитку національної економіки. Метою дослідження було здійснити аналіз навчальних підручників з інформатики та виявити основні тенденції у методиці навчання вебтехнологій учнів базової школи. Для досягнення визначеної мети використано комплекс теоретичних методів, такі як аналіз, систематизація та узагальнення науково-методичної та навчальної літератури, методів навчання та застосування сучасних цифрових засобів у процесі навчання вебтехнологій. Проведений аналіз навчального матеріалу з теми «Створення та публікація вебресурсів» у підручниках з інформатики для учнів 8 класу свідчить про достатність та сучасність освітнього контенту для формування базових знань з даної тематики. Виявлено, що компетенції та практичні навички, набуті учнями, забезпечують можливість реалізації їхнього потенціалу у розробці вебсторінок та сайтів – від найпростіших проєктів, створених мовою розмітки HTML, до складних вебсайтів з інтегрованими елементами, розроблених за допомогою автоматизованих конструкторів сайтів із застосуванням актуальних технологій. Значна увага приділялась практичним завданням, що сприяли закріпленню теоретичних знань та розвитку корисних цифрових навичок зі створення власних вебсторінок. Автори активно використовували сучасні технології, такі як QR-коди, онлайн-сервіси та інтерактивні ресурси, що сприяє підвищенню мотивації та зацікавленості учнів до вивчення предмета. Результати дослідження можуть бути використані в освітньому процесі як у загальноосвітніх школах, так і в спеціалізованих навчальних закладах для підготовки учнів до роботи з вебтехнологіями

Ключові слова: методика навчання інформатики; навчальний підручник з інформатики; функції навчального підручника; цифрові технології; навчальний процес

UDC 37.01
DOI: 10.52534/msu-pp1.2025.19

Taisa Yamchuk*

PhD in Psychology, Associate Professor
Mukachevo State University
89600, 26 Uzhhorodska Str., Mukachevo, Ukraine
<https://orcid.org/0000-0003-0392-2249>

The resilience of the student community in wartime

Article's History:

Received: 07.11.2024
Revised: 02.03.2025
Accepted: 26.03.2025

Suggested Citation:

Yamchuk, T. (2025). The resilience of the student community in wartime. *Scientific Bulletin of Mukachevo State University. Series "Pedagogy and Psychology"*, 11(1), 19-31. doi: 10.52534/msu-pp1.2025.19.

Abstract. The study aimed to identify strategies for overcoming difficulties and enhancing student resilience. The methodology included the use of strengths, weaknesses, opportunities, and threats analysis, student surveys, and a comparative analysis of student support strategies implemented in Ukraine, Poland, and Georgia during wartime. The research examined the resilience of the student community in wartime conditions, focusing on the impact of war on students' psycho-emotional state, academic motivation, and adaptability to new learning environments. The study provided unique data on stress and anxiety levels among students, a decline in their ability to concentrate, and reduced motivation for learning. It was found that social and psychological support from universities, families, and community initiatives plays a crucial role in maintaining student resilience. Additionally, physical activity and participation in volunteer initiatives were identified as having a positive impact on students' psychological stability. Compared to Ukraine and Poland, Georgia has developed student support strategies for crisis situations, including the introduction of psychological support programmes and scholarship schemes for students from affected regions. Georgian universities actively collaborate with international organisations to provide additional support for students in crisis situations. The need to strengthen social and psychological support for students during wartime has been identified, along with the development of programmes to promote psycho-emotional well-being and the provision of flexible and accessible learning formats in remote education settings. The findings also confirm that support from universities and community organisations is crucial in enhancing student resilience in challenging circumstances. The practical significance of the study lies in the potential application of its results to develop recommendations for the creation of effective student support programmes in wartime conditions. The strategies developed can be implemented in Ukrainian universities to improve student adaptation to wartime challenges, reduce stress and anxiety levels, and enhance academic performance amid instability

Keywords: psychological resilience; adaptation; support; mental health; social integration

*Corresponding author

INTRODUCTION

The resilience of the student community during wartime is a crucial area of study within the fields of Psychology, Pedagogy, and Sociology. War impacts all aspects of life, and education is no exception. Students living in active combat zones or forced to adapt to new realities through emigration or internal displacement face numerous challenges. These include stressful situations, the loss of

familiar learning environments, mental health disorders, and the need for rapid adaptation to altered social conditions. However, despite these difficulties, students can demonstrate significant resilience through various protective mechanisms, such as support from loved ones, university institutions, and their own internal motivation and adaptability.



Copyright © The Author(s). This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (<https://creativecommons.org/licenses/by/4.0/>)

In this context, resilience is defined not only as resistance to stressful situations but also as the ability to recover, find new ways to solve problems, and maintain mental health in changing environments. The role of social support and integration is vital in fostering collective resilience. Further research is needed to explore the specifics of student community resilience in wartime, the impact of various forms of support on students' ability to adapt, and the factors that promote or hinder the development of this resilience. A significant number of researchers have explored this topic, highlighting various perspectives. For instance, A.J. Abuejheisheh *et al.* (2024) focused on the impact of the war that began on 7 October 2023, in Palestine, on medical students at Al-Quds University. They analysed levels of anxiety, depression, stress, and resilience among students, revealing how conflict increases stress and anxiety levels. They also emphasised the crucial role of resilience as a protective factor in maintaining mental health. Specifically, G.G. Abulfaraj *et al.* (2024), in their systematic review, investigated the impact of interventions aimed at enhancing student resilience on their mental health and well-being. The authors highlighted various student support strategies used in crisis situations, such as war or pandemics, and evaluated the effectiveness of these interventions in reducing stress and anxiety. E.O. Apio (2022) studied resilience among children during the war in northern Uganda. This research emphasised the importance of psychosocial support and assistance for children who have experienced violence, to develop their psychological resilience.

A. Artyukhov *et al.* (2024) conducted a bibliometric analysis of research on educational resilience in armed conflicts. They examined trends in academic studies on student resilience, particularly in wartime, and identified key support strategies. Y. Assefa *et al.* (2022) analysed the impact of armed violence on student achievement and the role of parents in developing academic resilience during war. They emphasised the importance of family and school support in enhancing youth resilience in violent environments. Models that integrate university support, academic demands, and resilience-building strategies can help students overcome crises. A. Awais *et al.* (2023) developed a model that combines university support, academic demands, and student resilience development strategies during crisis situations, including war.

The importance of developing stress resilience among students studying abroad becomes particularly relevant in wartime. B. Baizhumanova *et al.* (2024) investigated the impact of stress and resilience development on the mental health and well-being of students studying abroad during wartime. Strategies for developing resilience among teachers during war are crucial for maintaining the quality of education. O. Banit & O. Merzliakova (2023) analysed strategies for developing resilience among Ukrainian teachers during the war, identifying adaptation and support methods that allow them to maintain professionalism and mental health. I. Bartusevičienė *et al.* (2021) addressed the importance of ensuring the academic resilience of universities

during crises. They studied how the transition from face-to-face to online learning during the pandemic affected the student community, revealing the importance of flexibility and adaptation in crisis situations.

The asymmetrical impact of war on social groups requires particular attention when formulating resilience development policies. G. Celi *et al.* (2022) studied the asymmetrical impact of war on different social groups, especially within the EU context, emphasising the importance of developing resilience at the level of governments and educational institutions. H. Egan *et al.* (2022) explored the impact of mindfulness and self-compassion on student resilience, highlighting the role of these practices in enhancing mental well-being and academic achievement. Resilience among Ukrainian youth is a key aspect of their mental health during wartime. F. Giordano *et al.* (2024) investigated the development of resilience among Ukrainian youth during the war, focusing on the importance of social support within peer groups to help young people cope with stress and traumatic experiences of war.

Research on student resilience in wartime leaves some important aspects under-explored. The impact of social support from peers or the community on the development of resilience in students facing psycho-emotional difficulties due to conflict is not sufficiently considered. This aspect could be crucial for students, as social networks can significantly contribute to their recovery. The study of the effectiveness of psychological interventions often fails to account for cultural and social differences among students from different regions. Considering these factors could help adapt strategies to specific groups and increase their effectiveness in wartime. There is also insufficient research on the use of modern technologies, such as online platforms and mobile applications, to support students. These gaps require further research, particularly regarding the effectiveness of various resilience development strategies, taking into account social, cultural, and technological aspects. The aim was to develop recommendations for improving the resilience of the student community based on the research findings.

The research objectives were:

1. To determine the current state of resilience within the student community during wartime and identify the main challenges students face.
2. To analyse strategies for overcoming difficulties and enhancing student resilience used in Ukraine and compare them with the experiences of Poland and Georgia.
3. To provide recommendations for improving the resilience of the student community based on the research findings.

MATERIALS AND METHODS

The initial stage of the research involved determining the current state of resilience within the student community during wartime and identifying key challenges based on criteria such as the psycho-emotional state of students, including levels of stress, anxiety, and emotional burnout.

Adaptability to change, focusing on the ability to effectively respond to new learning conditions, remote education formats, and shifts in communication methods. Social support, encompassing assistance from family, friends, universities, and community initiatives. Educational resilience refers to motivation for learning, academic performance, and maintaining engagement in academic activities during wartime. Financial and material difficulties, including access to essential learning resources and financial stability issues. The theoretical foundation of the research was based on the study of A. Burovytska (2024). Specifically, a comparative analysis of student resilience support strategies in Ukraine, Poland, and Georgia was conducted. This comparative analysis was chosen due to the shared historical and cultural ties among these countries, as well as the similar challenges they face.

The main stage involved identifying strategies for overcoming difficulties and enhancing the resilience of the student community during wartime and conducting a comparative analysis of strategies implemented in Ukraine and countries such as Poland and Georgia. The experience of these countries in organising student support during cri-

sis situations was examined, including psychological assistance programmes, financial support, and measures to integrate students into social initiatives. This allowed for an assessment of which approaches are most effective and which aspects need improvement in the Ukrainian context.

The final stage of the research included surveying students from Ukrainian universities to assess their resilience during wartime. 250 students aged 18 to 25 participated in the survey, including 150 women (60%) and 100 men (40%). Students from Taras Shevchenko National University of Kyiv and Ivan Franko National University of Lviv participated in the study. These universities were chosen due to the diversity of student specialisations, allowing for the collection of representative data about the student environment. The survey was conducted from October to December 2024 using the Google Forms online platform. During the research, the provisions of the Code of Ethics by the American Sociological Association (2018) were adhered to. Ethical standards were maintained during the surveys, ensuring voluntary participation, informed consent of respondents, and confidentiality of the collected information (Table 1).

Table 1. Example of questionnaire questions

No.	Questions
1.	What is your stress level on a scale from 1 to 10?
2.	How has the war affected your academic motivation? (increased/remained unchanged/decreased)
3.	Do you feel supported by the university? (yes/partially/no)
4.	What stress-coping strategies do you use? (physical activity, socialising with friends, meditation, volunteering, other)
5.	Have you had to change your place of residence due to the war? (yes/no)
6.	Do you experience social isolation due to wartime circumstances? (yes/no/partially)
7.	Have you participated in volunteer or humanitarian initiatives? (yes, actively/sometimes/no)
8.	How has your ability to concentrate and study changed compared to the pre-war period? (improved/remained unchanged/worsened)
9.	Do you believe that the war has made you more resilient to life's challenges? (yes/partially/no)
10.	What measures do you think would help students better adapt to wartime conditions? (open question)

Source: compiled by the author

During the processing of the survey results with “yes” or “no” answers, the number of responses in each category was counted for each question. Then, the percentage of “yes” responses was calculated using the formula: (number of “yes” responses / total number of responses) × 100. Based on the collected data, a strengths, weaknesses, opportunities, and threats (SWOT) analysis of the student community's resilience was conducted.

RESULTS

The current state of student community resilience and key challenges during wartime

Resilience is a key factor for mental health and well-being, both for individuals and society as a whole. In the context of students, especially during wartime, resilience takes on particular significance. Students face numerous challenges, such as evacuation, loss of loved ones, violence, and other negative events that can affect their mental health and academic activities. Studying student resilience during

wartime provides an opportunity to develop psychological support programmes and strategies for this vulnerable population. Resilience is not a static characteristic; it can develop and strengthen throughout life. Psychologists have been studying resilience, defined as robustness and flexibility, since the 1970s. It also helps prevent burnout, anxiety, and depressive states. If resilience is an innate trait, then it exists in every person and can be trained like a muscle to cultivate mental resilience and prevent disorders (Balagina, 2023). Understanding and developing resilience is essential for maintaining mental health and the effective functioning of individuals in conditions of stress and uncertainty. This is particularly relevant for students who face additional challenges while studying during a military conflict (Burovytska, 2024). Thus, resilience is a multidimensional phenomenon that encompasses the psychological, social, educational, and physical aspects of an individual's life. Developing this quality is key to ensuring the resilience and adaptability of students during war and other crisis situations.

The psycho-emotional state of students during wartime is significantly affected by constant stress, uncertainty about the future, loss of loved ones or their homes, forced migration, and the disruption of their usual way of life. War creates chronic tension that can lead to increased anxiety, depressive states, and emotional burnout. Many students report difficulties with sleep, problems with concentration, a general feeling of fatigue, and a reduced interest in studying. The feeling of helplessness and loss of control over one's life is also a significant factor, which can lead to passivity or, conversely, excessive tension in an attempt to compensate for instability. Adaptability to change is a key indicator of resilience, as students are forced to quickly adjust to new learning and daily living conditions. The transition to remote learning, disruptions in electricity and internet connections, evacuation to other regions or countries, and changes in communication methods with teachers and classmates all require flexibility and the ability to independently manage one's learning process.

Some students face a lack of adequate learning conditions, the inability to attend lectures in real-time, and difficulties completing assignments due to insufficient information or a lack of selfdiscipline. Social support plays a critical role in maintaining student resilience, as a sense of belonging to a community and having support from loved ones helps to overcome stressful situations. Support from family can manifest in financial assistance, emotional stability, and creating favourable learning conditions, even if the student is far from home. Connection with friends and the university environment is also important, as interaction with others helps reduce anxiety and maintain a sense of normalcy (Psychological support for..., 2022). Universities implement various initiatives aimed at providing psychological assistance to students, including consultations with specialists, the creation of online support groups, and the organisation of volunteer activities that help students feel valued and involved.

Students' educational resilience is determined by their motivation to study, their academic performance, and their ability to maintain academic engagement even in challenging conditions. For many students, studying becomes a kind of psychological resource that allows them to maintain a sense of normalcy and continue to develop despite external circumstances. However, there are significant challenges, including loss of motivation due to future uncertainty, difficulties in accessing materials and resources, and a decline in the quality of the educational process due to teacher overload and ineffective communication. Some students are forced to combine studying with work, which complicates material absorption and leads to burnout (Zhyhaylo & Sholubka, 2022). Financial and material difficulties are among the most common problems students face during wartime. Job loss, decreased family income, and rising prices for housing, food, and utilities force many students to seek additional sources of funding. Some are forced to drop out or take a leave of absence due to the inability to pay tuition or provide themselves with necessary resources.

Scholarship programmes, financial assistance from universities, grant initiatives, and support from international organisations offering opportunities to continue education in Ukraine or abroad play an important role in overcoming these difficulties. Assessing the resilience of the student community during wartime allows for the identification of the main challenges students face and the development of effective strategies to overcome them. Psycho-emotional state, adaptability to change, level of social support, educational resilience, and financial difficulties are the main factors that determine students' ability to cope with crisis situations and continue their education. During the war, Ukrainian students can receive financial support through various programmes and initiatives. For example, scholarships for students under the age of 18 are 150% of the subsistence minimum, which currently amounts to 4,116 UAH per month. For students aged 18-23, the scholarship is also 150% of the subsistence minimum (Sobora, 2022). This initiative aims to support students during the war and ensure access to education in difficult conditions. Identifying these problems helps create a comprehensive support system that will help students maintain psychological health, academic success, and social integration during the war and post-war period.

Strategies for overcoming challenges and enhancing student resilience

In the context of war, Ukrainian students face numerous challenges affecting their psycho-emotional state, quality of education, financial situation, and social adaptation. To support the student community during this period, various strategies are being developed, such as organising psychological training, providing social support, and creating online communities for sharing experiences and resources. These strategies are aimed at ensuring psychological resilience, adaptation to changes in the learning process, and maintaining access to educational opportunities. One of the key areas of support is the provision of psychological assistance, as constant stress, uncertainty, and traumatic events can significantly affect students' well-being. Many universities have established psychological support hotlines where students can receive consultations from qualified specialists. Group online sessions are also conducted to help students learn techniques for coping with stress, managing anxiety, and maintaining emotional balance.

Particular attention is paid to educators, as their interaction with students significantly impacts the psychological climate of the learning environment. Teachers undergo specialised training in communicating with students who are emotionally exhausted or experiencing acute psychological crises. The organisation of the educational process has also changed significantly during wartime. Distance learning has become the primary mode of education, allowing students to continue their studies regardless of their location (Burovytska, 2024). To ensure access to knowledge, universities have actively used electronic platforms,

open educational resources, and recorded lectures. Flexible study schedules have been implemented to accommodate technical problems, power outages, and individual student circumstances. Some educational institutions have provided opportunities for students to temporarily take courses at partner universities abroad, with subsequent recognition of the results obtained.

Financial support for students has become another crucial aspect of strategies aimed at ensuring their resilience. In Ukraine, several grants and scholarship programmes have been introduced to assist students affected by the war. Some universities, such as Taras Shevchenko National University of Kyiv and National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”, have waived or reduced tuition fees for certain categories of students, introduced additional financial incentives, and opportunities for paid internships. Students also receive support from international organisations and foundations, such as the William and Flora Hewlett Foundation and the Soros Foundation, which offer financial assistance to continue their education. Social initiatives also play a significant role in supporting students. Volunteer organisations, in collaboration with universities, conduct humanitarian aid collection campaigns, organise mutual assistance among students, and create communities for psychological support. Universities encourage student involvement in volunteer initiatives, allowing them not only to receive help but also to feel valued and find new ways to adapt to reality (Volunteers and their family..., 2024).

The experience of overcoming challenges in the student environment can be compared with the practices of other countries that have faced war or have received a significant number of student refugees, particularly Poland and Georgia. In Poland, which became one of the main host countries for Ukrainian students during the war, several initiatives were implemented to support student refugees. After the start of the war in Ukraine, Polish universities simplified the admission procedures for Ukrainian

students, providing an opportunity to continue or start their studies without unnecessary bureaucratic hurdles. In particular, universities such as the University of Warsaw, Jagiellonian University, Wrocław University of Science and Technology, Cracow University of Economics, Lublin University of Technology, Maria Curie-Skłodowska University, and SGH Warsaw School of Economics offer simplified admission conditions for Ukrainian students. They also provide the opportunity for free education if they have a certificate from the State Commission for the Certification of Knowledge of the Polish Language at the C1 level or a Polish Card (Free education in Poland..., 2025).

In addition, the Polish government and various foundations have offered scholarship programmes for Ukrainian students, covering tuition and living expenses. For example, the “Scholarship Programme of the Government of Poland for Young Scientists” programme provides financial support to students from Ukraine to conduct research at Polish universities (The 23rd edition of..., 2024). Polish universities also provide psychological support for refugee students, organising consultations and group sessions to facilitate adaptation to the new environment. Georgia, having its own experience with military conflicts, has also developed strategies to support students in crisis situations. Georgian universities have implemented psychological support programmes for students affected by conflicts, providing individual and group consultations. Additionally, scholarship programmes have been introduced for students from affected regions, allowing them to continue their education without financial barriers. Georgian universities also actively collaborate with international organisations to provide additional support to students in crisis situations (Education Ministry to offer..., 2022). To better understand the strategies for supporting the resilience of the student community during wartime, a comparative analysis of measures implemented in Ukraine, Poland, and Georgia was conducted. The summarised results of this analysis are presented in Table 2.

Table 2. Comparative analysis of student resilience support strategies in Ukraine, Poland, and Georgia

Criteria	Ukraine	Poland	Georgia
Psychological Support	Hotlines, online consultations, stress management training, teacher support	Consultations for refugee students, group adaptation sessions	Psychological support programmes, individual and group consultations
Educational Process	Distance learning, electronic platforms, open courses, flexible schedules	Simplified admission for Ukrainian students, opportunities for free education	Continued education programmes for students from affected regions
Financial Support	Grants, scholarships, tuition waivers or reductions, paid internships	Government and private scholarships, coverage of living expenses	Scholarships for students from conflict zones, collaboration with international foundations
Social Initiatives	Volunteer movements, humanitarian aid collection, mutual aid among students	Integration programmes for Ukrainian students, cultural events	Volunteer programmes, interaction with international organisations

Source: compiled by the author based on Free psychological assistance to students from Ukraine is a project of the Student Parliament of the Republic of Poland (2023), United Nations High Commissioner for Refugees Georgia (2024)

The comparative analysis of student resilience support strategies has shown that all three countries apply a comprehensive approach, but with different emphases according to their capabilities and challenges. Ukraine primarily focuses on ensuring the continuity of the educational process, adapting to distance learning, and providing psychological support to students. Given the war-time conditions, educational institutions are focused on minimising student stress, providing consultations, and developing tools to overcome emotional burnout. Poland, hosting a significant number of Ukrainian students, has focused on their integration into local universities and financial support. Simplified admission procedures, scholarship programmes, and assistance in resolving housing and social issues have been implemented. Georgia, having its own experience with military conflicts, emphasises psychological support for students and financial assistance through scholarships and international programmes. Particular attention is paid to supporting students from affected regions. Although the approaches vary, all countries are directing efforts towards enhancing the resilience of the student community, adapting to new conditions, and maintaining access to quality education. This confirms the importance of comprehensive and flexible strategies to ensure student stability in crisis situations.

The physical aspect of resilience is an important component of the overall adaptation and ability of students to cope with the stresses of war. Physical activity not only positively affects overall health but also psycho-emotional well-being. It is known that regular physical activity can significantly reduce levels of anxiety, depression, and stress, improve mood through the release of endorphins, and enhance concentration and overall energy levels. For students experiencing the stresses of war, exercise can be an important tool for maintaining mental health and stability. In crisis periods, such as war, physical activity can be used as a method of stress relief and improvement of psycho-emotional state. Students who participate in sports or actively engage in physical activities (e.g., yoga, running, fitness, team sports) often experience lower levels of anxiety and depression (Hossain *et al.*, 2024). Universities can provide students with access to sports clubs or even organise special events to motivate students to remain physically active. In particular, during wartime, when students often have to

change their place of residence or adapt to new learning conditions, the availability of opportunities for physical activity becomes even more important. Programmes that include physical exercises and health support activities can be an effective tool for supporting student resilience, helping to reduce physical and mental exhaustion.

War has a significant impact on the academic performance of students. Students who experience armed conflicts or face their consequences often have difficulties with concentration, learning, and completing assignments. Experiencing stress, anxiety, physical and emotional fatigue, as well as problems with housing and access to learning materials, can reduce the effectiveness of the learning process. In wartime, many students may face constant distractions due to external circumstances, which significantly complicates maintaining motivation to study and achieving high results (Diab & Schultz, 2020). Changes in the learning regime, such as the transition to distance learning, can also be a challenge for students who do not always have the necessary technical resources for effective learning. For many students, problems with internet access, computer equipment, or simply maintaining academic balance during the war can become a serious barrier to successful learning.

At the same time, it is important to note that some students may demonstrate increased resilience under stress, allowing them to maintain academic engagement and even achieve high results. For example, students who have participated in volunteer initiatives or actively helped communities may feel higher motivation to continue their studies, which in turn stimulates them to improve their academic performance. An analysis of the impact of war on academic performance shows that while some students may lose motivation or reduce their academic engagement, others can adapt and find new ways to achieve success, including using online resources, group projects, or new forms of collaboration with teachers. Universities, in turn, can support students by providing additional academic resources, reduced assignment requirements, or the development of alternative forms of assessment that take into account the difficulties students face in wartime. To identify and better understand the impact of war on students, a survey was conducted, the results of which are shown in Table 3.

Table 3. Student survey results on resilience during wartime

Question	Responses (%)
What is your stress level on a scale from 1 to 10?	1-3 – 11.2%, 4-6 – 28.5%, 7-9 – 42.8%, 10 – 17.5%
How has the war affected your academic motivation?	Increased – 23.6%, Remained unchanged – 32.1%, Decreased – 44.3%
Do you feel supported by the university?	Yes – 18.7%, Partially – 50.9%, No – 30.4%

Table 3. Continued

Question	Responses (%)
What stress-coping strategies do you use?	Physical activity – 40.3%, Socialising with friends – 28.5%, Meditation – 19.8%, Volunteering – 6.7%, Other – 4.7%
Have you had to change your place of residence due to the war?	Yes – 53.2%, No – 46.8%
Do you experience social isolation due to wartime circumstances?	Yes – 49.4%, Partially – 28.7%, No – 21.9%
Have you participated in volunteer or humanitarian initiatives?	Yes, actively – 18.3%, Sometimes – 30.1%, No – 51.6%
How has your ability to concentrate and study changed compared to the pre-war period?	Improved – 14.2%, Remained unchanged – 25.8%, Worsened – 60.0%
Do you believe that the war has made you more resilient to life's challenges?	Yes – 31.4%, Partially – 42.3%, No – 26.3%
What measures do you think would help students better adapt to wartime conditions?	Psychological support – 37.5%, Improving online learning – 30.2%, University assistance – 17.6%, Financial support – 14.7%

Source: compiled by the author

The survey results showed that the war has significantly impacted the psycho-emotional state of students, their motivation to study, and their social interaction. Most respondents experience high levels of stress, concentration problems, and some social isolation. At the same time, a significant portion of students note an increase in their own resilience to life's challenges. The main adaptation

strategies were physical activity, social support, and participation in volunteer initiatives. To improve student resilience, it is necessary to expand access to psychological assistance, improve the educational process, and provide additional financial support. Based on the collected data, a SWOT analysis of the student community's resilience was conducted, as shown in Table 4.

Table 4. SWOT analysis of student community resilience

Strengths	Weaknesses
High adaptability in crisis situations	Increased levels of stress, anxiety, and emotional burnout
Active use of coping strategies (physical activity, social support, volunteering)	Worsened concentration and academic productivity
Social cohesion and mutual support among students	Feelings of social isolation due to wartime circumstances
Development of resilience to life's challenges	Insufficient financial support for students in difficult conditions
Opportunities	Threats
Development of psychological support and mental health programmes	Further, increase in stress levels due to prolonged uncertainty
Improvement of online learning and access to educational resources	Loss of motivation to study due to unstable situation
Enhanced support from universities and international initiatives	Decline in the quality of education due to forced adaptation to difficult conditions
Involvement of students in volunteer and community activities to enhance their resilience	Mass emigration of students and brain drain

Source: compiled by the author

The SWOT analysis confirms that, despite the significant adaptability of students, their resilience remains vulnerable due to high levels of stress, instability in the educational process, and social isolation. This indicates the need to strengthen psychological and social support to ensure their resilience during wartime.

Recommendations for enhancing student community resilience during wartime

The resilience of the student community during wartime is a crucial factor that determines their ability to overcome difficulties, adapt to changes, and maintain effectiveness in their studies and daily life. Given the identified

challenges, including increased stress levels, social isolation, reduced academic motivation, and financial difficulties, it is necessary to develop a comprehensive set of measures to strengthen the psychological, social, and educational resilience of students. One of the key areas is ensuring access to quality psychological support. In conditions of constant stress and uncertainty, students must have the opportunity to receive professional assistance. Universities can expand the network of psychological consultations, create crisis support centres, and organise regular training sessions on emotional self-regulation. An important step is the implementation of self-help and stress resilience development programmes, which include training in relaxation techniques, cognitive-behavioural strategies for overcoming difficulties, and methods for managing emotions. Social support plays a significant role in building student resilience. One solution could be to expand mentorship programmes, where experienced students or teachers provide support to those in need. It is also worth encouraging the creation of student communities and mutual aid groups that will foster an atmosphere of trust and support.

Volunteer initiatives can be an effective way not only to strengthen social connections but also to increase psychological resilience through active engagement and a sense of personal significance. The war has caused significant changes in the learning format, forcing many students to switch to distance or hybrid learning. To improve resilience, it is necessary to ensure a stable and accessible learning process. This includes improving online education methods, providing students with flexible conditions for taking exams and completing assignments, and expanding access to learning materials. It is important to consider that not all students have equal opportunities for distance learning, so universities should help provide students with the necessary technical resources.

Students who maintain or even increase their motivation in challenging conditions demonstrate greater resilience to stress. To this end, universities should develop programmes that stimulate academic engagement, including flexible curricula, opportunities for personalised learning, and academic mentorship support. Furthermore, it is important to publicise success stories of students who have overcome difficulties, which can serve as inspiration for others. Financial stability also affects students' ability to adapt to challenging conditions. In many cases, the war has deprived students of the opportunity to work, forced them to change their place of residence, or face financial hardship. To support students, it is necessary to expand scholarship programmes, provide financial assistance to those in difficult circumstances, and create opportunities for student employment through university initiatives. Access to housing and social services for students who have been forced to leave their homes due to the war is also an important aspect. Engaging students in active community service can contribute to their psychological well-being and enhance resilience. Volunteering, participating in charitable projects, and community initiatives help students find

meaning in their activities, develop a sense of responsibility and social unity. Such initiatives not only support society but also contribute to the personal development of students, helping them to better adapt to the challenges of modern life.

It is also necessary to pay attention to the physical health of students, as it directly affects their psycho-emotional state. Regular physical activity, a healthy lifestyle, and access to sports programmes can significantly improve students' ability to cope with stressful situations. Universities can promote the organisation of sports events, create free fitness programmes, and promote a healthy lifestyle among young people. In wartime, students often face a great deal of uncertainty, which can cause additional stress. Universities should ensure regular communication with students about the educational process, support opportunities, and available resources. Transparent communication, rapid response to problems, and open dialogue between administration and students will help increase trust and reduce anxiety. The experiences of countries such as Poland and Georgia show that effective social support programmes, flexible educational approaches, and active student involvement in community life contribute to enhancing resilience. Ukrainian universities can adopt best practices by implementing new mechanisms to support students and ensure their integration into the international academic environment.

Therefore, improving the resilience of the student community during wartime requires a comprehensive approach that includes strengthening psychological support, enhancing social connections, adapting the educational process, ensuring financial stability, promoting a healthy lifestyle, and expanding information support. The implementation of these measures will not only increase students' adaptation to wartime conditions but also contribute to the formation of a more resilient, cohesive, and self-sufficient youth environment.

DISCUSSION

The research findings on the resilience of the student community during wartime demonstrate the multifaceted nature of this phenomenon and its critical importance for ensuring the mental health and academic stability of young people. It has been established that the main factors of resilience are social support, adaptability to change, and the availability of psychological resources. These findings have significant practical implications, as they indicate the need to implement systemic approaches to support students in crisis situations.

The research data are consistent with the findings of S. Johansson *et al.* (2023), who emphasised the connection between collective resilience and students' ability to overcome the challenges of war. The authors stressed that effective interaction within academic communities contributes to reducing anxiety levels and improving the overall psychological state of young people. This confirms the importance of supportive social connections, which serve as a key resource for overcoming crisis situations. In turn,

A. Kaim *et al.* (2024) explored the impact of adaptation strategies on student resilience levels. Their findings indicate that students who actively use flexible coping strategies adapt more easily to stressful conditions and maintain motivation to study. This aligns with the results obtained, which emphasise the importance of adaptability as a key factor in resilience. In wartime, this flexibility manifests not only in the academic sphere but also in the social and emotional spheres of students' lives. L. Kiltz *et al.* (2024) examined the role of psychological resources in supporting student resilience during crises. The researchers found that the development of emotional intelligence, self-regulation skills, and stress resistance positively affects the ability of young people to overcome difficulties. This confirms the need to expand psychological support in higher education institutions, particularly through specialised training programmes, counselling centres, and educational initiatives. Overall, the research results indicate that the resilience of the student community is a complex phenomenon determined by the interaction of social, adaptive, and psychological factors. Further research could focus on studying the long-term effects of war on student communities, as well as on developing effective interventions to strengthen their resilience.

The analysis of the obtained results aligns with previous research. S. Kimhi *et al.* (2023) pointed out the significance of protective and vulnerable factors in the context of war, which directly correlates with the conclusions about the resilience of the student community. The conclusion that strong social connections increase stress resistance is supported by the research results, which demonstrate that support from classmates and teachers contributes to students' adaptation to wartime realities. Y. Kurnyshova (2023) considered resilience as a form of normative agency, which allows students to overcome challenges and maintain internal motivation. This corresponds to the conclusions about the importance of student autonomy and initiative in the process of adapting to wartime conditions, which allows them not only to cope with difficulties but also to continue their academic and personal development. V. Lunov & I. Rozhkova (2024) emphasised the importance of strategies and interventions for building resilience, which is also supported by the conclusion about the effectiveness of adaptive educational programmes. The study found that the implementation of psychological training and educational initiatives aimed at developing resilience positively affects the emotional state of students. On the other hand, T. Matusевич *et al.* (2024) argued that distance learning can increase stress, while the research results demonstrate that flexible online platforms, with proper support, contribute to reducing anxiety. This discrepancy can be explained by contextual differences in the samples, indicating the need for further research on the effectiveness of different learning formats in wartime. Thus, the obtained results align with previous research, confirming the importance of social support, student autonomy, and adaptive educational strategies for enhancing resilience during wartime.

Research by international scholars also confirms the relevance of this topic. Y. Mulati & E. Purwandari (2022) emphasised the importance of resilience in reducing academic stress, which is directly related to the study of student community resilience in wartime, as military events significantly increase stress levels among students. The ability to adapt to new learning conditions and overcome difficulties is a key factor in their psychological resilience. R.A. Price (2023) proposed the concept of "designer resilience", which involves the active adaptation of students to challenging conditions. In the context of war, this idea is reflected in students' search for new approaches to learning, interaction, and mutual support, which is an important element of their resilience. V. Ogorenko *et al.* (2024) focused on different types of resilience among students during wartime, which was also reflected in the study by identifying variations in individual coping strategies. This confirms the need for a comprehensive approach to studying resilience, considering the various factors that affect students' adaptation to stressful conditions.

R. Schwarzer (2024) explored resilience in the context of stress and migration, highlighting the importance of comprehensive interventions to support students in critical conditions. This directly relates to the situation of students who, due to war, are forced to change their place of residence or study and adapt to new social and cultural circumstances. M. Shwaikh (2023) emphasised the need to create an inclusive environment and cultivate a "language of care", which aligns with the study's conclusions about the importance of empathy in university communities. During wartime, mutual support and social connections play a key role in maintaining students' emotional balance. V. Sodolevska (2024) and S. Tanana & L. Soha (2024) pointed out the necessity of psychological interventions to support youth mental health, which is consistent with the data on the effectiveness of such measures. The study also emphasises that psychological support and specialised programmes can significantly improve students' resilience during wartime. Thus, the results of international research confirm the importance of resilience as a key factor in maintaining students' psychological well-being in stressful conditions. This also aligns with the conclusions about the need to provide students with effective tools for adaptation, the development of emotional resilience, and the formation of a supportive educational environment in wartime.

An important aspect highlighted in the research by L. Oviedo *et al.* (2022) concerned coping strategies among students who had experienced conflicts. Their findings on the key role of social capital coincide with current analysis regarding the importance of peer support. In wartime, social connections play a decisive role in maintaining students' psychological resilience, helping them adapt to new challenges and overcome emotional exhaustion. M. Trinder *et al.* (2024) focused on the specifics of adaptation for students in language specialisations, which confirms the diversity of resilience manifestations in different

academic communities. The study also found that academic specialisation affects how students cope with stressful situations: specifically, humanities students more often seek social support, while those in technical disciplines may rely on individual coping strategies. A. Tolstoukhov & V. Lunov (2023) and Y. Utsumi (2022) examined the regional aspects of resilience formation, which can be integrated into further research. Since student resilience largely depends on the socio-cultural and economic context, further analysis of regional differences will allow for a deeper understanding of the mechanisms of adaptation of student communities in various wartime conditions. Thus, the research results confirm the importance of social capital, individual and group coping strategies, and regional peculiarities in the formation of student resilience during wartime.

CONCLUSIONS

In the course of studying the resilience of the student community during wartime, key aspects that affect students' ability to adapt to changes, maintain their motivation, and preserve mental stability were identified. One of the main results of the study was the confirmation that war has a significant impact on the psycho-emotional state of students, their stress levels, and their ability to concentrate. The data obtained showed that students experience high levels of anxiety and stress, which negatively affects their academic performance, learning ability, and motivation. This is confirmed by the high percentage of respondents who noted a deterioration in their ability to concentrate on learning, as well as a decrease in motivation to study due to the war. In addition, the study revealed significant differences in the level of support that students receive from the university and social institutions.

Although many students noted the presence of support from teachers and administration, social support, in particular, assistance from family and friends, as well as volunteer initiatives, remain important factors that enhance resilience. At the same time, the survey results indicate the need to strengthen social and psychological support, particularly through the organisation of additional measures

focused on students' mental health. Regarding the physical aspect of resilience, the research results showed that most students use physical activity as a way to cope with stress. This includes sports, yoga, walks, and other forms of activity that help reduce anxiety and depression. Universities can help enhance resilience by organising access to sports and rehabilitation programmes, which can be an effective tool for supporting students. One of the important findings of the study is the identification of the need to improve the distance learning system, as most students faced problems related to access to technical resources or adaptation to new forms of learning. This indicates the importance of further developing infrastructure to ensure continuous and effective learning during crises.

The main recommendations arising from the study are to strengthen social and psychological support for students, particularly through the organisation of psychotherapy sessions, support groups, and the development of programmes to improve psycho-emotional health. More attention should also be paid to the physical health of students, encouraging them to participate in physical activities that help reduce stress. On the other hand, it is necessary to continue improving distance learning technologies, provide students with all the necessary resources for effective learning, and introduce flexible forms of assessment that take into account the circumstances of war.

Given the results obtained, further research could focus on studying the effects of war on students' mental health, as well as on developing and implementing programmes that will facilitate their adaptation to wartime conditions. An in-depth analysis of psychological support methods and evaluation of their effectiveness in different conditions will help create effective strategies to enhance student resilience in the future.

ACKNOWLEDGEMENTS

None.

CONFLICT OF INTEREST

None.

REFERENCES

- [1] Abuejheisheh, A.J., *et al.* (2024). Anxiety, depression, stress, and resilience among undergraduate nursing students at Al-Quds University: The impact of war started on October 7 in Palestine. *BMC Nursing*, 23, article number 784. doi: 10.1186/s12912-024-02442-6.
- [2] Abulfaraj, G.G., Upsher, R., Zavos, H.M.S., & Dommett, E.J. (2024). The impact of resilience interventions on university students' mental health and well-being: A systematic review. *Education Sciences*, 14(5), article number 510. doi: 10.3390/educsci14050510.
- [3] American Sociological Association. (2018). *Code of ethics*. Retrieved from <https://surl.li/nzydac>.
- [4] Apio, E.O. (2022). Resilience among children born of war in northern Uganda. *Frontiers in Political Science*, 4, article number 874548. doi: 10.3389/fpos.2022.874548.
- [5] Artyukhov, A., Lapidus, A., Yermenko, O., Artyukhova, N., & Churikanova, O. (2024). Educational resilience through the armed conflicts: A bibliometric analysis. *Business Ethics and Leadership*, 8(2), 164-183. doi: 10.61093/bel.8(2).164-183.2024.
- [6] Assefa, Y., Tilwani, S.A., Moges, B.T., & Shah, M.A. (2022). The impact of armed violence on students' educational attainment and the role of parents in resilience schooling and the education process. *Heliyon*, 8(12), article number e12192. doi: 10.1016/j.heliyon.2022.e12192.

- [7] Awais, A., Fu, N., & Jones, S. (2023). Developing students' resilience during the crisis: A moderated model linking college support, study demands, student resilience, and students' change-oriented behaviours. *Higher Education Quarterly*, 78(3), 565-585. doi: 10.1111/hequ.12468.
- [8] Baizhumanova, B., Berdibayeva, S., Arzymbetova, S., Garber, A., Duanayeva, S., & Kulzhabayeva, L. (2024). Role of stress and resilience in the psychological health of students studying abroad. *Open Psychology Journal*, 17, article number e18743501309040. doi:10.2174/0118743501309040240430064925.
- [9] Balagina, M. (2023). *What is resilience*. Retrieved from <https://altera.center/blog/shcho-take-rezylentnist-202/>.
- [10] Banit, O., & Merzliakova, O. (2023). Identification of the key strategies of resilience of Ukrainian teachers in the conditions of war. *European Humanities Studies: State and Society*, 1(1), 4-23. doi: 10.38014/ehs-ss.2023.1.01.
- [11] Bartusevičienė, I., Pazaver, A., & Kitada, M. (2021). Building a resilient university: Ensuring academic continuity – transition from face-to-face to online in the COVID-19 pandemic. *WMU Journal of Maritime Affairs*, 20, 151-172. doi: 10.1007/s13437-021-00239-x.
- [12] Burovytska, A. (2024). Peculiarities of students' resilience during studies in wartime conditions. *Proceedings. Series: Psychology*, 2, 17-23. doi: 10.32782/cusu-psy-2024-2-2.
- [13] Celi, G., Guarascio, D., Reljic, J., Simonazzi, A., & Zezza, F. (2022). The asymmetric impact of war: Resilience, vulnerability and implications for EU policy. *Intereconomics*, 57(3), 141-147. doi: 10.1007/s10272-022-1049-2.
- [14] Diab, S.Y., & Schultz, J. (2020). Factors contributing to student academic underachievement in war and conflict: A multilevel qualitative study. *Teaching and Teacher Education*, 97, article number 103211. doi: 10.1016/j.tate.2020.103211.
- [15] Education Ministry to offer free psychological counseling to Ukrainian children in Georgia. (2022). Retrieved from <https://agenda.ge/en/news/2022/768#gsc.tab=0>.
- [16] Egan, H., O'Hara, M., Cook, A., & Mantzios, M. (2022). Mindfulness, self-compassion, resiliency, and wellbeing in higher education: A recipe to increase academic performance. *Journal of Further and Higher Education*, 46(3), 301-311. doi: 10.1080/0309877X.2021.1912306.
- [17] Free education in Poland for Ukrainians. (2025). Retrieved from https://univerpl.com.ua/bezkoshtovne-navchannya/?utm_source=chatgpt.com.
- [18] Free psychological assistance to students from Ukraine is a project of the Student Parliament of the Republic of Poland. (2023). Retrieved from https://www.gov.pl/web/ua/Bezkoshtovna-psykholohichna-dopomoha-studentam-z-Ukrayiny?utm_source=chatgpt.com.
- [19] Giordano, F., Lipscomb, S., Jefferies, P., Kwon, K., & Giammarchi, M. (2024). Resilience processes among Ukrainian youth preparing to build resilience with peers during the Ukraine-Russia war. *Frontiers in Psychology*, 15, article number 1331886. doi: 10.3389/fpsyg.2024.1331886.
- [20] Hossain, M.N., Lee, J., Choi, H., Kwak, Y., & Kim, J. (2024). The impact of exercise on depression: How moving makes your brain and body feel better. *Physical Activity and Nutrition*, 28(2), 43-51. doi: 10.20463/pan.2024.0015.
- [21] Johansson, S., Hansen, K.Y., & Thorsen, C. (2023). A modeling approach to identify academically resilient students: Evidence from PIRLS 2016. *European Journal of Psychology of Education*, 39, 711-730. doi: 10.1007/s10212-023-00711-7.
- [22] Kaim, A., Tov, M.S., Kimhi, S., Marciano, H., Eshel, Y., & Adini, B. (2024). A longitudinal study of societal resilience and its predictors during the Israel-Gaza war. *Applied Psychology Health and Well-Being*, 16(3), 1479-1496. doi: 10.1111/aphw.12539.
- [23] Kiltz, L., Fokkens-Bruinsma, M., & Jansen, E.P.W.A. (2024). Promoting university students' well-being and resilience by means of a game-approach basic psychological need intervention: A case study. *International Journal of Applied Positive Psychology*, 9, 1721-1744. doi: 10.1007/s41042-024-00189-8.
- [24] Kimhi, S., Eshel, Y., Marciano, H., & Adini, B. (2023). Impact of the war in Ukraine on resilience, protective, and vulnerability factors. *Frontiers in Public Health*, 11, article number 1053940. doi: 10.3389/fpubh.2023.1053940.
- [25] Kurnyshova, Y. (2023). Ukraine at war: Resilience and normative agency. *Central European Journal of International and Security Studies*, 17(2), 80-110. doi: 10.51870/uxxz5757.
- [26] Lunov, V., & Rozhkova, I. (2024). Enhancing student resilience during times of war: Strategies and interventions. *SSRN Electronic Journal*. doi: 10.2139/ssrn.4751355.
- [27] Matushevych, T., Demeshkant, N., & Trusz, S. (2024). Factor structure of academic resilience among Polish and Ukrainian students involved in remote education caused by Covid-19 and military aggression. *Scientific Reports*, 14, article number 1000. doi: 10.1038/s41598-024-51388-x.
- [28] Mulati, Y., & Purwandari, E. (2022). The role of resilience in coping with academic stress (A meta-analysis study). *KnE Social Sciences*, 7(18), 169-181. doi: 10.18502/kss.v7i18.12387.
- [29] Ogorenko, V., Shusterman, T., Nikolenko, A., Kokashynskyi, V., & Khotimska, A. (2024). Rank correlation of resiliency modalities among higher education students in war conditions. *Psychosomatic Medicine and General Practice*, 9(1). doi: 10.26766/pmgp.v9i1.456.

- [30] Oviedo, L., Seryczyńska, B., Torralba, J., Roszak, P., Del Angel, J., Vyshynska, O., Muzychuk, I., & Churpita, S. (2022). Coping and resilience strategies among Ukraine war refugees. *International Journal of Environmental Research and Public Health*, 19(20), article number 13094. doi: [10.3390/ijerph192013094](https://doi.org/10.3390/ijerph192013094).
- [31] Price, R.A. (2023). A review of resilience in higher education: Toward the emerging concept of designer resilience. *Studies in Higher Education*, 48(1), 83-99. doi: [10.1080/03075079.2022.2112027](https://doi.org/10.1080/03075079.2022.2112027).
- [32] Psychological support for students during the educational process under martial law. (2022). Retrieved from <https://dmu.edu.ua/ua/nevidkladna-dopomoha/1653-psikhologichna-pidtrimka-studentiv>.
- [33] Schwarzer, R. (2024). Stress, resilience, and coping resources in the context of war, terror, and migration. *Current Opinion in Behavioral Sciences*, 57, article number 101393. doi: [10.1016/j.cobeha.2024.101393](https://doi.org/10.1016/j.cobeha.2024.101393).
- [34] Shwaikh, M. (2023). Beyond expectations of resilience: Towards a language of care. *Global Studies Quarterly*, 3(2). doi: [10.1093/isagsq/ksad030](https://doi.org/10.1093/isagsq/ksad030).
- [35] Sobora, I. (2022). *Scholarships during the war: Who can receive and how much*. Retrieved from <https://progroshi.news/news/finansii-stipendiji-pid-chas-viyni-hto-mozhe-otrimati-ta-yakiy-rozmir-2264.html>.
- [36] Sodolevska, V. (2024). The impact of war on the mental health of youth: The role of resilience and psychological interventions. *Psychosomatic Medicine and General Practice*, 9(3). doi: [10.26766/pmgp.v9i3.532](https://doi.org/10.26766/pmgp.v9i3.532).
- [37] Tanana, S., & Soha, L. (2024). Innovation approaches to the organisation of the educational process in professional training of future teachers of foreign languages under the conditions war state. *Scientia et Societas*, 3(2), 28-36. doi: [10.69587/ss/2.2024.28](https://doi.org/10.69587/ss/2.2024.28).
- [38] The 23rd edition of the scholarship program for young scientists. (2024). Retrieved from <https://www.gov.pl/web/ukraina-uk/>.
- [39] Tolstoukhov, A., & Lunov, V. (2023). Educational resilience in turmoil: Psychological well-being and mental health among the Ukrainian educational community during the Russo-Ukrainian war. *SSRN Electronic Journal*. doi: [10.2139/ssrn.4683791](https://doi.org/10.2139/ssrn.4683791).
- [40] Trinder, M., Dziedzic, M., & Gałazka, A. (2024). Resilience in the face of the ongoing war in Ukraine and coping strategies adopted by Polish students of modern languages in higher education. *New Educational Review*, 75(1), 67-77. doi: [10.15804/ner.2024.75.1.05](https://doi.org/10.15804/ner.2024.75.1.05).
- [41] United Nations High Commissioner for Refugees Georgia. (2024). *Protection for arrivals from Ukraine*. Retrieved from <https://help.unhcr.org/georgia/protection-for-arrivals-from-ukraine/>.
- [42] Utsumi, Y. (2022). Armed conflict, education access, and community resilience: Evidence from the Afghanistan NRVA Survey 2005 and 2007. *International Journal of Educational Development*, 88, article number 102512. doi: [10.1016/j.ijedudev.2021.102512](https://doi.org/10.1016/j.ijedudev.2021.102512).
- [43] Volunteers and their family members affected by the war can receive a study grant. (2024). Retrieved from <https://osvita.rayon.in.ua/news/728509-dobrovoltsi-y-chleni-ikhnikh-rodin-yaki-postrazhdali-vid-viyn-mozhut-otrimati-grant-na-navchannya>.
- [44] Zhyhaylo, N., & Sholubka, T. (2022). Formation of psychological stability of students of higher education institutions during the war. *Visnyk of the Lviv University. Series Psychological Sciences*, 14, 3-14. doi: [10.30970/PS.2022.14.1](https://doi.org/10.30970/PS.2022.14.1).

Таїса Ямчук

Кандидат психологічних наук, доцент
Мукачівський державний університет
89600, вул. Ужгородська, 26, м. Мукачево, Україна
<https://orcid.org/0000-0003-0392-2249>

Резильєнтність студентського колективу в умовах війни

Анотація. Метою було виокремити стратегії подолання труднощів і підвищення резильєнтності студентів. Методологія включала використання strengths, weaknesses, opportunities, and threats analysis, опитування серед студентів та порівняльний аналіз стратегій підтримки студентів в умовах війни, реалізованих в Україні, Польщі та Грузії. У дослідженні вивчалася резильєнтність студентського колективу в умовах війни, зокрема вплив війни на психоемоційний стан, академічну мотивацію та адаптивність студентів до нових умов навчання. У процесі дослідження було отримано унікальні дані про рівень стресу та тривожності серед студентів, зниження їхньої здатності до концентрації та мотивації до навчання, а також виявлено, що значну роль у підтримці стійкості студентів відіграє соціальна та психологічна підтримка з боку університетів, родини та громадських ініціатив. Також визначено, що фізична активність та участь у волонтерських ініціативах мають позитивний вплив на психологічну стійкість студентів. У порівнянні з Україною та Польщею, Грузія розробила стратегії підтримки студентів у кризових ситуаціях, зокрема впровадивши програми психологічної підтримки та стипендіальні програми для студентів з постраждалих регіонів. Грузинські університети активно співпрацюють з міжнародними організаціями для забезпечення додаткової підтримки студентам у кризових ситуаціях. Було виявлено необхідність посилення соціальної та психологічної підтримки студентів в умовах війни, розвитку програм підтримки психоемоційного здоров'я, а також забезпечення гнучких і доступних форм навчання в умовах дистанційного навчання. Отримані результати також підтверджують, що підтримка з боку університетів та громадських організацій є ключовою для підвищення резильєнтності студентів у складних умовах. Практичне значення роботи полягає в можливості використання результатів для розробки рекомендацій щодо створення ефективних програм підтримки студентів в умовах війни. Розроблені стратегії можуть бути застосовані в українських університетах для посилення адаптації студентів до воєнних умов, зниження рівня стресу та тривожності, а також для покращення академічної успішності в умовах нестабільності

Ключові слова: психологічна стійкість; адаптація; підтримка; ментальне здоров'я; соціальна інтеграція

UDC 159.955-043.86:373.3.016:528.9-028.31(045)
DOI: 10.52534/msu-pp1.2025.32

Marianna Horvat*

PhD in Pedagogy, Associate Professor
Mukachevo State University
89600, 26 Uzhhorodska Str., Mukachevo, Ukraine
<https://orcid.org/0000-0003-2320-9731>

Mariia Kuzma-Kachur

PhD in Pedagogy, Associate Professor
Mukachevo State University
89600, 26 Uzhhorodska Str., Mukachevo, Ukraine
<https://orcid.org/0000-0002-8580-5830>

Development of spatial thinking in the process of cultivating cartographic literacy in primary education learners

Article's History:

Received: 23.10.2024
Revised: 25.02.2025
Accepted: 26.03.2025

Suggested Citation:

Horvat, M., & Kuzma-Kachur, M. (2025). Development of spatial thinking in the process of cultivating cartographic literacy in primary education learners. *Scientific Bulletin of Mukachevo State University. Series "Pedagogy and Psychology"*, 11(1), 32-40. doi: 10.52534/msu-pp1.2025.32.

Abstract. The development of spatial thinking is a crucial aspect of cognitive growth in primary education learners, as it enables the ability to navigate both real and graphical spaces, analyse relationships between objects, and assess their dimensions, distances, and locations. In contemporary educational contexts, the issue of fostering cartographic literacy as a means of enhancing spatial thinking has become particularly relevant, as it equips pupils with the skills necessary to work effectively with geographical maps and other graphical materials. This study aimed to substantiate the significance of spatial thinking for the intellectual development of young learners and to identify effective methods for its advancement in the process of cultivating cartographic literacy. The research involved an analysis of regulatory documents, educational curricula, and methodological guidelines governing the primary school education process. Additionally, an assessment of spatial thinking proficiency levels among young learners was conducted, revealing a predominance of intermediate and sufficient levels of competence development. This confirmed the need to refine methodological approaches to its development. The article examined contemporary pedagogical approaches that foster the development of spatial thinking, including graphic modelling, interactive exercises, problem-based learning, and the use of information and communication technologies. It has been established that implementing these methods enhances pupils' cognitive engagement, cultivates analytical thinking skills, and improves their ability to work with cartographic materials. The study findings indicated that the spatial thinking proficiency of most young learners is at an intermediate or sufficient level, highlighting the need to refine methodological approaches to its advancement. The proposed methods can be integrated into educational practice in traditional, blended, and distance learning formats, facilitating the development of spatial analysis and critical thinking skills while enhancing the effectiveness of knowledge acquisition.

Keywords: visual thinking; cognitive development; map work; graphic modelling; educational process

*Corresponding author



INTRODUCTION

In contemporary education, there is a crucial need to prioritise the development of spatial thinking among primary education learners. This skill forms the foundation for children's understanding of the world around them and is a vital component of overall cognitive function. However, a significant portion of academic studies in this area remains largely theoretical, lacking empirical research into the impact of cartographic literacy on spatial thinking development. The importance of fostering spatial thinking is underscored by its role in enabling individuals to navigate both physical and abstract environments. Consequently, the relevance of this research is further justified by the prevalence of theoretical discourse that is not substantiated by empirical evidence demonstrating the effects of cartographic literacy on the development of spatial thinking in primary school pupils.

In contemporary society, there is an increasing emphasis on developing well-rounded individuals who can adapt effectively to rapid changes, make creative decisions, and solve nonstandard problems (Resolution of the Cabinet of Ministers of Ukraine No. 87, 2018). A key factor in this development is spatial thinking, a vital human ability that involves spatial analysis and orientation in real-world environments, contributing to successful social adaptation. Spatial thinking is viewed as a mental process involving the creation and manipulation of spatial representations when solving practical and theoretical tasks. Its development is essential for the comprehensive intellectual growth of learners, as it fosters specialised skills important for future professional pursuits. Thinking, as a phenomenon, is a subject of research across various academic disciplines, including Psychology, Philosophy, Heuristics, Aesthetics, Cybernetics, and Neuropsychology. This has led to the identification of its essence, forms, types, and characteristics. Thinking is understood as a complex psychological process that enables purposeful, mediated, and generalised cognition of the essential characteristics of objects and phenomena in reality, as well as the relationships between them. It operates through integrated complexes of concepts and representations, facilitating the acquisition of new knowledge, easing adaptation to changes, predicting events, and achieving set goals (Kustov & Alekseeva, 2010).

The development of spatial thinking significantly influences the overall intellectual growth of schoolchildren. It serves as a means for the practical perception of objects and phenomena in reality, facilitates successful engagement with various graphical models, and plays a crucial role in the psychological preparation of learners for diverse professional activities. The development of a pupil's personality through cartography is primarily associated with the formation of spatial thinking. According to H.I. Ivanova (2022), the process of spatial thinking involves the constant recoding of images, i.e., the transition from spatial images of real objects to their conventional graphical representations, from three-dimensional to two-dimensional images, and vice versa. The researcher characterised spatial

thinking by these procedural features: the ability to generate visual hypotheses (both reproductive and original), categorical flexibility, and constructive activity. Furthermore, she identified "three levels of spatial thinking development: initial – the ability to change the position of a spatial object; intermediate – the ability to change the structure of a spatial object; and advanced – the ability to create a new spatial object based on a model".

The influence of cartographic literacy on the development of spatial thinking has been explored by S.M.V. Castellar & B.G.F. Jordao (2021), who, based on their research findings, convincingly justified its significance, particularly given the increasing accessibility of digital cartographic resources in both public and private institutions. In-depth investigations into the impact of cartographic literacy on spatial thinking have been conducted by T. Wang (2022). This research emphasised the importance of teaching cartographic literacy in primary and secondary schools, highlighting its unique role in developing spatial thinking, especially considering the accelerated use of digital technologies in online teaching and learning during the COVID-19 pandemic.

In the research of O.I. Pometun & N.M. Hupan (2024), it is emphasised that the need to understand geospatial data has been further heightened in Ukrainian society by the war. Knowledge of geographical maps and the ability to navigate space have become crucial for survival. This underscores the need to develop spatial thinking, which facilitates the acquisition of geospatial data skills. Consequently, the researchers proposed the introduction of the pedagogical term "geospatial thinking" into the educational process, defined as "a set of knowledge and skills in using spatial concepts, maps, and graphs to analyse events, phenomena, and processes of the past, as well as the ability of learners to use them for the analysis and solution of contemporary problems".

Didactic recommendations on the methodology for developing cartographic literacy at various stages of working with maps are described by E. Oliveira *et al.* (2021). The value of this research lies in its description of an algorithm for pupils to complete practical tasks in map creation, which can even be visualised with detailed analysis of the territories or events depicted. The process of familiarising oneself with cartographic concepts is conducted in a gamified format, which motivates greater engagement in cognitive activities. I. Raynes (2020) proposed contemporary approaches to developing visual thinking when working with maps. A generation raised in a visually saturated culture requires something new and unconventional. The formation of cartographic literacy could be achieved through the method of animating the geographical environment in combination with storytelling. This research aimed to establish the significance of spatial thinking in the intellectual development of primary education learners and to diagnose and foster its development through cartographic literacy. Following the research aim, the following objectives were set:

1. To examine the dynamics of spatial thinking development in primary education learners during the formation of cartographic literacy.

2. To conduct a diagnosis of spatial thinking development in primary education learners during the formation of cartographic literacy.

MATERIALS AND METHODS

The research methods employed in this article included both theoretical and practical approaches. The theoretical aspects involved the analysis of scientific literature (Varii, 2009), psychological and pedagogical studies (Kustov & Alekseeva, 2010), methodological resources (50+ virtual tours..., 2020), and the review of primary

school textbooks and learning materials in the natural sciences. This review aimed to identify suitable methods and techniques for developing spatial thinking through cartographic literacy in primary education learners. The practical aspects included observations of the cognitive learning activities of primary school pupils (Hilberg *et al.*, 2021). The study of spatial thinking development in primary education learners was conducted according to the requirements of the Order of the Ministry of Education and Science of Ukraine No. 813 (2021). To determine the established levels of spatial thinking development in primary education learners, the proposed characteristics were used, and interpreted concerning the subject of the research (Table 1).

Table 1. Framework for assessing spatial thinking development in pupils during the formation of cartographic literacy

Levels	Criteria and indicators
High (H)	The pupil completes learning tasks at a productive-creative level: independently <i>identifies</i> objects mentioned in the tasks in the environment or on a graphical representation; <i>characterises</i> them, establishes cause-and-effect relationships and classification features; <i>applies</i> acquired competency components to achieve results in tasks related to the development of spatial thinking; <i>finds</i> additional information, evaluates it and transforms it into graphical form (on a contour map, site plan, diagram, etc.); <i>predicts</i> possible outcomes, correlates the results of completed work with assumptions and evaluates them
Sufficient (S)	The pupil completes learning tasks at a productive level: independently <i>identifies</i> objects mentioned in the tasks in the environment or on a graphical representation; <i>characterises</i> them, establishes cause-and-effect relationships and groups them; <i>applies</i> acquired competency components to achieve results in tasks related to the development of spatial thinking; <i>finds</i> additional information and transforms it into graphical form (on a contour map, site plan, diagram, etc.); <i>explains</i> the method of performing actions, verifies the possibility of completing tasks and evaluates them
Average (A)	The pupil completes learning tasks at a reproductive level: requires clarification when <i>identifying</i> objects mentioned in the tasks in the environment or on a graphical representation; <i>names</i> their essential features, groups them; <i>reproduces</i> learning actions according to an algorithm/scheme to achieve results in tasks related to the development of spatial thinking; <i>finds</i> additional information and transforms it into graphical form (on a contour map, site plan, diagram, etc.) following a model or with teacher assistance; <i>comments</i> on learning actions using reference points
Initial (I)	The pupil completes learning tasks at the level of copying examples after repeated explanation: requires clarification when <i>identifying</i> objects mentioned in the tasks in the environment or on a graphical representation; <i>names</i> their essential features; <i>reproduces</i> learning actions according to an algorithm/scheme to achieve results; <i>finds</i> additional information and partially transforms it into graphical form (on a contour map, site plan, diagram, etc.) following a model or with teacher assistance; <i>comments</i> on individual learning actions using reference points

Source: developed by the authors

The diagnostic assessment of spatial thinking levels was conducted based on the results of a thematic diagnostic task, "Nature of Ukraine", with 4th-grade pupils from the Mukachevo territorial community. A total of 120 pupils participated in the study during the first semester of the 2024/2025 academic year. The task design incorporated a tiered approach:

- first level tasks required performing actions based on a model: using a local plan, draw the symbol for a mixed forest, a spring, etc.; using a physical map of Ukraine, mark the city of Kyiv on an outline map, and so on;
- second level tasks were reproductive and involved completing tests (selective);
- third level tasks involved practical work related to orientation on illustrated images, drawing basic local plans using five symbolic signs, and marking geographical objects (land surface forms) on an outline map of Ukraine;
- fourth level tasks were creative and exploratory in nature, presenting problems: using a local plan, prove that the distance between settlements is shorter when travelling along a path, and so on.

The task construction also considered the "Characteristics of Learning Outcomes" for primary education pupils, as outlined in the Order of the Ministry of Education and Science of Ukraine No. 813 (2021), relevant to the subject of the study. As the study used the results of planned diagnostic tasks from the curriculum, presented in an aggregated form (while maintaining confidentiality), the atmosphere during their completion was traditional, without any added psychological pressure.

RESULTS AND DISCUSSION

Modern education is adopting new educational practices and concepts, becoming more flexible, open, and dynamic. The volume and quantity of information that learners must master is constantly increasing. Independent searching for methods of selecting, transforming, and reproducing educational information becomes crucial, to incorporate technologies based on the principle of visualisation into the learning process. These technologies provide the opportunity to unify all theoretical concepts, allowing for rapid and comprehensive material summarisation and the application

of theoretical information in practical activities. Spatial thinking is characterised by a continuous process of recoding images. This involves transitioning from spatial representations of real-world objects to their symbolic graphical representations, as well as from three-dimensional to two-dimensional images and vice versa. This mental flexibility is a fundamental requirement for effective work across a broad spectrum of fields, from cartography to engineering.

The dynamic and fluid nature of imagery in younger school children necessitates a reevaluation of traditional approaches to developing cartographic literacy. The use of pre-made maps without analysis and interactive engagement transforms them into static images, which have low effectiveness in developing spatial competencies. Images that are not subjected to active analysis and transformation remain merely aesthetic objects, lacking educational value. Consequently, the pedagogical process loses the opportunity to employ active methods of working with cartographic materials, which would ensure the development of analytical and creative abilities. For example, the implementation of tasks involving the construction of three-dimensional models, the analytical processing of cartographic materials, or their interpretation.

The development of spatial thinking occurs non-linearly and is determined by age, individual, and sociocultural factors. The most sensitive period for its formation is early childhood when children exhibit an increased ability to dynamically manipulate spatial images. At this age, cognitive structures are not yet stabilised, creating opportunities for the active development of spatial imagination and analytical thinking under appropriate pedagogical guidance. Spatial thinking also functions as a subconscious cognitive process, integrating information from various sensory modalities. Breakthroughs in science and technology often originate in the subconscious, where information is integrated and transformed. Only at the stage of conscious analysis are they subjected to logical verification, which is crucial for their validity. This process directly contributes to the development of spatial thinking, a versatile tool for acquiring knowledge and mastering various activities. Therefore, the formation of spatial thinking in early childhood is not only a pedagogical task but also a critical condition for cognitive development.

Spatial thinking reaches its highest level of development on a graphical basis, due to its ability to visualise abstract ideas. This is especially important in the modern educational process, where the graphical representation of knowledge is an effective tool for its acquisition. Simultaneously, each subject area defines specific requirements for spatial thinking, forming a system of knowledge and skills that are adapted to the needs of the particular discipline. Spatial thinking enables individuals to represent the surrounding world in spatial forms, which is an integral part of their cognitive activity. All types of human activity are associated with both direct contact with objects and the manipulation of their mental images. The ability to manipulate spatial images allows for the integration of knowledge

about objects into coherent models of reality. In the context of school education, the problem of developing visual thinking is extremely relevant. Often, the reasons for learner underachievement remain obscured due to insufficient consideration of their individual cognitive styles. In particular, a lack of development in spatial thinking can become a barrier to mastering educational material, especially in subjects that require analytical and visual processing of information, such as mathematics and natural sciences.

The most advanced forms of spatial thinking are formed based on graphical representation, which serves as a foundation for constructing complex visual structures. Visual images are dominant in this process, as they most naturally reflect the spatial properties of objects and their interrelationships. In the process of solving cognitive tasks related to spatial thinking, there is a constant transition from one visual image to another, which allows for the sequential analysis, interpretation, and reconstruction of spatial interactions. Fig. 1 provides examples of tasks on the topic "What is the surface of Ukraine?" (4th grade) (Hilberg *et al.*, 2021):

1. Examine the diagram. Which types of terrain are classified as mountains, and which as plains? What do the numbers mean? Formulate a definition of a hollow.
2. On which plains (flat or hilly) is the horizon line visible further?
3. Mark the main landforms of Ukraine on an outline map.

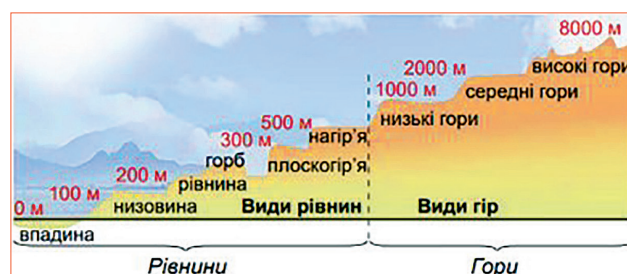


Figure 1. Types of terrain: plains and mountains

Note: Ukrainian textbook, the figure is presented in the original language

Source: T. Hilberg *et al.* (2021)

Modelling is an effective means of developing spatial thinking during the formation of cartographic literacy. When studying this topic, pupils will find it engaging to model landforms using materials such as modelling clay. The level of technological development has led to the saturation of the educational environment with digital devices. However, reduced funding for educational institutions due to the war limits the use of interactive whiteboards and smart tables for modelling, which would encourage pupils to create simple models or visualise geographical objects. Nevertheless, there are gadgets and interactive whiteboards that allow for the integration of digital technologies with interactive methods. Interactive methods, such as group work, the development of three-dimensional models, and

the analysis of cartographic data, play a crucial role in this process. The use of productive and problem-solving methods fosters the development of not only spatial thinking but also key competencies in learners. Furthermore, conducting demonstration activities using digital maps increases learner motivation and engagement in the learning process.

A distinctive feature of this process is the use of various types of graphical representations that complement each other, forming a systematic basis for thinking. Visual images not only reflect individual characteristics of objects but also interact with each other, creating coherent systems of representations. This systematicity allows for the transition from isolated object perception to an understanding of their complex interrelationships, which is key to developing flexible and analytical spatial thinking. This can include problem-based tasks such as: "Help third-graders select maps from the school atlas to answer the following questions:

- Where does spruce grow in Ukraine?
- Which countries border Ukraine?
- What is the highest mountain peak in Ukraine?
- Where is the Askania-Nova reserve located?
- Where is the region in which you live located?"

(Hilberg *et al.*, 2021).

Spatial thinking is based on the analysis of spatial properties and relationships of realistic objects or graphical representations. The foundation of spatial thinking is the manipulation of spatial images, which is formed in the process of perceiving or imagining spatial characteristics and relationships of objects. The term "imagination" is often considered synonymous with the concept of "spatial thinking", as both these mental processes involve the active use of images and representations. Analysing the similarity between these concepts, it can be stated that there is a close connection between imagination and spatial thinking. Both processes are oriented towards the manipulation of images that reflect technical or spatial properties of objects, and they also jointly function in solving problems that require visualisation and transformation of spatial information.

The similarity between imagination and spatial thinking manifests in the shared mechanisms through which these processes form, process, and integrate spatial images. This has led to the frequent interchangeable use of the terms "imagination" and "spatial thinking" in literature, although there are certain differences related to their functional specificity. Spatial thinking primarily focuses on solving tasks that involve realistic manipulation of spatial properties, whereas imagination encompasses a broader range of cognitive operations related to the creative construction of images. Thinking is considered a method of cognition. From a psychological perspective, cognition appears as the process of creating representations (images) of the environment, its representations, and models. However, perception can also be cognition. Therefore, it should be emphasised that thinking is defined as "special cognition, "mediated and generalised"" (Varii, 2009). An example according to the subject of study: by examining the trunk of a tree, one can observe the placement of moss on it (representation 1).

In the case of mediated thinking, which goes beyond direct perception of the environment, a conclusion can be drawn about the location of the points of the horizon (representation 2). This process is schematically depicted in Fig. 2, using another example.

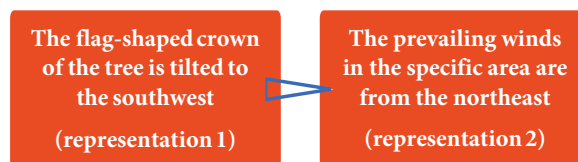


Figure 2. Representations

in thinking using cartographic concepts

Source: developed by the authors based on M.Y. Varii (2009)

When examining site plans and other geographical representations as models of the Earth's surface, it is essential to highlight the importance of understanding the processes of their perception, as this regulates the cognitive process and influences decision-making when navigating space using a map. Spatial perception involves the conscious reflection of shape, size, distance between objects, and their relative positions. Perception is inseparable from the thinking and activities of learners and is one of the most important aspects of the holistic process of cognition. At the initial stage of developing spatial thinking through cartographic literacy, it is necessary to discuss spatial vocabulary with learners. The core concepts include words that can:

- describe shape in three-dimensional space: circle, ellipse, sphere, disc;
- define the size of objects: large, small, medium-sized;
- establish spatial characteristics: straight, wavy, concave;
- determine the location of objects: north, south, east, west.

It is essential to consistently encourage primary school learners to use spatial vocabulary during task completion, exercises, and other activities. When conducting tasks to develop spatial thinking, it is important to establish a direct connection between objects and the space around them. The methodological apparatus of the textbook includes illustrative cartographic material for modelling such tasks. These may include:

- for the topic "What is a site plan?" (4th grade): Which settlement is marked on the site plan? In which direction from the settlement is the orchard located? In which direction from the orchard should you move to reach the spring? If the Bila River flows from northwest to southeast, on which bank is the village of Lyvky situated? etc.;
- for the topic "What are globes and maps for?" (4th grade): Determine in which hemisphere, relative to the equator, Ukraine is located? Measure the length of the meridians and parallels on the globe with a measuring tape. Are the meridians and parallels of equal length? etc.

By understanding how maps are constructed, pupils can orient themselves, visualise locations, relative

positions, and sizes of objects and territories, and assess distances in their studies. However, using maps as a visual aid is not limited to the formation of spatial representations. Methods and techniques for developing cartographic literacy can vary and contribute to activating learning and cognitive activities: productive (applying learned material in practice), heuristic or partially searchbased (pupils discover individual elements of new tasks by solving cognitive problems), problem-based (pupils recognise a problem and find ways to solve it), and interactive (active interaction of all pupils, during which each pupil reflects on their activity and experiences their success). It is important to acknowledge the current realities of education, where the majority of institutions have transitioned to blended or distance learning. Nevertheless, internet resources (Pinterest, spatial intelligence) provide numerous ideas and suggestions for exercises to develop spatial thinking. Numerous proposals can be found for conducting virtual tours, with online access to these tours becoming more prevalent during the pandemic (50+ virtual tours..., 2020).

Through such activities, alongside spatial thinking, visual thinking is also developed. Learners can visualise images and details of objects or phenomena. For example, indicating the distance between objects, describing the nature of the steppe or tundra, modelling a food chain in a mixed forest, etc. New educational software and pedagogical tools designed to develop logical, critical, and spatial thinking in primary school learners are constantly appearing in the educational services market. Mini-games are particularly popular. Their application in the educational process requires primary school teachers to be knowledgeable in the theoretical and practical aspects of computer didactics (Horvat *et al.*, 2023). The diagnosis of spatial thinking development during the formation of cartographic literacy was conducted based on the analysis of a diagnostic task on the topic "Nature of Ukraine", where a tiered approach was considered in the task design. The results of the analysis are presented in Fig. 3.

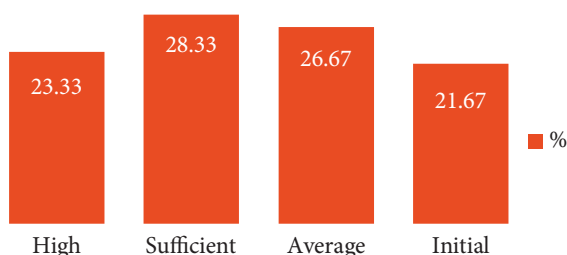


Figure 3. Quantitative indicators of diagnostic task results
Source: developed by the authors based on the results of the study

The experimental results demonstrated that the majority of primary school learners exhibit average (26.67%) and sufficient (28.33%) levels of spatial thinking development. This indicates that most pupils possess basic and intermediate skills in spatial orientation, with the ability to complete reproductive and partially productive tasks. Concurrently,

23.33% of pupils demonstrated a high level of development, characterised by the ability to analyse, apply a creative approach, and solve complex tasks. The smallest percentage of pupils (21.67%) are at the initial level, indicating a need for individual pedagogical support and repeated explanations. O. Novikova (2010) conducted thorough research on the development of spatial thinking in primary school learners, using a range of general methodologies ("Pattern Construction", "Meadow", Verkhuv tests, Silver tests, etc.). The research results showed that spatial thinking in pupils is not developed at a sufficient level: 23.59% – low; 56.1% – average; 20.31% – high. However, the list of diagnostic methods used does not include a cartographic component.

The National Doctrine for the Development of Education in Ukraine defines the need to modernise educational approaches that promote the development of key competencies, particularly spatial thinking. This thinking plays an important role in the formation of analytical and creative abilities, which are necessary for the harmonious development of the individual. Ukrainian researchers (Zharkova & Mechnyk, 2009; Novikova, 2017) emphasise the importance of using interactive technologies in the educational process, such as modelling, analysis of cartographic materials, and the construction of graphical models. These approaches help to develop learners' ability to independently solve practical and theoretical problems.

The obtained experimental results provide evidence of the relevance of this issue. Pupils with sufficient and average levels of development demonstrated the ability to work with graphical materials but required additional tasks to facilitate the transition to a higher level of development. At the same time, the proportion of pupils with a high level demonstrates that with appropriate pedagogical support, the development of spatial thinking is achievable even at the primary school level. All methodologies have their own characteristics, and their effective implementation depends on the level of teacher training. To address existing challenges and enhance learning effectiveness, it is necessary to:

1. Employ tasks involving graphical modelling and analysis of geographical maps.
2. Integrate information and communication technologies into the educational process.
3. Provide a differentiated approach to pupils with varying levels of spatial thinking development.
4. Maintain pupils' interest through interactive exercises and visualisation of learning materials.

Therefore, the research findings confirm the importance of improving pedagogical methodologies aimed at developing spatial thinking. The integration of innovative approaches will create conditions for the harmonious cognitive and personal development of learners, fostering skills necessary for the modern world. The problem of researching the development of spatial thinking and finding ways to improve it has been addressed by both past and present educators and psychologists. In particular, J. Piaget (2008) emphasises the role of images in mental activity. In his view, thinking originates in perceptual activity.

An important thesis for this research is that a map, like any other geographical representation, acts as an intermediary environment for humans, contributing to the development of the psyche. Mastering an image occurs in object-practical activity through the sphere of the ideal. Thus, the formation of cartographic literacy influences the development of an individual's spatial thinking.

In an analytical review of scholarly sources on the investigated problem, particular attention was focused on publications from recent years by both foreign and Ukrainian researchers. The fundamental principle was the relevance of the topic under consideration and the value of the research materials. T. Wang (2022) described the future of cartography and geoinformation systems, as well as the unique role of maps in the study of various disciplines for the development of spatial thinking. Among the challenges facing society, the author focuses on the fact that the level of spatial thinking and the ability to reason require more specific training in the context of their application. Therefore, particular attention should be paid to maps and the study of cartography. Understanding the components of cartography (scale, conventional symbols, orientation tools, etc.) is important in making decisions about spatial information. In this aspect, J. Kerski (2001) emphasises the importance of cartographic literacy for the development of spatial thinking and the deepening of geographical knowledge. The research results of G. Chu *et al.* (2018) highlighted that cartographic literacy is a valuable tool for developing pupils' spatial thinking and influencing their essential understanding of thematic maps.

The significance of spatial thinking, which is an integral component of cartographic literacy and a fundamental aspect of geographical education, was highlighted by D. Clarke (2003). In his opinion, geospatial technologies play a significant role in its development. Spatial information is considered particularly important for development, and he provides the example that up to 80% of decisions, particularly regarding construction, are based on space-related data, confirming the significance of an individual's spatial thinking. The psychological patterns of spatial thinking development were studied by O.A. Novikova (2017). The researcher emphasised that spatial thinking is a type of visual thinking and described five substructures of visual thinking: topological, projective, ordered, metric, and dominant compositional. Important in her research, considering the problem of the current study, is the assertion that "in its most developed forms, spatial thinking is formed predominantly on a graphical basis, and its features are studied in the context of general characteristics of visual thinking. Spatial thinking is formed in a system of knowledge that is to be acquired; each subject area, through its content, defines the requirements for the development of spatial thinking".

The elements of spatial thinking include: transitioning from surface to space and back and shifting from a fixed frame of reference to an arbitrary one. Graphical teaching aids for developing spatial thinking in primary school include site plans and geographical maps, through which

pupils directly perceive a visual representation of space. I. Zharkova & L. Mechnyk (2009) describe ways to improve the process of forming cartographic knowledge in primary school learners and their ability to work with geographical maps in their research. It is worth noting that practical educators, applying scientific research, offer their own developments regarding the development of spatial thinking in the study of the geographical component of education. For example, I. Obratsova (n.d.) (a teacher at Chernivtsi Gymnasium No. 5) proposed methods of visualising information in the process of studying topics in geography lessons: structural-logical schemes, Ishikawa diagrams ("Fishbone"), "Country Business Card" frame schemes, "Pyramid of Thoughts", and others. T. Nazarenko (2015) conducted a deep research analysis of the methodology for using cartographic literacy in the learning process, based on which it was proposed to use information and telecommunication technologies that would stimulate the development of cartography teaching methods in schools.

In the research of O. Pometun & N. Hupan (2024), it could be found a justification for the transformation of spatial thinking into geospatial thinking, which appears as a unity of three elements: spatial concepts (spatial cognition), representation tools (spatial thinking), and spatial reasoning (conclusions and hypotheses). E. Tretyakova (2018) closely links the categories "spatial thinking" and "spatial competence", emphasising that "the development of learners' spatial competence must go through two stages – the performance of exercises by pupils to acquire certain skills, and the performance of tasks aimed at forming a certain ability". Some aspects of the influence of cartographic material on the development of visual thinking in primary school learners are reflected in the study of I. Lapshina & S. Lupinovich (2022). The author presents the following algorithm for forming cartographic skills as a means of developing spatial thinking: object plan, object plan scale; site plan: conventional symbols of the site plan, site plan scale, cardinal directions on the site plan; map; map symbols, map scale. Despite a significant amount of research on this problem, not all aspects of primary school teachers' professional activities in developing spatial thinking during the formation of cartographic literacy have received complete and comprehensive coverage in the scientific literature and pedagogical practice.

CONCLUSIONS

The research results confirmed that the level of spatial thinking development in the majority of primary education learners is average or sufficient, indicating a need to improve methodological approaches to its development. Spatial thinking is an integral part of cognitive development, as it provides the ability to analyse relationships between objects, navigate space, and apply acquired knowledge in practical situations. The formation of spatial thinking is closely linked to cartographic literacy, which facilitates learning to work with geographical maps, analyse spatial data, and create graphical models. The conducted research showed

that the use of interactive exercises, graphical modelling, problem-based learning, and digital technologies promotes the development of pupils' analytical thinking and improves their skills in working with cartographic materials.

The results of the study also confirmed that the level of spatial thinking of students largely depends on the educational context in which they study. Both teaching methods and the use of various educational technologies can influence the development of spatial representations. Digital tools, such as interactive exercises and mapping software, play an important role in this process, helping not only to improve spatial orientation skills but also to develop analytical thinking in students. At the same time, the research

revealed that some pupils demonstrate a low level of spatial thinking, which requires an individual approach and adaptation to learning tasks. Further research could be aimed at developing personalised learning programs that take into account the individual characteristics of learners, as well as improving methods for assessing the level of spatial thinking development.

None.

ACKNOWLEDGEMENTS

CONFLICT OF INTEREST

None.

REFERENCES

- [1] 50+ virtual tours of museums around the world and Ukraine. (2020). Retrieved from <https://surl.li/zmurzo>.
- [2] Castellar, S.M.V., & Jordao, B.G.F. (2021). Spatial thinking in cartography teaching for schoolchildren. *International Journal of Cartography*, 7(3), 304-316. doi: 10.1080/23729333.2021.1969716.
- [3] Chu, G., Hwang, C., & Choi, J. (2018). Teaching spatial thinking with the national atlas of Korea in U.S. secondary level education. *Proceedings of the Ica*, 1, 1-5. doi: 10.5194/ica-proc-1-22-2018.
- [4] Clarke, D. (2003). *Are you functionally map literate?*. In *Proceedings of the 21st international cartographic conference* (pp. 713-719). Durban: Hosted by The International Cartographic Association (ICA).
- [5] Hilberg, T., Tarnavska, S., & Pavych, N. (2021). *Explore the world*. Kyiv: Geneza.
- [6] Horvat, M., Kuzma-Kachur, M., Bryzhak, N., Mochan, T., & Chuchalina, Y. (2023). *Information and communication technologies as a means of teaching natural science in primary schools: Professional teacher training*. *Youth Voice Journal*, 1, 30-39.
- [7] Ivanova, G.I. (2022). *Development of spatial thinking of students using 3D modeling*. In *The current state of development of world science: Characteristics and features: IV International multidisciplinary scientific and theoretical conference* (pp. 135-137). Lisbon: Portuguese Republic.
- [8] Kerski, J. (2001). A national assessment of GIS in American high schools. *International Research in Geographical and Environmental Education*, 10(1), 72-84. doi: 10.1080/10382040108667425.
- [9] Kustov, A.V., & Alekseeva, Y.A. (2010). *Thinking: Psychological, psychopathological and psychotherapeutic aspects*. Sumy: Publishing house of Sumy State University.
- [10] Lapshina, I., & Lupinovich, S. (2022). Stages of formation of information security skills in masters of specialty 013 Primary education. *Pedagogical Sciences*, 5(2), 64-69. doi: 10.33989/2524-2474.2022.80.278217.
- [11] Nazarenko, T.G. (2015). *Formation of cartographic literacy in primary school students in geography lessons*. *Ukrainian Pedagogical Journal*, 3, 126-136.
- [12] Novikova, O.A. (2010). *Conceptual model of studying spatial thinking in primary school students*. *Scientific Journal of the National Pedagogical University Named After M.P. Dragomanov. Series 19: Correctional Pedagogy and Special Psychology*, 16, 294-298.
- [13] Novikova, O.A. (2017). *Psychological patterns of spatial thinking development*. Retrieved from <https://ap.uu.edu.ua/upload/publicationpdf/bc57b435f8a5bcd5b60a8205db4c8e7d.pdf>.
- [14] Obratsova, I. (n.d). *Information visualization in geography lessons: Purpose, techniques, feasibility*. Retrieved from <https://vseosvita.ua/library/vydy-vizualizatsii-informatsii-z-heohrafi-756330.html>.
- [15] Oliveira, É., Ferreira, M., Oliveira, R., & Maciel, V. (2021). Usual and unusual maps: A playful introduction to the basic concepts of cartography in high school. *South Florida Journal of Development*, 2(1), 738-751. doi: 10.46932/sfjdv2n1-053.
- [16] Order of the Ministry of Education and Science of Ukraine No. 813 "On Approval of Methodological Recommendations for Assessing the Learning Outcomes of Students in Grades 1-4 of General Secondary Education Institutions". (2021, July). Retrieved from https://drive.google.com/file/d/1DuEdJ31mq4-gyMoszi89TOwfu8q_-PRM/view.
- [17] Piaget, J. (2008). *Children's conceptions of space*. London, New York: Psychology Press.
- [18] Pometun, O., & Gupan, N. (2024). Issues of developing students' geospatial thinking in teaching history in the new Ukrainian school. *Ukrainian Pedagogical Journal*, 2, 131-139. doi: 10.32405/2411-1317-2024-2-131-139.
- [19] Raynes, I., & Heiser, N. (2020). Cartographic literacy through object-based learning: The value of primary sources in instruction. *Journal of Map & Geography Libraries*, 15, 1-23. doi: 10.1080/15420353.2020.1739188.
- [20] Resolution of the Cabinet of Ministers of Ukraine No. 87 "On Approval of the State Standard of Primary Education". (2018, February). Retrieved from <https://surl.li/svpisce>.

- [21] Tretyakova, O.V. (2018). [Cartographic skills as a component of spatial competence](#). *Theory and Methods of Teaching Social Disciplines: Scientific and Pedagogical Journal*, 1(6), 3-5.
- [22] Varii, M.Y. (2009). [General psychology](#). Kyiv: Center for Educational Literature.
- [23] Wang, T. (2022). Future education of cartography and GIS: What is next?. *Journal of Geodesy and Geoinformation Science*, 5(3), 1-6. doi: 10.11947/j.JGGS.2022.0301.
- [24] Zharkova, I., & Mechnyk, L. (2009). [Ways to improve the process of forming cartographic knowledge and skills in working with geographic maps in younger schoolchildren](#). *Scientific Notes of Ternopil Volodymyr Hnatiuk National Pedagogical University. Series: Pedagogy*, 4, 95-100.

Маріанна Горват

Кандидат педагогічних наук, доцент
Мукачівський державний університет
89600, вул. Ужгородська, 26, м. Мукачево, Україна
<https://orcid.org/0000-0003-2320-9731>

Марія Кузьма-Качур

Кандидат педагогічних наук, доцент
Мукачівський державний університет
89600, вул. Ужгородська, 26, м. Мукачево, Україна
<https://orcid.org/0000-0002-8580-5830>

Розвиток просторового мислення в процесі формування у здобувачів початкової освіти картографічної грамотності

Анотація. Розвиток просторового мислення є важливим компонентом когнітивного розвитку здобувачів початкової освіти, оскільки воно забезпечує здатність орієнтуватися у реальному та графічному просторі, аналізувати взаємозв'язки між об'єктами, оцінювати їхні розміри, відстані та розташування. У сучасних освітніх реаліях особливої актуальності набуває проблема формування картографічної грамотності як засобу розвитку просторового мислення, що дозволяє учням ефективно працювати з географічними картами та іншими графічними матеріалами. Метою дослідження було обґрунтування значущості просторового мислення для інтелектуального становлення особистості молодших школярів та визначення ефективних методів його розвитку в процесі формування картографічної грамотності. У ході дослідження було проведено аналіз нормативно-правових документів, навчальних програм і методичних рекомендацій, що регламентують освітній процес у початковій школі. Також здійснено діагностику рівнів сформованості просторового мислення у молодших школярів, що дозволило встановити переважання середнього та достатнього рівнів розвитку цієї компетенції. Це підтвердило необхідність удосконалення методичних підходів до її формування. У статті розглянуто сучасні педагогічні підходи, які сприяють розвитку просторового мислення: графічне моделювання, інтерактивні вправи, проблемно-орієнтоване навчання та використання інформаційно-комунікаційних технологій. Виявлено, що впровадження цих методик дозволяє активізувати пізнавальну діяльність учнів, формувати навички аналітичного мислення та покращувати здатність працювати з картографічними матеріалами. Результати дослідження засвідчили, що рівень сформованості просторового мислення у більшості молодших школярів є середнім або достатнім, що вказує на необхідність удосконалення методичних підходів до його розвитку. Запропоновані методики можуть бути впроваджені в освітню практику у традиційній, змішаній та дистанційній формах навчання, що сприятиме формуванню в учнів навичок просторового аналізу, критичного мислення та підвищенню ефективності засвоєння навчального матеріалу.

Ключові слова: наочно-образне мислення; когнітивний розвиток; робота з картою; графічне моделювання; освітній процес

UDC 004.946:37.04:331.5
DOI: 10.52534/msu-pp1.2025.41

Inokentii Korniienko*

Doctor of Psychological Sciences, Professor
Mukachevo State University
89600, 26 Uzhhorodska Str., Mukachevo, Ukraine
<https://orcid.org/0000-0003-1451-4128>

Beata Barchi

PhD in Psychology, Associate Professor
Mukachevo State University
89600, 26 Uzhhorodska Str., Mukachevo, Ukraine
<https://orcid.org/0000-0002-5923-7331>

Enhancing career adaptability through immersive virtual reality training

Article's History:

Received: 15.11.2024
Revised: 01.03.2025
Accepted: 26.03.2025

Suggested Citation:

Korniienko, I., & Barchi, B. (2025). Enhancing career adaptability through immersive virtual reality training. *Scientific Bulletin of Mukachevo State University. Series "Pedagogy and Psychology"*, 11(1), 41-50. doi: 10.52534/msu-pp1.2025.41.

Abstract. The integration of Virtual Reality (VR) into career development training offers a transformative approach to enhancing career adaptability, a crucial construct for navigating the challenges of modern professional environments. The aim of this study was to investigate the impact of Virtual Reality (VR) career exploration training on career adaptability. Employing a comparative design, data were collected from two groups – one receiving VR training and the other using traditional methods. The results of the study showed a significant positive impact of interactive VR simulations on key aspects of career adaptability. In particular, the use of VR technologies contributed to the improvement of participants' self-esteem, the development of professional knowledge, and the efficiency of goal setting and career planning. This study examined the effects of VR-based career exploration on five dimensions of career adaptability: self-appraisal, occupational information, goal selection, planning, and problem-solving. Results have revealed statistically significant improvements across all dimensions for the VR group, with the strongest effect observed in occupational information and substantial gains in planning and problem-solving. The findings underscored VR's potential as an innovative tool for experiential learning, offering immersive and interactive environments that facilitate skill acquisition, self-awareness, and effective career decision-making. Implications for educational institutions, career counseling practices, and workforce development programs have been discussed, highlighting the pivotal role of technology-enhanced training in preparing individuals for an evolving job market. The findings of this investigation have significant implications for career counseling practitioners, educational institutions, and organisations invested in workforce development

Keywords: career development; experiential learning; professional training; higher education; workforce preparation

*Corresponding author

INTRODUCTION

In modern world, career paths are becoming less predictable due to rapid changes in technology, the instability of the labour market and the need for continuous professional development. In the context of digital transformation and automation of professions, career adaptability is a key

factor in success, as it allows specialists to quickly respond to challenges, change their professional trajectory and effectively develop new competencies. In the context of digital transformation and automation of professions, career adaptability is a key factor in success, as it allows specialists



to quickly respond to challenges, change their professional trajectory, and effectively develop new competencies.

Researcher A. Singh *et al.* (2023) studied immersive virtual reality (VR) as a training tool opens up new opportunities for the development of career adaptability, as it creates realistic scenarios of professional activity. A. Maroungkas *et al.* (2023) found that the user can experiment with new professions, skills and behavioural models without risking their real career path while education. The interactivity of VR technologies contributes to a deeper immersion in the learning process and better assimilation of information (Cheng, 2022). Through simulations of critical situations, VR training helps develop the ability to make decisions quickly and adapt to changes, as the learners study best when they receive information in a style that incorporates visual (Yin, 2022). VR allows for safe immersion in a new professional environment, reducing anxiety and uncertainty.

The collection of materials of the scientific and practical conference “Immersive technologies in education” by Yu.G. Nosenko (2024) examined scientific and methodological issues of the digitalisation of society and education, in particular the use of VR for the development of competencies that contribute to successful adaptation to a rapidly changing world. The authors emphasise that immersive technologies allow you to create realistic scenarios that contribute to deeper assimilation of the material and the development of practical skills. The paper “Teaching award: rising to the challenge” by J. Espinoza (2025) discusses the integration of VR into business education to increase empathy and understanding of inclusion in business contexts. The authors note that the use of VR contributes to the development of socially responsible and proactive leaders, which is an important aspect of career adaptability.

Modern research such as D. Sudharson *et al.* (2024) confirms the effectiveness of using VR technologies in developing career adaptability and professional skills. Immersive environments contribute to deeper learning of material, the development of practical competencies and increased confidence in making career decisions. The rapid advancement of digital technologies has ushered in unprecedented opportunities for innovation in career development and professional preparation. Virtual Reality (VR), which emerged primarily as an entertainment platform, has evolved into a transformative technological paradigm with far-reaching implications across multiple sectors, including education, professional training, and career development (Radianti *et al.*, 2020). This technological evolution presents a compelling opportunity to address one of the most significant challenges in contemporary career development: the cultivation of career adaptability in an increasingly dynamic professional landscape.

Authors L. Ghosh & R. Ravichandran (2024), concluded that the rapidly evolving job market requires education to be flexible and adaptable, and new technologies provide innovative ways to address this need. As VR technology has advanced, concepts like immersion and presence have significantly developed. Immersion relies on the technological

capabilities of the system delivering the experience. Virtual Reality is transforming education by offering personalised, immersive, and engaging learning opportunities. It boosts student motivation and engagement, fosters collaboration, and provides unique applications across a wide range of subjects. The integration of Virtual Reality technology in career exploration training represents a paradigm shift in how individuals prepare for and adapt to professional challenges. Unlike traditional career preparation methods, VR technology offers immersive, experiential learning environments that can simulate real-world professional scenarios with unprecedented fidelity. This technological capability creates opportunities for individuals to explore diverse career paths, develop professional skills, and build confidence through hands-on experience in risk-free virtual environments.

Active learning is highly beneficial for students. The advantages associated with VR largely align with those of active learning, though they may also stem from various psychological factors. VR has been shown to have a remarkably positive impact on mood, with participants in VR experiments reporting increased positive emotions and a general reduction in negative ones. In contrast, participants using traditional reading materials experienced a decline in positive feelings. Overall, the use of VR headsets enhances the learning experience in a meaningful way (Kornienko & Barchi, 2020). The potential impact of VR-based career exploration extends beyond mere skill acquisition. Through immersive experiences, participants can develop deeper insights into various professional roles, workplace cultures, and career trajectories, potentially enhancing their career decision-making capabilities and adaptive responses to professional challenges. The technology's ability to provide immediate feedback, facilitate repeated practice, and offer personalised learning experiences aligns with contemporary theories of experiential learning and career development. However, while the theoretical foundations supporting VR's application in career development are robust, empirical research examining its effectiveness in enhancing career adaptability remains in its nascent stages. Previous studies have primarily focused on VR's technical capabilities or its application in specific professional training contexts, leaving a significant gap in understanding of how VR-based career exploration influences the broader construct of career adaptability.

The research aimed to evaluate how immersive VR experiences influence the key dimensions of career adaptability self-appraisal, occupational information, goal selection, planning, and problem-solving compared to traditional training methods, thereby providing empirical insights into the efficacy of VR in enhancing career development outcomes.

MATERIALS AND METHODS

The study was conducted from September 2024 to December 2024 with a sample of 60 master's students from Mukachevo State University, Ukraine, who were enrolled in diverse specialties spanning various academic and

professional fields. The study of the impact of VR uses in career guidance, including the analysis of its effectiveness through five dimensions of career adaptability (self-assessment, professional information, goal selection, planning, and problem solving), adhered to all provisions of the Declaration of Helsinki (2013). All participants provided informed consent to participate in the study after receiving full information about its objectives, procedures, possible risks, and benefits. The participants' personal data were protected in accordance with ethical standards, which guaranteed their anonymity and non-disclosure of information to third parties. The study was conducted taking into account the physical and psychological comfort of the participants, minimising potential risks associated with the use of VR technologies. The study complied with the principles of impartiality, reliability, and transparency in data collection, analysis, and interpretation.

Thus, the study met the highest ethical standards accepted in the international scientific community. The participants were evenly divided into two groups: the experimental group ($n=30$), which underwent career exploration training using Virtual Reality (VR), and the control group ($n=30$), which engaged in traditional career training methods. The participants represented a heterogeneous mix of specialties (psychologists, English philologists and musicians), ensuring a broad perspective on the efficacy of VR-based interventions across different academic disciplines. The inclusion of students from varied fields also allowed the study to examine the generalisability of VR's impact on career adaptability across diverse career contexts. For the experimental group, the Oculus Go headset - a standalone VR device was utilised to deliver immersive career training experiences. The training modules included virtual simulations of professional environments, career-related tasks, and problem-solving scenarios tailored to enhance the five dimensions of career adaptability: self-appraisal, occupational information, goal selection, planning, and problem-solving. The control group, on the other hand, participated in conventional methods such as lectures and discussions covering similar content without the interactive, immersive elements of VR.

A comparative design was employed to evaluate the influence of VR-based training on the five dimensions of career adaptability: self-appraisal, occupational information, goal selection, planning, and problem-solving. Pre- and post-intervention assessments were conducted for both groups using the Career Decision Self-Efficacy Scale – Short Form (CDSE-SF) (Taylor & Betz, 1983). The experimental group engaged in immersive VR scenarios tailored to simulate real-world professional challenges and career decision-making tasks, while the control group participated in traditional lecture-based training sessions focusing on similar content. Statistical analysis was performed to compare the changes in career adaptability scores between the groups. The design ensured robust comparisons of the interventions, highlighting the distinct contributions of VR technology to career training outcomes. By focusing on a

diverse cohort of master's students, the study provides valuable insights into the potential of VR to enhance career development across a wide array of professional trajectories.

RESULTS

The obtained results of the study demonstrate the effectiveness of using immersive virtual reality as a training tool for developing career adaptability. In particular, it was found that the integration of VR technologies into the educational process contributes to an increase in the level of career flexibility, a decrease in the fear of professional changes, and the development of key adaptation skills. Data analysis showed that participants in VR training demonstrated a significantly higher level of readiness to master new competencies and make decisions in uncertain professional situations compared to those who used traditional training methods. A detailed analysis of the obtained data and their justification is provided below.

The effectiveness of VR training in developing career adaptability depends on several key characteristics. They determine how well participants can learn new skills, adapt to change, and make effective decisions in a professional environment. Studies (Kaplan *et al.*, 2021). Show that VR training can be more effective than traditional training methods. In particular, the use of VR allows you to minimise risks in practical work, reduces the influence of the human factor on decision-making and provides opportunities to control both theoretical knowledge and practical skills. This contributes to a significant reduction in errors in the formation of professional competencies and psychological preparation of specialists for real working conditions. The key characteristics of VR training that affect the effectiveness of career development are: immersiveness as deep immersion in the virtual environment allows users to feel the realism of situations, which contributes to better assimilation of the material (Cheng, 2022). Interactivity: the ability to actively interact with the virtual environment increases engagement and motivation for learning (Alvarez, 2021). Safety: VR provides a safe environment for practicing skills without risk to health or property (Qusheh *et al.*, 2021). The ability to simulate complex situations (Svendsen *et al.*, 2024). VR allows you to recreate scenarios that are difficult or impossible to implement in real life, which is especially useful for preparing for non-standard or crisis situations; simulation of complex situations and emotional impact: stress testing in safe conditions as VR allows you to simulate complex professional situations without risk to your real career (Nassar *et al.*, 2021). Emotional involvement is characterised by the fact that virtual environments evoke stronger emotions than traditional learning methods, which contributes to better memorisation (Andreoletti *et al.*, 2022). Development of soft skills: communication and negotiations as VR can simulate conversations with clients, colleagues, managers, helping to improve communication skills (Havola *et al.*, 2021; Palmas *et al.*, 2021). Critical thinking and decision-making develop better. Thanks to simulated problem situations, participants learn to

analyse information and make informed decisions to prevent distortion (Joo *et al.*, 2024). Gamification and motivation (Sandrone & Carlson, 2021): elements such as rewards, points, difficulty levels make learning more exciting. Competitions and challenges provide the opportunity to compare results and receive feedback, increasing motivation.

These characteristics contribute to more effective training and preparation of specialists for real challenges in professional activities. Using VR training helps to increase confidence in making career decisions (Holly *et al.*, 2024). By simulating real-world work situations and practicing the necessary skills in a safe environment, users can better prepare for real-world challenges, which increases their self-confidence and ability to make informed decisions (King *et al.*, 2022). Thus, VR training shows significant potential in increasing the effectiveness of learning and career development, outperforming traditional methods in a number of indicators. VR allows to simulate real career situations (e.g. interviews, negotiations, team management) without risking real career. This reduces the fear of making mistakes and provides the opportunity to practice different strategies for behaving in difficult situations. Regular interaction with career challenges in VR helps to better understand one's own capabilities, strengths, and areas for development (Villena-Taranilla *et al.*, 2022). The more a person undergoes VR training, the more confident they feel in real-world career decisions. VR systems can provide immediate feedback, helping users understand their mistakes and work on them. This approach strengthens the sense of control over their career development.

VR solutions significantly increase confidence in making career decisions through realistic training, a safe environment for experimentation, adaptation to stressful situations, and positive feedback. This allows users to feel more in control of their career path, make informed choices, and respond effectively to professional challenges. The findings of this study highlight the comparative effectiveness of Virtual Reality (VR) training versus traditional methods in enhancing career adaptability across key dimensions. A detailed analysis of pre- and post-training

assessments is presented below, showcasing the differences in self-appraisal, occupational information, goal selection, planning, and problem-solving scores for both groups. These results provide valuable insights into the advantages of immersive VR environments in fostering career-related skills and decision-making abilities. Summary statistics for each dimension are detailed in Table 1. The CDSE-SF was developed by K. Taylor & N. Betz (1983) as a shorter version of the original 50-item Career Decision Self-Efficacy Scale. This 25-item version measures an individual's belief in their ability to successfully complete tasks necessary for career decision-making. The scale is built on Albert Bandura's self-efficacy theory, which suggests that people's beliefs about their capabilities influence their behaviour and success. In the context of career decisions, this means that how confident someone feels about making career-related choices affects their actual ability to make and implement these decisions. The CDSE-SF measures five key competencies, with five items per competency:

- self-appraisal: this dimension examines how well individuals can assess their own abilities, interests, and values. for example, one item might ask about confidence in determining what one values most in an occupation;
- occupational information: this area focuses on gathering and understanding career-related information. Items might assess confidence in finding salary ranges for occupations or researching specific employers;
- goal selection: this component measures the ability to match personal characteristics with career requirements and select appropriate career paths. A sample item might ask about confidence in choosing a career that fits one's preferred lifestyle;
- planning: this dimension evaluates the ability to implement career choices and create action plans. Questions might address confidence in preparing a good resume or planning steps toward a chosen career;
- problem solving: this area assesses the ability to handle challenges and make alternative plans when facing obstacles. Items might ask about confidence in changing occupations if current choice proves unsatisfying.

Table 1. Pre- and post-training scores for career adaptability dimensions in VR and traditional groups

Scale	VR Group (n = 30)		Δ	Traditional Group (n = 30)		Δ
	Pre M(SD)	Post M(SD)		Pre M(SD)	Post M(SD)	
Self-Appraisal	3.2(0.6)	4.1(0.5)	+0.9	3.3(0.6)	3.6(0.5)	+0.3
Occupational Information	3.0(0.7)	4.3(0.4)	+1.3	3.1(0.6)	3.7(0.5)	+0.6
Goal Selection	3.4(0.5)	4.0(0.4)	+0.6	3.3(0.5)	3.5(0.5)	+0.2
Planning	3.1(0.6)	4.2(0.4)	+1.1	3.2(0.6)	3.6(0.5)	+0.4
Problem Solving	2.9(0.7)	4.0(0.5)	+1.1	3.0(0.6)	3.4(0.6)	+0.4

Note: M = Mean; SD = Standard Deviation; Δ = Change score (Post - Pre)

Source: developed by the authors

Based on the results obtained, it can be concluded that the use of VR training is significantly more effective in developing career adaptability than traditional training methods. Self-appraisal scale – participants in the VR group

showed an improvement of 0.9 points, which significantly exceeds the increase in the traditional group (+0.3). This indicates that the VR methodology helps to better understand one's strengths and weaknesses in the professional

sphere. Occupational Information scale - the greatest increase is observed in the VR group (+1.3 points), while the traditional approach gave only +0.6. This confirms the effectiveness of immersive technologies in forming a deeper understanding of the professional environment. Goal Selection scale - the VR group improved its indicators by 0.6, which is three times higher than the increase in the traditional group (+0.2). This suggests that the interactive experience contributes to a more conscious choice of career path. Planning scale - participants in the VR group improved their planning skills by 1.1 points, while the traditional group only increased by 0.4. This proves that VR significantly increases the ability to strategically approach career development. Problem Solving scale - the VR group showed an increase of 1.1 points, while the traditional

group only increased by 0.4. This indicates that the VR environment effectively simulates real-life work challenges, helping to develop adaptability in difficult situations.

All measured indicators improved significantly in the VR group compared to the traditional group. Particularly significant changes were observed in career awareness, strategic planning and problem solving. This confirms the effectiveness of VR training as a modern tool for developing career adaptability. Table 2 presents the results of the Wilcoxon Signed-Rank Test, detailing the statistical significance, Z-scores, and effect sizes for the changes observed in the five dimensions of career adaptability. These results provide a deeper understanding of the comparative impact of VR and traditional training methods, emphasising the extent of improvements across each dimension.

Table 2. Wilcoxon signed-rank test results for career adaptability scales

Scale	Z-score	p-value	Effect Size
Self-Appraisal	-3.24	0.001	0.42
Occupational Information	-4.12	<0.001	0.53
Goal Selection	-2.45	0.014	0.32
Planning	-3.78	<0.001	0.49
Problem Solving	-3.56	<0.001	0.46

Note: Effect size is calculated as $r = |Z|/\sqrt{N}$ where N is total sample size

Source: developed by the authors

Statistical analysis of the obtained data confirms the significant effectiveness of VR training in developing career adaptability. Z-score, p-value and Effect Size were used to assess the differences between groups.

Z-score = -3.24, $p = 0.001 \rightarrow$ statistically significant difference

Effect Size = 0.42 $\rightarrow$ medium effect

VR training significantly improved the ability of participants to assess their strengths and weaknesses in their careers. In terms of occupational information, the results showed a highly significant difference ($Z = -4.12$, $p < 0.001$) with a medium-high effect size (0.53). This indicates that participants in the VR group demonstrated a notable improvement in their understanding of the professional environment and career development opportunities compared to those who underwent traditional training. Regarding goal selection, the difference was statistically significant ($Z = -2.45$, $p = 0.014$), but with a smaller effect size (0.32), suggesting a small to moderate impact. While VR training helped participants better define their career goals, the effect was less pronounced compared to other aspects of career adaptability. For planning, the analysis revealed a highly significant difference ($Z = -3.78$, $p < 0.001$) with a medium-high effect size (0.49). This suggests that VR training effectively supports the development of strategic career planning skills, including preparation for potential career changes. Finally, in the area of problem-solving, the findings showed a highly significant difference ($Z = -3.56$, $p < 0.001$) with a medium effect size (0.46). This implies that VR training contributes to improving participants' ability to analyse and resolve career-related challenges.

Overall, the results highlight the effectiveness of VR in enhancing various aspects of career adaptability, particularly in understanding occupational information and career planning. VR group participants significantly improved their career problem-solving skills, indicating their better adaptability to the challenges of the professional environment. All indicators were statistically significant ($p < 0.05$), confirming the effectiveness of VR training in developing career adaptability. The most pronounced effect is observed in professional awareness (Effect Size = 0.53), indicating the ability of VR to immerse participants in realistic career scenarios. Significant improvements were also recorded in planning, self-assessment, and problem-solving skills. Therefore, the use of immersive virtual reality as a training tool is an effective tool for increasing career flexibility and adaptability.

The Wilcoxon Signed-Rank Test results reveal several important findings:

1. Statistical significance: all dimensions show statistically significant differences between the VR and traditional groups, with p-values ranging from <0.001 to 0.014.

2. Effect Sizes:

• Strongest effect observed in Occupational Information ($r = 0.53$).

• Moderate effects in Planning ($r = 0.49$) and Problem Solving ($r = 0.46$).

• Smallest effect in Goal Selection ($r = 0.32$).

3. Z-scores: the negative Z-scores indicate that the VR group consistently showed higher improvements compared to the traditional group across all dimensions.

The VR group might show greater improvement in self-appraisal due to the immersive and interactive nature

of virtual reality environments. Such environments offer students opportunities for direct engagement and reflection on their performance, fostering a deeper understanding of their abilities, interests, and values. In particular, the immediacy of feedback in VR simulations allows participants to connect their actions with outcomes in real-time, which may enhance their ability to evaluate their competencies critically. For example, tasks designed within a VR environment can simulate professional challenges, requiring students to make decisions and observe their consequences, thus strengthening their self-awareness and confidence in self-appraisal. The substantial difference observed in the Occupational Information dimension is likely attributable to VR's capacity to deliver experiential learning through simulated occupational scenarios. Unlike traditional methods, which may rely on textual or verbal descriptions of career roles, VR provides a multidimensional, sensory-rich experience. Students can virtually "step into" a profession, interact with tools, and observe workflows, thereby gaining nuanced insights into occupational demands, environments, and expectations. This immersive method likely contributes to a more comprehensive understanding of career-related information, as evidenced by the significant improvement in confidence in accessing and interpreting occupational data in the VR group.

The moderate improvement in Goal Selection within the VR group can be understood in the context of VR's ability to align experiential learning with personal interests and skills. By immersing students in scenarios tailored to various professional fields, VR allows them to test their preferences and aptitudes in a simulated yet realistic setting. This process can clarify career goals by helping individuals connect theoretical knowledge with practical application. Although the improvement in this dimension is less pronounced compared to others, it highlights VR's role in facilitating a more informed and personalised approach to career decision-making. The larger improvement observed in the Planning dimension underscores VR's unique contribution to career preparation. Immersive simulations offer students a platform to practice and refine essential planning skills, such as creating action plans, preparing application materials, and navigating professional workflows. For instance, a VR simulation might guide students through the process of preparing a resume or planning the steps for career advancement, offering both practical instruction and contextual relevance. This experiential learning approach ensures that students not only understand the theoretical components of career planning but also apply them in simulated professional contexts, which enhances their readiness for real-world implementation.

The significant gains in Problem Solving observed in the VR group reflect the dynamic and interactive nature of VR learning environments. Unlike traditional methods that often emphasise passive learning, VR simulations require active engagement in resolving complex, real-world problems. These scenarios frequently involve encountering unexpected challenges, weighing alternatives, and making

decisions under simulated pressure. This approach helps students develop adaptive problem-solving skills by allowing them to practice critical thinking and flexibility in a controlled yet realistic setting. Consequently, students in the VR group exhibited heightened confidence in their ability to manage career-related challenges and formulate alternative strategies when faced with obstacles. These modeled results suggest that VR-based career counseling could be particularly effective in enhancing career decision self-efficacy, with the strongest impacts in areas requiring experiential learning and direct engagement with career-related tasks. The traditional lecture format, while showing some improvement, might not offer the same degree of hands-on experience and immediate feedback that VR provides. The results suggest that the VR intervention was particularly effective in enhancing students' confidence in gathering and understanding occupational information, which aligns with the immersive nature of VR experiences. While Goal Selection showed the smallest effect size, it still demonstrated statistically significant improvement favoring the VR group.

DISCUSSION

Career adaptability, conceptualised as an individual's capacity to navigate career transitions and adjust to emerging professional challenges, has become increasingly crucial in modern rapidly evolving job market (Savickas & Porfelli, 2012). As noted by M.L. Savickas (2013), this psychosocial construct encompasses four fundamental dimensions: career concern (planning for future possibilities), control (taking responsibility for one's career development), curiosity (exploring various career options), and confidence (believing in one's ability to succeed). As labor markets continue to transform under the influence of technological advancement and global economic shifts, the development of these adaptability components has become paramount for sustainable career success.

By investigating how immersive VR experiences influence the four dimensions of career adaptability, this research seeks to contribute to understanding of technology-enhanced career development interventions and their potential role in preparing individuals for the evolving demands of the modern workforce. Understanding the relationship between VR-based career exploration and career adaptability could inform the design of more effective career development interventions and contribute to the broader discourse on technology-enhanced learning in professional development contexts. The rapidly changing landscape of work calls for adaptable education, with emerging technologies paving the way for innovative solutions. As VR technology has advanced, the concepts of immersion and presence have also evolved. Immersion is influenced by the technological features of the system delivering the experience. Virtual Reality is reshaping education by enabling personalised, engaging, and immersive learning experiences. It boosts student motivation and participation, encourages collaboration, and unlocks unique possibilities across diverse subject areas.

The research by A. Maroukas *et al.* (2023) indicates that IVR training can improve skill acquisition and boost learner engagement. However, there is an increasing acknowledgment of the need for further exploration into more advanced training methods, including adaptive training approaches. The integration of Virtual Reality (VR) technology within career exploration training demonstrates significant potential for enhancing career adaptability - a multidimensional construct encompassing an individual's capacity to modify career-related attitudes and behaviors in response to emerging challenges and opportunities within the professional landscape. This adaptability framework incorporates several critical dimensions, including concern, control, curiosity, and confidence, which collectively contribute to professional development outcomes.

The implementation of VR technology in career preparation presents multiple empirically supported advantages that enhance pedagogical efficacy, accessibility, and interactive engagement. The primary benefit lies in technology's capacity for environmental simulation, facilitating risk-free experiential learning. VR systems enable the recreation of complex or potentially hazardous operational environments, such as aviation scenarios, heavy machinery operation, or medical procedures, without compromising participant safety. This verisimilitude in experiential learning provides students with contextually rich opportunities for professional role exploration under conditions that closely approximate real-world scenarios, thereby enhancing their comprehension of future occupational demands.

Furthermore, VR technology demonstrates considerable utility in skill acquisition and development. The platform facilitates the acquisition of technical competencies, including tool manipulation, software operation, and equipment handling. Additionally, VR simulations prove particularly effective in cultivating essential soft skills, including interpersonal communication, stress management strategies, and collaborative teamwork capabilities through the simulation of diverse social interactions. The immersive nature of VR technology significantly enhances cognitive retention through deep experiential learning. This interactive pedagogical approach demonstrates superior engagement metrics compared to traditional instructional methodologies. Technology's scalability enables simultaneous multi-participant training programs, independent of geographical constraints, thereby eliminating the necessity for costly physical travel or on-site training infrastructure. Moreover, VR platforms support pedagogical differentiation through customisable learning parameters that accommodate varying levels of participant knowledge and competency, enabling self-paced learning progression. The technology's capacity for immediate feedback facilitation enables rapid error correction and performance optimisation, contributing to enhanced learning outcomes.

While virtual environments offer an effective means of exploring various experiences, VR enables users to engage in immersive interactions with simulated 3D environments (Holly *et al.*, 2024). This facilitates the realistic

exploration of different career fields in a virtual setting without the need for physical presence. The knowledge and skills gained through the Master of Arts in Social Entrepreneurship (MASE) program were instrumental in fostering an entrepreneurial mindset, empowering participants to apply these skills and make an impact, whether as job creators/entrepreneurs or job seekers/intrapreneurs as noted by A. Singh *et al.* (2023). Additionally, it contributed to changes in their career choices, job preferences, and job mobility. Preparation for the modern job market is being done with the help latest technologies. Employers are increasingly using VR in their activities, so students familiar with these technologies have a competitive advantage. From medicine to design, VR is becoming an indispensable tool in many industries. The integration of Virtual Reality (VR) applications in career development and professional training has evolved significantly, offering diverse platforms tailored to specific professional domains and educational objectives. These applications represent a paradigm shift in experiential learning and professional skill development, providing immersive environments that simulate real-world scenarios with increasing sophistication.

Educational platforms such as Engage VR exemplify the potential of virtual environments for distance learning and professional development. This platform facilitates synchronous participation in simulations, lectures, and workshops, particularly beneficial for careers in education, management, and information technology. Similarly, Google Expeditions extends the boundaries of career exploration through interactive virtual tours, enabling participants to investigate various professional domains, from archaeology to medicine, thereby enhancing career decision-making processes through direct experiential learning. The emergence of job simulation technologies represents a significant advancement in professional training methodology. These sophisticated platforms replicate authentic work processes and scenarios, serving multiple objectives: skill development, operational efficiency enhancement, and safety protocol training. For instance, Job Simulator provides introductory exposure to various professional roles through gamified experiences, offering particular value for career exploration among young professionals.

In the medical domain, platforms such as Surgical Theatre demonstrate the advanced capabilities of VR in professional training. This specialised application enables surgical practitioners to rehearse complex procedures in a risk-free virtual environment, representing a significant innovation in medical education and professional development. Communication skill development has also been revolutionised through VR applications like Virtual Speech, which provides immersive environments for practicing public speaking and business negotiations. This platform has particular relevance for professionals in management, sales, and legal practices, where effective communication is paramount. The field of psychology has embraced VR technology with particular enthusiasm, implementing it across multiple

domains: education, research, and therapeutic practice. VR Psychological Lab exemplifies this integration, offering psychology students opportunities to develop diagnostic, interviewing, and counselling competencies through simulated clinical encounters. This platform facilitates the study of Behavioral responses across various environmental contexts.

Similarly, Psious represents an advanced application specifically designed for psychology students and practitioners, focusing on anxiety disorders, phobias, and post-traumatic stress disorder (PTSD) treatment methodologies. This platform bridges the gap between theoretical knowledge and practical application in psychological intervention. Virtual Reality Exposure Therapy (VRET) represents a significant advancement in psychological intervention training. This methodology combines VR technology with traditional exposure therapy principles, creating controlled environments that simulate specific triggers, stressors, or anxiety-inducing stimuli. The application can incorporate multisensory elements – visual, auditory, olfactory, and haptic feedback – to create immersive therapeutic experiences. For instance, in treating aviophobia, VRET can simulate various aspects of air travel without requiring physical presence in an aircraft, facilitating gradual exposure and anxiety reduction.

In the domain of neuropsychology, applications such as The Body VR: Journey Inside a Cell, while primarily focused on biological processes, contribute to psychology students' understanding of neurobiological mechanisms and their relationship to psychological functioning. This interdisciplinary approach enhances comprehension of the biological foundations of psychological processes. This diverse array of VR applications demonstrates the technology's potential to transform professional training and career development across multiple disciplines. The continued evolution of these platforms suggests an increasingly significant role for VR in professional education and skill development.

CONCLUSIONS

This study demonstrates the transformative potential of Virtual Reality (VR) in enhancing career adaptability - a multidimensional construct critical for navigating the complexities of the modern job market. By comparing the outcomes of VR-based and traditional career exploration training, the research highlights the superior efficacy of

VR interventions in fostering key competencies, including self-appraisal, occupational information, goal selection, planning, and problem-solving. The immersive nature of VR allows participants to engage in experiential learning within simulated environments that closely mirror real-world scenarios, thereby bridging the gap between theoretical knowledge and practical application.

Notably, the strongest effects were observed in occupational information and planning, suggesting that VR excels in areas requiring active engagement and contextual understanding. While goal selection showed the smallest improvement, the results still affirm VR's capacity to personalise career exploration based on individual interests and abilities. These results carry substantial implications for educators, career counselors, and workforce development professionals. Incorporating VR into career training programs can enrich traditional pedagogical approaches by providing learners with hands-on experiences that enhance both technical and soft skills. Furthermore, the scalability and flexibility of VR make it a promising tool for addressing the diverse needs of learners in various educational and professional contexts. As the global workforce continues to evolve, adopting innovative technologies like VR will be crucial in preparing individuals to meet emerging challenges and seize new opportunities. Future research should explore the long-term impact of VR-based training on career trajectories and examine its application across diverse populations and professional domains.

ACKNOWLEDGEMENTS

The authors express their sincere gratitude to the administration of Mukachevo State University for the technical assistance, valuable ideas, and financial support that made this study possible. We highly appreciate the university's contribution to creating favourable conditions for scientific work and developing innovative approaches in research activities.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest that could affect the objectivity or results of this study. All stages of the study, including planning, execution, data analysis, and preparation of the article, were conducted independently, without external influence or bias.

REFERENCES

- [1] Alvarez, K.S. (2021). Using virtual simulations in online laboratory instruction and active learning exercises as a response to instructional challenges during COVID-19. *Journal of Microbiology & Biology Education*, 22(1). doi: 10.1128/jmbe.v22i1.2503.
- [2] Andreoletti, D., Paoliello, M., Luceri, L., Leidi, T., Peternier, A., & Giordano, S. (2022). A framework for emotion-driven product design through virtual reality. In *Information technology for management: Business and social issues* (pp. 42-61). Cham: Springer International Publishing. doi: 10.1007/978-3-030-98997-2_3.
- [3] Cheng, K.-H. (2022). Teachers' perceptions of exploiting immersive virtual field trips for learning in primary education. *Journal of Research on Technology in Education*, 54(3), 438-455. doi: 10.1080/15391523.2021.1876576.
- [4] Declaration of Helsinki. (2013). Retrieved from <https://surl.li/inczsd>.
- [5] Espinoza, J. (2025) *Teaching award: Rising to the challenge*. Retrieved from <https://www.ft.com/content/bad75b74-a260-4306-8b9f-9281bc0ca85a>.

- [6] Ghosh, L., & Ravichandran, R. (2024). Emerging technologies in vocational education and training. *Journal of Digital Learning and Education*, 4(1), 41-49. [doi: 10.52562/jdle.v4i1.975](https://doi.org/10.52562/jdle.v4i1.975).
- [7] Havola, S., Haavisto, E., Mäkinen, H., Engblom, J., & Koivisto, J.-M. (2021). The effects of computer-based simulation game and virtual reality simulation in nursing students' self-evaluated clinical reasoning skills. *Computers, Informatics, Nursing*, 39(11), 725-735. [doi: 10.1097/CIN.0000000000000748](https://doi.org/10.1097/CIN.0000000000000748).
- [8] Holly, M., Weichselbraun, C., Wohlmuth, F., Glawogger, F., Seiser, M., Einwallner, P., & Pirker, J. (2024). VRChances: An immersive virtual reality experience to support teenagers in their career decisions. *Multimodal Technologies and Interaction*, 8(9), article number 78. [doi: 10.3390/mti8090078](https://doi.org/10.3390/mti8090078).
- [9] Joo, J.-H., Han, S.-H., Park, I., & Chung, T.-S. (2024). Immersive emotion analysis in VR environments: A sensor-based approach to prevent distortion. *Electronics*, 13(8), article number 1494. [doi: 10.3390/electronics13081494](https://doi.org/10.3390/electronics13081494).
- [10] Kaplan, A.D., Cruik, J., Endsley, M., Beers, S.M., Sawyer, B.D., & Hancock, P.A. (2021). The effects of virtual reality, augmented reality, and mixed reality as training enhancement methods: A meta-analysis. *Human Factors*, 63(4), 706-726. [doi: 10.1177/0018720820904229](https://doi.org/10.1177/0018720820904229).
- [11] King, S., Boyer, J., Bell, T., & Estapa, A. (2022). An automated virtual reality training system for teacher-student interaction: A randomized controlled trial. *JMIR Serious Games*, 10(4), article number e41097. [doi: 10.2196/41097](https://doi.org/10.2196/41097).
- [12] Korniienko, I.A., & Barchi, B.V. (2020). Influence of virtual reality tools on human anatomy learning. *Information Technologies and Learning Tools*, 77(3), 66-75. [doi: 10.33407/itlt.v77i3.3493](https://doi.org/10.33407/itlt.v77i3.3493).
- [13] Maroukakis, A., Troussas, C., Krouska, A., & Sgouropoulou, C. (2023). How personalized and effective is immersive virtual reality in education? A systematic literature review for the last decade. *Multimedia Tools and Applications*, 83, 18185-18233. [doi: 10.1007/s11042-023-15986-7](https://doi.org/10.1007/s11042-023-15986-7).
- [14] Nassar, A.K., Al-Manaseer, F., Knowlton, L.M., & Tuma, F. (2021). Virtual reality (VR) as a simulation modality for technical skills acquisition. *Annals of Medicine and Surgery*, 71, article number 102945. [doi: 10.1016/j.amsu.2021.102945](https://doi.org/10.1016/j.amsu.2021.102945).
- [15] Nosenko, Yu.G. (Ed.). (2024). *Immersive technologies in education: Collection of materials of the IV International scientific and practical conference*. Kyiv: ITS NAPS of Ukraine.
- [16] Palmas, F., Reinelt, R., Cichor, J.E., Plecher, D.A., & Klinker, G. (2021). Virtual reality public speaking training: Experimental evaluation of direct feedback technology acceptance. In *2021 IEEE virtual reality and 3d user interfaces (VR)* (pp. 463-472). Lisboa: IEEE. [doi: 10.1109/vr50410.2021.00070](https://doi.org/10.1109/vr50410.2021.00070).
- [17] Qushem, U.B., Christopoulos, A., Oyelere, S.S., Ogata, H., & Laakso, M.J. (2021). Multimodal technologies in precision education: Providing new opportunities or adding more challenges?. *Education Sciences*, 11(7), article number 338. [doi: 10.3390/educsci11070338](https://doi.org/10.3390/educsci11070338).
- [18] Radianti, J., Majchrzak, T.A., Fromm, J., & Wohlgenannt, I. (2020). A systematic review of immersive virtual reality applications for higher education: Design elements, lessons learned, and research agenda. *Computers & Education*, 147, article number 103778. [doi: 10.1016/j.compedu.2019.103778](https://doi.org/10.1016/j.compedu.2019.103778).
- [19] Sandrone, S., & Carlson, C. (2021). Gamification and game-based education in neurology and neuroscience: Applications, challenges, and opportunities. *Brain Disorders*. [doi: 10.1016/j.dscb.2021.100008](https://doi.org/10.1016/j.dscb.2021.100008).
- [20] Savickas, M.L. (2013). [Career construction theory and practice](#). In R.W. Lent & S.D. Brown (Eds.), *Career development and counseling: Putting theory and research to work* (pp. 147-183). New Jersey: John Wiley & Sons.
- [21] Savickas, M.L., & Porfeli, E.J. (2012). Career adapt-abilities scale: Construction, reliability, and measurement equivalence across 13 countries. *Journal of Vocational Behavior*, 80(3), 661-673. [doi: 10.1016/j.jvb.2012.01.011](https://doi.org/10.1016/j.jvb.2012.01.011).
- [22] Singh, A., Chakraborty, S., & Patoju, S.K.S. (2023). Career choices and job preferences of social entrepreneurship graduates: Implication for redefining "success" of social entrepreneurship education. *Social Enterprise Journal*, 19, 459-480. [doi: 10.1108/SEJ-11-2022-0103](https://doi.org/10.1108/SEJ-11-2022-0103).
- [23] Sudharson, D., Malik, R., & Sathya, R.R. (2024). A novel adaptive framework for immersive learning using VR in education. In R. Malik, A. Sharma & P. Chaudhary (Eds.), *Transforming education with virtual reality* (pp. 3-26). Beverly: Scrivener Publishing LLC. [doi: 10.1002/9781394200498.ch1](https://doi.org/10.1002/9781394200498.ch1).
- [24] Svendsen, B.T., Petersen, L.F., Skjelsager, A., Lippert, A., & Ostergaard, D. (2024). Using simulation scenarios and a debriefing structure to promote feedback skills among interprofessional team members in clinical practice. *Advances in Simulation*, 9 article number 39. [doi: 10.1186/s41077-024-00303-5](https://doi.org/10.1186/s41077-024-00303-5).
- [25] Taylor, K.M., & Betz, N.E. (1983). Career decision-making self-efficacy scale. *APA PsycTests*. [doi: 10.1037/t01482-000](https://doi.org/10.1037/t01482-000).
- [26] Villena-Taranilla, R., Tirado-Olivares, S., Cózar-Gutiérrez, R., & González-Calero, J.A. (2022). Effects of virtual reality on learning outcomes in k-6 education: A meta-analysis. *Educational Research Review*, 35, article number 100434. [doi: 10.1016/j.edurev.2022.100434](https://doi.org/10.1016/j.edurev.2022.100434).
- [27] Yin, W. (2022). An artificial intelligent virtual reality interactive model for distance education. *Journal of Mathematics*, article number 9817457. [doi: 10.1155/2022/7099963](https://doi.org/10.1155/2022/7099963).

Інокентій Корнієнко

Доктор психологічних наук, професор
Мукачівський державний університет
89600, вул. Ужгородська, 26, м. Мукачево, Україна
<https://orcid.org/0000-0003-1451-4128>

Беата Барчі

Кандидат психологічних наук, доцент
Мукачівський державний університет
89600, вул. Ужгородська, 26, м. Мукачево, Україна
<https://orcid.org/0000-0002-5923-7331>

Розвиток адаптивності кар'єри через імерсивну віртуальну реальність тренінговими засобами

Анотація. Інтеграція віртуальної реальності (VR) у навчальні програми з розвитку кар'єри пропонує трансформаційний підхід до підвищення кар'єрної адаптивності – ключового конструкту для успішної навігації викликами сучасного професійного середовища. Метою цього дослідження було вивчення впливу тренінгу з професійної орієнтації у віртуальній реальності (VR) на кар'єрну адаптивність. Використовуючи порівняльний дизайн, дані було зібрано від двох груп – однієї, яка проходила навчання з використанням VR, та іншої, яка використовувала традиційні методи. Результати дослідження свідчать про значний позитивний вплив інтерактивних VR-симуляцій на ключові аспекти кар'єрної адаптивності. Зокрема, використання VR-технологій сприяло покращенню самооцінки учасників, розвитку професійних знань, а також підвищенню ефективності постановки цілей та планування кар'єрного шляху. У цьому дослідженні проаналізовано вплив використання VR у кар'єрній орієнтації беручи до уваги п'ять вимірів адаптивності в кар'єрі: самооцінку, професійну інформацію, вибір цілей, планування та вирішення проблем. Результати показали статистично значущі покращення у всіх вимірах для групи, яка навчалася з використанням VR, із найбільшим впливом у сфері професійної інформації та значними покращеннями у плануванні та вирішенні проблем. Отримані результати підкреслюють потенціал VR як інноваційного інструменту для експериментального навчання, що пропонує імерсивні та інтерактивні середовища, які сприяють набуттю навичок, самосвідомості та ефективному прийняттю кар'єрних рішень. Обговорено наслідки для освітніх установ, практики кар'єрного консультування та програм розвитку робочої сили, акцентуючи на ключовій ролі навчання, супроводжувачого технологіями, у підготовці людей до динамічного ринку праці. Результати дослідження мають важливі імплікації для фахівців з кар'єрного консультування, освітніх закладів та організацій, зацікавлених у розвитку кадрового потенціалу

Ключові слова: розвиток кар'єри; експериментальне навчання; професійне навчання; вища освіта; підготовка до професійної діяльності

UDC 378.147
DOI: 10.52534/msu-pp1.2025.51

Olena Diahyleva

PhD in Pedagogy, Associate Professor
Kherson State Maritime Academy
73000, 20 Nezalezhnosti Ave., Kherson, Ukraine
<https://orcid.org/0000-0003-3741-4066>

Olena Kononova

Lecturer
Maritime Applied College of Kherson State Maritime Academy
73000, 14/1 Nezalezhnosti Ave., Kherson, Ukraine
<https://orcid.org/0009-0007-1386-6590>

Alona Yurzhenko*

PhD in Pedagogy, Associate Professor
Kherson State Maritime Academy
73000, 20 Nezalezhnosti Ave., Kherson, Ukraine
<https://orcid.org/0000-0002-6560-4601>

Valerii Svyryda

Senior Lecturer
Kherson State Maritime Academy
73000, 20 Nezalezhnosti Ave., Kherson, Ukraine
<https://orcid.org/0000-0003-2415-4461>

Development of professional competence of future specialists in the operation of shipboard technical systems and complexes using LMS MOODLE

Article's History:

Received: 19.10.2024
Revised: 27.02.2025
Accepted: 26.03.2025

Suggested Citation:

Diahyleva, O., Kononova, O., Yurzhenko, A., & Svyryda, V. (2025). Development of professional competence of future specialists in the operation of shipboard technical systems and complexes using LMS MOODLE. *Scientific Bulletin of Mukachevo State University. Series "Pedagogy and Psychology"*, 11(1), 51-59. doi: 10.52534/msu-pp1.2025.51.

Abstract. Modern digital learning tools have become an integral part of maritime education and training (MET). Modernisation of MET with digital tools requires the development of new skills for maritime professionals (e.g., specialists in the management of shipboard technical systems and complexes). The purpose of the present study was to analyse the role of digital learning platforms, specifically, learning management systems (LMS), modular object-oriented dynamic learning environments (MOODLE), and online ESP courses. The study described the LMS MOODLE tools used in ESP online courses for future specialists in the management of shipboard technical systems and complexes to develop their professional competence. The study analysed the possibilities of the digital educational environment for the development of professional skills and competences of students of maritime educational institutions. The advantages of integrating e-learning into the training of ship's mechanics were determined, specifically through flexibility in access to materials, adaptability of the educational process, and the possibility of forming individual learning paths. It was concluded that the LMS MOODLE significantly contributes to the development of professional competence of maritime specialists in e-learning. This ensures a comprehensive approach to MET and allows future specialists in the management of shipboard technical systems and complexes to take an active part in e-learning. As a result, students acquire theoretical knowledge with practical skills necessary for further work on board. The practical value

*Corresponding author



of this study lies in its possible application of LMS MOODLE by teachers in teaching ESP in maritime higher education institutions

Keywords: maritime institutions; marine professionals; digitalisation; maritime English; e-learning

INTRODUCTION

The need to develop the professional competence of future shipboard technical systems management specialists using the MOODLE LMS is driven by the necessity of adapting maritime education to modern technological requirements. The development of innovative information technologies and globalisation are changing the requirements for training specialists who must possess not only theoretical knowledge but also practical skills for the effective management of complex ship systems. The use of MOODLE allows integrating modern distance learning methods, which contributes to the individualisation of education, the development of self-education skills, the necessary professional competences, such as analytical thinking, and skills in working with technical programmes. This makes learning more interactive and effective, meeting the requirements of the modern labour market.

Global standardisation in the maritime industry has become uniform globally. Every seafarer must be well-qualified not only to graduate from a maritime institution but also to get certificates, pass interviews at crewing agencies, take English language tests, etc. English tests vary depending on the shipping companies' requirements. Examples are as follows: Marlins, TEST of Maritime English for Seafarers, SMCP-Based Tests (Official website of the International..., n.d.). The crewing agencies use these tests to check future worker's ability to speak in English. Professional tests are developed according to international maritime standards (e.g., STCW – Sailors' Training and Certification and Watchkeeping).

The professional competence of future seafarers has been explored by many researchers, each of whom has made a valuable contribution to the disclosure of various aspects of this issue. Overall, their research indicates the significance of developing not only technical knowledge, but also socio-communicative skills, which are key in the maritime profession. All these studies confirm the effectiveness of the use of digital technologies in the training of seafarers. They provide flexibility of training, improve access to training materials, and create an interactive environment for the development of professional skills. S. Ghosh *et al.* (2024) investigated the characteristics of skills and competence frameworks through a systematic literature review. The researchers also examined the STCW Code for seafarer training. As a result, the researchers proposed their variant of essential characteristics of the frameworks which need to be imbibed in the Code to maintain its relevance. A group of Ukrainian researchers investigated the professional competence of specialists in the maritime industry, particularly the role of soft skills in it. The researchers re-

viewed the use of soft skills in the professional competence of maritime specialists and determined the value of these soft skills for the work of seafarers (Zheliaskov *et al.*, 2024). O.L. Moroz (2024) studied the professionally oriented communicative competence of seafarers. The researcher offered some practical solutions that helped teachers to minimise the challenges of online Maritime English course teaching.

Y. Tymoshchuk (2019) studied the essence of a foreign seafarer's professional competence using the example of learning professional English. The researcher proved the value of foreign communicative approach in forming a comprehensively developed seaman, ready to perform their professional activities on board. E. Sumartono (2024) investigated the impact of digital platforms on the effectiveness of training future seafarers. The findings of the study revealed that digital transformation has fundamentally changed the way seafarers work, study, and interact. J. Li *et al.* (2024) analysed the adaptation of electronic technologies in maritime education, particularly the use of artificial intelligence to personalise the educational process. The principal subject of their study was digital literacy. As the result, the seafarers' digital literacy was found to be at a moderate level.

E. Ceylani *et al.* (2022) ranked critical competences for future seafarers within the scope of digital transformation. The researchers concluded that cognitive skills are expected to be the most significant competencies of maritime professionals in the context of digitalisation. M.I.A. Aziz & W.Z. Zakaria (2022) focused on Malaysian seafarers in their study. Their findings suggested Malaysian seafarers' readiness to adopt digital innovations at the workplace. However, all the studies mentioned did not address the competence of specialists in the operation of shipboard technical systems and complexes and thus their findings have limited generalisability. That is why the purpose of the present study was to describe the development of the professional competence of future specialists in the operation of shipboard technical systems and complexes using LMS MOODLE.

MATERIALS AND METHODS

This study was conducted at the Kherson State Maritime Academy (KSMA), Odesa, Ukraine. KSMA trains the following maritime professionals: ship navigators, electrical engineers, and specialists in the operation of shipboard technical systems and complexes. The study involved three stages of pedagogical experiment: preliminary, content, and analytical. First-year cadets of Marine Engineering Faculty were chosen as a subject of research during the preliminary stage of experiment. The survey of their professional

competency was developed on LMS MOODLE (Questionnaire resource) during September 2024 to collect the data from cadets. The preliminary survey placed on LMS MOODLE ESP online course is presented in Figure 1 below.

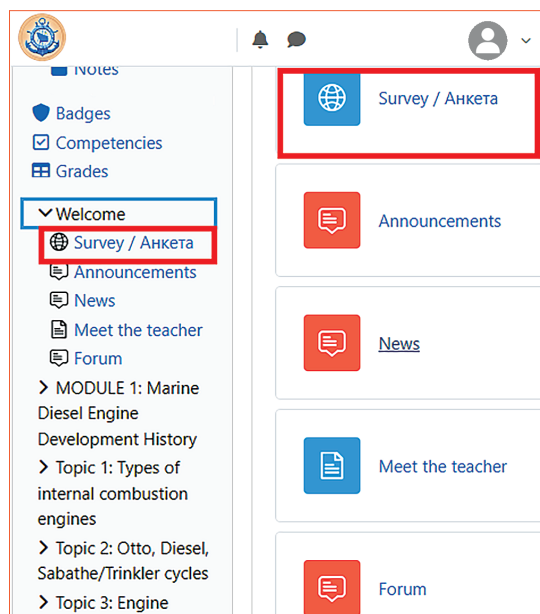


Figure 1. Preliminary survey on LMS MOODLE

Source: ESP online course on LMS MOODLE of KSMA

The survey included 13 questions (as an initial diagnostic tool) and was conducted by 61 cadets (mostly 18-year-old males). The survey results did not affect the cadets' distribution into groups and English subgroups. Cadets were randomly distributed into two main groups using alphabetical order, ensuring an unbiased distribution: 211AP group (1st (15 cadets) and 2nd (16 cadets) subgroups) and 212AP group (1st (15 cadets) and 2nd (15 cadets) subgroups). Most of participants, who generally possessed a basic level of professional competence, began the experiment on equal terms.

The content stage of the experiment was conducted during one semester of the 2024/2025 academic year – from October 2024 to January. During this period, new educational and methodological materials were developed specifically for LMS MOODLE to enhance the professional competence of future specialists in the operation of ship-board technical systems and complexes. These materials incorporate innovative tools and instruments such as the H5P module for interactive content, gamification elements to boost engagement, and assignments for continuous assessment. Each tool was strategically selected to promote active learning, foster critical thinking, and simulate real-world problem-solving scenarios relevant to maritime operations.

The final diagnosis, conducted during the analytical stage of the experiment, provided a comprehensive assessment of the implemented methods. This evaluation compared the performance of cadets in the experimental groups – who used the newly developed materials – with

that of control groups following conventional instructional methods. Various metrics were employed, including the quality of assignments submitted, improvements in professional competencies, and overall engagement with the course content. The comparative analysis aimed to validate the effectiveness of the modernised approach in fostering both communicative and professional skills. The study followed all ethical standards of the Declaration of Helsinki (2013), anonymity was preserved during the experiment, and no rights were violated. The data was taken from LMS MOODLE of KSMA (ESP online course).

RESULTS AND DISCUSSION

LMS MOODLE at KSMA serves as a comprehensive digital hub that encompasses online courses for all subjects taught at the institution and its structural subdivisions (e.g., Maritime Applied College). This integrated platform not only centralises the curriculum but also supports a flexible, anytime-anywhere learning environment. Within this framework, the ESP course was specifically developed to enhance cadets' communicative and professional competences by leveraging a diverse range of interactive and collaborative tools. The ESP course is structured to address both language skills and professional knowledge by incorporating a variety of MOODLE activities and resources. Quiz and Survey: these tools enable continuous evaluation of student's progress, enabling instructors to assess understanding and provide prompt, personalised feedback. Questionnaire facilitates self-assessment and helps gauge prior knowledge and learning outcomes. Book, Lesson, and Page serve as organised repositories for comprehensive learning materials, guiding students through structured content and facilitating self-paced study. Wiki and Glossary: encourage collaborative content creation and serve as valuable reference tools, particularly for mastering technical vocabulary and maritime-specific terminologies.

Assignments were used in each module of the ESP online course, which contributed to the integration of theoretical knowledge with practical skills. Parts of the student textbook (Kudryavtseva *et al.*, 2018) served as detailed instructions for working on the Assignments, which enabled students to navigate the tasks and complete them independently. These assignments were assigned as homework during the semester for future specialists in ship engineering systems and complex operations, ensuring systematic repetition and consolidation of the studied material (Bekteshi *et al.*, 2021). Using this platform, teachers could collect completed tasks, provide detailed comments on each assignment, and evaluate them, which created effective feedback. This enabled cadets to receive recommendations for improving the quality of work, correcting mistakes and, if necessary, re-submit tasks to improve their skills. This approach stimulated the development of self-control, critical thinking, and responsibility for their learning (Tsimplis, 2020). A particularly significant aspect is the ability to resubmit assignments. This enables students to view mistakes not as failures but as part of the learning process and

develop individual improvement strategies, which is crucial for the development of professional competence (Konratenko *et al.*, 2021). The feedback received motivates students to improve themselves and contributes to the creation of a positive learning environment where everyone is free to experiment and develop. Teachers could analyse the progress of each student, track errors, and promptly adjust the learning process, ensuring an individual approach to each cadet (Kurban, 2018).

Assignments (Fig. 2) are a useful tool for the development of both communicative and professional com-

petencies, as they contribute to the active engagement of students in the learning process, the development of analytical abilities, and the ability to work effectively in a team (Lytyynova, 2015). The tasks integrate theoretical training with practical activities, which allows future specialists not only to master the material but also to adapt it to the real conditions of professional activity in the field of ship engineering systems and the operation of complexes. Thus, the tasks serve not only as a means of testing knowledge but also stimulate continuous professional growth and cadets' self-development (Mezentseva, 2020).

DMA system purpose	
DMA system reset positions	
DMA system operation	
DMA system base time settings	
DMA system auto activation	
DMA system emergency call	

Figure 2. Example of Assignment on LMS MOODLE

Source: ESP online course on LMS MOODLE of KSMA

Module Book (Fig. 3) is also used as a useful tool for teachers in ESP classes. This module can be used to present new vocabulary at the Presentation stage of the lesson. Module Book allows the creation of various digital pages with such elements as text, pictures, gifs, videos, audio, links, and H5P (Mohan, 2018). By integrating multimedia elements teachers can create a dynamic learning environment that addresses various learning styles and keeps students motivated. For example, including interactive quizzes or drag-and-drop exercises on a book page can reinforce new vocabulary, ensuring that students are actively engaged with the content rather than passively reading it (Rasool & Dawood, 2021). Book can contain a list of the names of book pages (Table of contents), Book description, ID number, language to be forced (e.g., English), Restricted access which is really useful for home tasks, activity completion option, tags, and competencies (in case online courses contain competency framework created by MOODLE administrator). In addition to its role in introducing new material, the Module Book is extremely versatile. Teachers can use it to curate supplementary resources, create thematic sections, or even develop self-study materials that align with the course competency

framework. By tagging content and linking it to specific competencies, teachers can track student progress and ensure that each student is achieving the desired outcomes (Schaffzin, 2016). The flexibility of the Book module supports a holistic approach to learning, combining presentation, practice, and application phases (Semerikov *et al.*, 2020). This not only improves students' understanding of new vocabulary but also integrates these terms into a broader communicative context, thereby enhancing both linguistic proficiency and professional competence in ESP (Sherman *et al.*, 2020).

The Chat and Forum modules are two activities that are mostly used to develop students' writing skills (Fig. 4), considering the restrictions on full offline classrooms during martial law in Ukraine (Striuk & Semerikov, 2020). The only sufficient difference between them is that the Forum module creates asynchronous discussions while the Chat module creates synchronous ones. The synchronous nature of the Chat module encourages immediate dialogue between students, enabling them to quickly clarify doubts and share ideas, which is especially valuable when in-person classes are not possible (Valko *et al.*, 2021). In contrast, the asynchronous forum module enables students to take

time to formulate thoughtful responses, encouraging deeper reflection on topics and facilitating richer discussion (Yakhontova, 2003). Chats are text-based but in Forums students can add pictures, GIFs, videos, H5P components, which helps illustrate complex concepts and makes the learning process more engaging for diverse learning styles. Both Chats and Forums sessions are saved and can be made available for everyone unless the course tutor has made a restriction (e.g., for distinct groups or subgroups). Due to the impossibility of conducting fully offline classes during martial law in Ukraine, KSMA A. Volkova (2021) found

Chat and Forum modules useful for group discussions, especially for future specialists in operating shipboard technical systems and complexes to exchange their experience on various topics while studying ESP (Zaitseva et al., 2022). Saved discussion recordings allow instructors to monitor student engagement and assess written communication skills over time (Zinchenko et al., 2022). These recordings can also serve as a basis for providing detailed feedback, helping students identify areas for improvement and encouraging the continued development of professional writing and critical thinking skills (Sakib et al., 2021).

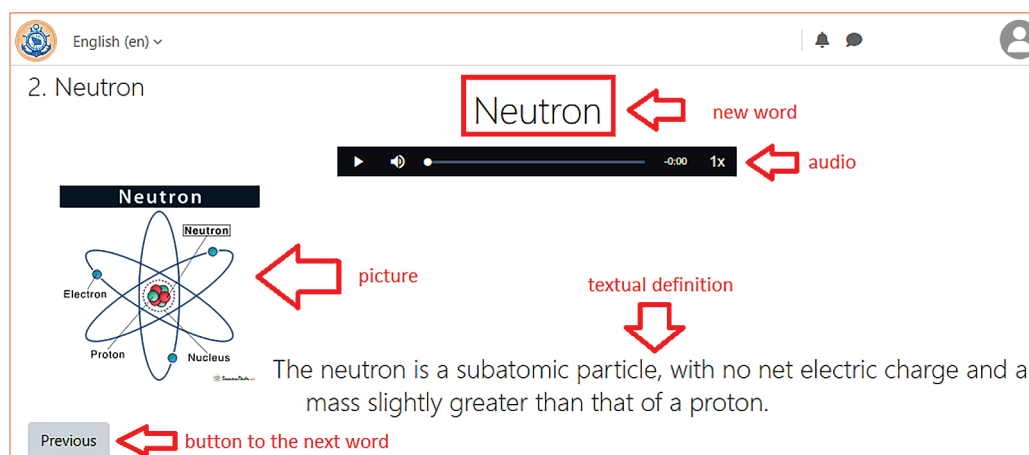


Figure 3. Book on the topic “Electricity in the Engine room”

Source: Maritime English course on LMS MOODLE of KSMA

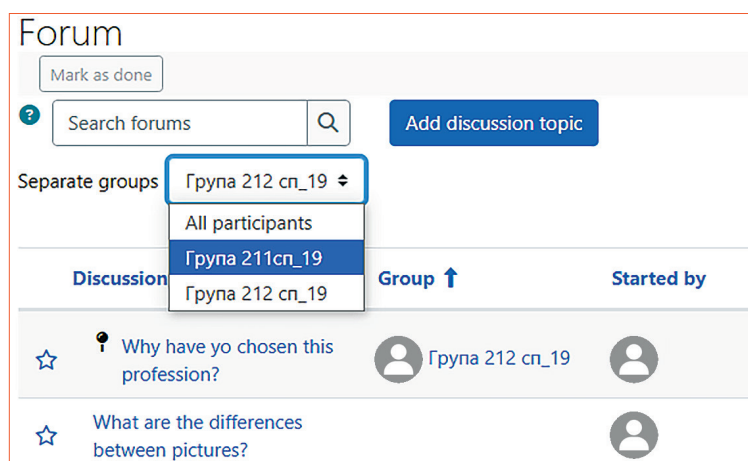


Figure 4. Forum of ESP course in LMS MOODLE

Source: ESP course on LMS MOODLE of KSMA

The flexibility of these modules means that they can be seamlessly integrated with other MOODLE activities and assessment tools, providing a comprehensive environment for the development of language and technical skills (Pidpala, 2017; Tyron et al., 2020). Using SCORM and HotPot allows integrating interactive modules, simulations, and dynamic content that accurately simulate real professional situations and encourage independent analysis of situations, decision-making, and experimentation, which

is critical in the training of specialists (Liashenko, 2024). SCORM packages allow creating adaptive training programmes, where each student can work on practical tasks that match their level of training. This approach enables a detailed assessment of individual progress, which helps to identify strengths and areas for improvement. HotPot allows developing interactive exercises, tests, and tasks with gamification elements that stimulate active engagement of students (Fig. 5).

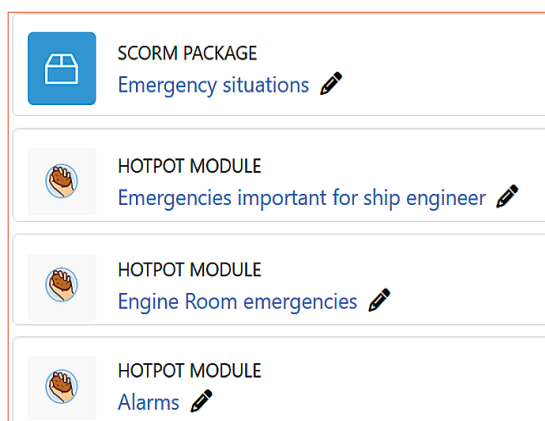


Figure 5. SCORM and HotPot of ESP course in LMS MOODLE

Source: ESP course on LMS MOODLE of KSMA

The Recosha Meet platform opens wide opportunities for organising virtual meetings, facilitating real-time collaboration. This tool enables teachers and students to conduct online conferences, seminars, and interactive classes, which maintains continuity of communication even in remote mode. Virtual meetings using Recosha Meet contribute to the development of communication skills, allow quickly solving problem situations and exchanging experience in real time. This is particularly relevant in the context of modern challenges, when conventional teaching methods must be adapted to the online environment. The integration of Recosha Meet into the educational process forms an effective platform for collaboration, which increases the overall level of professional training of future specialists (Fig. 6).

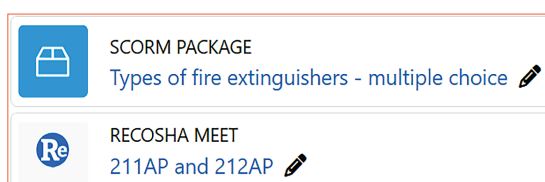


Figure 6. The Recosha Meet platform of ESP course in LMS MOODLE

Source: ESP course on LMS MOODLE of KSMA

The analytical phase of the study collected, synthesised, and evaluated comprehensive data to assess the effectiveness of the newly implemented methods and tools within the ESP course. This phase served as a link between the experimental activities and the final diagnosis of the learners' competences. During this phase, a series of practical tasks and performance assessments were conducted for both the experimental and control groups. These assessments provided measurable data on the learners' progress in both communicative and professional skills (Shintial *et al.*, 2024; Bahno & Serhiichuk, 2024). In addition to the numerical data, qualitative data was collected from both learners and instructors. This feedback highlighted the ease of use of the

Moodle tools and provided insights into areas that required further improvement.

The analytical phase involved a systematic comparison between the group that experienced the new, integrated Moodle activities, and the control group that followed conventional teaching methods. This comparison was essential to identify a modernised approach to learning outcomes. By analysing both qualitative and quantitative data, instructors could assess improvements in critical areas such as language proficiency, decision-making skills, and the ability to apply theoretical knowledge to practical maritime scenarios. The analytical phase confirmed the effectiveness of integrating advanced tools such as H5P, SCORM packages, and interactive collaboration platforms (e.g., Recosha Meet) into the curriculum. Informed curriculum development: the insights gained in this phase laid the foundation for future adjustments and improvements to the course design, ensuring that the curriculum stays responsive to the changing needs of maritime education. Long-term competency development: by correlating the use of innovative learning tools with improved performance indicators, the analysis highlighted the potential for sustained professional growth and better preparedness for real-world maritime challenges. The analytical phase was thus a critical component of the experiment, not only providing a detailed assessment of current pedagogical interventions but also informing strategic decisions for the development of future curricula. Through robust data collection, comparative analysis, statistical and qualitative assessments, this phase ensured that the methods implemented were effective and scalable for enhancing the professional skills of the future maritime professional.

The integration of these diverse tools within the ESP course enables a multi-dimensional approach to learning. Cadets benefit from the combination of theoretical content, interactive multimedia, and collaborative activities. This approach not only enhances their language proficiency but also equips them with the practical skills required for managing ship technical systems and complex operations (Gucma, *et al.*, 2023). Overall, the LMS MOODLE platform at KSMA, with its extensive suite of activities and resources, plays a pivotal role in modernising education. It provides a dynamic, interactive, and student-centred learning environment that effectively supports the professional and communicative development of future maritime specialists. Since most students in both groups (211AP and 212AP) undergo internships on board ships and are on board for extended periods, the significance of using a modern LMS system is particularly relevant. In this mode of study, students face a series of challenges, including the variability of conditions on board and limited access to stationary educational resources. The LMS provides continuous access to online courses, which is critical to maintaining a prominent level of professional training for future specialists. One of the key advantages of the LMS is its mobility and the ability to access it from any device, regardless of the student's location. Whether it is a computer, tablet,

or smartphone, the system allows easily entering online courses in each subject, which is crucial for students who often change their location along with the ship. This creates a flexible learning environment that can adapt to constantly changing conditions.

The centralised access to learning materials provided by the LMS enables students to quickly find the necessary information, view lectures, complete homework assignments, and take part in interactive discussions. All learning resources are stored in one place, which greatly simplifies the organisation of the learning process and provides a systematic approach to studying the material. Finally, the LMS creates opportunities for operational communication between students and teachers. By integrating online communication and collaboration tools, even when working remotely on board, teachers can provide prompt feedback, hold consultations, and organise virtual meetings. This contributes to the continuous learning process and maintains a strong level of professional training of students, despite the challenges associated with the conditions of practice on board.

Thus, the professional competence of future seafarers is multicomponent and includes both technical knowledge and soft skills (social and communicative), as well as adaptation to the digital learning environment. The achieved results call for integration of two approaches: implementation of soft skills as part of professional competence with emphasis on communication skills, teamwork, and decision-making skills in challenging conditions which are essential for seafarers; implementation of digital technologies in the educational process for the organisation of adaptability, interactivity, and individualisation of training. Implementation of innovations such as LMS MOODLE, virtual simulators, and augmented reality offers an opportunity to create an efficient environment for training future specialists.

CONCLUSIONS

This study found that the LMS MOODLE platform helps students to not only actively learn theoretical

material but also to develop practical skills necessary for making operational decisions in real shipping conditions. Interactive modules, remote tests, and forums contribute to the exchange of experience between students and teachers, which enables prompt adjustment of the educational process and the introduction of innovative methods. It was concluded that the LMS MOODLE significantly contributes to the development of the professional competence of maritime specialists during e-learning. This provides a comprehensive approach to MET and allows future specialists in managing shipboard technical systems and complexes to take an active part in e-learning. The integration of this platform into the educational process helped to optimise the structure of educational programmes, which further contributed to the individualisation of approaches to each student and increases their motivation.

Furthermore, the usage of the LMS MOODLE contributes to the development of critical thinking and analytical abilities, which are crucial for the effective solution of practical tasks. The system allows creating simulations and model various scenarios that meet the modern requirements of professional activity on a ship. This creates conditions for continuous professional growth and improves the quality of training of future specialists. Finally, the implementation of e-learning using LMS MOODLE corresponds to modern trends in education and opens new prospects for the development of highly qualified maritime specialists capable of effectively managing shipboard technical systems and complexes in the conditions of dynamic development of the industry. Further research will analyse the effectiveness of digital technologies in increasing the level of professional communication of cadets in English in the context of globalisation of the maritime industry.

ACKNOWLEDGEMENTS

None.

CONFLICT OF INTEREST

The authors of this study declare no conflict of interest.

REFERENCES

- [1] Aziz, M.I.A., & Zakaria, W.Z.B.W. (2022). *Assessing the intention to use digital tools amongst malaysian seafarers*. SABF.
- [2] Bahno, Y., & Serhiichuk, O. (2024). Didactic principles of implementation of mixed forms of education in the educational environment of educational institutions. *Scientia et Societas*, 3(2), 70-81. doi: 10.69587/ss/2.2024.70.
- [3] Bekteshi, E., Shala, M., & Xhaferi, B. (2021). Challenges of English teaching in engineering courses. *Journal of Modern Research in English Language Studies*, 8(4), 1-20. doi: 10.30479/JMRELS.2020.13275.1640.
- [4] Ceylani, E., Kolçak, İ.Ç., & Solmaz, M.S. (2022). *A ranking of critical competencies for future seafarers in the scope of digital transformation*. In *Proceedings of the international association of maritime universities conference* (pp. 206-216). Batumi: International Association of Maritime Universities.
- [5] Declaration of Helsinki. (2013). Retrieved from <https://www.wma.net/policies-post/wma-declaration-of-helsinki/>.
- [6] Ghosh, S., Emad, G.R., & Ravi, A. (2024). Investigating the characteristics of skills and competency frameworks through a systematic literature review: A feasibility study to revise the STCW Code for seafarer training. *Australian Journal of Maritime & Ocean Affairs*, 1-17. doi: 10.1080/18366503.2024.2374606.
- [7] Gucma, M., Deja, A., & Szymonowicz, J. (2023). Environmental solutions for maritime ships: Challenges and needs. *Production Engineering Archives*, 29(2), 216-224. doi: 10.30657/pea.2023.29.25.

- [8] Kondratenko, L.O., Samoylenko, H.T., Kiv, A.E., Selivanova, A.V., Pursky, O.I., Filimonova, T.O., & Buchatska, I.O. (2021). Computer simulation of processes that influence adolescent learning motivation. *CTE Workshop Proceedings*, 8, 495-506. doi: [10.55056/cte.303](https://doi.org/10.55056/cte.303).
- [9] Kudryavtseva, V., Malakhivska, T., Moroz, O., Petrovska, Y., & Frolova, O. (2018). *Welcome aboard: Coursebook*. Kherson: STAR.
- [10] Kurban, C.F. (2018). Designing effective, contemporary assessment on a flipped educational sciences course. *Interactive Learning Environments*, 27(8), 1143-1159. doi: [10.1080/10494820.2018.1522650](https://doi.org/10.1080/10494820.2018.1522650).
- [11] Li, J., Dong, W., Yan, X., Shi, L., & Lv, C. (2024). A study on digital literacy and influencing factors among Chinese seafarers. *Scientific Reports*, 14, article number 29574. doi: [10.1038/s41598-024-81069-8](https://doi.org/10.1038/s41598-024-81069-8).
- [12] Liashenko, U. (2024). Training of future ship engineers and electricians by means of competence, communicative and interdisciplinary approaches. *ScienceRise: Pedagogical Education*, 3(60), 4-9. doi: [10.15587/2519-4984.2024.305117](https://doi.org/10.15587/2519-4984.2024.305117).
- [13] Lytvynova, S.H. (2015). All-Ukrainian project "Cloud services in education" as a factor of development of cloud-oriented educational environments in general educational institutions. *Cloud-Based Learning Environment*, 13, 16-23. doi: [10.55056/nocote.v13i0.878](https://doi.org/10.55056/nocote.v13i0.878).
- [14] Mezentseva, S.V. (2020). A new culture of broadcasting knowledge in the conditions of the digital educational environment of an artistic university (about the experience of working in the Moodle and Moodle Music Systems). *ICONI*, 3, 80-86. doi: [10.33779/2658-4824.2020.3.080-086](https://doi.org/10.33779/2658-4824.2020.3.080-086).
- [15] Mohan, D. (2018). Flipped classroom, flipped teaching and flipped learning in the foreign/second language post-secondary classroom. *Nouvelle Revue Synergies Canada*, 2(11). doi: [10.21083/nrsc.v0i11.4016](https://doi.org/10.21083/nrsc.v0i11.4016).
- [16] Moroz, O.L. (2024). [Practical ways to improve the efficiency of professionally-oriented communicative competency formation of future seafarers](#). In *Materials of international conference "Realities and priorities of science and education development"* (pp. 56-60). Chernihiv.
- [17] Official website of the International Maritime Organization. (n.d.). Retrieved from <https://www.imo.org>.
- [18] Pidpala, I. (2017). Legal requirements for the professional and qualification qualities of seafarers. *Journal of Education, Health and Sport*, 7(11), 465-480. doi: [10.5281/zenodo.4609265](https://doi.org/10.5281/zenodo.4609265).
- [19] Rasool, J.A., & Dawood, S.S. (2021). Evaluate the use of Moodle platforms for education in University of Duhok using online survey application. *International Journal of Machine Learning and Computing*, 11(2), 152-157. doi: [10.18178/ijmlc.2021.11.2.1028](https://doi.org/10.18178/ijmlc.2021.11.2.1028).
- [20] Sakib, N., Gissi, E., & Backer, H. (2021). Addressing the pollution control potential of marine spatial planning for shipping activity. *Marine Policy*, 132, article number 104648. doi: [10.1016/j.marpol.2021.104648](https://doi.org/10.1016/j.marpol.2021.104648).
- [21] Schaffzin, K.T. (2016). Learning outcomes in a flipped classroom: A comparison of civil procedure II test scores between students in a traditional class and a flipped class. *University of Memphis Law Review*, 46(3), 661-693. doi: [10.2139/ssrn.3956257](https://doi.org/10.2139/ssrn.3956257).
- [22] Semerikov, S., Striuk, A., Striuk, L., Striuk, M., & Shalatska, H. (2020). Sustainability in software engineering education: A case of general professional competencies. *E3S Web of Conferences*, 166, article number 10036. doi: [10.1051/e3sconf/202016610036](https://doi.org/10.1051/e3sconf/202016610036).
- [23] Sherman, M., Samchynska, Y., Sikelinda, M., & Yurzhenko, A. (2020). Formation of digital and research competences in the training of it professionals in a modern university. *Information Technologies in Education*, 44, 18-30. doi: [10.14308/ite000722](https://doi.org/10.14308/ite000722).
- [24] Shintial, Y., Asikin, M., & Mascarinas, A. (2024). [The implementation of english for specific purposes in maritime vocational schools \(MVS\)](#). *Nestia Journal*, 1(1).
- [25] Striuk, A.M., & Semerikov, S.O. (2022). Professional competencies of future software engineers in the software design: Teaching techniques. *Journal of Physics: Conference Series*, 2288, article number 012012. doi: [10.1088/1742-6596/2288/1/012012](https://doi.org/10.1088/1742-6596/2288/1/012012).
- [26] Sumartono, E. (2024). [The life of seafarers in the digital age: An analysis of the philosophy of ethics and morality in the use of technology](#). *Side: Scientific Development Journal*, 1(3), 78-87.
- [27] Tsimplis, M. (2020). Marine pollution from shipping activities. In *Maritime law* (pp. 403-464). London: Informa Law from Routledge. doi: [10.4324/9781003046943](https://doi.org/10.4324/9781003046943).
- [28] Tymoshchuk, Y. (2019). [The essence and specific features of professional competence for seafarer specialists in the process of teaching foreign language for specific purposes](#). *Social Work and Education*, 6(4), 419-426.
- [29] Tyron, O., Korieshkova, S., Didenko, M., & Kaminska, S. (2020). Psycho-pedagogical approaches to the design of English learning course for ship engineers. *International Journal of Engineering Pedagogy (iJEP)*, 10(6), 21-35. doi: [10.3991/ijep.v10i6.14107](https://doi.org/10.3991/ijep.v10i6.14107).
- [30] Valko, N.V., Osadchyi, V.V., & Kruhlyk, V.S. (2021). Cloud resources use for students' project activities. *CTE Workshop Proceedings*, 8, 304-317. doi: [10.55056/cte.240](https://doi.org/10.55056/cte.240).
- [31] Volkova, A. (2021). Making sense of simulators in teaching maritime English. *Actual Questions of Humanitarian Studies*, 42, 34-39. doi: [10.24919/2308-4863/42-3-6](https://doi.org/10.24919/2308-4863/42-3-6).

- [32] Yakhontova, T.V. (2003). *English academic writing for students and researchers* (2nd ed.). Lviv.
- [33] Zaitseva, N.V., Symonenko, S.V., & Osadchyi, V.V. (2022). A blended English for specific purposes course with the focus on critical thinking skills development for computer science students. *Journal of Physics: Conference Series*, 2288, article number 012037. doi: [10.1088/1742-6596/2288/1/012037](https://doi.org/10.1088/1742-6596/2288/1/012037).
- [34] Zheliaskov, V., Berezovska, V., Tymofyeyeva, O., Chyzh, S., & Turlak, L. (2024). Soft skills in the professional competence of specialists in the maritime industry. *Scientific Journal of Maritime Research-Pomorstvo*, 38(1), 141-152. doi: [10.31217/p.38.1.11](https://doi.org/10.31217/p.38.1.11).
- [35] Zinchenko, S., Tovstokoryi, O., Nosov, P., Popovych, I., & Kyrychenko, K. (2022). Pivot Point position determination and its use for manoeuvring a vessel. *Ships and Offshore Structures*, 18(3), 358-364. doi: [10.1080/17445302.2022.2052480](https://doi.org/10.1080/17445302.2022.2052480).

Олена Дягілева

Кандидат педагогічних наук, доцент
Херсонська державна морська академія
73000, просп. Незалежності, 20, м. Херсон, Україна
<https://orcid.org/0000-0003-3741-4066>

Олена Кононова

Викладач
Морський фаховий коледж Херсонської державної морської академії
73000, просп. Незалежності, 14, м. Херсон, Україна
<https://orcid.org/0000-0003-0403-7292>

Альона Юрженко

Кандидат педагогічних наук, доцент кафедри
Херсонська державна морська академія
73000, просп. Незалежності, 20, м. Херсон, Україна
<https://orcid.org/0000-0002-6560-4601>

Валерій Свирида

Старший викладач
Херсонська державна морська академія
73000, просп. Незалежності, 20, м. Херсон, Україна
<https://orcid.org/0000-0003-2415-4461>

Формування професійної компетентності майбутніх фахівців управління судновими технічними системами і комплексами засобами LMS MOODLE

Анотація. Сучасні цифрові засоби навчання стали невід'ємною частиною морської освіти та підготовки (MET). Модернізація MET за допомогою цифрових інструментів вимагає формування нових навичок у морських фахівців (наприклад, у фахівців управління судновими технічними системами і комплексами). Метою цього дослідження було провести аналіз ролі цифрових навчальних платформ, зокрема системи управління навчанням (LMS), модульного об'єктно-орієнтованого динамічного навчального середовища (MOODLE) та онлайн-курсів англійської мови за професійним спрямуванням (ESP). У статті описуються інструменти LMS MOODLE, які використовуються в онлайн-курсах ESP для майбутніх фахівців управління судновими технічними системами і комплексами для формування їх професійної компетентності. Проаналізовано можливості цифрового освітнього середовища для розвитку професійних навичок та компетентностей здобувачів морських навчальних закладів. Визначено переваги інтеграції електронного навчання у підготовку суднових механіків, зокрема через гнучкість у доступі до матеріалів, адаптивність навчального процесу та можливість формування індивідуальних траєкторій навчання. Зроблено висновок, що LMS MOODLE суттєво сприяє формуванню професійної компетентності морських фахівців під час електронного навчання. Це забезпечує комплексний підхід до MET і дозволяє майбутнім фахівцям управління судновими технічними системами і комплексами брати активну участь в електронному навчанні. В результаті студенти отримують теоретичні знання з практичними навичками, необхідними для подальшої роботи на борту судна. Практична цінність цього дослідження полягає в його можливому застосуванні викладачами LMS MOODLE у викладанні ESP у морських закладах вищої освіти.

Ключові слова: морські заклади освіти; морські фахівці; діджиталізація; морська англійська; електронне навчання

UDC 376:81-13

DOI: 10.52534/msu-pp1.2025.60

Martin Chukwudi Ekeh*

PhD in Early Childhood Education, Senior Postdoctoral Research Fellow

University of Johannesburg

2019, 157 Beit Str., Johannesburg, South Africa

<https://orcid.org/0000-0001-7799-9885>

Differentiated pedagogy for early-grade learners with executive function and visual processing challenges

Article's History:

Received: 26.10.2024

Revised: 28.02.2025

Accepted: 26.03.2025

Suggested Citation:

Ekeh, M.Ch. (2025). Differentiated pedagogy for early-grade learners with executive function and visual processing challenges. *Scientific Bulletin of Mukachevo State University. Series "Pedagogy and Psychology"*, 11(1), 60-70. doi: 10.52534/msu-pp1.2025.60.

Abstract. This study is relevant as it enhances cognitive skills that are vital in a technology-driven society and promotes equitable learning by addressing executive function and visual processing challenges. Thus, the research aimed to provide various pedagogical approaches to mitigate the learning challenges of young learners with executive function and visual processing challenges. Adopting a qualitative research method, a simple random sampling of twelve participants (eight teachers and four parents) from eight public primary schools was conducted to explore teachers' experiences and parents' perceptions of the research phenomenon. Semi-structured interviews were used for data collection. Findings indicated that while teachers employ various differentiated strategies, including flexible grouping and multi-sensory approaches, they face significant challenges such as time constraints, resource limitations, and insufficient specialist training. The study highlighted the importance of positive teacher-student relationships and parent-teacher collaboration in successfully implementing differentiated instruction. Teachers of primary school learners who implemented structured interventions and individualised learning approaches reported improved student engagement and academic performance. The research contributed to understanding how differentiated pedagogy can effectively support early-grade learners with specific learning challenges. It recommends enhanced professional development programmes, improved resource allocation, structured assessment systems, and strengthened parent-teacher partnerships. The findings established that differentiated instruction enhances academic performance while fostering learners' self-regulation skills and task confidence. The prioritisation of inclusive practices and teacher development by school leadership emerged as a pivotal institutional enabler. The approach advanced SDG 4 by reducing learning disparities in early education through pedagogically responsive frameworks. These findings significantly impact educational policy, teacher training, and classroom practice in supporting diverse learning needs in early-grade education

Keywords: cognitive control; visual perception; young learners; learning difficulties; teacher development

*Corresponding author

INTRODUCTION

Learning difficulties are globally recognised phenomena that significantly impact learning outcomes for students. These challenges, particularly prevalent in early-grade learning, remain a concern for teachers and parents due to a lack of understanding of how best to address them. The

importance of the study cannot be overestimated as it offers a solution for learners with executive function challenges, enabling them to navigate their difficulties and enjoy equal educational opportunities to their peers without such challenges. Considering that society is now technologydriven,



this study aims to enhance learners' cognition as they engage with digital tools and educational resources. Therefore, early identification and appropriate support are crucial for these learners.

As noted by J.M. Fletcher *et al.* (2007) and J.S. Barrot *et al.* (2021), many learners struggle to overcome their problems due to delayed identification or inadequate pedagogical strategies. Various factors contribute to learning difficulties, including dyslexia, dyscalculia, attention-deficit/hyperactivity disorder (ADHD), speech and language disorders, visual processing disorder, auditory processing disorder, autism spectrum disorder, and executive functioning difficulties. Each child's unique manifestation of these challenges underscores the need for individualised approaches to support their learning journey. Moreover, learning difficulties present differently across individuals. For instance, dyslexia affects reading and language processing skills. Children with dyslexia may find it difficult to decode words, recognise letters, and comprehend written information (Snowling *et al.*, 2020; Prior, 2022).

Conversely, learners with dyscalculia may struggle to understand and apply mathematical concepts, identify numbers, and perform calculations. Similarly, learners with attention-deficit/hyperactivity disorder (ADHD) have difficulty focusing on tasks, staying organised, and following instructions. Visual processing challenges significantly impact early childhood learning and development. Children with visual processing difficulties may struggle to recognise shapes, letters, and words, leading to issues with reading fluency and comprehension. These difficulties extend beyond literacy, affecting a child's ability to interpret graphs, maps, and geometric shapes in mathematics and science. It is crucial to distinguish visual processing disorders from visual acuity problems, as they may persist even in children with perfect eyesight. This distinction makes identification and intervention challenging without specialised assessment tools and strategies (Dawson & Guare, 2018). Other learners may need help articulating sounds, understanding language, or expressing themselves verbally. These difficulties can affect their communication skills and, consequently, their academic progress. Such challenges may hinder their learning in various subjects, creating complex obstacles that educators must navigate to provide adequate support. The interplay between visual processing difficulties and other learning challenges, such as executive function deficits, can exacerbate learners' obstacles, necessitating a comprehensive and nuanced approach to intervention and support.

Executive function (EF) is another crucial cognitive process that plays a significant role in early childhood development and academic success. As defined by E.K. Goh & H.J. Jeon (2022), executive function encompasses the mental regulation of a learner's behaviour to accomplish tasks. Similarly, environmental factors play a critical role in developing visual processing skills and executive function. Researchers have highlighted that a low-income family environment can inhibit executive function development. The absence of learning stimuli, such as books, toys, and other

necessary infrastructure in home and school environments, can negatively impact a child's executive function (Zulkifli *et al.*, 2021). Moreover, psychological factors such as parental conflicts, bullying at school, and an unsupportive learning environment can significantly hinder the development of executive function skills (Ekeh & Venketsamy, 2021).

The home environment, in particular, contributes significantly through sensitive parenting behaviour, emotional support, and cognitive stimulation. These factors highlight the interplay between a child's environment and cognitive development, emphasising the need for comprehensive support systems at home and in educational settings. Recognising the impact of environmental factors is important for developing effective interventions and support strategies for learners with visual processing and executive function challenges. This study aimed to explore how differentiated pedagogy supports early-grade learners with executive function and visual processing challenges. It examines the effectiveness of instructional methods, teachers' experiences, and parents' perceptions to provide insights into improving support for these learners at school and home.

LITERATURE REVIEW

Differentiated pedagogy, also referred to as differentiated instruction or differentiated learning, is an educational approach that acknowledges and accommodates the diverse needs, abilities, learning styles, and interests of individual students within a classroom (Aftab, 2016). The concept of differentiated pedagogy is based on the understanding that students are unique and have varying levels of readiness, preferences, and strengths in learning. Primarily, differentiated pedagogy aims to create a learning environment that accommodates these differences and allows each student to engage with the content, process information, and demonstrate their comprehension in ways that are most effective and meaningful for them (Benjamin, 2014). It goes beyond the traditional one-size-fits-all teaching approach and seeks to address the diverse learning needs of students within a single classroom. The conventional one-size-fits-all teaching approach assumes that all students in a class possess the same level of readiness and can learn at the same pace and in the same manner. However, students possess varying prior knowledge, skills, and learning preferences. Some students may grasp concepts quickly and need more challenging material, while others may require additional support and more time to understand the same concepts (Tomlinson, 2017). Differentiated pedagogy involves adjusting various aspects of teaching, such as content, process, and assessment, to cater to the individual learning profiles of students (Dawson & Guare, 2018).

Differentiated pedagogy offers numerous benefits for students and educators, allowing teachers to tailor their instruction to meet each student's unique needs, abilities, and interests (Tomlinson, 2017; Bahno & Serhiichuk, 2023). This personalised approach enhances students' learning experience and ensures they are appropriately challenged and supported (Benjamin, 2014). Students are more

likely to engage in learning when presented with content and activities that align with their interests and learning styles. A deeper understanding of the material and more enthusiasm for learning can lead to heightened engagement. S.W.Y. Wan (2016) argues that by catering to students' diverse learning needs, differentiated pedagogy can help improve academic performance. He further notes that when students feel that their learning is meaningful and relevant to them, they are more likely to excel in their studies. Differentiated instruction fosters an inclusive classroom environment where all students are valued and respected for their unique contributions. It helps create a sense of belonging and ensures that no student feels left behind. Differentiated pedagogy reflects the diversity of the natural world, where people have different strengths and abilities. When students experience personalised classroom learning, they develop skills that prepare them to navigate a diverse and complex world beyond school (Kotob & Abadi, 2019).

Students learn at different rates, and differentiated pedagogy accommodates these differences by allowing students to progress at their own pace. This flexibility can help prevent students from feeling rushed or bored while enabling them to develop a deeper understanding of the material. In their research, X. Li *et al.* (2022) assert that when teachers take the time to understand and address their students' individual needs, it leads to stronger teacher-student relationships. This rapport can enhance communication, trust, and overall classroom dynamics for students. Differentiated pedagogy benefits students with various learning styles, abilities, and cultural backgrounds. According to C.A. Tomlinson (2017), differentiated pedagogy particularly benefits students with learning disabilities as well as gifted students, as it offers individualised support to suit their needs. Providing various learning opportunities and challenges through differentiated instruction encourages critical thinking and problem-solving skills. Students are encouraged to think independently and apply their knowledge to real-world situations. Addressing individual learning needs early helps prevent academic gaps from widening. Furthermore, teachers help struggling students catch up to their peers by providing appropriate support and intervention.

Teachers seeking to enhance their understanding and implementation of differentiated pedagogy can explore various resources and professional development opportunities that enable them to tailor instruction to meet their students' diverse needs and learning styles. For instance, workshops, seminars, and conferences featuring expert speakers, hands-on activities, and opportunities to network with other educators who focus on differentiated instruction help teachers improve their practice (Blaz, 2023). According to D. De Neve & G. Devos (2016), professional learning communities composed of teachers interested in differentiated pedagogy provide an effective means of developing and refining differentiated practices. Additionally, many educational platforms offer online courses on differentiated instruction. These courses allow participants to learn at

their own pace and often include practical strategies and real-world examples. C. Redecker & Y. Punie (2017) state that participating in educational webinars and exploring websites providing resources, lesson plans, and methods for differentiated instruction is an effective way of gaining an understanding of and implementing differentiated pedagogy in the classroom. Similarly, K.L. Martin *et al.* (2016) emphasise that observing experienced teachers who successfully implement differentiated strategies in their classrooms and seeking guidance from a mentor or professional colleague is highly beneficial.

High academic performance serves as a powerful motivator force for learners, teachers, and parents; thus, every effort should be made to achieve this goal. Whereas the learner, as the focal point of learning, is expected to perform brilliantly, some cognitive processes may impact academic performance. In this study, the cognitive process under consideration is executive function (EF). According to E.K. Goh & H.J. Jeon (2022), executive function refers to the mental modulation of a learner's behaviour to accomplish a task. Executive function encompasses cognitive processes that allow learners to plan, supervise, regulate, organise, focus their attention, self-monitor, and coordinate their actions (Titz & Karbach, 2014; Clements *et al.*, 2016). Executive function also improves learners' critical thinking and memory retention, consequently enhancing academic achievement. According to D.H. Clements *et al.* (2016), executive function processes rapidly develop during early childhood, highlighting their importance in early education.

Although executive function positively influences learners' overall academic development, the National Research Council (2001) asserts that executive function significantly impacts mathematical proficiency. The research council identified five interwoven strands that contribute to proficiency in mathematics: conceptual understanding, strategic competence, procedural fluency, adaptive reasoning, and productive disposition (National Research Council, 2001). These strands form the foundation for learners' logical reasoning, justification, explanation, and reflection. According to X. Zhang *et al.* (2020), enhancing mathematical proficiency in early education serves as a predictor of greater achievement in later years. Similarly, evidence suggests that learners' early knowledge of mathematics strongly influences their performance in both primary and secondary education (Ten Braak *et al.*, 2022). Therefore, differentiated pedagogy plays a crucial role in improving learners' executive function to develop domain-specific problem-solving competencies.

Regarding difficulties in executive function, the environment plays a significant role. E.K. Goh & H.J. Jeon (2022) state that a low-income family environment inhibits executive function. A child's executive function development is negatively affected when the home or school environment lacks learning stimuli such as books, toys, technological tools, and other necessary resources (Yogman *et al.*, 2018). Specifically, an unfavourable psychological environment, characterised by parental conflict, domestic violence and

persistent bullying at school, can severely impair a child's executive function (Ekeh & Venketsamy, 2021). Conversely, meaningful interactions between parents and children, teachers and learners, and among peers provide essential stimuli and diverse experiences, leading to improved executive function. Notably, the home environment plays a fundamental role in shaping learners' executive function, considering the influence of responsive parenting behaviour, emotional support, and cognitive stimulation (Kim & Kwak, 2015). Furthermore, encouraging attention-oriented engagement, reducing conflict and domestic violence, eliminating aggressive behaviours that lead to depression, and fostering family cohesion contribute to the enhancement of executive function in young learners.

MATERIALS AND METHODS

The research adopted a qualitative methodology with a phenomenological design to provide a thorough exploration and understanding of the research subject. This approach was chosen to gain deeper insight into teachers' and early-grade learners' experiences, perspectives, and interactions within public primary schools in Owerri Municipal, Imo State, Nigeria. Through interviews and document analysis, the researcher sought to provide a detailed and nuanced description of how differentiated pedagogy is implemented and perceived in early-grade classrooms in these schools.

Teachers and parents of early-grade learners in Owerri Municipal public primary schools comprised the research participants. The researcher employed simple random sampling to select eight schools out of twenty-five in the area and chose one early-grade teacher from each school. Four parents were also selected randomly from the same schools, bringing the total to twelve participants. The simple random sampling technique ensured an unbiased selection of schools and participants. The researcher considered this sample size adequate as the study aimed to provide a comprehensive exploration and deeper insight into teachers' use of differentiated pedagogy in addressing learning difficulties in early grades. The study focused on early-grade educators within this school system, who formed the core research participants. Using a systematic approach, the researcher applied simple random sampling to carefully select a representative sample of schools from a larger group of twenty-five institutions within Owerri Municipal. A single early-grade teacher was chosen from each school, resulting in eight participants to align with the research's defined scope. The deliberate use of simple random sampling ensured an unbiased selection process, allowing for a diverse representation of educational contexts and teaching practices.

The researcher gathered data for this study through interviews. This method facilitated in-depth engagement with participants, making it particularly suitable for the study. The conversations were audio-recorded to ensure accurate documentation of information. Subsequently, transcribing the interview recordings into text enabled data analysis. The study employed a word cloud and an integrated

thematic analysis approach to determine the meaning of the collected data. After transcription, the researcher familiarised himself with the participants' responses, coded the data, and identified emerging themes within the dataset. A rigorous validation process was employed to ensure the reliability and credibility of the gathered data. The researcher utilised member checking and peer debriefing to enhance the trustworthiness of the data. Through peer debriefing, experts in the field were engaged to review and provide feedback on the research process and findings. This collaborative approach helped identify potential biases or oversights, strengthening the overall integrity of the study.

Additionally, member-checking was employed to validate the accuracy and authenticity of the data from the participants' perspective. Participants were given the opportunity to review and verify the researcher's interpretations of their responses. This approach helped the researcher ensure that participants' voices were accurately represented in the findings. The iterative feedback and validation process fostered a sense of collaboration and mutual respect between the researcher and the participants, further enhancing the credibility of the data. Moreover, to validate the interview questions used in the study, two experienced early childhood education specialists were consulted. These experts provided valuable insights and feedback on the relevance, clarity, and comprehensiveness of the interview questions. Their input helped refine and improve the interview protocol, ensuring it effectively captured the desired information and yielded meaningful data. By employing these validation techniques, the researcher upheld trustworthiness and credibility in the research process, contributing to the rigour and reliability of the study's findings.

The researcher diligently adhered to the ethical guidelines outlined by J.W. Creswell & C.N. Poth (2016) throughout the study, prioritising the well-being and privacy of the participants. Before the research commenced, formal approval was obtained from the Faculty of Specialised Education Research Ethics Committee at Alvan Ikoku Federal University of Education, ensuring the study met rigorous ethical standards. The study obtained informed consent from all participants, with strict adherence to ethical protocols that ensured anonymity through the pseudonymisation of all personal identifiers and maintained confidentiality using tiered data security measures. Interviews were scheduled exclusively during non-teaching periods (breaks, after-school hours) to avoid disrupting pedagogical activities, with strict adherence to the principles of voluntary participation, as outlined in the Belmont Report (1974). No financial incentives, refreshments, or compensatory measures were provided to participants, eliminating potential coercion risks and safeguarding data integrity against response bias. Written consent protocols explicitly affirmed participants' right to withdraw at any stage without academic or professional repercussions. Each participant was assigned a unique pseudonym, denoted as Teacher Participant 1 (TP 1), Teacher Participant 2 (TP 2), and so forth, up to TP 8. Similarly, Parent Participants were

coded as PP 1, PP 2, and so forth, up to PP 4. The study employed pseudonyms to refer to individual participants, safeguarding their privacy and confidentiality.

Furthermore, to protect the identities of the schools involved in the study, a similar coding system was employed. Each school was assigned a coded identifier: Sch 1, Sch 2, Sch 3, Sch 4, Sch 5, Sch 6, Sch 7, and Sch 8.

RESULTS

This study integrates empirical research, participant experiences, and critical interpretation to provide a comprehensive understanding of the implementation of differentiated pedagogy in early-grade education. The study presents four major themes that emerged from the data, supported by relevant empirical evidence and participant narratives.

Theme 1: Teachers' experiences and perspectives on implementing differentiated instruction for diverse learners

Identifying diverse learning challenges is a crucial first step in implementing differentiated instruction. The participant teachers consistently reported a range of learning difficulties among their students. As TP1 notes:

"Yes sir, I have, like some of them are slow in writing, as they are in the class together, their learning or intellectual ability are not the same, so those slow learners, you have to give them time, like when you write on the board, you have to wait for them to finish writing. Also, some of them are visually impaired, some of them have attention deficit hyperactive disorder(lack of focus)".

These observations align closely with the findings of J.S. Barrot *et al.* (2021) and J.M. Fletcher *et al.* (2007), who emphasise the prevalence and impact of learning difficulties in early education. The diversity of challenges identified by teachers, including visual impairment, slow writing, and attention deficits, reflects the complex nature of learning difficulties described in the literature.

TP3's experience further illustrates this complexity: *"Yes, I have [encountered learners with difficulty], like visual impairment, slow writing, slow reading and lack of concentration..."*. These observations correspond with G.W. Humphreys & V. Bruce's (2021) research on visual processing disorders and executive function challenges in early learners. Teachers' ability to identify these varied challenges is crucial for implementing effective differentiated instruction.

The consistency in teachers' observations across different classrooms suggests a widespread need for differentiated instruction. However, the variation in how teachers describe these challenges indicates a potential need for standardised assessment tools and professional development in identifying specific learning difficulties.

Teachers reported employing various differentiated instructional methods to address diverse learning needs. TP4 describes a multi-faceted approach:

"I emphasise on them, like yesterday I found out that some of them cannot write or read. I started teaching them how to read using syllables, like I will cut some words and tell them to complete and pronounce them, sometimes I will tell

them to write numbers and figures from 1 to 200 just to keep them busy. I also grouped them so that those that knows it will also teach them how to do it".

This approach exemplifies the principles of differentiated pedagogy outlined by A. Benjamin (2014), which emphasises adapting content, process, and product according to students' readiness, interests, and learning profiles. The use of syllable-based reading instruction and peer teaching reflects evidence-based practices in literacy development (Aftab, 2016).

TP5 describes another strategy:

"OK like those finds it difficult to write, the visually impaired, you make sure you keep them at the front sit because when they sit at the back, they will not see what is on the board. You can also use the think-pair-share method whereby in the class, you share them into groups; in each group, you have a leader or coordinator, so you give them work to do".

This approach incorporates environmental modifications and collaborative learning strategies, reflecting the multi-faceted nature of differentiated instruction as described by D.S.Y. Choi & P. Morrison (2014). While teachers implement various differentiated strategies, there appears to be a need for more systematic and evidence-based approaches. While valuable, relying primarily on seating arrangements and group work could be supplemented with targeted interventions for specific learning difficulties.

Both teachers and parents reported positive impacts from differentiated instruction. TP7 observes: *"Yes, it helps the children a lot in terms of improvement and changes. You will see the children concentrating for those that are not concentrating, and those that are not writing well will start writing well"*. This outcome corroborates the research of S. Kim & K. Kwak (2015), which found significant positive effects of differentiated instruction on student achievement. PP1's feedback further supports this: *"It has improved maximally, she's now comfortable to learn, she is now eager to do her assignment unlike before"*.

These observations reflect the potential of differentiated instruction to enhance academic performance and student engagement, as noted in the literature (Goh & Jeon, 2022). The positive feedback from both teachers and parents suggests that differentiated instruction has a meaningful impact. However, a more comprehensive long-term assessment of these impacts would be beneficial to fully evaluate the effectiveness of these strategies.

Despite the positive impacts, teachers face significant challenges in implementing differentiated instruction. TP4 describes: *"Hmm, it's not really easy, it's time-consuming, we have to put more effort and work to achieve it, and also observation for them to do the work very well and so many other things involved"*.

This echoes the findings of A.I. Gambari *et al.* (2018), who identified time constraints and increased workload as significant barriers to implementing differentiated instruction. TP2 adds:

"Ok, it consumes time because it's time we used to do it. For instance, if you are teaching mathematics, it will take

more time to teach the slow learners to understand, so you have to put more time into them to understand."

These challenges highlight the need for systemic support and resources to enable effective differentiated instruction, as emphasised by A.I. Gambari *et al.* (2018). The recurring reports of time and resource constraints across multiple teachers suggest a systemic issue that needs addressing at an institutional or policy level. Without adequate support, the full potential of differentiated instruction may not be fully realised.

Theme 2: Parent involvement and communication

The degree of parental involvement and communication between teachers and parents varies. TP8 describes their approach:

"OK, you have to invite the parents because it's teamwork between the parents and the teachers, so you invite the parents and tell them the problem the child is having in the class, then you tell the parents what to do at home to help the child improve".

This aligns with research by S. Kim & K. Kwak (2015) on the importance of home-school partnerships in supporting students with learning difficulties. PP2's experience reflects some success in this area:

"Yes, it was last session when they did open day; they called parents to interact with their class teachers and the areas where their children are having difficulties so they will know how to help them in their studies..."

While efforts are being made to involve parents, the variation in approaches and experiences suggests a need for more structured and consistent parent-teacher communication strategies. Developing standardised protocols for parental involvement could enhance the effectiveness of differentiated instruction.

Theme 3: Enhancing educational quality through teacher capacity building and inclusive practices

Teachers express appreciation for professional development opportunities. TP5 shares:

"So, like recently, I have been doing different seminars. The lecturers in the university's primary education department help teach us, so periodically, they conduct seminars and workshops for us. So with training like that, you can be equipped to assist the children when you come back..."

This aligns with research by D.S.Y. Choi & P. Morrison (2014) on the importance of ongoing professional development in enhancing teachers' ability to implement differentiated instruction effectively. While teachers value these opportunities, there appears to be a need for more targeted training specifically focused on differentiated instruction for students with executive function difficulties and visual processing challenges. Developing a comprehensive and continuous ongoing professional development programme could significantly enhance teachers' capabilities in this area.

There is growing awareness of and increasing implementation of inclusive education practices. TP2 describes their approach:

"OK, that's mainstreaming, when I teach, I will make sure they will be at the same level, the same level in the same

that I have extra time to drill the special ones and the ones with challenges, and I set a goal, questions, I give assignments and call the child privately and also with the help of the parents, we will move hand in hand to get the child".

While there is a clear commitment to inclusive practices, there appears to be a need for more structured, evidence-based approaches. Developing clearer guidelines and targeted strategies for inclusive education could enhance the effectiveness of these efforts.

Teachers use various assessment methods to gauge the effectiveness of their strategies. TP1 describes:

"I access it by evaluating the children, and I will write questions after teaching. They will answer and pass, then I will mark and do the corrections, so with their feedback, I will know those that are doing well or lagging behind".

This approach aligns with the principles of formative assessment as described by P. Dawson & R. Guare (2018), which emphasise the importance of ongoing feedback in the learning process. While teachers employ various assessment methods, there appears to be a need for more systematic and standardised assessment approaches. Developing a comprehensive framework that integrates both formative and summative assessment elements could provide more robust data on the effectiveness of differentiated instruction.

Theme 4: Educational support systems – resources and relationships in teaching and learning

Both teachers and parents identify the need for more resources to support differentiated instruction. PP3 emphasises:

"You know they say that a hungry man is an angry man; for these things now to work, there must be something to be done; in such a school now, all these materials should be made available, like blackboard, chalk, marker even the seats because there is a way a student will sit in the class he or she may not pay attention to what the teacher is teaching, the students should be comfortable where they are sitting".

This aligns with research by A.I. Gambari *et al.* (2018) on the importance of adequate resources in implementing effective differentiated instruction. The consistent identification of resource needs across multiple participants suggests a systemic issue requiring institutional or policy-level intervention. Addressing these resource gaps could significantly enhance the effectiveness of differentiated instruction.

Participants emphasised the importance of positive teacher-student relationships in facilitating learning. PP4 shares:

"Ok, initially she had some learning challenges while she was in primary one because she is the type that if you scold her, she gets withdrawn, you can ask her questions she will not answer, so the teacher at that time was much more like harsh to her so she began to be backward until I intervened in the matter and told her the temperament of the girl that if she continues this way you will lose her, I did that until she subbed and made her a friend and she started coming up"

This aligns with X. Li *et al.* (2022), who highlight the significant impact of teacher-student relationships on student engagement and achievement, particularly for

students with learning difficulties. The emphasis on positive relationships suggests the need for additional training and support for teachers in developing effective interpersonal skills and understanding diverse student needs. Integrating this aspect more explicitly into teacher training and professional development could enhance the overall effectiveness of differentiated instruction.

Personal experiences often illuminate learners' struggles with executive function difficulties and visual processing challenges. As a high school student, the author faced significant difficulties with executive function and ADHD while attending a boarding school where teachers and prefects expected uniform conformity to school activities. The rigid, one-size-fits-all approach and the absence of close student-teacher relationships meant that difficulties with task focus, organisation, and self-regulation went unnoticed, significantly impacting academic performance. It was not until a teacher took a personal interest and applied differentiated learning strategies that the author overcame these challenges. This experience underscores the transformative potential of individualised support and differentiated instruction for learners facing cognitive processing difficulties. The journey from struggling with unrecognised learning challenges to achieving academic success through targeted interventions highlights the critical importance of educator awareness and appropriate instructional adaptations. Personal narratives such as this not only illustrate the real-world impact of learning difficulties but also emphasise the potential for positive outcomes when students receive the right kind of support at the right time.

Differentiated pedagogy emerges as a promising approach to addressing the diverse learning needs and abilities of students, particularly those experiencing learning difficulties in early grades (Suprayogi & Valcke, 2016; Wan, 2016). When applied effectively, this teaching approach can promote inclusive education and ensure all learners receive the necessary support. Implementation requires teachers to employ various assessment tools to evaluate students' strengths, weaknesses, and learning styles, thereby identifying specific areas of struggle (Dawson & Guare, 2018). This study focuses on visual processing and executive function difficulties, recognising that learners with these challenges may struggle with tasks involving the recognition of shapes and letters, reading comprehension, organisation, planning, and time management. By exploring the application of differentiated pedagogy in addressing these specific learning difficulties, this research aims to contribute to more effective educational strategies for early-grade learners. The ability of differentiated pedagogy to accommodate the unique needs of each learner, particularly those with visual processing and executive function challenges, offers a pathway towards more inclusive and effective educational practices. This approach not only addresses the immediate academic needs of students but also has the potential to foster long-term learning skills and strategies that can benefit learners throughout their educational journey and beyond.

The importance of executive function in early education cannot be overstated, as it forms the foundation for critical thinking, memory skills, and overall academic development. The development of executive function skills – such as planning, monitoring, self-regulation, organisation, attention control, and coordination – (Titz & Karbach, 2014; Clements *et al.*, 2016). is particularly rapid during the early years, making it a critical focus area for early-grade education. Research has shown that executive function significantly influences mathematics proficiency (National Research Council, 2001). The five strands of mathematics proficiency – conceptual understanding, strategic competence, procedural fluency, adaptive reasoning, and productive disposition – all rely heavily on executive function skills. This underscores the importance of addressing executive function challenges early in a child's educational journey, as deficits in these areas can have far-reaching consequences across various academic domains and beyond.

Learners with visual processing difficulties may encounter numerous obstacles that adversely affect their academic performance and overall learning experience. Visual processing refers to the brain's ability to accurately interpret visual information from the environment. Issues with visual processing can hinder learners' abilities to recognise and differentiate letters, words, and symbols (Janarthanan, 2017). Learners may experience difficulties decoding words, tracking lines of text, and comprehending learning materials. Handwriting and spatial organisation skills are also affected, as these learners often struggle with letter formation, sizing, spacing, and overall legibility (Humphreys & Bruce, 2021).

Another challenge associated with visual processing difficulties is the need for learners to remember and recall visual information, such as shapes, colours, and images. This challenge hinders learners' ability to recognise familiar objects or remember details from visual learning materials. Consequently, difficulties in coordinating visual information with motor skills lead to problems with activities such as copying from the board, drawing, or completing puzzles. Furthermore, learners with visual processing difficulties struggle to sustain their attention on visual tasks, leading to problems with focus and concentration in the classroom. Visual processing issues impact learners' ability to perceive and interpret visual stimuli accurately, as demonstrated by their trouble in recognising shapes, forms, and patterns (Janarthanan, 2017).

Accordingly, they struggle to understand spatial concepts, such as directionality, left-right orientation, and spatial relationships between objects. A learners' ability to understand and follow sequential information, such as steps in a mathematical problem or directions for a science experiment, is impacted by visual difficulties (Janarthanan, 2017). Processing visual information can be overwhelming for learners with these difficulties, especially in visually busy or cluttered environments (Humphreys & Bruce, 2021). Visual processing issues significantly affect learners' performance

across various subjects that heavily rely on visual information, such as reading, mathematics, science, and art. Struggling with visual processing challenges can lead to frustration, anxiety, and a decline in self-confidence, potentially affecting students' social interactions and overall well-being.

Flexible grouping of students based on their needs and abilities is an effective approach to supporting learners with visual processing and executive function difficulties (Choi & Morrison, 2014). In their research, G. Colón *et al.* (2022) noted that forming flexible small groups or pairing where students with different abilities provide opportunities for struggling students to learn from their peers, allowing for collaborative learning and peer support. Similarly, A.I. Gambari *et al.* (2018) state that using varied instructional materials and techniques caters to different learning styles. For instance, incorporating visual aids, hands-on activities, technology tools, and manipulatives engages students and enhances accessibility. Author D. Blaz (2023) argues that this approach to learning is more accessible by offering multiple pathways for students to demonstrate their understanding, such as written assignments, oral presentations, or multimedia projects. Comparably, L.F. Skaff *et al.* (2016) argue that developing Individualised Learning Plans (ILPs) for students with specific learning difficulties is an effective strategy to support students with learning challenges. ILPs allow teachers to outline targeted goals, strategies, and accommodations tailored to students' needs. Regularly reviewing and updating these plans based on ongoing assessments and progress monitoring ensures that teachers remain informed about learner support progress (Dawson & Guare, 2018).

Scaffolding instruction for learners with learning disabilities is an essential support system for students, as teachers break down complex tasks into smaller, manageable steps. According to J.R. Boyle *et al.* (2016), teachers must provide scaffolds, such as graphic organisers, checklists, or step-by-step instructions, to guide students through learning. These supports should be gradually removed as students become more independent and confident in their abilities. S.L. Benton & S. Young (2018) highlight that providing timely and specific feedback to students helps them understand their strengths and areas for improvement while offering additional support through one-on-one or small-group interventions, which provide targeted instruction and guidance. Similarly, S. Kim & K. Kwak (2015) emphasise the importance of collaboration with parents and caregivers to gain insights into students' learning difficulties and establish a partnership that supports student progress. Sharing information about strategies used in the classroom and providing resources that parents can use to reinforce learning at home is essential. In contrast, teachers must remember that differentiated pedagogy is not a one-size-fits-all approach: it requires continuous reflection, flexibility, and adaptation to meet the evolving needs of each student (Benjamin, 2014). A comprehensive study on differentiated pedagogy for early-grade learners with executive function and visual processing challenges reveals

several critical recommendations that warrant immediate attention and implementation. These recommendations are designed to enhance the learning experience and outcomes of affected students.

Professional development and teacher training emerge as primary recommendations from this research. Educational institutions must prioritise regular, specialised training to equip teachers with the skills needed to identify and address executive function and visual processing challenges. These programmes should include mentorship opportunities, where experienced teachers can guide newer colleagues in implementing differentiated instruction strategies. Additionally, workshops focusing on the latest research-based interventions and technological tools would help ensure that teachers remain current with best practices for supporting diverse learning needs.

Resource allocation and infrastructure development constitute another crucial area for improvement. Schools must invest in appropriate learning materials and assistive technologies to support learners with visual processing challenges. Creating dedicated resource rooms equipped with specialised learning tools and ensuring adequate funding for assessment tools and intervention resources is essential. Furthermore, implementing digital learning platforms that support differentiated instruction would enhance the learning experience for students with these specific challenges. The study emphasises the importance of effective assessment and monitoring systems. Educational institutions should develop standardised screening tools for the early identification of executive function and visual processing challenges. Regular progress monitoring systems must be implemented to track student development systematically. Creating Individualised Learning Plans with specific, measurable goals for each affected student and establishing systematic documentation procedures for tracking intervention effectiveness would support more targeted and successful interventions.

Parent-teacher collaboration is a vital component of successful intervention strategies. Schools should establish regular communication channels through various platforms to keep parents informed and involved in their child's learning journey. Hosting workshops to educate parents about executive function and visual processing challenges would enable them to provide better support at home. Creating parent support groups and developing home-school partnership programmes would ensure consistency in intervention approaches and create a more supportive learning environment for affected students. The classroom environment and teaching strategies require careful consideration and modification. Teachers should implement flexible seating arrangements that accommodate visual processing needs and utilise multisensory teaching approaches to support different learning styles. Incorporating technology-enhanced learning tools that support executive function development and creating structured daily routines would help students develop essential skills while accommodating their specific needs.

This integrated analysis reveals a complex landscape of differentiated instruction implementation in early-grade education. While teachers employ various strategies and observe positive impacts, significant challenges remain regarding time constraints, resource availability, and systematic implementation. The voices of teachers and parents highlight the critical need for ongoing professional development, enhanced resources, and stronger home-school partnerships. Moving forward, there is a clear need for more structured and evidence-based approaches to differentiated instruction, particularly for learners with executive function and visual processing challenges. This should involve developing comprehensive assessment frameworks, enhancing teacher training programmes, and addressing systemic resource gaps. By integrating these elements, schools can create more effective and inclusive learning environments that truly meet the diverse needs of all students.

CONCLUSIONS

The research conclusively demonstrates that addressing executive function and visual processing challenges in early-grade education requires a multifaceted approach involving educators, parents, and educational administrators. Early identification of learning challenges is crucial, as intervention in the early stages leads to better outcomes and prevents the widening of achievement gaps. Teacher preparedness through continuous professional development significantly impacts their ability to implement effective differentiated instruction strategies and support student success. The study's findings emphasise that adequate resources, both material and human, are essential for implementing effective differentiated instruction strategies. Schools must prioritise resource allocation to support these needs effectively. Success in supporting learners with these challenges requires strong collaboration between teachers, parents, and other stakeholders in

the educational system. Moreover, the research underscores that each learner's needs are unique and require personalised intervention strategies, making a one-size-fits-all approach ineffective.

This study reveals that differentiated pedagogy effectively addresses the diverse learning needs of early-grade students. Teachers' observations and participant feedback demonstrate that adaptive instructional methods lead to improved student engagement and academic performance, particularly for learners facing challenges such as visual processing difficulties and executive function deficits. Both educators and parents highlight the positive impact of these tailored strategies, noting increased confidence and better classroom outcomes. However, the study also identifies persistent challenges, including time constraints, resource limitations, and the need for more systematic assessment tools. Overall, the findings underscore the promise of differentiated instruction while emphasising the necessity for enhanced professional development, structured support systems, and robust home-school partnerships to fully realise its benefits. Future research should focus on enhancing understanding and improving intervention strategies. These include examining the longterm effectiveness of specific intervention strategies, evaluating the impact of technology-enhanced learning tools on student outcomes, understanding the role of cultural factors in intervention effectiveness, conducting cost-benefit analyses of various intervention approaches, and developing more efficient assessment tools.

ACKNOWLEDGEMENTS

None.

CONFLICT OF INTEREST

This research received no funding from commercial, public, or non-governmental organisations; hence, it is not associated with conflicting or competing interests.

REFERENCES

- [1] Aftab, J. (2016). Teachers' beliefs about differentiated instructions in mixed-ability classrooms: A case of time limitation. *Journal of Education and Educational Development*, 2(2), 94-114. [doi: 10.22555/joeed.v2i2.441](https://doi.org/10.22555/joeed.v2i2.441).
- [2] Bahno, Y., & Serhiichuk, O. (2023). Pedagogical practice as the basis for the formation of pedagogical values of future teachers in higher education institutions. *Scientia et Societas*, 2(2), 63-72. [doi: 10.69587/ss/2.2023.63](https://doi.org/10.69587/ss/2.2023.63).
- [3] Barrot, J.S., Llenares, I.I., & Del Rosario, L.S. (2021). Students' online learning challenges during the pandemic and how they cope with them: The case of the Philippines. *Education and Information Technologies*, 26(6), 7321-7338. [doi: 10.1007/s10639-021-10589-x](https://doi.org/10.1007/s10639-021-10589-x).
- [4] Benjamin, A. (2014). *Differentiated instruction: A guide for elementary school teachers*. New York: Routledge. [doi: 10.4324/9781315854120](https://doi.org/10.4324/9781315854120).
- [5] Benton, S.L., & Young, S. (2018). *Best practices in teaching evaluation*. Stockholm: IDEA Center.
- [6] Blaz, D. (2023). *Differentiated instruction: A guide for world language teachers*. New York: Routledge. [doi: 10.4324/9781003293293-1](https://doi.org/10.4324/9781003293293-1).
- [7] Boyle, J.R., Rosen, S.M., & Forchelli, G. (2016). Exploring metacognitive strategy use during note-taking for students with learning disabilities. *International Journal of Primary, Elementary and Early Years Education*, 44(2), 161-180. [doi: 10.1080/03004279.2014.929722](https://doi.org/10.1080/03004279.2014.929722).
- [8] Choi, D.S.Y., & Morrison, P. (2014). Learning to get it right: Understanding change processes in professional development for teachers of English learners. *Professional Development in Education*, 40(3), 416-435. [doi: 10.1080/19415257.2013.806948](https://doi.org/10.1080/19415257.2013.806948).

- [9] Clements, D.H., Sarama, J., & Germeroth, C. (2016). Learning executive function and early mathematics: Directions of causal relations. *Early Childhood Research Quarterly*, 36, 79-90. doi: [10.1016/j.ecresq.2015.12.009](https://doi.org/10.1016/j.ecresq.2015.12.009).
- [10] Colón, G., Zgliczynski, T., & Maheady, L. (2022). Using flexible grouping. In L.A. Maheady & M. Lewis (Eds.), *High leverage practices for inclusive classrooms* (pp. 265-281). New York: Routledge. doi: [10.4324/9781003148609-23](https://doi.org/10.4324/9781003148609-23).
- [11] Creswell, J.W., & Poth, C.N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. Los Angeles: Sage Publications.
- [12] Dawson, P., & Guare, R. (2018). *Executive skills in children and adolescents: A practical guide to assessment and intervention*. New York: Guilford Publications.
- [13] De Neve, D., & Devos, G. (2016). How do professional learning communities aid and hamper the professional learning of beginning teachers related to differentiated instruction?. *Teachers and Teaching*, 23(3), 262-283. doi: [10.1080/13540602.2016.1206524](https://doi.org/10.1080/13540602.2016.1206524).
- [14] Ekeh, M.C., & Venketsamy, R. (2021). Ensuring child-friendly learning environments in Nigerian Early Childhood Centers. In M.G. Forero (Ed.), *The education systems of Africa* (pp. 677-703). Cham: Springer. doi: [10.1007/978-3-030-44217-0_37](https://doi.org/10.1007/978-3-030-44217-0_37).
- [15] Fletcher, J.M., Lyon, G.R., Fuchs, L.S., & Barnes, M.A. (2007). *Learning disabilities: From identification to intervention*. New York: Guilford Publications. doi: [10.1177/1087054707305354](https://doi.org/10.1177/1087054707305354).
- [16] Gambari, A.I., Shittu, A.T., Ogunlade, O.O., & Osunlade, O.R. (2018). [Effectiveness of blended learning and e-learning modes of instruction on the performance of undergraduates in Kwara State, Nigeria](https://doi.org/10.1177/1087054707305354). *MOJES: Malaysian Online Journal of Educational Sciences*, 5(1), 25-36.
- [17] Goh, E.K., & Jeon, H.J. (2022). Application of a Bayesian network learning model to predict longitudinal trajectories of executive function difficulties in elementary school students. *Journal of Intelligence*, 10(4), article number 74. doi: [10.1016/j.ecresq.2015.12.009](https://doi.org/10.1016/j.ecresq.2015.12.009).
- [18] Humphreys, G.W., & Bruce, V. (2021). *Visual cognition: Computational, experimental and neuropsychological perspectives*. London: Psychology Press. doi: [10.4324/9781315785141](https://doi.org/10.4324/9781315785141).
- [19] Janarthanan, S.D. (2017). Visual processing disorder in children. *Ophthalmology Open Journal*, 2(2), 45-47. doi: [10.17140/oj-2-113](https://doi.org/10.17140/oj-2-113).
- [20] Kim, S., & Kwak, K. (2015). Exploring the effects on intelligence development at seven years of age: On the home environments and child development at three years. *The Korean Journal of Human Development*, 22(2), 75-91. doi: [10.15284/kjhd.2015.22.2.75](https://doi.org/10.15284/kjhd.2015.22.2.75).
- [21] Kotob, M.M., & Abadi, M.A. (2019). The influence of differentiated instruction on academic achievement of students in mixed ability classrooms. *International Linguistics Research*, 2(2), 8-28. doi: [10.30560/ilr.v2n2p8](https://doi.org/10.30560/ilr.v2n2p8).
- [22] Li, X., Bergin, C., & Olsen, A.A. (2022). Positive teacher-student relationships may lead to better teaching. *Learning and Instruction*, 80, article number 101581. doi: [10.1016/j.learninstruc.2022.101581](https://doi.org/10.1016/j.learninstruc.2022.101581).
- [23] Martin, K.L., Buelow, S.M., & Hoffman, J.T. (2016). New teacher induction: Support that impacts beginning middle-level educators. *Middle School Journal*, 47(1), 4-12. doi: [10.1080/00940771.2016.1059725](https://doi.org/10.1080/00940771.2016.1059725).
- [24] National Research Council. (2001). *Adding it up: Helping children learn mathematics*. Washington: National Academy Press. doi: [10.17226/9822](https://doi.org/10.17226/9822).
- [25] Prior, M. (2022). *Understanding specific learning difficulties*. London: Psychology Press. doi: [10.4324/9781315784816](https://doi.org/10.4324/9781315784816).
- [26] Redecker, C., & Punie, Y. (2017). Digital competence of educators. In *11th International conference on computer supported education* (pp. 541-548). Luxembourg: Publications Office of the European Union. doi: [10.5220/0007679005410548](https://doi.org/10.5220/0007679005410548).
- [27] Skaff, L.F., Kemp, J.N., Sternesky McGovern, L.A., & Fantacone, J.M. (2016). Educator and parent views of the effectiveness of individualized learning plans for students with disabilities. *Career Development and Transition for Exceptional Individuals*, 39(2), 68-78. doi: [10.1177/2165143414546131](https://doi.org/10.1177/2165143414546131).
- [28] Snowling, M.J., Hulme, C., & Nation, K. (2020). Defining and understanding dyslexia: Past, present and future. *Oxford Review of Education*, 46(4), 501-513. doi: [10.1080/03054985.2020.1765756](https://doi.org/10.1080/03054985.2020.1765756).
- [29] Suprayogi, M.N., & Valcke, M. (2016). Differentiated instruction in primary schools: Implementation and challenges in Indonesia. *Ponte Journal*, 72(6), 2-18. doi: [10.21506/j.ponte.2016.6.1](https://doi.org/10.21506/j.ponte.2016.6.1).
- [30] Ten Braak, D., Lenes, R., Purpura, D.J., Schmitt, S.A., & Størksen, I. (2022). Why do early mathematics skills predict later mathematics and reading achievement? The role of executive function. *Journal of Experimental Child Psychology*, 214, article number 105306. doi: [10.1016/j.jecp.2021.105306](https://doi.org/10.1016/j.jecp.2021.105306).
- [31] The Belmont Report. (1974). Retrieved from <https://www.hhs.gov/ohrp/regulations-and-policy/belmont-report/index.html>.
- [32] Titz, C., & Karbach, J. (2014). Working memory and executive functions: Effects of training on academic achievement. *Psychological Research*, 78, 852-868. doi: [10.1007/s00426-013-0537-1](https://doi.org/10.1007/s00426-013-0537-1).
- [33] Tomlinson, C.A. (2017). Differentiated instruction. In T. Balchin, S. Hymer & D.J. Matthews (Eds.), *Fundamentals of gifted education* (pp. 279-292). New York: Routledge. doi: [10.4324/9781315639987-26](https://doi.org/10.4324/9781315639987-26).

- [34] Wan, S.W.Y. (2016). Differentiated instruction: Hong Kong prospective teachers' teaching efficacy and beliefs. *Teachers and Teaching*, 22(2), 148-176. doi: [10.1080/13540602.2015.1055435](https://doi.org/10.1080/13540602.2015.1055435).
- [35] Yogman, M., et al. (2018). The power of play: A pediatric role in enhancing development in young children. *Pediatrics*, 142(3), article number e20173616. doi: [10.1542/peds.2018-2058](https://doi.org/10.1542/peds.2018-2058).
- [36] Zhang, X., Räsänen, P., Koponen, T., Aunola, K., Lerkkanen, M.K., & Nurmi, J.E. (2020). Early cognitive precursors of children's mathematics learning disability and persistent low achievement: A 5-year longitudinal study. *Child Development*, 91(1), 7-27. doi: [10.1111/cdev.13123](https://doi.org/10.1111/cdev.13123).
- [37] Zulkifli, N., Novianti, R., & Garzia, M. (2021). The role of preschool in using gadgets for the digital natives generation. *Jurnal Pendidikan Usia Dini*, 15(2), 221-238. doi: [10.21009/jpud.152.02](https://doi.org/10.21009/jpud.152.02).

Мартін Чуквуді Екех

Кандидат наук у галузі дошкільної освіти, старший науковий співробітник
постдокторантури Йоганнесбурзький університет
2019, 157 вул. Бейт, м. Йоганнесбург, Південна Африка
<https://orcid.org/0000-0001-7799-9885>

Диференційована педагогіка для учнів молодших класів з проблемами виконавчої функції та візуальної обробки інформації

Анотація. Це дослідження є актуальним, оскільки воно покращує когнітивні навички, життєво важливі в суспільстві, керованому технологіями, і сприяє рівноправному навчанню, вирішуючи проблеми виконавчої функції та зорового сприйняття. Таким чином, дослідження мало на меті запропонувати різні педагогічні підходи для пом'якшення труднощів у навчанні молодих учнів з проблемами виконавчої функції та зорової обробки. Застосовуючи якісний метод дослідження, за допомогою простої випадкової вибірки з дванадцяти учасників (вісім вчителів і чотири батьки) з восьми державних початкових шкіл було вивчено досвід вчителів і сприйняття батьками досліджуваного явища. Для збору даних використовувалося напівструктуроване інтерв'ю. Результати показали, що, хоча вчителі застосовують різні диференційовані стратегії, включаючи гнучке групування та мультисенсорні підходи, вони стикаються зі значними проблемами, такими як брак часу, обмеженість ресурсів та недостатня спеціалізована підготовка. Дослідження підкреслило важливість позитивних стосунків між вчителями та учнями, а також співпраці між батьками та вчителями для успішного впровадження диференційованого навчання. Вчителі початкових класів, які впроваджували структуровані інтервенції та індивідуалізовані підходи до навчання, повідомили про покращення залучення учнів та їхньої академічної успішності. Дослідження сприяє розумінню того, як диференційована педагогіка може ефективно підтримувати учнів початкових класів з особливими навчальними проблемами. Рекомендовано вдосконалювати програми професійного розвитку, покращувати розподіл ресурсів, структурувати системи оцінювання та зміцнювати партнерство між батьками та вчителями. Встановлено, що диференційоване навчання підвищує академічну успішність, розвиваючи в учнів навички саморегуляції та впевненість у виконанні завдань. Пріоритетність інклюзивних практик та підвищення кваліфікації вчителів з боку керівництва шкіл виявилися ключовими інституційними факторами, що сприяють цьому. Цей підхід сприяє досягненню ЦСР 4, зменшуючи нерівність у навчанні в ранній освіті за допомогою педагогічно чутливих рамок. Результати дослідження суттєво впливають на освітню політику, підготовку вчителів та практику роботи в класі, спрямовану на підтримку різноманітних навчальних потреб у початковій освіті

Ключові слова: виконавча функція; візуальна обробка інформації; учні молодших класів; труднощі у навчанні; розвиток вчителів

UDC 373.3

DOI: 10.52534/msu-pp1.2025.71

Halyna Kobernyk*

PhD in Pedagogical Sciences, Professor

Pavlo Tychyna Uman State Pedagogical University

20300, 2 Sadova Str., Uman, Ukraine

<https://orcid.org/0000-0001-9340-1707>

Innovative approaches to the formation of mathematical competence of future primary school teachers

Article's History:

Received: 15.10.2024

Revised: 25.02.2025

Accepted: 26.03.2025

Suggested Citation:

Kobernyk, H. (2025). Innovative approaches to the formation of mathematical competence of future primary school teachers. *Scientific Bulletin of Mukachevo State University. Series "Pedagogy and Psychology"*, 11(1), 71-81. doi: 10.52534/msu-pp1.2025.71.

Abstract. The purpose of the study was to investigate the impact of interactive methods, digital technologies and an interdisciplinary approach on the formation of students' mathematical competence and the effectiveness of knowledge acquisition. The methodology included comparative analysis, pedagogical experiment, analysis of strengths and weaknesses, opportunities and threats, and identification of innovative approaches to the formation of mathematical competence of higher education students in the Primary Education programme. The results of the study showed that keeping progress diaries promotes self-reflection of students, improves their ability to plan the learning process and increases motivation. Students' self-assessment confirmed the growth of confidence in their knowledge and skills, as well as the development of independence. Improvements were found in planning their own learning and setting realistic goals using new approaches. This indicated an increase in their learning motivation and active participation in the educational process. Innovative teaching methods, such as problem-based learning, modelling, interactive technologies and gamification, have improved the understanding of mathematical concepts. Comparative analysis showed a higher level of success in the experimental group – the average score of test tasks increased by 23%. The diaries helped students to understand their own learning progress, which increased their motivation and engagement. The use of digital tools, such as GeoGebra and Desmos, improved the visualisation of mathematical processes. The main challenges were adaptation to new learning formats and the need for teacher training. The findings can be used to improve methodological approaches to teaching mathematics in higher education and to develop recommendations for the introduction of innovative technologies in the educational process

Keywords: educational process; gamification; critical thinking; latest methods; individual needs

*Corresponding author

INTRODUCTION

Developing students' mathematical competence requires the implementation of effective teaching approaches that consider their individual needs and future professional activities. The use of adaptive online platforms, integration of project work and modelling of real-life situations contribute to the understanding of mathematical concepts and the development of analytical thinking. In addition, the combination of mathematical disciplines with other fields of knowledge helps students to see the practical value of the skills they have acquired.

The relevance of the study is due to the reform of educational standards, which involve the development of not only subject knowledge but also the ability to apply mathematical models in practical situations. In particular, European and international educational trends emphasise the importance of developing critical thinking, mathematical literacy and an interdisciplinary approach to learning. The emphasis on interactive methods, such as team tasks, case discussions and digital simulations, increases motivation to learn and develops the ability to solve complex



problems. Such approaches contribute not only to the successful learning of the material, but also to preparing students for future professional challenges, where mathematical competence plays an important role (Hetmanenko, 2024).

The issue of forming and developing the mathematical competence of students and teachers with the help of new technologies has been studied by a number of researchers, in particular, J. Piñero Charlo *et al.* (2022) found that the process of algorithmisation significantly influenced the formation of mathematical competence of students who studied *Algoritmos Basados en Números* and Counting-Based Calculation using game technologies. The study showed that students who were taught using the *Algoritmos Basados en Números* methodology showed better results in arithmetic operations and understanding of numerical relationships compared to students who used the traditional Counting-Based Calculation approach. The study by P. Frejd & P. Vos (2022) analysed innovations in the assessment and development of mathematical modelling. They found that new approaches can help improve competences in mathematical modelling. The main findings relate to teaching methods, assessment, and the importance of understanding context when teaching modelling. T. Zaporozhchenko *et al.* (2022) examined ways to improve the mathematical competence of future primary school teachers in Ukraine. They concluded that the use of innovative methods, in particular the integration of STEM education and problem-based learning, contributes to improving the level of students' training. In addition, they emphasised the need to expand the practical component in the educational process, which allows future teachers to better understand how to effectively teach mathematics to younger students. O. Onoprienko & S. Skvortsova (2024) analysed the educational programme "Methodology of Forming Mathematical Competence of Primary School Students", considering it as a resource for teachers' professional development. They found that the programme helps to improve teachers' methodological skills, allowing them to more effectively develop students' mathematical competence. The authors noted that the introduction of the programme into the teacher training system has a positive impact on teachers' readiness to use active methods of teaching mathematics.

A. Kolomiiets *et al.* (2023) focused on improving the cognitive component of mathematical competence of students of technical specialties. They concluded that the use of practice-oriented methods and digital technologies significantly improves the quality of mathematical training. The authors emphasised the success of integrating problem-based learning and modelling of real technical processes into the curriculum, which contributes to improving students' mathematical literacy. M. Kandemir & N. Eryilmaz (2025) found that mathematical modelling with the help of digital tools not only improves the quality of learning but also stimulates students' interest. The authors proved that the integration of technology into the educational process contributes to the development of analytical thinking and the ability of students to apply the acquired knowledge

in practical tasks. Y. Wulandari *et al.* (2024) found that future mathematics teachers demonstrated different levels of mathematical literacy in graph theory, with the most difficult tasks requiring abstract thinking and applying concepts in new contexts. The authors highlighted that it is necessary to strengthen teaching methods focused on the development of logical analysis and solving non-standard problems. L. Zhang *et al.* (2025) conducted a systematic review of interventions in mathematics education aimed at supporting and assessing the process of formulating mathematical problems. They found that the most effective approaches were those that combined guided learning with independent research, as they promoted the development of students' creative thinking and mathematical skills.

The main aspects of students' mathematical training in the context of their professional self-realisation were studied by M. Astafieva *et al.* (2020). They found that combining traditional methods with modern digital resources significantly improves the learning process. The authors emphasised the need to expand the use of interactive technologies in teaching to develop critical thinking and adapt students to real professional challenges. M. Munaji *et al.* (2025) analysed flexibility in teaching mathematics in interactive classrooms and found that the effectiveness of this approach depended largely on the role of teachers in creating a dynamic learning environment. They found that flexibility facilitated the adaptation of teaching methods to individual student needs, which improved understanding of mathematical concepts. B. Williner (2024) investigated the impact of tasks using GeoGebra software on the development of mathematical competence. The author found that the use of this resource allows students to better understand mathematical relationships, improves their motivation to learn, and contributes to more effective mathematical problem-solving. Despite a considerable amount of research, the influence of individual cognitive styles of students on the effectiveness of using information technology in mathematics teaching remains insufficiently studied.

The aim of the study was to investigate different methods that influence the formation of mathematical competence in future primary school teachers through the introduction of interactive approaches, digital technologies and interdisciplinary learning. Objectives of the study were:

- to analyse innovative methods of forming mathematical competence in higher education students majoring in Primary Education;
- to compare the effectiveness of the methods used in the formation of mathematical competence of the study participants;
- to identify factors that facilitate or hinder the effective application of innovative approaches in the educational process.

MATERIALS AND METHODS

The pedagogical experiment, which was conducted at Pavlo Tychyna Uman State Pedagogical University, involved 50 students majoring in Primary Education, who were

divided into two groups: control (25 students) and experimental (25 students). The control group consisted of 5 boys and 20 girls, and the experimental group consisted of 5 boys and 20 girls. The age of the participants ranged from 18 to 22 years. The experiment lasted from September 2023 to May 2024. Students were selected to participate in the experiment based on their level of mathematical competence and digital skills. The level of mathematical knowledge was assessed through pre-testing, which allowed to identify students with the appropriate level of training for each group. Students were randomly assigned to the control and experimental groups. All ethical standards were met during the study. Students voluntarily participated in the study and received full information about its objectives, methods and possible consequences. Data confidentiality was ensured, and none of the participants' personal information was disclosed without their permission. The study also received ethical approval from the Pavlo Tychyna Uman State Pedagogical University's Ethics Committee, which confirmed that all procedures met ethical requirements and standards for scientific research.

The group of teachers who assessed the students' results consisted of 2 women. All teachers had higher qualifications and more than 5 years of experience in teaching mathematics, with PhD degrees. They participated in the assessment of students' results and actively adjusted teaching approaches. Standardised test tasks developed on the basis of the curriculum were used to determine the initial level of students before the experiment. Written tests with open and closed questions, as well as matching and short answer tasks were used to measure the level of knowledge (for example, the geometry task included calculating the area of a triangle with sides of 6 cm, 8 cm and 10 cm, where the correct answer was 24 cm²; in the section "Elements of Mathematical Logic", students had to determine the number of ways to arrange 5 different books on a shelf. The correct answer was 120. After group assignment and pre-testing, teaching was carried out according to innovative approaches for the experimental group and traditional methods for the control group. The assessment of mathematical tasks was carried out by the number of correct answers to test tasks, as well as by the level of participation and involvement of students in the learning process. The specific criteria were as follows:

- 5 points – the student successfully completed the task with a high level of accuracy and confidence, actively participated in the class, and demonstrated a positive attitude towards the methods used;
- 3 points – the student performed the task with some mistakes, the level of his/her involvement in the learning process was average, motivation, and performance varied;
- 1 point – the student had significant difficulties in solving problems, showed a low level of participation and motivation, and failed to complete assignments.

Forms of work included lectures, seminars, practical classes, group projects, and independent work in mathematics in accordance with the educational and professional

programme "Primary Education". The control group was taught using traditional methods, with an emphasis on explaining the material by the teacher, while the experimental group was introduced to digital technologies, problem-based learning, and an interdisciplinary approach. Problem-based learning for students in the experimental group included working on open-ended mathematical problems. Using the project method, these students conducted research based on real statistical data, creating analytical reports and presentations. Interactive digital technologies included GeoGebra, Desmos, and Moodle for process visualisation and self-testing. Modelling and simulations helped analyse economic and physical processes, while gamification in the form of mathematical quests and quizzes enhanced learning. The data obtained allowed to evaluate the effectiveness of the methods and compare the results of the experimental and control groups.

The students kept diaries, recording: self-assessment of performance (level of understanding of the material, complexity of tasks, individual progress), comparison of the results of exercises (analysis of changes at each stage of learning) and feedback from teachers (recommendations, correction of errors, comments). Content analysis was used to analyse the diaries, i.e., the students' entries were coded into main categories (e.g., "improved understanding", "difficulties", "need for additional explanations") and then evaluated qualitatively and quantitatively.

After the experiment, students' performance was assessed by means of repeated tests, quizzes, analysis of practical problem-solving and oral responses. Teachers compared the average score in the two groups, analysed the quality of problem-solving, the level of independence and the ability to apply mathematical knowledge in practical situations. To compare the results of the experimental and control groups, the student's t-test for independent samples was used, as the data under study had a normal distribution. The statistical error was considered significant at the level of $p < 0.05$, which allowed to assess the reliability of changes in the level of students' mathematical competence.

For the analysis, several innovative methods of forming the mathematical competence of future primary school teachers were selected: problem-based learning, project-based learning, digital technologies, modelling, and gamification. The ratings were provided by teachers on a 5-point scale, where: 5 – very high level, 4 – high, 3 – medium, 2 – low, 1 – very low. The methods were evaluated according to the following criteria: analytical thinking (test results with comparison of alternative solutions, where 5 is all completed tasks), applicability in real life (success in completing practical tasks that simulated real problems, where 5 is all solved problems), efficiency (5 is providing logical justifications for all tasks), motivation (5 – providing detailed answers in class, attending all classes), independence (5 – all tasks completed without the help of a teacher), interactivity (5 – high level of engagement through digital tools, group projects, simulations). The comparative analysis allowed to identify the most effective methods for

developing mathematical competence in future primary school teachers, taking into account these criteria. A SWOT analysis of the innovative forms of work of the experimental group was conducted, which allowed to assess the factors that contributed to better student results and effective formation of mathematical competence.

RESULTS

Before the experiment began, an initial test was conducted to assess the participants' level of competence in key mathematical knowledge. Analysis of the data helped to establish the baseline and identify potential areas for improvement (Table 1).

Table 1. Pre-experimental testing results for both groups

Categories	Points	Before the experiment begins	
		Control group	Experimental group
Algebra	1	33%	28%
	3	47%	47%
	5	20%	25%
Functions and graphs	1	40%	34%
	3	43%	44%
	5	17%	22%
Geometry	1	27%	22%
	3	50%	50%
	5	23%	28%
Logical thinking and combinatorics	1	23%	19%
	3	53%	53%
	5	24%	28%
Applied problems	1	30%	25%
	3	50%	50%
	5	20%	25%

Note: percentages are the number of students in the corresponding category

Source: compiled by the author

The forms of work during the experiment included lectures, seminars, practical classes, group projects, and independent work. The control group used traditional approaches that focused on explaining the material by the teacher, taking notes, and reproducing tasks. The main emphasis was placed on the mechanical learning of algorithms and solving standard problems according to a model, which helped to develop skills but did not always stimulate a deeper understanding of mathematical concepts.

The implementation of teaching methods in the experimental group was based on modern pedagogical approaches aimed at improving students' mathematical competence. The main criteria for choosing methods were their effectiveness in developing analytical thinking, practical orientation and motivation to learn. One of the key approaches was the integration of digital technologies into the learning process. The use of mathematical simulators allowed students to visualise functions, geometric structures and analyse graphical dependencies, which increased their understanding of mathematical concepts (Sirakov, 2022; Kulimova, 2024). The use of interactive tests in Google Forms provided prompt feedback, which facilitated the correction of knowledge and independent work. The use of the Moodle online platform allowed for distance learning by providing access to learning materials, tests, and discussions. In addition, the introduction of an interdisciplinary approach allowed for the integration of mathematical knowledge with other disciplines, such as physics, economics, and computer science. For instance, when studying the

topic "Linear Equations", students modelled financial processes, analysed economic indicators and predicted changes in exchange rates, which demonstrated the practical importance of mathematical methods in professional activities.

The project-based learning method also played an important role in developing mathematical competence. Students worked in groups to develop their own mini-research, create presentations and demonstrate the application of mathematical principles. For example, as part of the Functions and Graphs topic, students analysed statistical data on demographic changes in different countries, identified trends and made predictions based on the results. This contributed to the development of teamwork skills, analytical thinking and effective communication. To increase student motivation, gamification elements were introduced into the learning process. The use of mathematical quests, contests, interactive quizzes and competitions made learning more interesting and dynamic (Neugebauer *et al.*, 2023). For example, students competed in the speed of solving problems, participated in mathematical marathons and collective logic games, which stimulated interest in the subject and contributed to better learning.

The analysis of the students' progress diaries of both groups allowed to assess not only the level of learning, but also motivation, independence in learning, reflective skills and the effectiveness of the methods used. In the control group, where traditional teaching methods (lectures, standardised exercises, testing) were used, students generally demonstrated passivity in the learning process.

It was recorded that 68% of students reported difficulties in memorising problem-solving algorithms without a deep understanding of their application, and only 32% noticed improvements in solving mathematical problems during the course. In addition, 47% of students reported problems with applying the formulas they had learnt in new or unusual situations. In terms of motivation, 55% of students perceived the learning process as monotonous, and 61% completed assignments mainly to get a grade rather than to learn the material. Only 28% enjoyed solving mathematical problems. An analysis of students' reflections showed that only 25% tried to analyse their own mistakes, while 40% noted the need to repeat the material multiple times because of its rapid forgetting. Teachers noted that the control group's diary entries were mostly descriptive, without an in-depth analysis of their own achievements or difficulties. At the same time, students in the experimental group, who studied using problem-based learning, the project method, interactive digital technologies, modelling, and gamification, demonstrated much more active engagement in the learning process. For example, 84% of students said that the use of new methods helped them better understand mathematical concepts and make it easier to apply knowledge in practical situations, and 79% reported a significant improvement in their ability to analyse complex mathematical problems and look for alternative solutions. Overall, 88% of students reported significant progress in their understanding and application of mathematical concepts over the course of the course. In terms of motivation, 82% of students said that the new methods made learning more

interesting and interactive, and 76% reported an increase in intrinsic motivation due to the ability to find solutions on their own through simulations and digital platforms. In addition, 91% of students enjoyed group discussions and explaining the material to their classmates, which improved their understanding of the topic. In the area of reflection, 91% of students actively analysed their progress, comparing the results at the beginning and end of each stage of learning, and 76% described their own mistakes in detail, formulating strategies to avoid them in the future. Teachers noted that students in the experimental group showed a deeper analysis of their own achievements and difficulties, and used self-reflection and critical thinking more often.

A comparative analysis of the results of the control and experimental groups revealed significant differences. While the control group mostly perceived learning as an obligation, the experimental group showed a much higher interest in the subject (82% vs. 55%). Only 25% of students in the control group analysed their own mistakes, while in the experimental group this figure reached 76%. Students in the experimental group also showed a higher level of independence in learning, actively using digital tools, simulations, and group methods to find solutions on their own. The data obtained confirmed the effectiveness of innovative teaching methods, especially in terms of developing analytical thinking, reflection and independent work of students. The results of the repeated testing indicate that the use of such pedagogical technologies has significantly increased the effectiveness of learning and contributed to the formation of a deeper understanding of mathematical concepts (Table 2)

Table 2. Post-experimental testing results for both groups

Categories	Points	At the end of the experiment	
		Control group	Experimental group
Algebra	1	20%	6%
	3	50%	31%
	5	30%	63%
Functions and graphs	1	27%	3%
	3	50%	28%
	5	23%	69%
Geometry	1	20%	9%
	3	53%	31%
	5	27%	60%
Logical thinking and combinatorics	1	17%	6%
	3	57%	34%
	5	26%	60%
Applied problems	1	23%	6%
	3	53%	31%
	5	24%	63%

Note: percentages are the number of students in the corresponding category

Source: compiled by the author

A comparative analysis of the results before and after the experiment showed that the traditional teaching methods used in the control group, although they contributed to a certain improvement in students' knowledge, this progress was not as pronounced as in the case

of interactive teaching methods. In the control group, the improvement in mathematical knowledge was moderate. The analysis of the results showed that the number of students with a low level of mathematical knowledge decreased by 7-13%, depending on the category of tasks. At

the same time, the proportion of students who achieved a high level of proficiency increased by an average of only 5-10%. These results indicate that traditional teaching methods, while having some positive impact, are not always able to provide a deep understanding of the material, especially when it comes to complex mathematical topics. The smallest improvements were recorded in the categories of Functions and Graphs and Applied Problems. This may be due to the fact that in order to master these topics effectively, students need not only to memorise theoretical material, but also to develop skills in its practical application, which requires the use of more interactive teaching methods. In contrast, the experimental group showed a significant increase in the level of mathematical competence. The test results show that the number of students with high results increased by 35-45% in all assessment categories. This was a strong proof of the effectiveness of the methods used, such as problem-based learning, modelling, and the integration of digital technologies. The progress was particularly pronounced in the categories of Functions and Graphs (+47%) and Applied Problems (+38%). Such a significant increase indicated that the use of visual models, interactive digital tools and real-life practical tasks contributed to a better understanding of the material. Digital technologies allowed students to simulate functions in a virtual environment, observe changes in parameters in real time, and analyse

the results, which greatly facilitates the understanding of complex mathematical concepts.

Another important aspect is the reduction in the number of students with low levels of mathematical skills in the experimental group. For example, in the category "Functions and Graphs" this figure decreased from 34% to 3%, and in the category "Applied Problems" – from 25% to 6%. This indicates that the teaching methods used not only contributed to the development of strong students, but also provided support for those who had initial difficulties with mathematics. It is important to note that the innovative methods helped students with low levels of preparation to overcome the main barriers to learning mathematics by making the material more accessible and understandable. In addition, the results confirm the importance of developing logical thinking and combinatorics. In the experimental group, the proportion of students with a high level in this category increased from 28% to 60%. This indicates the effectiveness of gamification, interactive tasks and problem-based learning in the development of analytical skills. The use of gaming elements in the learning process allowed students to learn the material better, as such teaching methods stimulate active thinking, promote the development of a strategic approach to problem-solving and increase the level of cognitive flexibility. The effectiveness of the above-mentioned teaching methods was then determined by five key criteria, as shown in Table 3.

Table 3. Analysis of the effectiveness of innovative teaching methods

Teaching methods	Analytical thinking	Applicability in real-world conditions	Student motivation	Independence	Interactivity
Problem-based learning	4.5	4.7	3.5	4.6	3.8
Project method	4.6	4.8	4.5	4.7	3.9
Interactive digital technologies	3.5	3.7	4.6	3.6	4.8
Modelling and simulations	3.6	4.8	4.6	3.7	4.7
Gamification	2.8	3.5	4.7	2.5	4.7

Note: ratings are given on a 5-point scale, where: 5 – very high level, 4 – high, 3 – average, 2 – low, 1 – very low

Source: compiled by the author

Problem-based learning and the project method had the highest rates of analytical thinking development. This is because these approaches are focused on solving complex problems that require in-depth analysis, critical thinking, and information synthesis. Participants in the learning process must find ways to solve problems on their own, which helps to develop logic and argumentation. Instead, gamification demonstrated the lowest level of analytical thinking. This is due to the fact that it focuses more on motivation and engagement rather than in-depth analysis. Game mechanics often use simpler tasks, which reduces the level of cognitive load.

Gamification had the highest motivation scores. This is because the use of game elements, such as points, ratings, rewards, and interactive scenarios, increases students' interest and engagement. Students often perceive learning through game-based mechanisms as less stressful

and more attractive. The project-based method and simulation also had a high level of motivation, as students see clear results of their work. In contrast, problem-based learning has an average level of motivation, as solving complex problems can cause cognitive load, which is not always attractive to all students.

An important aspect is that, although the motivational indicators differ, each approach also affects the level of student autonomy. Problem-based learning and the project method greatly contribute to the development of independence, as students must research a problem, formulate questions, analyse information, and propose solutions on their own. Gamification, on the other hand, has a low level of autonomy development, as most gamified learning platforms provide structured, directed interaction that does not always require deep independent analysis. But the highest level of interactivity is observed

in gamification and interactive digital technologies. This is due to the use of visualisation, interactive simulations, game scenarios and multimedia elements, which allows students to actively interact with the material. In addition, problem-based learning and the project method have an average level of interactivity, as they are based more on group work and discussions than on interactive technologies.

After analysing students' progress diaries, testing, and comparing the results of the control and experimental groups, a SWOT analysis of innovative methods of developing mathematical competence was conducted. This made it possible to identify the main advantages and disadvan-

tages of each approach, as well as to assess their impact on the level of student learning. The analysis helped to identify the factors that contributed to the improvement of learning outcomes and the possible risks associated with the introduction of new methods. Particular attention was paid to the effectiveness of digital technologies, problem-based learning, project-based learning, modelling, and gamification. This made it possible to draw conclusions about the feasibility of further use of these methods in pedagogical practice and to identify the best strategies for their implementation. Table 4 below presents the results of the SWOT analysis of the innovative teaching methods used in the experimental group.

Table 4. SWOT-analysis of the applied innovative methods of mathematical competence formation

Methods	Strengths	Weaknesses	Opportunities	Threats
Problem-based learning	Development of critical thinking and analytical skills	Requires more time to prepare and conduct classes	Development of independent research skills	There may be a lack of sufficient support from teachers
	Increase motivation to learn	Can be difficult for students with insufficient background knowledge	Adaptation to real professional situations	It is difficult to assess the individual contribution of a student in group work
	Improving teamwork skills			
Project method	Stimulate students' creativity and independence	High workload for teachers in the assessment process	Improving interdisciplinary learning	Possible difficulties in accessing the necessary resources
	Practical tasks increase engagement	Some students may take a passive role in team projects	Development of time and resource management skills	Lack of standard criteria for evaluating project results
	Enhances the integration of mathematical knowledge across disciplines			
Interactive digital technologies	Visualisation of complex mathematical concepts	High technical requirements (appropriate software is required)	Distance learning and individualisation of the process	Dependence on technical infrastructure
	Increasing student engagement through multimedia resources	Not all students have sufficient digital competence	Use of artificial intelligence for adaptive learning	Possible difficulties in integrating new technologies into the traditional educational process
	Flexibility in learning (access to materials online)			
Modelling and simulations	Allows visually exploring complex mathematical processes	High level of difficulty for beginners	Integration with other disciplines (physics, engineering, economics)	High cost of developing high-quality simulations
	Increase the accuracy and understanding of the application of mathematical models	Not all aspects of mathematics can be modelled effectively		Possible overload of students with complex models
	Develop skills in solving practical problems			
Gamification	Increase student motivation and engagement	A limited number of topics are suitable for the game format	Use of gaming platforms for independent learning	Possible reduction in the seriousness of the perception of educational material
	Promotes better learning through a playful approach	May distract students from the main material	Increasing interest in learning through game elements	Requires considerable effort to develop high-quality educational games
	Develops competitive spirit and self-control			

Source: compiled by the author

The conducted SWOT-analysis allowed evaluating the effectiveness of various innovative methods of forming mathematical competence among students of the experimental group. It was found that the most effective approaches were interactive digital technologies and modelling

and simulation. They have significantly improved students' understanding of complex mathematical concepts by visualising processes that remain abstract in traditional teaching settings. At the same time, the use of digital tools provided individualised learning and the opportunity to work

independently on the material, which had a positive impact on academic performance. Gamification has demonstrated a significant motivational effect, increasing student engagement in the learning process. However, its effectiveness was selective, as not all mathematical topics can be effectively adapted to game formats. Another important factor was the need to carefully select game mechanics so that they did not distract students from the main content of the material.

Problem-based learning and project-based learning methods ensured the development of critical thinking, analytical skills, and an interdisciplinary approach to problem-solving. They contributed to the active involvement of students in the learning process and increased their independence in learning mathematics. However, their implementation required significant time and organisational resources from both teachers and students. One of the challenges was assessing the contribution of each participant to the collective activity, which sometimes made it difficult to objectively determine the level of learning. Among the main risks of implementing innovative teaching methods was the dependence on technical infrastructure, which is critical for interactive digital technologies and modelling. In addition, some students had insufficient training to work with new learning formats, which could complicate the adaptation process. An important condition for the successful application of these methods is their gradual introduction, taking into account the characteristics of the student population and ensuring proper methodological support for teachers. In general, the analysis showed that the integration of innovative methods contributes to the development of students' mathematical competence, their motivation, and engagement in the learning process. At the same time, the effective application of these approaches requires a flexible methodological strategy that combines traditional and modern educational technologies.

DISCUSSION

The results of this study have shown that the use of digital technologies, adaptive learning and interactive platforms contributes to improving the level of mathematical competence of future specialists. This is consistent with the findings of A. Berciano *et al.* (2024), who in their systematic review of STEAM projects in primary education in Spain, found that the integration of an interdisciplinary approach contributes to the development of mathematical and scientific competences. In particular, their results confirm that the use of digital technologies and project-based learning has a positive impact on students' mathematical thinking. The study also showed that mathematical modelling remains an effective tool for developing students' analytical skills. L. Zhang *et al.* (2024) noted that students who actively used mathematical modelling demonstrated a significantly higher level of understanding of abstract concepts and were able to apply the knowledge gained in practical situations. In addition, the results of this work showed that early involvement of children in logical and mathematical tasks improves their cognitive skills and

mathematical thinking. The same conclusion was reached by I. Menacho *et al.* (2024), who emphasise the need to establish clear standards for assessing children's mathematical competence, which helps teachers to adapt teaching methods to the needs of students. The study by D. Nordqvist *et al.* (2023) supplemented this idea. They tested new approaches to the development of written mathematical communication among students and proved that such methods contribute to a better understanding of mathematical concepts. In particular, the use of structured writing tasks and reflective journals allowed students to formulate their own mathematical reasoning more clearly and logically. The results show that the development of written mathematical communication skills not only improves academic performance, but also contributes to deeper learning.

This study also found that alternative methods of teaching mathematics, such as interactive algorithms, contribute to improved understanding of mathematical operations. This coincides with the findings of M. Canto López *et al.* (2022), who analysed the main innovative and alternative methods of teaching written algorithms in primary school. They note that the use of non-traditional approaches, such as visualisation of algorithms and the use of digital tools, improves students' mathematical thinking and increases the level of learning. The integration of innovative programmes into teaching also improves their mathematical competences. This correlates with the study by F. Chacón *et al.* (2024). The researchers confirmed that the use of these programmes contributes to the development of mathematical thinking in students of pedagogical specialities. They note that interactive tools allow students to better understand complex concepts. The study also found that personalised mathematics learning using artificial intelligence contributes to the development of competence in solving mathematical problems among primary school students. D. Chau *et al.* (2025) also proved the effectiveness of AI chatbots in teaching mathematics in Vietnam. They note that such technologies help to adapt the learning process to the level of each student, which positively affects their learning outcomes. This is also in line with the study by M. Krause *et al.* (2024), who found that students who actively use mobile devices for learning demonstrate a higher level of mathematical competence. At the same time, they note that problems associated with excessive use of smartphones and the fear of missing out on important information can have a negative impact on learning outcomes. This also correlates with the study by N. Sirakova & N. Sirakov (2023). The use of online resources helps to increase students' motivation to learn foreign languages and develop their listening and speaking skills. These approaches can be useful for increasing students' motivation and competence in various fields, including systems programming or mathematics.

The results of this study also showed the importance of interactive tasks and tools in the development of mathematical competences, which is consistent with the findings of P. Ester *et al.* (2022), who found that the use of video games in mathematics teaching contributed to the development of

mathematical skills, especially in the areas of logical thinking and spatial imagination. The study also showed that game-based methods increased students' motivation and contributed to their active involvement in the learning process. This study also found that the use of an interdisciplinary approach promotes deeper learning of mathematical concepts and the development of critical thinking. Similar results were obtained by A. Rashidov (2020), who focused on the development of students' creative and informational competences in mathematics. He argues that students who actively use mathematical methods in analysing information demonstrate a higher level of creative thinking. These results confirmed this conclusion, as students who participated in project-based learning using real-world mathematical problems had a significantly higher level of competencies. The study by H. Rocha & A. Babo (2024) also highlighted the link between problem-solving and mathematical competence. They found that the development of problem-solving skills contributes to the development of mathematical literacy. This correlates with the findings of the present study. The study also showed that the role of the teacher is crucial in the development of mathematical competence. This is consistent with the findings of L. Hetmanenko (2024), who found that the active use of simulation research in mathematics teaching significantly improves students' engagement and ability to solve complex problems.

Similar results to the present study were obtained by A. Pansell (2023), who studied the use of information technology in teaching physics and mathematics. The author noted that the use of virtual simulations and mathematical models contributes to the development of systemic thinking and analytical skills of students. This study also found that the integration of information technology has a positive impact on the development of mathematical competences. Research by G. Sayeg & M. Rodriguez-Paz (2024) showed that the use of gamification and chatbots (in particular, ChatGPT) in mathematics teaching increases students' interest and improves mathematical modelling. The data obtained confirm this conclusion, as students who participated in learning with elements of gamification demonstrated high results in solving mathematical problems and greater motivation to learn. Therefore, the results of this study confirm the effectiveness of innovative methods and are consistent with the findings of the above researchers. This indicates that the integration of digital technologies, personalised learning, mathematical modelling and alternative methods has a positive impact on the level of mathematical knowledge and skills of pupils and students.

CONCLUSIONS

The results of the study confirmed the effectiveness of using innovative methods in the formation of students' mathematical competence. The introduction of problem-based learning, project-based learning, interactive digital technologies, modelling and simulation, and gamification had a positive impact on the development of analytical thinking, motivation to learn, level of independence, and ability to apply knowledge in practical situations.

A comparative analysis of the experimental and control groups showed a significant difference in the level of learning. Students of the experimental group who were taught using innovative methods demonstrated a much deeper understanding of mathematical concepts and a higher level of success in completing test tasks, solving practical problems and preparing analytical reports. The project-based method helped students apply mathematical knowledge to analyse real-world statistical data, developing their research and critical thinking skills. Gamification increased the level of student engagement and motivation, which was reflected in the growth of their academic performance and activity in the classroom. Compared to the control group, the number of students who actively participated in the classes increased by 29%.

Students' self-assessment data also confirmed the effectiveness of the proposed methods. The progress diaries revealed positive dynamics of self-reflection and awareness of their own learning progress. In addition, students noted improvements in their ability to plan their own learning and set realistic goals. This indicates an increase in their learning motivation and active participation in the educational process. In general, there was a tendency for self-esteem to increase, which confirms the effectiveness of the methods used in developing students' independence.

Thus, the study confirmed that the use of innovative teaching approaches contributes to the more effective formation of students' mathematical competence. In the future, further research can be expanded to different specialities and levels of education, which will allow for a more comprehensive assessment of the effectiveness of innovative methods in the formation of mathematical competence.

ACKNOWLEDGEMENTS

None.

CONFLICT OF INTEREST

None.

REFERENCES

- [1] Astafieva, M., Bodnenko, D., Lytvyn, O., Proshkin, V., & Zhylytsov, O. (2020). Mathematical preparation of students for their professional self-realization in modern innovative society. *SHS Web of Conferences*, 75, article number 04010. [doi: 10.1051/shsconf/20207504010](https://doi.org/10.1051/shsconf/20207504010).
- [2] Berciano, A., Uskola, A., & Zamalloa, T. (2024). Evaluation of mathematical and scientific competences in primary education STEAM projects in Spain: A systematic review. *Education Sciences*, 14(12), article number 1349. [doi: 10.3390/educsci14121349](https://doi.org/10.3390/educsci14121349).

- [3] Canto López, M.C., Manchado Porras, M., Piñero Charlo, J.C., Mera Cantillo, C., Delgado Casas, C., Aragón Mendizábal, E., & García Sedeño, M.A. (2022). Description of main innovative and alternative methodologies for mathematical learning of written algorithms in primary education. *Frontiers in Psychology*, 13, article number 913536. doi: [10.3389/fpsyg.2022.913536](https://doi.org/10.3389/fpsyg.2022.913536).
- [4] Chacón, F.Y., Ramírez Sobalvarro, Y., Gamboa Ferrer, L.R., & Blaz Fernandez, F.E. (2024). Integration of GeoGebra and Maple in the construction of mathematical competences in civil engineering students in a private university. In *22nd LACCEI international multi-conference for engineering, education, and technology: Sustainable engineering for a diverse, equitable, and inclusive future at the service of education, research, and industry for a society 5.0. hybrid event*. San Jose. doi: [10.18687/LACCEI2024.1.1.233](https://doi.org/10.18687/LACCEI2024.1.1.233).
- [5] Chau, D.B., Luong, V.T., Long, T.T., & Linh, N.T. (2025). Personalized mathematics teaching with the support of AI chatbots to improve mathematical problem-solving competence for high school students in Vietnam. *European Journal of Educational Research*, 14(1), 323-333. doi: [10.12973/eu-jer.14.1.323](https://doi.org/10.12973/eu-jer.14.1.323).
- [6] Ester, P., Herrero, L., Ruiz, B., & Purón, A. (2022). [Learning mathematics by playing: Development of mathematical skills through video games](https://doi.org/10.1016/j.sbspro.2022.111111). *Revista Ibérica de Sistemas e Tecnologías de Información*, 50(5), 1-12.
- [7] Frejd, P., & Vos, P. (2022). A commentary on the special issue “Innovations in measuring and fostering mathematical modelling competencies”. *Educational Studies in Mathematics*, 109, 455-468. doi: [10.1007/s10649-021-10122-4](https://doi.org/10.1007/s10649-021-10122-4).
- [8] Hetmanenko, L. (2024). The teacher's role in the formation of mathematical competence through symmedian research. *African Journal of Applied Research*, 10(1), 387-399. doi: [10.26437/ajar.v10i1.710](https://doi.org/10.26437/ajar.v10i1.710).
- [9] Kandemir, M.A., & Eryilmaz, N. (2025). Innovative approaches in mathematical modeling: Harnessing technology for teaching second degree equations to future mathematics educators in Türkiye. *Social Sciences & Humanities Open*, 11, article number 101281. doi: [10.1016/j.ssaho.2025.101281](https://doi.org/10.1016/j.ssaho.2025.101281).
- [10] Kolomiiets, A., Klochko, V., Stakhova, O., Klochko, O., Petruk, V., & Kovalchuk, M. (2023). Improving the level of cognitive component of mathematical competence in the process of mathematical training of students of technical specialties. *Revista Romaneasca Pentru Educatie Multidimensionala*, 15(1), 261-284. doi: [10.18662/rrem/15.1/696](https://doi.org/10.18662/rrem/15.1/696).
- [11] Krause, M., et al. (2024). Effects of student-owned and provided mobile devices on mathematical modeling competence: Investigating interaction effects with problematic smartphone use and fear of missing out. *Frontiers in Education*, 9, article number 1167114. doi: [10.3389/educ.2024.1167114](https://doi.org/10.3389/educ.2024.1167114).
- [12] Kulimova, Yu. (2024). Improving the speech-communicative competence of future elementary school teachers in the context of digitalisation the higher pedagogical education in Ukraine. *Pedagogical Sciences*, 27(2), 24-33. doi: [10.33989/2524-2474.2024.2.24](https://doi.org/10.33989/2524-2474.2024.2.24).
- [13] Menacho, I., Aragón, E., Arrigoni, F., Mera, C., Canto, M.C., & Navarro, J.I. (2024). Establishing benchmarks for assessing early mathematical competence in children. *Frontiers in Education*, 9, article number 1384422. doi: [10.3389/educ.2024.1384422](https://doi.org/10.3389/educ.2024.1384422).
- [14] Munaji, M., Rohaeti, T., Mutadi, M., Sumliyah, S., & Kodirun, K. (2025). A literature review of flexibility in interactive mathematics classrooms: The role of teachers and students. *EduLearn*, 19(2), article number 21501. doi: [10.11591/edulearn.v19i2.21501](https://doi.org/10.11591/edulearn.v19i2.21501).
- [15] Neugebauer, M., Tousside, B., & Frochte, J. (2023). Success factors for mathematical e-learning exercises focusing first-year students. In *Proceedings of the 15th international conference on computer supported education* (pp. 306-317). Prague. doi: [10.5220/0011858400003470](https://doi.org/10.5220/0011858400003470).
- [16] Nordqvist, D., Ahl, L.M., & Helenius, O. (2023). [Piloting an innovation for developing students' written mathematical communication competency](https://doi.org/10.1016/j.sbspro.2023.111111). In *Thirteenth congress of the European society for research in mathematics education (CERME13)*. Budapest: Alfréd Rényi Institute of Mathematics; Eötvös Loránd University of Budapest.
- [17] Onoprienko, O.V., & Skvortsova, S.O. (2024). Educational program “Methodology of formation of mathematical competence of primary school students” as a resource for professional development of teachers. *New Inception*, 1-2(15-16), 13-25. doi: [10.58407/NI.24.1-2.1](https://doi.org/10.58407/NI.24.1-2.1).
- [18] Pansell, A. (2023). Mathematical knowledge for teaching as a didactic praxeology. *Frontiers in Education*, 8, article number 1165977. doi: [10.3389/educ.2023.1165977](https://doi.org/10.3389/educ.2023.1165977).
- [19] Piñero Charlo, J.C., Noriega Bustelo, R., Canto López, M., & Costado Dios, M.T. (2022). Influence of the algorithmization process on the mathematical competence: A case study of trainee teachers assessing ABN- and CBC-instructed schoolchildren by gamification. *Mathematics*, 10(16), article number 3021. doi: [10.3390/math10163021](https://doi.org/10.3390/math10163021).
- [20] Rashidov, A. (2020). [Development of creative and working with information competences of students in mathematics](https://doi.org/10.1016/j.sbspro.2020.111111). *European Journal of Research and Reflection in Educational Sciences*, 8(3), 10-15.
- [21] Rocha, H., & Babo, A. (2024). Problem-solving and mathematical competence: A look to the relation during the study of Linear Programming. *Thinking Skills and Creativity*, 51, article number 101461. doi: [10.1016/j.tsc.2023.101461](https://doi.org/10.1016/j.tsc.2023.101461).

- [22] Sayeg, G., & Rodriguez-Paz, M.X. (2024). Use of game-based learning with ChatGPT to improve mathematical modeling competences in first-year engineering students. In *2024 ASEE annual conference & exposition*. Portland. doi: [10.18260/1-2--48216](https://doi.org/10.18260/1-2--48216).
- [23] Sirakov, H. (2022). [Mathematics curricula and their role for formation of mathematical competence for students in specialties “Programmer” and “System programmer”](#). *Mathematics and Education in Mathematics*, 51, 190-195.
- [24] Sirakova, N., & Sirakov, N. (2023). Diagnosis and assessment of the motivation and mathematical competence of students majoring in systems programming. *AIP Conference Proceedings*, 2939, article number 050003. doi: [10.1063/5.0179388](https://doi.org/10.1063/5.0179388).
- [25] Williner, B. (2024). Influence of tasks with GeoGebra software on the development of mathematical competence in engineering students. *Bolema – Mathematics Education Bulletin*, 38, article number e230215. doi: [10.1590/1980-4415v38a230215](https://doi.org/10.1590/1980-4415v38a230215).
- [26] Wulandari, Y.O., Khasanah, F., & Yuniarto, E. (2024). The profile of mathematical literacy skills of prospective mathematics teachers in graph theory. *AIP Conference Proceedings*, 3148, article number 040044. doi: [10.1063/5.0242209](https://doi.org/10.1063/5.0242209).
- [27] Zaporozhchenko, T., Vykhreshch, V., Paguta, T., Bykov, I., Chykurova, O., & Pysarchuk, O. (2022). How to improve the mathematical competences of future primary school teachers in Ukraine? Innovative aspect. *Revista Romaneasca pentru Educatie Multidimensionala*, 14(1), 83-100. doi: [10.18662/rrem/14.1Sup1/538](https://doi.org/10.18662/rrem/14.1Sup1/538).
- [28] Zhang, L., Stylianides, A.J., & Stylianides, G.J. (2025). Approaches to supporting and measuring mathematical problem posing: A systematic review of interventions in mathematics education. *International Journal of Science and Mathematics Education*. doi: [10.1007/s10763-025-10542-1](https://doi.org/10.1007/s10763-025-10542-1).
- [29] Zhang, L., Stylianides, G.J., & Stylianides, A.J. (2024). Enhancing mathematical problem posing competence: A meta-analysis of intervention studies. *International Journal of STEM Education*, 11, article number 48. doi: [10.1186/s40594-024-00507-1](https://doi.org/10.1186/s40594-024-00507-1).

Галина Коберник

Кандидат педагогічних наук, професор

Уманський державний педагогічний університет імені Павла Тичини

20300, вул. Садова, 2, м. Умань, Україна

<https://orcid.org/0000-0001-9340-1707>

Інноваційні підходи до формування математичної компетентності майбутніх учителів початкової школи

Анотація. Метою дослідження було вивчення впливу інтерактивних методів, цифрових технологій і міждисциплінарного підходу на формування математичної компетентності студентів та ефективність засвоєння знань. Методологія включала порівняльний аналіз, педагогічний експеримент, аналіз сильних і слабких сторін, можливостей і загроз, визначення інноваційних підходів до формування математичної компетентності здобувачів вищої освіти за освітньою програмою “Початкова освіта”. Результати дослідження показали, що ведення щоденників успішності сприяє саморефлексії студентів, покращує їхню здатність до планування навчального процесу та підвищує мотивацію. Самооцінка студентів підтвердила зростання впевненості у власних знаннях і навичках, а також розвиток самостійності. Виявлено поліпшення у плануванні власного навчання та постановці реалістичних цілей за допомогою нових підходів. Це свідчить про підвищення їхньої навчальної мотивації та активної участі в освітньому процесі. Інноваційні методи навчання, такі як проблемно-орієнтоване навчання, моделювання, інтерактивні технології та гейміфікація, покращили розуміння математичних концепцій. Порівняльний аналіз засвідчив вищий рівень успішності в експериментальній групі – середній бал тестових завдань зріс на 23%. Щоденники сприяли усвідомленню власного навчального прогресу, що підвищило мотивацію та залученість студентів. Використання цифрових інструментів, таких як GeoGebra та Desmos, покращило візуалізацію математичних процесів. Основними викликами стали адаптація до нових форматів навчання та необхідність підготовки викладачів. Отримані результати можуть бути використані для вдосконалення методичних підходів до викладання математики у вищій освіті та розробки рекомендацій для впровадження інноваційних технологій у навчальний процес.

Ключові слова: навчальний процес; гейміфікація; критичне мислення; новітні методи; індивідуальні потреби

UDC 159.942

DOI: 10.52534/msu-pp1.2025.82

Svitlana Shevchenko*

PhD in Psychology, Associate Professor
Bogdan Khmelnytsky Melitopol State Pedagogical University
69000, 59 Naukove Mistechko Str., Zaporizhzhia, Ukraine
<https://orcid.org/0000-0001-8281-243X>

Hanna Varina

Master of Psychology, Senior Lecturer
Bohdan Khmelnytsky Melitopol State Pedagogical University
69000, 59 Naukove Mistechko Str., Zaporizhzhia, Ukraine
<https://orcid.org/0000-0002-0087-4264>

Specific features of re-adaptation of military personnel after leaving the combat zone

Article's History:

Received: 11.11.2024

Revised: 04.03.2025

Accepted: 26.03.2025

Suggested Citation:

Shevchenko, S., & Varina, H. (2025). Specific features of re-adaptation of military personnel after leaving the combat zone. *Scientific Bulletin of Mukachevo State University. Series "Pedagogy and Psychology"*, 11(1), 82-90. doi: 10.52534/msu-pp1.2025.82.

Abstract. The issue of re-adaptation of military personnel after taking part in combat operations is one of the most complex and urgent challenges in the context of modern social and psychological difficulties. Soldiers returning to civilian life after combat often face numerous difficulties, related not only to physical recovery but also to psychological and social reintegration. These include experiencing traumatic stress, alienation, social isolation, and challenges in adapting to a changed reality. The purpose of this study was to analyse the existing research on the issue, as well as to conduct an experimental examination of the manifestations of post-traumatic stress disorder (PTSD), depression, anxiety, and stress in military personnel. The empirical study employed diagnostic methods such as the PTSD Checklist – Military Version (PCL-M), the Perceived Stress Scale, the Beck Anxiety Inventory, and the Beck Depression Inventory. The experimental findings revealed that most combat veterans experience significant psycho-emotional difficulties, including specific signs of PTSD, elevated levels of stress, moderate-to-high anxiety levels, and moderate depressive symptoms indicative of mild-to-moderate depression. Among the study participants, varying levels of depressive symptoms and high psycho-emotional tension were observed, complicating the social adaptation. The findings emphasised that rehabilitation should involve multidisciplinary support, combining psychotherapeutic methods, pharmacological treatment when necessary, and socio-psychological support to foster psychological resilience and social reintegration of veterans. The obtained data can be used to improve rehabilitation methodologies and develop innovative approaches for the effective restoration of veterans' mental health in the future

*Corresponding author

Keywords: PTSD; anxiety; stress; recovery; psychological well-being

INTRODUCTION

The process of returning military personnel to civilian life is complex, involving numerous psychological, social, and physical challenges. The number of veterans who need re-adaptation is steadily growing due to Ukraine's prolonged armed conflict. Combat experience can result in

substantial psychological trauma, such as PTSD (post-traumatic stress disorder), anxiety, depression, sleep disturbances, and other disorders that exacerbate the return to normal life. The social aspects of re-adaptation also play a crucial role. Rebuilding relationships with family and



close ones is often a challenge for service members, as they may struggle to fully understand the veterans' experiences. Communication barriers, societal misunderstanding, employment challenges, and adaptation to civilian life are just some of the obstacles veterans encounter. The presence of unresolved psychological issues can result in social isolation, substance abuse, aggressive behaviour, and even suicidal tendencies. The significance of investigating this issue becomes even clearer as the number of veterans in need of support grows and the complexity of the re-adaptation process increases. Reintegrating service members after combat is a challenging task that involves physical, psychological, and social dimensions. The value of each of these aspects in ensuring a successful transition to civilian life is highlighted in contemporary research.

Author D. Eddie *et al.* (2020) highlighted the matter of early detection and treatment of PTSD, which is a widespread issue among veterans. PTSD arises from combat-related stress and can greatly complicate the re-adaptation process. Research findings indicated that prompt psychotherapeutic intervention and, when necessary, pharmacological support can alleviate PTSD symptoms, enhance veterans' emotional well-being, and ultimately improve their quality of life. The prevention of PTSD from developing into more serious mental health disorders requires early detection and intervention. A. A.A.J. Scoglio *et al.* (2023) stressed the significance of social support in the re-adaptation process. According to the researchers, stable social connections, especially support from family, friends, and loved ones, are crucial in decreasing stress and depression among veterans. Veterans who do not receive such support are at a greater risk of experiencing psychological difficulties like loneliness and isolation, which can further complicate their transition to civilian life. Therefore, integrating family and social networks into the support system is a crucial element of effective re-adaptation.

According to Z. Kisarchuk (2020), the adaptation of military personnel and their families involves several key components: psychological adaptation (understanding the values and norms of civilian life), legal adaptation (familiarisation with legal rights and obligations regarding veterans and their families), and professional adaptation (enhancing existing or acquiring new professional skills). The researcher emphasised the significance of creating programmes that give veterans new professional skills, enabling them to integrate into the civilian workforce. These programmes should include training in fields such as IT, construction, and project management. Moreover, veterans should have access to specialised employment support centres that offer career counselling, job fair participation, and up-to-date labour market information. Furthermore, housing support programmes should be implemented, including housing loans and the creation of specialised residential complexes for veterans. It is vital to raise public awareness of the challenges veterans face when returning home. This can be achieved through information campaigns, media publications, seminars, workshops, and dedicated websites

and social media groups for veterans. Collaboration with the media is particularly crucial for highlighting veterans' issues, organising training sessions for journalists, and producing documentary programmes showcasing veterans' successes and the challenges they encounter during their reintegration into civilian life.

According to O. Ovcharenko (2023), these various forms of support are critical for the successful social adaptation of veterans, enabling them to integrate confidently into civilian life and fulfil their potential in an unfamiliar environment. The reintegration of military personnel is not only an essential aspect of state social policy but also a key factor in ensuring national security. Successful adaptation reduces social tensions, prevents conflicts, and facilitates veterans' active participation in society. The psychological aspect of reintegration is particularly significant, as service members who have experienced combat often struggle with mental health recovery. This can include symptoms of PTSD, depression, social isolation, and aggression. Effective reintegration programmes not only help restore psychological resilience but also support veterans in regaining social functionality, such as interpersonal communication, professional activity, and engagement in community life.

D. Gimeno Ruiz de Porras *et al.* (2024) explored the professional challenges faced by female veterans during their transition to civilian life and examined support systems. The study was based on a qualitative analysis of in-depth interviews with 40 female veterans who took part in military operations over the past decade. The researchers concluded on the need to develop gender-sensitive support programmes and eliminate systemic barriers that hinder professional integration. Moreover, according to V. Troshina (2021), a considerable portion of rehabilitation methods used for veterans primarily focus on temporary symptom relief rather than addressing the underlying causes of PTSD. Many service members struggle when offered only superficial support or therapies that concentrate solely on their past traumatic experiences. This approach often fails to help them properly reprocess their experiences and discover new paths for personal growth. In some cases, it may even worsen their psychological trauma, creating further challenges in their transition to civilian life. N.M. Martin *et al.* (2023) examined the physical health challenges faced by veterans after returning from service. The cohort study tracked 500 veterans over a 10-year period. The researchers emphasised the significance of a comprehensive approach to veterans' physical health post-demobilisation, including regular medical monitoring for early detection and treatment of chronic conditions, integration of physical activity programmes into the readjustment process to reduce the risk of comorbidities, and specialised support programmes for veterans with combat-related injuries.

Reintegration is a complex and multi-layered process that depends on numerous variables, meaning the absence of a single, universal solution for all veterans. L.M. Proudka & O.M. Pasko (2024) examined contemporary psychological aspects of the mental states of military personnel in the

context of adaptation after returning to civilian life from combat zones. The researchers emphasised that “the adaptation process of military personnel after taking part in combat operations is complex and multi-stage, requiring consideration of individual characteristics and prompt psychological support”. The key factors influencing the success of re-adaptation include the level of social support, the presence of post-traumatic stress disorders, and self-regulation ability. The researchers also noted that “effective re-adaptation requires a comprehensive approach that includes medical, psychological, and social components”.

In the study by E. McGlinchey *et al.* (2024) presented a systematic review of research on psychological resilience and reintegration of military personnel after returning from combat operations. The researchers analysed factors that contribute to successful re-adaptation, including social support, individual coping strategies, and psychological aid programmes. They also highlighted the significance of developing individualised approaches to re-adaptation, considering the unique needs of each service member. This systematic review examined the role of psychological resilience in the reintegration process of military personnel after combat deployment. The researchers analysed 25 empirical studies published between 2010 and 2022, focusing on factors influencing successful re-adaptation. L.L. Lira & J. Chandrasekar (2020) presented a meta-analysis investigating the challenges and opportunities related to employment for military personnel transitioning to civilian life. The researchers examined numerous studies to identify the principal obstacles and opportunities veterans encounter during their transition to civilian careers. Overall, the analysis of these studies demonstrated that veteran re-adaptation requires a comprehensive approach, incorporating psychological, social, and physical support, professional reintegration, and opportunities for spiritual recovery. Only such an approach can ensure a successful transition to civilian life, helping veterans overcome challenges and adapt to a new reality. The study theoretically and empirically examined the specific features of military personnel's re-adaptation after their return from combat zones. To fulfil the purpose of this study, the following objectives were outlined:

- to analyse the theoretical foundations of service members' re-adaptation after combat deployment;
- to conduct an empirical study on the psychological and social aspects of military re-adaptation;
- to examine the ways and means of optimising the military personnel's re-adaptation.

LITERATURE REVIEW

The study of military adaptation was based on a wide range of scientific studies that analyse the social, medical-psychological, and socio-psychological aspects of personality adaptation. Both Ukrainian and foreign researchers explored these issues, enabling a comprehensive approach to understanding the challenges veterans face upon returning to civilian life. O. Skrypkin (2020) examined the socio-psychological aspects of the reintegration of Ukrainian service members

after taking part in combat operations in eastern Ukraine. The researchers conducted in-depth interviews with 50 veterans and identified the following key factors influencing successful reintegration: family and community support, professional adaptation, and psychological assistance.

Families must be prepared for a potentially long and complex reintegration process that requires patience, empathy, and a willingness to help veterans navigate the arising challenges (Demchenko *et al.*, 2023). However, support should not be limited to family alone – broader societal acceptance is equally significant. Reintegration becomes much more complicated and can further deteriorate veterans' mental health if society refuses to welcome back veterans, or if stereotypes and discrimination persist. Yu. Bryndikov (2018) emphasised that the experience of combatants taking part in military operations in the east of Ukraine indicates an elevated level of trauma. To enhance combat effectiveness, preserve physical and mental health, and stabilise the psycho-emotional state of service members, there is a pressing need for comprehensive rehabilitation. The researcher presented his perspective on the matter, exploring various aspects of rehabilitation, its types, and potential applications, while also analysing international practices in rehabilitating combatants.

M. Marushchak (2023) highlighted that the psychological adaptation of service members is a complex, multi-level process reflected in their ability to adjust to high-stress, life-threatening conditions. It involves developing psychological resilience to mitigate the effects of these conditions on their mental well-being. M. Tsybaliuk & N. Zhygai-lo (2023) focused on the psychological aspects of the socio-psychological adaptation of demobilised personnel from the Armed Forces of Ukraine and other military formations. Their adaptation is influenced by changes in living conditions and the lack of prior psychological preparation for these transitions. The study highlighted the value of ensuring adaptation to civilian life, as well as preserving and restoring mental health, enabling veterans to contribute meaningfully to society and their families. To support the mental well-being of demobilised service members, the researchers proposed a comprehensive programme aimed at enhancing psychological resilience and improving adaptation conditions. Additionally, practical recommendations were provided to foster socio-psychological adaptation among veterans and former military personnel.

H. Prib *et al.* (2022) analysed the phenomenology of the socio-psychological adaptation process among service members, veterans, and combatants. The researchers emphasised that the nature of this adaptation process largely depends on individual psychological characteristics. They defined the socio-psychological adaptation of combatants as an adjustment to civilian life, shaped by their combat experience and its psychological consequences. The study identified and examined various adaptation types, each associated with specific behavioural strategies among service members, veterans, and combatants: imitation, balancing personal values with societal values, assimilation,

and adaptation through full acceptance. It was noted that after returning to civilian life, service members undergo a period of adjustment to new social dynamics, interactions, and personal development challenges. This phase involves reassessing social roles, partially or fully abandoning past behavioural patterns and strategies, and seeking new ways to integrate into the civilian environment. The study also outlined key areas for medical, psychological, and social support for service members, veterans, and combatants during their adaptation process.

O. Orlovskaya (2020) emphasised that after experiencing combat zones, individuals face the consequences of moral, psychological, and physical strain, which can lead to severe repercussions. Two key strategies for overcoming adaptation challenges were identified: the first strategy involves external assistance, characterised by professional support; the second strategy is internal, relying on family members who help the combatant adjust. The study confirmed that family plays a crucial role as a support resource for combatants during the adaptation period. The purpose of this process is to develop new skills, acquire new professions, and find a renewed sense of purpose in society. Veterans can use psychological healing tools like personal growth and goal-setting to reframe their experiences, derive meaning from them, and build a new identity beyond their military past.

MATERIALS AND METHODS

The research was carried out within the framework of the project implementation – Erasmus+ KA2 “Boosting University Psychological Resilience Wellbeing in (Post-) War Ukrainian Nation (BURN)” (ERASMUS-EDU-2023-CB-HE – 101129379). Project Duration: 01 January 2024 – 31 December 2026. Priority: A stronger Europe in the world. Grant holder: Ternopil Volodymyr Hnatiuk National Pedagogical University, Ukraine. To complete the objectives and fulfil the purpose of this study, theoretical methods included analysis, synthesis, generalisation, comparison, and classification of literature sources were employed. These methods facilitated the acquisition of new scientific knowledge regarding the specifics of re-adaptation processes and their effects on the psychological and social status of military personnel. Additionally, key factors influencing the success of re-adaptation were identified, encompassing psychological, social, and emotional aspects. Furthermore, various approaches to assessing the dynamics of re-adaptation processes were compared, along with the means of supporting service members in their reintegration into civilian life.

Empirical methods included testing, observation, and surveys, such as the PTSD Checklist-Military Version (PCL-M), the Psychological Stress Scale (PSM-25), Beck's Anxiety Inventory (BAI), and Beck's Depression Inventory (BDI). The study was conducted at a Veterans' Rehabilitation Centre in the city of Zaporizhzhia throughout 2024 and involved 70 military personnel who had recently returned from combat zones. The study was conducted following all ethical standards set out in the Declaration of Helsinki (2013). The following assessment tools were used:

The PTSD Checklist-Military Version (PCL-M) is a military-adapted questionnaire consisting of 17 statements related to symptoms of PTSD. Participants rate the extent to which they have experienced each symptom over the past month. While the PCL-M is not used for formal diagnosis, it helps assess the probability of PTSD. A total score of 50 or higher suggests a potential PTSD diagnosis. This tool holds great psychodiagnostic value, as it identifies combat-related stress symptoms. The Psychological Stress Scale (PSM-25) assesses the phenomenological structure of stress experiences. It measures stress levels based on behavioural, somatic, and affective indicators. Designed for individuals aged 18 to 65, the scale is applicable across multiple age and professional groups. Unlike tools that analyse specific stressors or pathological symptoms of anxiety and depression, the PSM-25 evaluates stress as a natural state of psychological tension, providing a pure assessment of stress levels.

Beck's Anxiety Inventory (BAI) is a clinical tool for identifying and measuring the severity of anxiety symptoms. The BAI consists of 21 items, each describing common psychological and physiological symptoms of anxiety. Participants rate their experience of each symptom on a scale from 0 (not at all) to 3 (severely bothered). The total score reflects the overall level of anxiety, making this tool useful for screening individuals aged 14 and older and guiding further psychological interventions. Beck's Depression Inventory (BDI) is a widely used instrument in clinical psychology and psychiatry for detecting and assessing the severity of depressive symptoms. The questionnaire covers emotional state, behavioural patterns, and physical well-being. Summing the scores allows for an evaluation of depression severity, which is essential for treatment planning and rehabilitation.

These methodologies provide a comprehensive assessment of the psychological state of combat veterans, particularly identifying symptoms of PTSD, anxiety, and depression. The application of such tools is crucial for designing effective social and psychological rehabilitation programmes to support veterans affected by combat experiences. The study was conducted with a strong emphasis on ensuring confidentiality and adhering to ethical standards. The purpose of the study, stages, and voluntary nature were fully explained to all participants. Each participant gave their consent either verbally or in writing, acknowledging their understanding of the study's objectives and their right to withdraw at any time without any negative consequences. Researchers ensured privacy by storing all responses in a way that prevented individual participants from being identified. The collected data were securely encrypted and accessible only to authorised researchers. The findings were published and presented in an aggregated form without mentioning any specific individuals. The study implemented these measures to ensure ethical compliance with psychological research standards, guaranteeing the confidentiality and protection of participants' personal information.

RESULTS AND DISCUSSION

The issue of military personnel's re-adaptation after combat operations is multifaceted and requires a comprehensive approach. It is not solely a matter of psychological well-being but also encompasses social integration, cultural adaptation, and economic aspects. Therefore, it is crucial to conduct research that provides a deeper understanding of the adaptation processes and facilitates the development of recommendations aimed at enhancing the effectiveness of rehabilitation programmes. Through theoretical analysis, the study examined the primary mental health disorders experienced by veterans, including post-traumatic stress disorder (PTSD), stress, depression, anxiety, and other psycho-emotional disturbances. The findings highlighted that exposure to combat serves as a significant stressor, often leading to long-term adverse effects on mental health. Additionally, the study underscored the significance of investigating

psychotherapeutic support methods, social adaptation strategies, and medical care for veterans, as these components constitute essential elements of a holistic rehabilitation approach.

Moreover, the research emphasised that successful reintegration into civilian life depends on the availability of tailored psychological interventions, structured social support networks, and accessible healthcare services. The study also compared various models of rehabilitation, identifying key factors that contribute to the effectiveness of re-adaptation programmes. These findings reinforce the necessity of interdisciplinary collaboration among mental health professionals, social workers, and medical practitioners to develop and implement evidence-based strategies for improving the psychological resilience and overall well-being of veterans. Based on the findings obtained from the PTSD Self-Assessment Scale (PCL-M), signs of PTSD were identified among the study participants (Table 1).

Table 1. Results of PTSD symptoms diagnosis among combat veterans

Category	Number of respondents (%)
Normative psychological activity	28.4%
Individual PTSD symptoms	37.3%
PTSD diagnosis	34.3%

Source: developed by the authors of this study

The findings suggest that a considerable proportion of the participants exhibited signs of PTSD, with 37.3% showing individual symptoms, and 34.3% meeting the criteria for a PTSD diagnosis. Only 28.4% demonstrated normative psychological activity, indicating a lower prevalence of symptoms associated with combat-related stress. These findings underscore the need for comprehensive support for veterans coping with trauma from active combat experiences. The analysis of the obtained data revealed the following results: 28.4% of respondents exhibited "normative psychological activity," 37.3% displayed "individual PTSD symptoms", and 34.3% of the participants were diagnosed with "PTSD". These findings form a basis for further development of individualised psychoneurological rehabilitation measures aimed at addressing the traumatic consequences and improving the psychological state of the programme participants. Using the PSM-25 Scale, the level of stress perceptions among combat veterans was assessed across somatic, behavioural, and emotional aspects (Fig. 1).

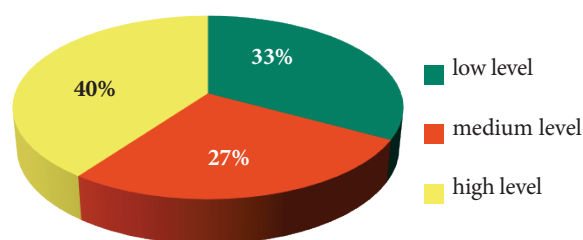


Figure 1. Level of stress perceptions according to the PSM-25 scale

Source: developed by the authors of this study

This chart highlights the varied levels of stress experienced by combat veterans in different dimensions, underlining the need for comprehensive approaches to stress management in rehabilitation programmes. The results indicate significant stress across the three domains (somatic, behavioural, and emotional), emphasising the significance of tailored interventions. According to the findings of the study, the following indicators were found: a low level of stress was observed in 33% of respondents, an average level of stress – in 27%, while a high level of stress was found in 40% of respondents. Based on the BAI results, the following anxiety levels were identified among the combat participants (Fig. 2): a low level of anxiety was recorded in 28.6% of respondents, a medium level – in 35.7%, and a high level of anxiety was present in 35.7% of participants. These findings indicate a significant prevalence of moderate-to-high anxiety among the respondents, suggesting the need for social-psychological support and corrective measures to address anxiety disorder symptoms. The increase in respondents with elevated levels of stress (40%) and anxiety (35.7%) suggests that post-traumatic experiences cause uncertainty and psychological tension. Anxiety can be a significant factor that prevents veterans from functioning in everyday life. Heart palpitations, sweating, and dizziness are common physical symptoms associated with elevated levels of anxiety, which can complicate social adaptation and increase the risk of developing depression. The study results show that anxiety disorders and depressive symptoms are often combined. 28.6% of respondents showed a high level of depressive symptoms.

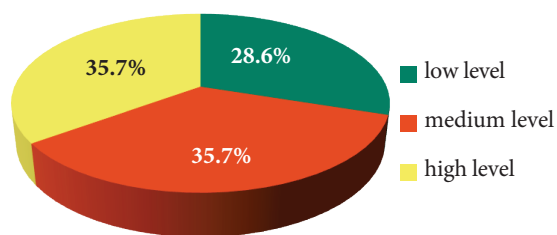


Figure 2. Anxiety levels according to the Beck Anxiety Inventory (BAI)

Source: developed by the authors of this study

Based on the findings of the study using the Beck Depression Inventory (BDI), various levels of depressive symptoms were identified among the combat participants, which allows for an assessment of the depth of depressive experiences within the sample (Table 2). The study found that a low level of depressive symptoms (minimal manifestations or absence of depressive states) was characteristic of 32.9% of respondents, a moderate level of depression (indicating the presence of moderate depressive experiences) was recorded in 40% of participants, and a high level of depression (indicating the presence of deep depressive symptoms that may require clinical attention) was observed in

27.1% of respondents. The findings suggest that depressive states are widespread among combat participants, with many respondents experiencing both moderate and severe depression. The implementation of social-psychological rehabilitation programmes, especially those that use therapeutic techniques to overcome depressive symptoms and enhance emotional well-being of participants, is highlighted by these data. Depression among veterans is a severe issue that requires attention. The elevated level of depression (27.1%) can lead to social alienation, a decrease in functioning in personal and professional life, and an increased risk of suicidal attempts. The level of depression in 40% of respondents indicates moderate depression, which may be a symptom of adaptation disorders related to the transition to civilian life after service. The data collected suggests that most combat veterans face significant psycho-emotional challenges, which necessitate a comprehensive approach to their rehabilitation. The rehabilitation process should include multidisciplinary support, combining psychotherapeutic methods, pharmacological treatment (when necessary), and social-psychological aid, which will contribute to the development of psychological resilience and social adaptation of veterans.

Table 2. Study results using the Beck Depression Inventory (BDI)

Level of depressive symptoms	Percentage of participants (%)
Low level	32.9%
Moderate level	40%
High level	27.1%

Source: developed by the authors of this study

According to the data obtained, the combatants who took part in the study are experiencing severe psychological consequences related to their combat experience. Most respondents need help in adapting to civilian life and restoring their mental health due to the elevated levels of stress, anxiety, and depression that were identified. The significance of a comprehensive approach to the psychosocial rehabilitation of veterans was highlighted, which requires the use of both individual and group therapy methods. K. Semanison *et al.* (2024) concentrated on the physical aspects of re-adaptation, with a particular emphasis on the need for rehabilitation for combat-related injuries. Many veterans suffer from physical wounds sustained during combat, which can be a major barrier to reintegration. Their research emphasised the value of physical rehabilitation in restoring physical functionality and improving emotional well-being. Specialised physical therapy programmes and psychological support are essential in facilitating both physical and mental recovery.

A.H. Boudoukha *et al.* (2017) examined the significance of professional reintegration for veterans. Many service members find it challenging to secure employment and adapt to civilian work environments after returning from combat. Professional reintegration plays a crucial role in fostering self-esteem and financial stability – key factors for successful re-adaptation. Veterans who obtain

employment after service usually experience a lower level of depression and stress. This enhances their confidence and reduces anxiety, making professional reintegration a vital component of a comprehensive approach to re-adaptation. P.N. Smith *et al.* (2016) examined the critical issue of suicidal tendencies among veterans, which represents one of the most severe challenges in the re-adaptation process. The researchers emphasised the necessity of preventive measures, which include specialised programmes for high-risk veterans and accessible psychological support. Veterans who are struggling with severe post-service challenges can be saved by prompt mental health interventions.

R. Pat-Horenczyk *et al.* (2015) investigated the role of spiritual practices in veterans' re-adaptation. Taking part in religious or spiritual activities was found to positively influence the recovery, as it can help reduce stress, anxiety, and depression. Veterans are provided with new coping mechanisms and a supportive environment through these practices. S. Zafar & E.C. Ross (2015) analysed the effectiveness of group therapy for veterans. Veterans can share their experiences, offer mutual support, and foster a sense of understanding by taking part in group therapy sessions. By using this approach, isolation can be reduced, and psychological recovery can be accelerated. Lastly, A. Hendrick *et al.* (2024) explored the effects of physical activity on veterans' mental health. Regular exercise, including sports

and yoga, has been shown to substantially reduce anxiety and depression levels among veterans. Additionally, physical activity improves overall health, which contributes to a more positive outlook on life.

Thus, the readjustment of service members after returning from combat is a complex and multifaceted process that involves not only the recovery of psychological and physical health but also social integration, support in adapting to new living conditions, professional reintegration, and the restoration of social connections.

CONCLUSIONS

The stress of taking part in combat operations can have long-lasting negative consequences for mental health. A prominent aspect of this section was also the study of national and international approaches to the rehabilitation of combat participants, which helped us to establish widespread principles that should underlie the effective rehabilitation programmes. The rehabilitation approach for veterans includes psychotherapeutic support methods, social adaptation, and medical aid, which were given special attention. The theoretical analysis confirmed that the re-adaptation of combat participants requires an individualised approach that accommodates the specific features of each veteran's traumatic experience. This determined the need for further research aimed at the development and testing of such programmes. The empirical research showed that the elevated level of PTSD (34.3%) among the participants is a significant indicator of severe traumatic experiences, which have a long-term influence on the mental health of combat veterans. PTSD is a complex disorder that may manifest through persistent memories of traumatic events, flashbacks, anxiety, aggression, and difficulties in interpersonal relationships. PTSD treatment requires specialised methods, such as cognitive behavioural therapy (CBT), art therapy, emotionally focused psychotherapy, and the possible use of pharmacological treatments to control symptoms.

This indicates the need for the creation of effective rehabilitation programmes that include various therapeutic approaches: cognitive-behavioural therapy to reduce anxiety and depression, therapeutic groups for veterans to reduce isolation, and art therapy to release emotions and

express experiences through creativity. The creation of employment support programmes and social integration initiatives is essential for veterans to slowly return to their normal lives, overcome social barriers, and manage the stress that comes with their transition into civilian society. Early intervention is crucial to prevent the development of severe mental disorders, such as suicidal tendencies or severe forms of depression, which could result from unresolved psycho-emotional issues, as highlighted by these results. To meet the needs of veterans, it is necessary to create rapid-response support that is accessible, including through specialised rehabilitation centres and support groups.

The prospects for future research on this topic involve the development and evaluation of the effectiveness of re-adaptation programmes for combat veterans based on an individualised approach, which factors in the unique nature of each veteran's traumatic experiences. This approach would require a thorough understanding of the distinct psychological, social, and emotional challenges faced by veterans, tailoring rehabilitation strategies to address these specific needs. Future studies should focus on assessing the outcomes of personalised rehabilitation interventions, exploring how various therapeutic modalities, social support systems, and medical treatments can be optimised to improve the overall reintegration process. Specifically, examining the impact of individualised approaches on the reduction of PTSD symptoms, anxiety, depression, and other mental health issues will be critical. Furthermore, research should explore the long-term effects of such programmes on veterans' psychological resilience, social functioning, and overall quality of life.

ACKNOWLEDGEMENTS

Co-funded by the European Union. Views and opinions expressed are however those of the authors' only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor the granting authority can be held responsible for them.

CONFLICT OF INTEREST

The authors of this study declare no conflict of interest.

REFERENCES

- [1] Boudoukha, A.H., Ouagazzal, O., & Goutaudier, N. (2017). When traumatic event exposure characteristics matter: Impact of traumatic event exposure characteristics on posttraumatic and dissociative symptoms. *Psychological Trauma: Theory, Research, Practice, and Policy*, 9(5), 561-566. doi: 10.1037/tra0000243.
- [2] Bryndikov, Y.L. (2018). *Rehabilitation of combatant military personnel in the social services system: Theoretical and methodological foundations*. Khmelnytskyi: Y.L. Bryndikov.
- [3] Declaration of Helsinki. (2013). Retrieved from <https://www.wma.net/what-we-do/medical-ethics/declaration-of-helsinki/>.
- [4] Demchenko, I., Kalynovska, I., & Kovtun, K. (2023). Features of social and psychological rehabilitation of children through music therapy during and after the war. *Humanities Studios: Pedagogy, Psychology, Philosophy*, 11(4), 52-60. doi: 10.31548/hspedagog14(4).2023.52-60.
- [5] Eddie, D., Bentley, K.H., Bernard, R., Yeung, A., Nyer, M., Pedrelli, P., Mischoulon, D., & Winkelman, J.W. (2020). Major depressive disorder and insomnia: Exploring a hypothesis of a common neurological basis using waking and sleep-derived heart rate variability. *Journal of Psychiatric Research*, 123, 89-94. doi: 10.1016/j.jpsychires.2020.01.015.

- [6] Gimeno Ruiz de Porras, D., *et al.* (2024). A qualitative assessment of changes in occupational exposures among healthcare facility workers. *Workplace Health & Safety*, 73(2), 53-62. doi: [10.1177/21650799241284085](https://doi.org/10.1177/21650799241284085).
- [7] Hendrick, A., Binks, E., Ferguson, N., & Di Lemma, L. (2024). Unveiling the influence of competitive sports on the sense of self and identity of disabled veterans: A systematic review and mixed-methods synthesis. *Identity*, 24(3), 194-212. doi: [10.1080/15283488.2024.2346257](https://doi.org/10.1080/15283488.2024.2346257).
- [8] Kisarchuk, Z.H. (2020) *Technologies of psychotherapeutic assistance for victims in overcoming symptoms of post-traumatic stress disorder*. Kyiv: Publishing House "Slovo".
- [9] Lira, L.L., & Chandrasekar, J. (2020). The state of research in veterans studies: A systematic literature review. *Journal of Veterans Studies*, 2. doi: [10.21061/jvs.v6i2.191](https://doi.org/10.21061/jvs.v6i2.191).
- [10] Martin, N.M., von Hurst, P.R., Conlon, C.A., Smeele, R.J.M., Mugridge, O.A.R., & Beck, K.L. (2023). Body fat percentage and blood donation are the strongest determinants of iron stores in premenopausal women joining the New Zealand army. *Military Medicine*, 188(7-8), e2550-e2556. doi: [10.1093/milmed/usad023](https://doi.org/10.1093/milmed/usad023).
- [11] Marushchak, M. (2023). Psychological foundations of the adaptation of Ukrainian armed forces military personnel to combat conditions. *Psychological and Pedagogical Problems of the Modern School*, 2(10), 35-44. doi: [10.31499/2706-6258.2\(10\).2023.290567](https://doi.org/10.31499/2706-6258.2(10).2023.290567).
- [12] McGlinchey, E., Spikol, E., Robinson, M., Ross, J., & Armour, C. (2024). The challenges of leaving: Reintegration difficulties and negative mental health outcomes in UK Armed Forces Veterans residing in Northern Ireland. *Journal of Military, Veteran and Family Health*, 10(3), 109-120. doi: [10.3138/jmvfh-2023-0066](https://doi.org/10.3138/jmvfh-2023-0066).
- [13] Orlovska, O.A. (2020). Coping strategies for adaptation problems in the family of a combatant after returning to civilian life. *Scientific Notes of V.I. Vernadsky TNU. Series: Psychology*, 31(70)(4), 127-132. doi: [10.32838/2709-3093/2020.4/19](https://doi.org/10.32838/2709-3093/2020.4/19).
- [14] Ovcharenko, O.Yu. (2023) *Psychology of stress and stress disorders: A textbook*. Kyiv: University "Ukraine".
- [15] Pat-Horenczyk, R., Perry, S., Hamama-Raz, Y., Ziv, Y., Schramm-Yavin, S., & Stemmer, S.M. (2015). Posttraumatic growth in breast cancer survivors: Constructive and illusory aspects. *Journal of Traumatic Stress*, 28(3), 214-222. doi: [10.1002/jts.22014](https://doi.org/10.1002/jts.22014).
- [16] Prib, H.A., Begeza, L.Ye., & Raievska, Ya.M. (2022). Socio-psychological adaptation of veteran military personnel: Issues of study. *Habitus*, 35, 159-163. doi: [10.32843/2663-5208.2022.35.23](https://doi.org/10.32843/2663-5208.2022.35.23).
- [17] Proudka, L.M., & Pasko, O.M. (2024). Psychological aspects of the adaptation of military personnel who participated in combat operations. *Southern Ukrainian Legal Journal. Legal System: Theory and Practice*, 2, 86-92. doi: [10.32850/sulj.2024.2.14](https://doi.org/10.32850/sulj.2024.2.14).
- [18] Scoglio, A.A.J., Molnar, B.E., Lincoln, A.K., Griffith, J., Park, C.L., & Kraus, S.W. (2023). Social support over time for men and women veterans with and without complex trauma histories. *Psychological Services*, 20(3), 516-524. doi: [10.1037/ser0000627](https://doi.org/10.1037/ser0000627).
- [19] Semanision, K., Williams, R., Moran, E., & Rabinowitz, A. (2024). Psychosocial determinants conferring resilience after TBI: Current understanding. *Current Physical Medicine and Rehabilitation Reports*, 12, 359-367. doi: [10.1007/s40141-024-00461-7](https://doi.org/10.1007/s40141-024-00461-7).
- [20] Skrypkin, O. (2020). Socio-psychological aspects of the reintegration of Ukrainian combatants into a peaceful society: Requests and expectations. *European Humanities Studies: State and Society*, 4, 74-85. doi: [10.38014/ehs-ss.2020.4.06](https://doi.org/10.38014/ehs-ss.2020.4.06).
- [21] Smith, P.N., Stanley, I.H., Joiner, T.E., Sachs-Ericsson, N.J., & Van Orden, K.A. (2016). An aspect of the capability for suicide – fearlessness of the pain involved in dying – amplifies the association between suicide ideation and attempts. *Archives of Suicide Research*, 20(4), 650-662. doi: [10.1080/13811118.2016.1162245](https://doi.org/10.1080/13811118.2016.1162245).
- [22] Troshina, V.V. (2021). *Methods of psychotherapy for veterans: Issues and prospects*. Kyiv: Psychological World.
- [23] Tsybaliuk, M., & Zhygailo, N. (2023). Psychological adaptation to civilian life of demobilized personnel from the armed forces of Ukraine and other military formations. *Bulletin of Lviv University. Series: Psychological Sciences*, 16, 46-55. doi: [10.30970/PS.2023.16.7](https://doi.org/10.30970/PS.2023.16.7).
- [24] Zafar, S., & Ross, E.C. (2015). Interreligious contact, attitudes, and stereotypes: A study of five religious groups in Canada. *Canadian Journal of Behavioural*, 47(1), 37-46. doi: [10.1037/a0036720](https://doi.org/10.1037/a0036720).

Світлана Шевченко

Кандидат психологічних наук, доцент

Мелітопольський державний педагогічний університет імені Богдана Хмельницького

69000, вул. Наукового містечка, 59, м. Запоріжжя, Україна

<https://orcid.org/0000-0001-8281-243X>

Ганна Варіна

Магістр психології, старший викладач

Мелітопольський державний педагогічний університет імені Богдана Хмельницького

69000, вул. Наукового містечка, 59, м. Запоріжжя, Україна

<https://orcid.org/0000-0002-0087-4264>

Особливості реадаптації військовослужбовців після виходу з зони бойових дій

Анотація. Проблема реадаптації військовослужбовців після участі в бойових діях є однією з найбільш складних і актуальних в контексті сучасних соціальних та психологічних викликів. Військові, які повертаються до мирного життя після участі в бойових діях, часто стикаються з численними труднощами, які стосуються не тільки фізичного відновлення, а й психологічного та соціального інтегрування, включаючи переживання стресових травм, відчуження, соціальну ізоляцію та проблеми в адаптації до зміненої реальності. Метою роботи був аналіз робіт з проблеми дослідження, експериментальне вивчення особливостей прояву ПТСР, депресії, тривожності та стресу у військових. В ході емпіричного дослідження використано такі методи діагностики, як шкала самооцінки наявності ПТСР (PCL-M), шкали стресу (PSM-25), тривожності (BAI) та депресії (BDI). Експериментально встановлено, що більшість учасників бойових дій переживають значні психоемоційні труднощі (виявлено окремі ознаки ПТСР, високий рівень стресових відчуттів, середній та високий рівень тривоги, середній рівень депресивності (який вказує на наявність помірних депресивних переживань)). Серед учасників бойових дій було виявлено різні рівні депресивної симптоматики, високий рівень психо-емоційного напруження, що дозволяє оцінити глибину депресивних переживань та ускладнює процес соціальної адаптації. Результати зазначили, що процес реабілітації повинен включати мультидисциплінарну підтримку, поєднуючи психотерапевтичні методи, медикаментозне лікування (за потреби), а також соціально-психологічну допомогу, що сприятиме розвитку психологічної стійкості і соціальної адаптації ветеранів. Отримані дані можуть бути використані для вдосконалення методик реабілітації та створення нових підходів для ефективного відновлення психічного здоров'я ветеранів у майбутньому

Ключові слова: ПТСР; тривожність; стрес; відновлення; психологічне здоров'я

UDC 159.92

DOI: 10.52534/msu-pp1.2025.91

Oleh Hryhoriev*

PhD Candidate, Postgraduate Student

Mukachevo State University

89600, 26 Uzhhorodska Str., Mukachevo, Ukraine

<https://orcid.org/0009-0005-1744-7946>

Psychological characteristics of various types of mental deprivation in individuals with prolonged stays in residential institutions

Article's History:

Received: 13.10.2024

Revised: 22.02.2025

Accepted: 26.03.2025

Suggested Citation:

Hryhoriev, O. (2025). Psychological characteristics of various types of mental deprivation in individuals with prolonged stays in residential institutions. *Scientific Bulletin of Mukachevo State University. Series "Pedagogy and Psychology"*, 11(1), 91-103. doi: 10.52534/msu-pp1.2025.91.

Abstract. In the context of the state's strategy for deinstitutionalisation, the issue of deprivation related conditions in closed residential institutions – conditions that hinder rather than foster personal development and socialisation – remains critical and requires thorough analysis, recommendations, and alternatives. This article aimed to examine the deprivation experienced by individuals who have been in residential institutions for an extended period. The application of scientific methods such as analysis, synthesis, comparison, abstraction, and generalisation has enabled an exploration of the specific features of this phenomenon within the broader issue of prolonged institutionalisation in specialised social care facilities. The study also considered the conceptualisation of deprivation within the framework of human sciences. It has been established that deprivation arises when vital needs remain unmet over an extended period, exerting a negative impact on personality development at various levels of the organisation and across multiple domains of life. It hindered adaptive tendencies in individuals facing adverse living conditions. The study revealed that temporality is a crucial structural component of self-awareness in individuals in residential institutions. The relationship between deprivation and adaptation processes was described. It was noted that deprivation can manifest both as a process and as a consequence of prolonged unmet fundamental needs within institutional settings. The findings may serve as a foundation for developing a systemic approach to strategies aimed at integrating residential institution inhabitants into society. Additionally, they can be applied by psychologists, social workers, and other institutional staff to foster independent living skills and enhance quality of life

Keywords: deprivation; isolation; fundamental personal needs; personal adjustment; personal maladjustment

*Corresponding author

INTRODUCTION

The study of personal deprivation within the context of social care institutions is highly relevant due to its significant impact on an individual's emotional and psychological state, cognitive development, and adaptive capabilities. Research in this area contributes to the development of effective psychological support and prevention methods to mitigate the negative consequences of deprivation. This is crucial for improving the quality of life for people living in such institutions. Within the Ukrainian system of residential institutions, the study of deprivation is particularly pressing. It requires careful analysis of the specific living conditions experienced by children and adults who suffer from a lack of social interaction, emotional support, and

the development of autonomy. This analysis is essential for developing alternative approaches to organising the lives of residents in these types of facilities.

Furthermore, mental deprivation, especially during childhood and adolescence, is a significant phenomenon that directly influences personality formation, adaptive abilities, and social behaviour. This becomes particularly significant within the context of the deprivation environment inherent in the residential institution system, which has a long history in Ukraine and is being brought to the forefront by structural changes in the educational and social spheres. Research on deprivation in psychology has been conducted by numerous scholars. Notably, I. Bretsko (2018) and



O. Sasovska (2021) laid the groundwork for the theoretical and psychological understanding of social deprivation. Their research demonstrated the impact of early separation from parents or caregivers on a child's emotional development. Contemporary studies on deprivation focus on deepening knowledge about sensory and cognitive deprivation. For example, N. Smith *et al.* (2018) advanced understanding of the effects of sensory deprivation on cognitive processes. O. Sidorenko & L. Hryshchenko (2023) investigated the impact of cognitive deprivation on student learning, and Y.M. Vizniuk (2018) explored the specific features of self-perception and social identity in deprived adolescents.

Significantly less research focuses on deprivation within social care institutions due to their remote locations, limited accessibility, and isolated nature. These institutions – namely, children's homes, children's residential homes, shelters for children, orphanages, general education boarding schools for orphans and children deprived of parental care, social rehabilitation centres for children with disabilities, social and psychological rehabilitation centres for children, psychiatric and neurological residential schools, geriatric care homes, and residential care homes for elderly adults and individuals with disabilities – are recognised as places of detention. This means they are locations that individuals cannot leave of their own volition or are unable to exercise that volition due to physical or material constraints. This circumstance prevents free public access to such institutions, thereby impeding scientific research. Existing studies on personal deprivation in institutional settings predominantly focus on children and adolescents in children's residential homes and general education boarding schools for orphans and children deprived of parental care. However, the range of individuals experiencing institutional deprivation is considerably broader, leaving many groups still under-researched in psychological studies.

Contemporary researchers, such as D. Goshovska *et al.* (2023), have dedicated considerable attention to studying deprivation and its impact on the ontogenesis and sociogenesis of children in closed social institutions. Their research emphasises that mental deprivation in these settings arises from restricted opportunities to satisfy basic needs: emotional, social, sensory, and cognitive. The researchers note that these children often experience emotional deficits due to a lack of personalised attention and care from adults, as well as social isolation, which causes difficulties in developing autonomy, forming self-esteem, and acquiring social skills. The authors also point to the long-term consequences of deprivation, including delayed mental development, low adaptability to social life, and an increased susceptibility to psychosocial problems in adulthood. They highlight the necessity of implementing individualised rehabilitation programmes that would promote the emotional and social development of children in social care institutions. The authors underscore the importance of creating a supportive environment that compensates for the deficit of basic needs and provides conditions for harmonious development.

N.V. Tsumareva (2021), in her research, extensively studied the emotional deprivation of young school-aged children raised in residential institutions and its impact on their development. She established that emotional deprivation in these settings is a systemic phenomenon that causes serious disturbances in the psychological, emotional, social, and behavioural domains. These disturbances include a reduced level of emotional resilience, a tendency towards anxiety and withdrawal, and difficulties in forming social connections. Consequently, the ability to adapt and integrate into society is diminished. The researcher also points to the slowing of physiological development in these children due to a lack of adequate stimulation and the underdevelopment of cognitive abilities. To address these issues, she developed a model of psychological support for foster families, which involves comprehensive work with children and their new caregivers. The problems of social deprivation in institutional settings have been addressed in the articles of H. Sand *et al.* (2024) and O. Sasovska (2021). These researchers emphasise the link between deprivation and a decline in cognitive activity, communication skills, and the development of antisocial behaviour. The research of H. Slozanska & N. Horishna (2021) highlights the negative impact of residential institutions on child development. These scholars stress that children's exposure to the depriving environment of large institutional settings leads to delays in psychological, cognitive, emotional, and social development. The authors identify key issues, including isolation from society, the development of an inferiority complex, low social maturity, and difficulties with integrating into society and forming families in the future.

While many studies have focused on the general aspects of deprivation, its psychological mechanisms, particularly within the depriving environment of Ukrainian residential institutions, remain under-researched. The complex socio-economic situation, which leads to an increase in the number of children and adults in these institutions, highlights the need for research into this phenomenon. The purpose of this article was to reveal the content of the various types of deprivation experienced by individuals who have prolonged stays in social care institutions.

MATERIALS AND METHODS

To achieve the aim, a combination of scientific-theoretical approaches and methods was employed. These methods ensured the exploration of the problem of diverse deprivation in social care institutions and its impact on personal development and adaptation. The comparative-genetic approach allowed for tracing the evolution of the study of the deprivation phenomenon. It also facilitated the identification and systematisation of contemporary theoretical approaches to defining deprivation, its essential characteristics, and contributing factors in Ukrainian and international scientific traditions. The structural-functional approach provided the opportunity to analyse the complex phenomenon of deprivation, considering its structural organisation and functional interrelationships.

The use of analysis and synthesis enabled the identification of key aspects of the depriving environment, such as social, emotional, sensory, and cognitive deprivation. Abstraction and generalisation methods contributed to the formation of a systematic view of the impact of diverse deprivation on individuals in conditions of prolonged stays in closed institutions. A theoretical analysis of scientific sources was conducted, which allowed for the development of a clear understanding of the concept of deprivation, its types, and consequences. The use of deduction allowed for examining the multifaceted phenomenon of deprivation from its abstract representation to the specific conditions in which the variability of its manifestations unfolds. The inductive method helped to generalise the role of deprivation in the development of individuals in social care institutions.

The choice of these methods was driven by the necessity to study the wide range of impacts of a depriving environment on both children and adults who experience prolonged isolation. The methods used allowed for the identification of critical aspects of deprivation, including

prolonged isolation, insufficient emotional contact, and a deficit of sensory enrichment. Through these methods, it became possible to construct a logical sequence between key concepts. Particular attention was paid to the impact of restrictive regimes and a lack of personalised attention on the development of children and adults. The primary materials consisted of contemporary international and Ukrainian scientific research on the phenomenon of deprivation, as well as observations of the living conditions of residents in social care institutions and the organisation of daily life within these facilities.

RESULTS AND DISCUSSION

The concept of “deprivation” is a complex interdisciplinary scientific category studied across various fields of knowledge, including Medicine, Biology, Philosophy, Psychology, Social work, Pedagogy, Law, and others. In each of these areas, deprivation acquires a specific meaning, reflecting its impact on particular aspects of human life and activity (Table 1).

Table 1. Interdisciplinary approach to the concept of “deprivation”

Field of study	Meaning of the concept of “deprivation”	Sources
Biology and Medicine	Deficiency of necessary conditions for physiological functioning (biogenic deprivation)	V. Kobylchenko & I. Omelchenko (2022)
Philosophy	Existential experience of insufficiency or loss of meaning	G. Huber (2002)
Legal sciences	Factors determining juvenile delinquency	D. Gurina (2015)
Sociology	Determinant and consequence of reform processes; failure of society to fulfil its functions in protecting and supporting the full existence of children	O.V. Brovko & M. Yatsiuk (2019)
Social work	Social exclusion or restricted access to basic resources, social needs, and contacts	A. Giddens (1991); Z. Bauman (2000); O. Krasnytska (2021)
Social pedagogy	Deprivation, limitations, insufficiency of conditions, material and spiritual resources necessary for the survival and development of children; limited opportunities for mastering an autonomous social role	I. Zvereva (2015); A.O. Polyanychko (2008)

Source: compiled by the author

In scientific tradition, the concept of deprivation is interpreted as a state in which an individual is deprived of the opportunity to satisfy their sensory, emotional, or cognitive needs. Deprivation is understood as a mental state that arises under the influence of complex existential conditions and is characterised by the limitation or absence of opportunities to satisfy basic life needs. Despite the lack of a unified perspective and definition of this concept in psychological science, it is undeniable that various interpretations are united by the context of deficit, deprivation, limitation, and dissatisfaction. Researchers from different scientific fields agree unanimously on the thesis that deprivation causes negative consequences for individuals at various levels of their organisation and in areas of their lives.

In psychological science, the concept of mental deprivation is frequently used. Numerous studies have highlighted the consequences of mental deprivation, which manifest in the form of deficiency and dysfunction of mental development (Langmeier & Matejcek, 1984; Bretsko, 2018). This phenomenon is primarily considered through its external

determination by social factors. Psychological science employs the concept of “mental deprivation”, which, on the one hand, refers to a mental state arising from the lack or dissatisfaction with vital mental needs, and on the other hand, to the situations and circumstances of an individual’s conditions and functioning (Kobylchenko & Omelchenko, 2022).

Scholarly sources indicate the particular vulnerability of the child’s psyche to the influence of deprivation (Polyanychko, 2008). The study of social deprivation began in the 19th century, with observations of deprivation phenomena in children deprived of parental care and placed in orphanages. The concepts of maternal deprivation and hospitalism were introduced into scientific discourse. A. Freud (1965) understands maternal deprivation as a lack of emotional bonds between mother and child. The concept of play deficit is also used to denote a state of dissatisfaction with a child’s basic need for play as the child’s primary activity. A. Freud interprets maternal deprivation through “separation anxiety”, which manifests as a child’s protest against separation from the mother. According to the researcher,

typical situations of maternal deprivation include residence in residential facilities for evacuated children during war-time, in hospitals without maternal presence, and peace-time, in orphanages and children's homes.

In the 20th century, the theory of relative deprivation was developed (Killian, 1984). According to this concept, aggressive behaviour and antisocial manifestations among young people are explained by both objective and subjective forms of deprivation, which include psychological and social factors. Subsequently, the concept of deprivation was studied concerning other areas of human activity due to historical events, scientific progress, social changes, and transformations in social institutions, within which humans were included. With the development of research technologies and methodologies, scientists gained more tools to observe the consequences of biogenic deprivation. An increasing number of social experiments were conducted. With the onset of societal crises, researchers began to analyse the consequences of unemployment (professional, material deprivation). The re-evaluation of the functioning of institutions that cared for disadvantaged children and adults raised the issue of the impact of a depriving environment on personal development. With the exploration of space, researchers were able to observe the processes that occur with isolated groups of people in depriving situations of prolonged stays on space stations in conditions of weightlessness. Various expeditions and extreme situations provided scientists with new knowledge about the mechanisms of diverse deprivation. This explains the variety of types of deprivation proposed by researchers.

The concepts of "frustration" and "isolation" are closely related to the term "deprivation" in terms of their psychological meaning. However, deprivation (i.e., a mental state caused by an individual's life in conditions of prolonged deprivation or significant limitation of opportunities to satisfy vital needs) is a more prolonged and persistent phenomenon than frustration. Isolation refers to a state in which an individual or group is separated from social contacts or sensory stimuli. This can be the result of external circumstances or an individual's conscious choice. Isolation can lead to limited social interaction and sensory perception, which, in turn, can affect the psychological and mental state of an individual. Thus, isolation can be one of the causes of deprivation, but not every instance of isolation leads to deprivation, and not every instance of deprivation is the result of isolation. In the context of examining the issue of individuals living in residential institutions within the social welfare system (children's homes, children's residential homes, geriatric care homes, psychiatric and neurological residential schools), the discussion encompasses both frustration of needs, isolation from the outside world, and various forms of deprivation.

It is important to note that deprivation can be viewed both as a process, during which the effects of depriving factors unfold over time and as a result, in the form of a specific state. Deprivation, as noted by D. Goshovska & Y. Goshovskyi (2022), is both a cause and a consequence

of personal and socio-psychological maladjustment among inhabitants of residential institutions, directing an individual's psychological development towards dysontogenesis. The author also makes a very important point regarding the duration of deprivation. At the theoretical-empirical level, it was proven that the duration of deprivation negatively impacts personal development. The researcher notes that temporality is a powerful root cause of the basic constructs of an individual's self-awareness, and therefore, it can be argued that there is a relationship between the duration, time, and extent of an individual's deprivation and the success of their future personal development.

It is also important to clarify what is meant by the concept of a "*depriving situation*". A depriving situation is defined as living conditions in which the satisfaction of basic physiological and psychological needs becomes impossible. This can be caused by individual physical limitations or by the influence of a combination of extreme circumstances that hinder proper "sensory enrichment". In psychology, such circumstances are referred to as an "impoverished environment", which is characterised by a lack of stimuli necessary for the harmonious development and functioning of the psyche. Depriving living conditions create extreme situations for individuals, to which their psychophysiological organisation is not adapted.

In psychology, it is common to distinguish the following types of deprivation: motor (spatial, locomotor-kinesesthetic, psychomotor), sensory (stimulus), informational (cognitive, deprivation of meaning), social (identity), maternal, professional, temporal, sleep deprivation, and monotony. Generalising the multiplicity of types of deprivation, it is necessary to supplement this list with the following types: familial, sexual, gender, communicative, extreme, economic (material), nutritional, institutional, total-partial (limited), overt-latent, external-internal, permanent, temporal (time-related, early, late), experimental, institutional, role-based, spiritual-somatic, organismic, sub-ethnic, and cultural. The approach to the typology of deprivation by J. Langmeier & Z. Matejcek (1984), who propose four types of deprivation (stimulus, meaning, emotional attitude, and identity), is based on which of the mental needs is chosen as the baseline and forms the essence of the deficiency. Among these needs, researchers include: the need for a certain amount of impressions, for a change in the modality of stimuli, for ensuring conditions for learning, for primary social connections (primarily with the mother), and for social self-realisation, mastering social roles, and value orientations. Y. Koreneva (2021) classifies deprivation by duration of action: short-term (due to illness, rest, work in specific conditions), protracted (work of astronauts or researchers at remote stations, stay in specialised institutions due to loss of health and ability to work), and long-term (self-isolation for religious reasons, membership in sects, institutional living due to illness).

However, according to N. Dmitriyuk (2015), the accumulation of various types of deprivation leads to the unification of an individual's psychological structure, reducing

their individual uniqueness. An individual is usually under the influence of several interrelated types of deprivation, which can interact, combine, or cause each other. The content of these types of deprivation is discussed in more detail, considering the specific characteristics of a person's life in residential institutions. First and foremost, *sensory* and *motor deprivations* are distinguished in the typology of deprivation. Sensory deprivation arises as a result of "stimulus hunger" – the inability to satisfy an individual's basic need for sensory impressions. It is caused by the limitation of external polymodal stimuli, including visual, auditory, tactile, olfactory, and other sensory influences. Motor deprivation is the result of a sudden restriction of physical activity due to illness, injury, or changes in living conditions, leading to a state of chronic hypodynamia. The consequences of motor deprivation are characterised by deformations that, in terms of depth of impact and complexity of overcoming, exceed the physiological disorders directly caused by the disease or traumatic injury.

Children who end up in shelters or residential institutions experience the full severity of sensory and motor deprivation. The specific characteristics of sensory and motor deprivation in these settings are determined by the organisation of childcare. Due to a shortage of staff, physical contact with the child is limited to feeding and sanitary-hygienic procedures. Sensory stimuli are confined to the space of the bed. The child experiences polymodal deprivation, including emotional, maternal, and tactile deprivation. Older children, although they have toys, do not adequately satisfy their basic need for play and interaction with significant adults. Through adults, children develop an understanding of their own emotions, learn to calm down, explore the boundaries of their bodies, and develop cognitive abilities. A child's motor activity promotes learning, exploration of the new, and the unfolding of a cascade of neurophysiological and cognitive processes important for the transition to the next stage of development and the formation of necessary new formations of a particular age period. Depriving influences significantly slow down ontogenesis, not to mention cases where a child has congenital developmental disabilities or injuries that complicate adaptation and deepen deprivation in a residential institution. Guided by the logic of diversifying visual stimuli, staff often attempt to colour the rooms of children's rooms. However, this practice often has the opposite effect – sensory (visual) overload (Shynkaruk, 2002).

When discussing adults living in specialised closed institutions within the social protection system, sensory deprivation is caused by the monotony of their small rooms with minimal furniture, the absence of personal belongings, photographs, and a lack of variety in their activities (a common pastime being limited to watching television with only a few channels in a communal room), a monotonous and impoverished diet (as the state allocates minimal funds for food), and limited access to current external information. In more severe cases, when residents, for example, in psychiatric and neurological residential schools,

have a pronounced and profound mental deficiency, some institutions practice locking people in a single room all day, where they sit on benches or lie on the floor, as they are unable to stay in their own rooms. Thus, they experience hypodynamia, sensory deprivation, and monotony in a confined space without the ability to influence it. In cases where people have free access to their rooms, but the institution lacks comprehensive rehabilitation programmes and well-planned leisure activities, individuals often choose to simply lie in bed all day. Cases of injury, the presence of diseases, or amputations that significantly reduce mobility or make movement entirely impossible are not uncommon. There are frequent instances where "bedridden" residents are placed on floors other than the ground floor, and in the absence of sufficient staff to assist, elevators, or means of transportation, these people may not leave the institution's grounds for years.

Humans require activation not only of visual and auditory analysers but also stimulation of tactile, temperature, muscle, taste, and other receptors. In conditions of sensory deprivation, inhabitants of residential institutions experience disinhibition of the cerebral cortex at the physiological level, which is accompanied by the appearance of hallucinations and perceptions that the subject perceives as reality. These phenomena may include visual visions (flashes of light, images of faces), auditory sensations (noises, music, voices), and tactile sensations (crawling ants, heat flows). The situation is further complicated by the fact that residents of psychiatric and neurological residential schools have mental disorders, including those with productive symptoms. Conditions in which a person experiences sensory deprivation only exacerbate the course of an existing disorder.

The deficit of sensory information activates a person's need for sensations and strong emotional experiences, which develops the phenomenon of sensory and emotional hunger (Tsumareva, 2021). This contributes to the activation of imagination and figurative memory, acquiring a compensatory protective character. The ability to store and reproduce vivid and detailed images of previously perceived objects or sensations becomes a means of adaptation. However, prolonged sensory deprivation leads to changes in the psycho-emotional state: lethargy, depression, and apathy, which can alternate with euphoria. Memory, sleep-wake rhythm, and thinking processes are disrupted, leading to trance states, hallucinations, and difficulty concentrating and analysing problems sequentially.

Y.M. Vizniuk (2018) hypothesised, based on learning theory, that in conditions of isolation from the natural environment and insufficient stimuli, a child cannot engage in the continuous process of re-evaluating them, creating models and strategic schemes based on them to interact constructively with the environment. Deprivation in early childhood makes it impossible to form such effective models. In later life, the maintenance of models becomes vulnerable, as these models and strategic actions are constantly changing, corrected, and regulated. This important

thesis explains, in particular, the process of skill loss among residents of closed residential institutions. Experimental studies confirm that sensory deprivation can provoke temporary psychosis or mental disorders (Yatsenko *et al.*, 2015). In prolonged deprivation, organic disorders arise: insufficient brain stimulation causes degenerative changes in nerve cells. This indicates the existence of a biological mechanism that links sensory and emotional deprivation with degenerative processes and even lethal outcomes. Thus, sensory deprivation, like physical deprivation, can cause irreversible consequences in the human body, sharing common biological and psychological characteristics.

Sensory deprivation also manifests as a deficit of information or impressions among inhabitants of residential institutions. Insufficient emotional stimulation, lack of communication, and sensory stimuli provoke mental and somatic disorders, exacerbating feelings of isolation. In childhood, emotional stimulation is critically important for full mental development and well-being in adulthood. The lack of sensory experiences causes emotional deprivation, the consequences of which are similar to sensory deprivation, but it is more difficult to recognise in everyday life. Emotional deprivation often underlies depression, loneliness, difficulties in socialisation, and also causes aggressive behaviour and addictions. Adaptation of the organism to the environment requires maintaining a constant information balance between the environment and the individual. Disruption of this balance due to information overload or underload (sensory isolation) can lead to significant functional mental disorders. Information deprivation is divided into personal (information about oneself, and one's environment), professional (information important within a professional group), and mass (distributed in mass media). Its consequence is *cognitive deprivation*, which manifests in thinking disorders, disorientation, and inability to make effective decisions. Cognitive (meaningful) deprivation is formed by an overly variable and chaotic structure of the external world with a lack of organisation of its content, which prevents the ability to understand, predict, and influence what is happening externally.

Individuals who stay in residential institutions for extended periods experience the full spectrum of cognitive deprivation. The specific characteristics of cognitive deprivation in inhabitants of residential institutions can be explained by their limited access to diverse information and interaction with the outside world. The emergence of information deprivation is facilitated not only by limited social isolation and a restricted and stable circle of contacts that individuals have in residential settings but also by the frequent absence of means of communication with the outside world (telephone or computer with internet access); difficult or non-existent access to sources of information; standardised communication between staff and residents; and limited self-expression, which impoverishes cognitive experience and skills in solving non-standard problems. This, in turn, causes disturbances in cognitive processes, including problems with thinking, disorientation in

spatial and temporal contexts, and inability to make informed decisions. The absence of an ordered and understandable structure of external information also deepens the chaotic perception of the world, making it impossible to predict events and influence them.

However, there is another extreme when there is the possibility of using means of communication with the outside world, such as the Internet. O. Sasovska (2021) explored the relationship between multifactorial deprivation in children with visual impairments and the emergence of internet addiction. Deprivation can stimulate self-absorption, isolation in the inner or virtual world, and escape into virtual space. Immersion in the internet is an attempt by the child to find safety and comfort. The researcher indicates that the conditions of residential institutions, including cultivated conformism, limitation of subjectivity, and difficulties in forming personal autonomy and identity due to the absence of family warmth and care, encourage children to actively seek role models on the Internet.

Sensory and cognitive deprivation are often accompanied by *social deprivation*. J. Langmeier & Z. Matejcek (1984) were among the first to introduce the concept of social deprivation and used it in studies of child development outside the family. By this concept, the authors understand social isolation and limited opportunities for mastering an autonomous social role. Contemporary psychologists expand the understanding of social deprivation to include the limitation of opportunities to observe the performance and assimilation of social roles (Bevz & Doroshenko, 2003; Bevz, 2018). Also, the consequences of social isolation or reduced living space (Bilynska & Tur, 2006), and the insufficiency of social influences (Krupnik, 2012). An individual living in the isolated micro-society of a residential institution has a stable environment within their room and ward. Exiting the territory is often minimised or impossible. During the period of additional isolation during the coronavirus pandemic, residents often could not even contact their relatives and guardians in person. The circumstances of prolonged confinement in a small social group are accompanied by increased anxiety, fear, and depression, and ecstatic affective states and euphoria may also develop. The public and volunteers do not have free access to the residential institution. Often, residents of the institution do not have relatives or friends who can visit them, and it is common practice for the director of the institution to be the official guardian. Society has become accustomed to not noticing those who live in residential institutions, and their residents do not participate in the social life of the community.

If added to this, the absence of means of communication, individuals living in institutions develop a sense of isolation and a state of *communication deprivation*. During visits to residential institutions, the residents' acute need for conversation and contact with a new person is immediately felt. People do not want to end their communication, follow behind, and sometimes surround in groups. The lack of communication is particularly acute in geriatric care homes, especially if residents are immobile

or bedridden and unable to move freely around the institution. In such cases, the only social environment for a person is their roommate and staff. Y.M. Terletska (2014) proposed a division of social deprivation, understood as the result of the dissatisfaction of certain groups of social needs, into the following subtypes: a) by content of needs: socio-spatial, age-related, prestige, self-affirmation, loss of meaning, freedom of choice, social stratum, gender, hopelessness, status-role, non-recognition, communication, and interaction; b) by factors of social influence: family, preschool, school, street, special institutional (schools, boarding schools, colonies, etc.), student, cult (confessions, sects), ethnic, social, professional; c) by time: short-term, protracted, long-term, lifelong; d) by volition: voluntary, forced, compulsory; e) by degree of awareness: conscious, partially conscious, unconscious; f) by degree of isolation: complete, partial, relative.

The unsatisfied need for social contact is exacerbated, and with prolonged deprivation, the protective mechanisms of the psyche may be activated. Prolonged social deprivation intensifies the need for communication, sometimes leading to the creation of an imaginary interlocutor through the personification of objects or engaging in dialogue with oneself. These phenomena are explained by the dialogical nature of human consciousness. In a state of loneliness, regulatory influences of society, such as approval, condemnation, or encouragement, are weakened, forcing a person to reproduce them independently through the exteriorisation of their own reactions. By expressing thoughts aloud, a person can perceive them as external, which is a protective reaction within the bounds of psychological normalcy. Speaking to oneself aloud in stressful situations is considered an effective way to prevent neuroses.

The reaction generated by social isolation, namely *the feeling of the presence of an outsider* (a person feels as if someone is watching and accompanying them), is quite interesting. This condition is associated with emotional tension, fears, and an increased need for communication. Research conducted among people in geographical and social isolation (Maksymenko, 2012) reveals in them traits of introversion, a focus on internal experiences, weak reaction to external stimuli, autistic and schizoid manifestations, emotional lethargy, distorted perception and judgment, as well as superficiality and selectivity of social contacts.

Over the relatively long history of studying this concept, science has accumulated several interesting experiments on the mechanisms and manifestations of human deprivation in various circumstances of life and activity: in conditions of space tests and weightlessness, extreme situations, forced isolation from society or a limited group of people, during scientific expeditions in mountainous and marine areas. However, the results of such experiments generally indicated that deprivation leads to negative consequences in personal development, and attempts by the psyche to compensate for distress by activating protective mechanisms, sometimes leading to irreversible phenomena. For example, studies of the lives of people at polar stations

concluded that the key factor of mental stress is not so much exhausting work and cold climatic conditions, but the limited territory of the station and the stability of the team, that is, the very same social deprivation (Yatsenko *et al.*, 2015).

In conditions of social deprivation, a person may exhibit atypical behaviour not only due to isolation from society but also due to the phenomenon known as the “aquarium phenomenon”. It is characterised by constant publicity, observable behaviour, and being in the spotlight of colleagues or neighbours. People in a social environment change their behaviour compared to how they behave alone, which is confirmed by numerous observations, including through hidden cameras. In the process of interaction, a person performs various social roles. The realisation that their behaviour is being observed forces them to constantly control their actions, not going beyond the limits of the given role and role function. This, in turn, causes prolonged internal tension, accompanied by the suppression of their own emotions and desires. Similar conditions are observed in the social environment of a residential institution. People can live in such an institution for decades, with relatively unchanged roommates or ward mates. Problems with privacy in residential institutions are one of the most painful: often there is no opportunity to be alone, rooms are mostly not locked (staff explain this as a safety measure), and even during sanitary-hygienic procedures, in the absence of elementary partitions or curtains in bathrooms, achieving privacy is very difficult. This creates considerable tension for the individual. The aforementioned features of the organisation of everyday life in residential institutions can create the mentioned “aquarium phenomenon”, when inhabitants of residential institutions cannot be alone, without the supervision of roommates, staff, or video surveillance.

The need to constantly interact with the unchanging social environment of a residential institution leads to information fatigue among communication partners. This phenomenon was vividly manifested in extreme conditions, namely in the confined space of a submarine crew. It was observed that from the beginning of the formation of a social group, its members show an active interest in each other, exchanging mostly biographical information. Subsequently, the circle of communication expands, and there is an active joint discussion of current events, impressions, and interests. However, gradually, mutual interest decreases (Yatsenko *et al.*, 2015). It can be concluded that social deprivation of residents of social protection institutions can be caused not only by isolation from the social environment and its absence (information deprivation) but also by the presence of a constant environment (roommates/ward mates, staff), within which a person is isolated and experiences information fatigue, which negatively affects their well-being.

It is necessary to note the general trend of developmental delays in children living in residential institutions. H. Sand *et al.* (2024), studying the impact of residential education upbringing in conditions of psychosocial deprivation on infants, found that despite good physical care, psychosocial deprivation increases the risks of developmental

disorders, affecting language and social skills the most. A longer stay in residential institutions is a risk factor for developmental delays. Researcher O. Krasnytska (2021) proposes to classify social deprivation depending on the nature of isolation. Social deprivation thus has several varieties:

1) *forced isolation* – arises from circumstances beyond the control of the individual or society (e.g., isolation of a ship's crew on a deserted island or an expedition lost in the taiga or desert; situations of child abandonment);

2) *compulsory isolation* – imposed by society regardless of the will of individuals who are in closed groups (e.g., prisoners, patients undergoing compulsory treatment, or conscript soldiers, residents of orphanages or boarding schools; isolation during a pandemic; placement of a person in residential institutions by relatives and loss of capacity);

3) *voluntary-forced or voluntary-compulsory isolation* – associated with achieving a significant goal that requires limiting contacts with society (e.g., professional closed groups, sports boarding schools, military schools and lyceums; individuals who recognise the need for psychiatric treatment to improve their well-being).

4) *voluntary isolation* – driven by the individual's choice to belong to a closed group (e.g., monks, sectarians, individuals who consciously choose alienation as a way of self-realisation; in some cases, elderly people choose to move to a geriatric care home in the absence of relatives who can care for them).

However, the researcher notes that social isolation does not always cause social deprivation. In many cases, particularly in conditions of voluntary or voluntary-compulsory isolation, the presence of a goal important to the individual contributes to the harmonious development of the personality, forming a mature, spiritually resilient, and internally rich individual without signs of deprivation syndrome. The author of this article considers it important to add: that even in cases of voluntary or compulsory-voluntary isolation of a person who enters the impoverished environment of a residential institution and experiences prolonged exposure to a depriving situation, with a lack of compensatory mechanisms and resources (both internal and external), the person has a high risk of experiencing the negative consequences of various types of deprivation.

As P.G. Yaremko (2022) rightly emphasises, depriving living conditions are extreme for humans, as their psychophysiological system is not adapted to such influences. The limitation of educational and social factors leads to disruption of the mechanisms of regular mental development, which ensures its stability and consistency. As a result, development acquires an irregular character, which negatively affects the processes of self-regulation, control of effectiveness, and correction of mental activity. This causes disorganisation of behaviour, disruption of its integrity and purposefulness.

It is advisable to distinguish between *primary deprivation* in residents of closed institutions, which is formed as a result of orphanhood, abandonment, or upbringing in a deviant family, and *secondary deprivation*, which is

manifested in the educational regime of the children's institution, its principles of restriction and punishment. There is a problem of regression in attempts to solve the problem of deprivation and child orphanhood from the level of foster families and family-type children's homes to the level of institutional forms of education and upbringing of children due to the socio-economic difficulties of martial law, related migration processes, and an increase in the number of orphans whose parents have died or are gone missing.

Primary deprivation in a child is associated with maternal and family deprivation. Early maternal deprivation forms complex pathological changes in the child's psyche. These children are characterised by disorders of the emotional-volitional sphere, intellectual developmental delay, uneven cognitive maturation, and speech disorders, especially expressive speech. Deprivation depression (apathetic or masked and phenomena of deprivation pseudo-autism) in children's home residents is observed much more frequently than in children growing up in families (Kononova, 2009). O. Stepanov (2006) notes that children who have experienced maternal deprivation, regardless of age group, often demonstrate undifferentiated speech, superficial contact with the environment, underdevelopment of the emotional sphere (blockage of feelings of pity, compassion, shame), and inability to recognise their own guilt. Reduced work capacity, attention and memory disorders are also characteristic. In psychology, this complex of symptoms is known as orphanhood syndrome, which reflects a delay or distortion in the formation of mental functions and the emotional sphere of personality.

The consequences of early maternal deprivation in children in social protection institutions often transition into social deprivation in adulthood, manifested in self-isolation, inability to build full-fledged social relationships, and a tendency towards aggressive or deviant behaviour. Emotional deprivation in early childhood forms a basic alienation from society, rejection of its values, and perception of the environment as threatening or hostile. The basis of these destructive attitudes is a deficit of basic trust, which arises as a result of partial or complete loss of maternal care.

Secondary deprivation in children and adults is caused by the conditions of staying in closed institutions. This type of deprivation is also called institutional deprivation. Institutional deprivation acts as a negative factor in the ontogenesis and sociogenesis of a child. The specificity of a closed social protection institution is its regime, isolation, and restrictions. Having experienced early deprivation, a child only reinforces unfavourable behavioural tactics and strategies. Relative isolation, which is a key determinant of institutional deprivation, leads to the formation of conflicting self-awareness in children. This significantly affects the adequacy of their behavioural reactions, which are often accompanied by emotional instability, cruelty, indifference, and aggressiveness. As O.V. Chistiak (2018) notes, adult-child communication in a residential home setting is distorted. Communication in the context of raising orphans is characterised by emotional limitations, a focus on negative

aspects of evaluation, and a shift of emphasis from practical activities to disciplinary aspects. This causes an increased need for attention, goodwill, and positive emotional contact in the child. Educators face difficulties in interacting with pupils who simultaneously seek emotional closeness and show aggression towards adults. The combination of aggressiveness with an inability to take responsibility forms a consumerist attitude towards adults and a tendency to shift the resolution of their problems to others.

It is common for a child with developmental disabilities or mental disorders to follow a fairly standard chain: first, they enter a children's home (up to 3 years old), then a children's residential home (from 4 to 18 years old), and then they are transferred to a psychiatric and neurological residential school (from 18 years old), where they can stay for decades or the rest of their lives. Early primary deprivation is compounded by secondary deprivation caused by the closed, isolated, and regimented nature of the institution, the specifics of the educational process, and the inadequacy or often absence of the necessary support from specialists who could partially compensate for developmental setbacks, learning difficulties, and loss of self-care skills. If a child, upon reaching the age of 18, is released from a social protection institution into independent life, the consequences of deprivation, disorientation, absence or unstructured knowledge of the surrounding world, and the lack of necessary self-care, planning, social connection, and professional skills immediately become apparent. The young person cannot find a job, manage finances reasonably, plan (including their expenses), create social connections, or stand up for themselves. Very quickly, the person begins to "capsulate", lose faith in their own abilities, and show signs of self-alienation and depressive tendencies.

Institutional deprivation of inhabitants of residential institutions is also caused by crowded living in monotonous conditions, which instils in children certain identification standards and chronotypes (our recreation room, our dining room, our classroom). Inhabitants of residential institutions tend to feel limited in their ability to control their own private space and organisation of time, without developing an understanding and experience of the phenomenon of privacy. The author's experience of visiting such institutions has shown that often even clothing in residential institutions is not personalised: today it is worn by one person, tomorrow by another. As a result, children and adults may ignore concepts such as "own-foreign", and "private-public", which can lead to the formation of antisocial behaviour.

Y. Koreneva (2021) studied the problems of deprivation in permanent confinement due to the pandemic. The author notes symptoms that accompany a person in conditions of forced group isolation: asthenia of the nervous system, as a result, conflicts and communication difficulties; chronic feelings of loneliness as a result of social deprivation, depression, poor sleep quality, anger, irritability, low mood (Brooks *et al.*, 2020), exacerbation of chronic diseases, the decline in cognitive functions, cardiovascular diseases; social isolation is even associated with the risk of

premature death. A group of researchers studying the phenomenon of deprivation, isolation, and strategies for overcoming them (Smith *et al.*, 2018) indicate that the longer the isolation lasts, the more prolonged the consequences, accompanied by avoidance strategies, symptoms of post-traumatic stress, and anger; there is a paradox of social proximity and separation: close proximity of people for a long time causes stress.

Separately, psychological literature considers a type of deprivation known as *family deprivation*. This condition arises when one family member feels a lack of satisfaction with their current needs due to the unwillingness or inability of other family members to provide it. This situation leads to mental tension, which can have negative consequences for both the individual and their immediate surroundings. Deficient family (non-family, institutional, surrogate) communication is considered by Y.M. Vizniuk (2018) as one of the most important determinants of the complication of identity acquisition by a deprived child, in particular, due to the lack of reference identification models for the assimilation of constructive behavioural patterns.

Studies in the context of the raised problem, which touch on another type of deprivation experienced by inhabitants of residential institutions, namely *professional deprivation*, are of interest. People in residential institutions usually lose their ability to work, and sometimes they have never mastered a profession or acquired a professional identity. Pedagogical neglect of children in institutions and formal receipt of a certificate, which further makes it impossible for the child to acquire knowledge and skills that would help in employment, is a common phenomenon. M. Jahoda (1997) developed a model of latent deprivation (latent function of employment and unemployment), according to which the mental health of unemployed individuals is worse compared to employed ones. This is due not only to the absence of an explicit function of employment, such as earning income, but also to a deficiency of five latent functions of employment: structured time, social contacts, collective purpose (awareness of one's usefulness to others), status, and activity. According to M. Jahoda, unemployment has two main consequences for a person: 1) reduced income and the risk of poverty; 2) exclusion from the material and social context provided by the workplace. Exclusion from the labour market leads to emotional stress and deterioration of mental health, as basic human needs are no longer met. These needs are: the need for structured, not empty time, for purposeful activity, not a feeling of uselessness, for a defined place in society, not exile, for entry into the network of society, not exclusion from it. Modern cross-cultural studies by K.I. Paul *et al.* (2023), based on meta-analytical methods that tested the assumptions of this theory, confirm that employed people have a higher level of all five latent functions, as well as the explicit function, compared to unemployed people (including pensioners). Thus, the assumption that employment best provides support for these latent functions and the realisation of these needs has been confirmed (Wacker, 2012).

These studies illustrate the importance for a person experiencing the consequences of professional deprivation in long-term residential institutions to have involvement in a collective purpose, acquire professional identity and status, have social contacts that help realise their own activity, and also have income. Inhabitants of residential institutions have the opportunity to participate in work on the auxiliary farm and perform certain types of work of their choice, but people do not receive official wages for this, and mostly they do this due to a lack of other options for spending time (unless there is abuse by the institutions of the opportunity to involve people in various types of work under the guise of work therapy). Summarising the analysis of the variety of types of deprivation experienced by a person in residential institutions, it should be noted that their content is generally similar. Types of deprivation intertwine, act simultaneously, and reinforce each other. The mental state of a deprived person is usually characterised by an increased level of anxiety, fear, and a feeling of deep dissatisfaction with themselves, their environment, and life in general. Typical manifestations include a decrease in vitality, and persistent depressive states, which can be accompanied by episodes of unmotivated aggression. The degree of deprivation impacts on an individual varies in each individual case. It is very important to consider the duration of the depriving impact of the institutional environment on the personality of its residents. The duration of the depriving situation determines the depth of harm caused by it, determines the prospects of personal development and the time required for recovery. If the deprivation is short-lived, it transforms into a depriving experience, which determines further strategies and reactions of the individual to similar circumstances.

Prolonged stays in residential institutions are often accompanied by the hidden influence of mental deprivation, which penetrates the inner world of the individual and negatively affects their life. This influence disrupts adaptive mechanisms and complicates the socialisation of these individuals. Given this, early diagnosis of deprivation manifestations and timely psychocorrectional work becomes particularly relevant. The earlier professional psychological support begins, the higher the chances of successful restoration of psycho-emotional balance and return to a full life. At the same time, effective adaptation of individuals to society requires a gradual transition from the institutional model to a form of supported living. This approach allows for minimising the impact of various types of deprivation, creating conditions for the development of autonomy, the formation of emotional bonds, and integration into society.

An important step in reforming the system of residential institutions is the introduction of alternative forms of supported living. This model involves providing individuals in need of social support with living conditions in small communities with an individual approach to their needs, integration into the social environment, and support in gaining independence. This approach helps reduce the level of deprivation, form emotional stability and social adaptation, and is an important stage in ensuring a full life for individuals

after leaving an institutionalised environment. The introduction of systematic diagnostic and psychocorrectional work, combined with the transition to supported living, are important factors that contribute not only to compensating for deprivation consequences but also to improving the quality of life of individuals in social care institutions.

CONCLUSIONS

Based on theoretical analysis, it has been established that deprivation is a borderline state that arises in situations where an individual cannot satisfy their basic life needs over a prolonged period. This state leads to serious consequences for mental health, as the individual experiences the simultaneous impact of various types of mental deprivation, which mutually reinforce each other. The system of residential institutions, functioning as places of detention, accumulates a significant number of negative factors that hinder the harmonious development of the personality of its residents. The remoteness of residential institutions, their isolation, the inability of individuals to leave their place of residence, regimentation, uniformity, lack of privacy, stable micro-environment within the institution, specifics of the educational process, prolonged stay in an impoverished environment, and isolation from the cultural and social life of society are the features that determine the content of various types of deprivation experienced by inhabitants of the residential institution system. The polymodal nature of deprivation influences and its prolonged effect on the ontogenesis and sociogenesis of children and adults is characteristic.

The negative consequences of deprivation on an individual are multifaceted and sometimes irreversible. They include reduced self-esteem, difficulties in self-identification, disruption of mental functions and personal development, as well as difficulties or impossibility of social adaptation. Children deprived of parental care are particularly vulnerable to the effects of mental deprivation. In conditions of prolonged stay in residential institutions, these effects can be amplified by the lack of emotional support and adequate social contacts and the influence of an impoverished environment. Therefore, it is important to implement measures for timely diagnosis and psychocorrection to mitigate the negative impact of various types of deprivation on the psyche of individuals in such institutions. Further research on deprivation should focus on evaluating the effectiveness of psychocorrectional methods and developing individualised rehabilitation programmes for individuals with experience of prolonged deprivation. It is important to study the impact of supported living on reducing deprivation syndromes and developing adaptive potential, as well as to improve approaches to the social integration of residents of social care institutions.

ACKNOWLEDGEMENTS

None.

CONFLICT OF INTEREST

None.

REFERENCES

- [1] Bauman, Z. (2000). *Liquid modernity*. Cambridge: Polity Press.
- [2] Bevz, H., & Doroshenko, O. (2003). [The influence of deprivation factors on the mental development of the child](#). *Problems of General and Pedagogical Psychology: Collection of Scientific Works of the H. S. Kostiuk Institute of Psychology of the Academy of Pedagogical Sciences of Ukraine*, 5(5), 25-34.
- [3] Bevz, H.M. (2018). Personal development of an orphan: Diagnostics of deprivation lesions. *Bulletin of Postgraduate Education. Series "Social and Behavioral Sciences"*, 6(35), 22-34. [doi: 10.32405/2522-9931-2018-6\(35\)-22-34](#).
- [4] Bilynska, R., & Tur, R. (2006). [Problems of deviant parenting: Early socialization in the formation of the parental sphere](#). *Psychologist*, 14, 24-27.
- [5] Bretsko, I. (2018). [Conceptual model of support and development of deprived adolescents with emotional burnout syndrome](#). *Theoretical and Applied Problems of Psychology*, 2, 49-60.
- [6] Brooks, S.K., Webster, R.K., Smith, L.E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G.J. (2020). The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *The Lancet*, 395, 912-920. [doi: 10.1016/S0140-6736\(20\)30460-8](#).
- [7] Brovko, O.V., & Yatsiuk, M. (2019). [Social deprivation as a determinant and consequence of reform processes](#). In *Economic development and heritage of Semen Kuznets: Materials of the international scientific and practical conference* (pp. 297-298). Kharkiv: Kharkiv National University of Economics named after S. Kuznets.
- [8] Chistiak, O.V. (2018). [Psychological and pedagogical conditions of formation of interpersonal relations of children in family-type children's homes](#) (PhD dissertation, Bohdan Khmelnytskyi National Academy of the State Border Guard Service of Ukraine, Khmelnytskyi, Ukraine).
- [9] Dmitriyuk, N. (2015). [Theoretical and methodological foundations of studying the problem of deprivation in psychological science](#). *Actual Problems of Psychology, H. S. Kostiuk Institute of Psychology, National Academy of Pedagogical Sciences of Ukraine*, 12(21), 114-124.
- [10] Freud, A. (1965). *Lectures on child psychoanalysis*. New York: International Universities Press.
- [11] Giddens, A. (1991). [Modernity and self-identity: Self and society in the late modern age](#). Stanford: Stanford University Press.
- [12] Goshovska, D., & Goshovskyi, Y. (2022). Psychological peculiarities of anxiety and sanogenicity of the deprived person. *Psychological Prospects Journal*, 39, 56-68. [doi: 10.29038/2227-1376-2022-39-hos](#).
- [13] Goshovska, D., Goshovskyi, Y., & Rudnytskyi, O. (2023). Features of the impact of psychoemotional burnout on the deformation of the self-concept of a deprived personality: A theoretical perspective on the problem. *Psychological Prospects Journal*, 41, 92-107. [doi: 10.29038/2227-1376-2023-41-hos](#).
- [14] Gurina, D.P. (2015). [Deprivation as a modern factor in determining juvenile delinquency](#). *Law and Society*, 4(3), 184-189.
- [15] Huber, G. (2002). The psychopathology of K. Jaspers and K. Schneider as a fundamental method for psychiatry. *World Journal of Biological Psychiatry*, 3(1), 50-57. [doi: 10.3109/15622970209150601](#).
- [16] Jahoda, M. (1997). Manifest and latent functions. In *The Blackwell encyclopedic dictionary of organizational psychology* (pp. 317-318).
- [17] Killian, L.M. (1984). Organization, rationality and spontaneity in the civil rights movement. *American Sociological Review*, 49(6), 770-783. [doi: 10.2307/2095529](#).
- [18] Kobylchenko, V., & Omelchenko, I. (2022). Phenomenology and typology of biogenic deprivation. *Psychology and Personality*, 2(22), 225-241. [doi: 10.33989/2226-4078.2022.2.265501](#).
- [19] Kononova, M.M. (2009). Influence of traumatic childhood experience on the subject's maladjustment. *Actual Problems of Psychology*, 10(2), 190-198.
- [20] Koreneva, Y. (2021). Problems of deprivation in permanent housing. *Young Scientist*, 4(92), 14-17. [doi: 10.32839/2304-5809/2021-4-92-4](#).
- [21] Krasnytska, O. (2021). Prevention of social deprivation of the individual. *Courtesy. Humanitas*, 3, 52-59. [doi: 10.32782/humanitas/2021.3.8](#).
- [22] Krupnik, I.R. (2012). [The phenomenon of mental deprivation and its importance in modern society](#). *Problems of General and Pedagogical Psychology*, 14(1), 156-163.
- [23] Langmeier, J., & Matejcek, Z. (1984). *Psychological deprivation in childhood*. New Jersey: Wiley.
- [24] Maksymenko, O.G. (2012). [Internal deprivation and its diagnostics](#). *Scientific Journal of the Drahomanov National Pedagogical University. Series 12: Psychological Sciences*, 36, 142-147.
- [25] Paul, K.I., Moser, K., Zechmann, M.A., Batinic, B., & Scholl, H. (2023). Employment status, psychological needs, and mental health: Meta-analytic findings concerning the latent deprivation model. *Frontiers in Psychology*, 14(1), article number 1017358. [doi: 10.3389/fpsyg.2023.1017358](#).
- [26] Polyanychko, A.O. (2008). [The current state of research on the problem of social deprivation of orphans and children deprived of parental care](#). *Pedagogical Sciences*, 3, 152-160.

- [27] Sand, H., Sticca, F., Eichelberger, D.A., Wehrle, F.M., Simoni, H., & Jenni, O.G. (2024). Raised in conditions of psychosocial deprivation: Effects of infant institutionalization on early development. *Children and Youth Services Review*, 163, article number 107718. doi: [10.1016/j.childyouth.2024.107718](https://doi.org/10.1016/j.childyouth.2024.107718).
- [28] Sasovska, O. (2021). Varietal deprivation and internet addictions of the individual: A theoretical perspective of the problem. *Bulletin of Lviv University. Series of Psychological Sciences*, 8, 150-156. doi: [10.30970/PS.2021.8.19](https://doi.org/10.30970/PS.2021.8.19).
- [29] Shynkaruk, V.I. (Ed.). (2002). *Philosophical encyclopedic dictionary*. Kyiv: Hryhorii Skovoroda Institute of Philosophy of the National Academy of Sciences of Ukraine: Abris.
- [30] Sidorenko, O., & Hryshchenko, L. (2023). Cognitive deprivation and its impact on student learning. *Educational Research*, 15(2), 78-92.
- [31] Slozanska, H., & Horishna, N. (2021). Functioning of residential care institutions and their negative impact on pupils. *Social Work and Education*, 8(1), 19-41. doi: [10.25128/2520-6230.21.1.2](https://doi.org/10.25128/2520-6230.21.1.2).
- [32] Smith, N., Barrett, E., & Sandal, G.M. (2018). Monitoring daily events, coping strategies and emotion during a desert expedition in the Middle East. *Stress and Health*, 34(4), 534-544. doi: [10.1002/smi.2814](https://doi.org/10.1002/smi.2814).
- [33] Terletska, Y.M. (2014). *Influence of social and economic deprivation of scientific and pedagogical workers on their professional activity* (PhD dissertation, Precarpathian National University Named After Vasyl Stefanyk, Ivano-Frankivsk, Ukraine).
- [34] Tsumareva, N.V. (2021). Theoretical and empirical study of the phenomenon of emotional deprivation. *Scientific Bulletin of Mykolaiv National University named after V.O. Sukhomlynskyi. Psychological Sciences: A Collection of Scientific Papers*, 2(21), 62-69. doi: [10.33310/2078-2128-2021-21-2-62-69](https://doi.org/10.33310/2078-2128-2021-21-2-62-69).
- [35] Vizniuk, Y.M. (2018). Psychological features of self-acceptance and social identity of deprived adolescents: Theoretical and empirical perspective. *Problems of Modern Psychology*, 40, 50-61. doi: [10.32626/2227-6246.2018-40.50-61](https://doi.org/10.32626/2227-6246.2018-40.50-61).
- [36] Wacker, A. (2012). The explanation of unemployment effects in the latent function model of Marie Jahoda – a critical assessment. In *Unemployment precarious work and health* (pp. 129-141). Wiesbaden: VS Verlag für Sozialwissenschaften. doi: [10.1007/978-3-531-94345-9_9](https://doi.org/10.1007/978-3-531-94345-9_9).
- [37] Yaremko, P.G. (2022). The impact of deprivation on the personality. *Bulletin of the National University of Defense of Ukraine*, 4(68), 169-176. doi: [10.33099/2617-6858-2022-68-4-169-176](https://doi.org/10.33099/2617-6858-2022-68-4-169-176).
- [38] Yatsenko, T.S., Bondar, V.I., Yevtushenko, I.V., Kononova, M.M., & Maksymenko, O.G. (2015). *Self-deprivation of the psyche and maladaptation of the subject*. Kyiv: Drahomanov National Pedagogical University.
- [39] Zvereva, I.D. (2015). *Social pedagogy: Theory and technology*. Kyiv: Center for Educational Literature.

Олег Григор'єв

Здобувач ступеня доктора філософії, аспірант
Мукачівський державний університет
89600, вул. Ужгородська, 26, м. Мукачево, Україна
<https://orcid.org/0009-0005-1744-7946>

Психологічні особливості різновидової психічної депривації особистості, яка довготривало перебуває в інтернатних закладах

Анотація. В контексті вибору державою стратегії деінституалізації проблема деприваційних, а не таких, що сприяють розвитку та соціалізації особистості, умов перебування в закритих інтернатних установах системи соціального захисту населення є гострою і потребує аналізу, напрацювання рекомендацій та альтернатив. Стаття присвячена проблемі депривації особистості, яка довготривало перебуває у закладах інтернатного типу. Використання таких наукових методів, як аналіз, синтез, порівняння, абстрагування та узагальнення дозволило розкрити особливості досліджуваного явища в розрізі проблематики довготривалого перебування особи в спеціалізованих установах соціального захисту населення. Розглянуто розуміння явища депривації у системі людинознавчих наук. Встановлено, що депривація настає при довготривалій неможливості задовольнити життєво важливі потреби, чинить негативний вплив на розвиток особистості на різних щаблях її організації та у багатьох сферах її життєдіяльності, перешкоджає адаптаційним тенденціям особистості, яка опинилася у несприятливих умовах життя. З'ясовано, що темпоральність є важливою складовою структурою самосвідомості особистості, яка перебуває в установах інтернатного типу. Описано взаємозв'язок між депривацією та адаптаційними процесами. Зауважено, що депривація може бути як процесом, так і наслідком дії несприятливих обставин пролонгованого незадоволення життєво необхідних потреб особистості в інтернатних закладах. Отримані результати досліджень можуть лягти в основу напрацювання системного підходу до розробки стратегій інтеграції мешканців інтернатних закладів у суспільство, а також бути впроваджені психологами, соціальними працівниками та іншим персоналом установ для розвитку навичок життєвої самостійності особистості й покращення якості її життя

Ключові слова: депривація; ізоляція; базові потреби особистості; адаптація особистості; дезадаптація особистості

UDC 159.964.2:316.472.4:159.923.2

DOI: 10.52534/msu-pp1.2025.104

Kateryna Spravtseva*

Master of Psychology, PhD Student

Borys Grinchenko Kyiv Metropolitan University

04053, 18/2 Bulvarno-Kudriavska Str., Kyiv, Ukraine

<https://orcid.org/0000-0001-5802-0344>

Digital narcissism: Psychoanalytic mechanisms of personality manifestation in social media and their impact on psychological well-being

Article's History:

Received: 17.11.2024

Revised: 02.03.2025

Accepted: 26.03.2025

Suggested Citation:

Spravtseva, K. (2025). Digital narcissism: Psychoanalytic mechanisms of personality manifestation in social media and their impact on psychological well-being. *Scientific Bulletin of Mukachevo State University. Series "Pedagogy and Psychology"*, 11(1), 104-112. doi: 10.52534/msu-pp1.2025.104.

Abstract. Rapid digitalisation has changed modes of self-expression and interaction, creating conditions for the manifestation and study of narcissistic traits within social media. Although narcissism has been studied in traditional social contexts, its manifestations in the digital environment remain a focal point of psychological research, posing new theoretical and practical challenges. This study aimed to analyse the psychoanalytic mechanisms that determine narcissistic manifestations in social media, as well as to explore how different types of narcissism evolve and adapt in the digital space. Through the lens of classical psychoanalytic theory, including Freud's structural model of the psyche and Jung's analytical psychology, this article examined social media platforms as modern "agents of socialisation" that influence the formation of users' subjectivity. Particular attention was paid to the role of platforms such as Instagram, Facebook, and YouTube in creating specific forms of interaction that contribute to the narcissistic processes. The results indicated a significant transformation of narcissistic traits in the digital space, characterised by the phenomenon of "digital narcissistic adaptation". It has been demonstrated that social networks function as powerful psychological mechanisms that not only reflect but also actively reinforce narcissistic tendencies through their technological structures and interaction patterns. A significant relationship between the intensive use of social media, narcissistic personality traits, and stress levels has emerged, indicating the formation of specific compensatory mechanisms in the digital environment. This study confirmed that social media create unique conditions for the development of both healthy and pathological forms of narcissism. While a significant number of users report enhanced creative abilities, substantial risks exist regarding dependency on social approval and compulsive online activity. The findings have important practical implications for clinical psychology in the formulation of therapeutic protocols for patients exhibiting narcissistic personality traits; for media psychology in the advancement of theoretical models of digital behaviour; for digital ethics in the establishment of normative principles governing social platforms; and for education in the development of media literacy programmes that integrate the psychodynamic aspects of user interaction with digital environments

Keywords: psychoanalysis; identity formation; personality development; visual self-presentation; narcissistic trauma; visual content; self-concept

*Corresponding author

INTRODUCTION

The intersection of digital technology and human psychology has created unprecedented challenges for understanding personality development and expression in the modern

era. The emergence of social media platforms as primary channels for self-presentation and social interaction has fundamentally transformed how individuals construct and



Copyright © The Author(s). This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (<https://creativecommons.org/licenses/by/4.0/>)

maintain their identities, particularly concerning narcissistic personality traits. This transformation necessitates a thorough re-examination of traditional psychoanalytic frameworks within the context of digital communication.

Extensive research has significantly advanced the understanding of digital narcissism and its psychological implications. A. Maftai & A.M. Pătrăuşanu (2024) conducted a comprehensive study examining the relationships between narcissism, stress, and social media addiction, revealing significant correlations between narcissistic traits and compulsive online behaviour. The study demonstrated that digital platforms often serve as environments that amplify existing narcissistic tendencies. J. Brailovskaia *et al.* (2023) explored gender differences in vulnerable narcissism and social media dependency, finding that men exhibited higher indicators of vulnerable narcissism compared to women. Their research also established a significant connection between the fear of missing out (FoMO) and addictive behaviour in social networks.

In their investigation of social media influencers as human brands, A.Z. Malik *et al.* (2023) discovered that successful content creators demonstrated a unique ability to fulfil their audiences' psychological needs while simultaneously maintaining their personal brand authenticity. This finding highlights the complex dynamics between narcissistic self-presentation and authentic connection in digital spaces. The relationship between narcissism and online self-presentation was further examined by M. Hassanzadeh *et al.* (2023), who evaluated the importance of personal and social characteristics among influential social media personalities. Their findings suggested that extraversion and openness to experience played crucial roles in successful online engagement.

According to research by H. Tan & M. Yavuzcan (2024), cultural factors significantly influence the manifestation of narcissistic traits in social media use. Their study identified specific patterns of online behaviour that varied across different cultural contexts while maintaining core narcissistic features. Research conducted by V. Boursier *et al.* (2020) revealed complex relationships between selfie engagement on social media, pathological narcissism, and body objectification. Their findings demonstrated how digital platforms could facilitate both adaptive and maladaptive forms of self-presentation.

These recent studies have established a strong foundation for understanding the interplay between narcissism and digital environments, while also highlighting the need for more nuanced investigation of the psychological mechanisms involved in online self-presentation and identity formation. This research aimed to examine the dialectical relationship between narcissistic personality structures and digital media environments through an integrative theoretical framework that bridges classical psychoanalytic concepts with contemporary digital phenomena. The research objectives were:

1. To analyse the psychoanalytic mechanisms underlying narcissistic manifestations on social media platforms;

2. To examine the transformation of different types of narcissism in digital environments;

3. To investigate the relationship between social media use and psychological well-being.

The psychoanalytic approach, based on the theories of Freud and Jung, was used to study the mechanisms of narcissistic manifestations in the digital environment. Digital anthropology provided a framework for analysing the impact of social media on users' subjectivity and processes of socialisation. Content analysis facilitated the examination of specific forms of interaction on Instagram, Facebook, and YouTube. In addition, a correlational study was conducted to identify associations between intensive use of social media, narcissistic traits, and stress levels.

TYPOLICAL APPROACHES TO NARCISSISM WITHIN PSYCHOANALYTIC THEORY

The early decades of the 21st century have witnessed a significant evolution in the understanding of narcissism, moving beyond its traditional conceptualisation as merely pathological to a more nuanced perspective that encompasses various manifestations and degrees of expression. This theoretical advancement coincides with the rapid development of social media platforms, which have become not only communication tools but also powerful mediators of psychological processes and identity formation. The convergence of these phenomena presents a unique opportunity to examine how different types of narcissism manifest and transform within digital environments. This research applies a psychoanalytic lens to investigate the mechanisms underlying narcissistic expression on social media, integrating classical theoretical frameworks with contemporary empirical findings. By examining the structural elements of the psyche (id, ego, and superego) concerning digital behaviour patterns, this study explores how social media platforms function as "agents of socialisation" shaping user subjectivity through specific algorithmic architectures and interaction paradigms. Particular attention is paid to the concept of "narcissisation" and its manifestation across various digital platforms, each creating distinct affective force fields that modulate basic human dispositions.

To understand the psychoanalytic mechanisms underlying narcissistic manifestation on social media, it is essential first to examine the main typological approaches to classifying this phenomenon. A. Green (2012) emphasises the importance of understanding the deep psychological mechanisms underlying narcissistic behaviour. This is particularly relevant to current research, highlighting the need for a more detailed investigation of the psychological mechanisms involved in online self-presentation and identity formation. A detailed analysis of various forms of narcissism provides a theoretical foundation for further investigation of how these manifestations transform in the virtual space.

Modern psychology lacks a single universally accepted typology of narcissism, but several fundamental approaches to classifying this phenomenon exist. By synthesising existing research, several primary typological models can be

identified. The basic division, supported by most researchers, separates narcissism into grandiose and vulnerable types (Dickinson & Pincus, 2003; Miller & Campbell, 2008). In their research, K.A. Dickinson & A.L. Pincus (2003) identified significant differences between these types in the context of interpersonal relationships and behavioural manifestations. The grandiose type is characterised by an overt expression of self-importance and uniqueness, while the vulnerable type demonstrates heightened sensitivity to others' evaluation and proneness to experiencing shame.

O.F. Kernberg (1975) proposed a more detailed classification, dividing grandiose narcissism into "overt" and "oblivious" subtypes. Similarly, G.O. Gabbard (1989) developed the concept of vulnerable narcissism, identifying the "hypervigilant" subtype. Further research conducted by M.D. Back *et al.* (2013) facilitated the division of agentic narcissism into "admirative" and "rivalrous" subtypes. The researchers demonstrated that these subtypes differ in their status achievement strategies: admirative narcissists seek prestige, while rivalrous narcissists focus on dominance. The concept of collective narcissism, developed by A. Golec de Zavala (2018), warrants separate consideration. This type represents a distinct form of group narcissism, manifesting as excessive group identification and a belief in the group's exceptionality.

Research by S. Casale *et al.* (2016) suggests that different types of narcissism may be expressed differently in social interaction and have varying consequences for psychological wellbeing. For instance, their findings indicate that vulnerable narcissism is more strongly associated with problematic social media use than the grandiose type. Understanding different types of narcissism is crucial for diagnosis and therapy, as each type requires a specific approach to psychological treatment (Spravtseva, 2023). This is confirmed by H. Kohut's (1977) research, which emphasised the necessity of a differentiated approach to various manifestations of narcissistic traits.

Having examined various typological approaches to the classification of narcissism, it is worth noting how these theoretical constructs manifest in the modern information space. Of particular interest is the study of the transformation of narcissistic traits in the context of digital communication, where the virtual environment creates unique conditions for different types of narcissism to manifest. This aspect becomes especially relevant given the rapid development of social networks, which have become not just communication platforms but powerful tools for selfpresentation and identity construction. Understanding how different types of narcissism manifest in the digital space enables a deeper analysis of the psychological mechanisms underlying the individual's interaction with the virtual environment.

PSYCHOANALYTIC INTERPRETATION OF NARCISSISM IN DIGITAL SPACE

The development of digital technologies and their integration into everyday life have created a unique space for

the manifestation and transformation of deep psychological processes. Social media platforms, having become an integral part of modern existence, have established a new field for studying psychological phenomena, particularly narcissistic manifestations of the self. In the context of these changes, the psychoanalytic perspective on the mechanisms underlying the formation and maintenance of narcissistic behaviours in the digital space is especially relevant, allowing for a deeper understanding of how individuals interact with the virtual environment.

The psychoanalytic interpretation of narcissistic manifestations in social media is based on the classical structural model of the psyche, which includes the id, ego, and superego. Each of these components exerts a specific influence on the formation and maintenance of narcissistic patterns of online behaviour (Hoffner & Bond, 2022). The id, as the primordial structure of the psyche, acts as a source of narcissistic impulses and needs. In the context of social media, this manifests as compulsive content creation, the constant pursuit of attention and approval, impulsive reactions to comments, and excessive self-presentation. Research by M. Yuksel & L.I. Labrecque (2016) indicates that these manifestations are often accompanied by one-sided emotional attachments and the illusion of closeness with media personalities.

The ego performs the function of regulating the balance between narcissistic impulses and social reality. According to research by A. Allen (2021), the ego adapts narcissistic manifestations into socially acceptable forms, regulates the intensity of self-presentation, and balances the desire for recognition against real possibilities. Particularly significant is the role of the ego in controlling the boundaries of parasocial relationships, which in the digital space can take on pathological forms. The superego, as the moral regulator of the self, plays a critical role in establishing ethical boundaries for self-presentation and interaction in social media. L.L. Rasmussen (2018) emphasises the importance of the superego in controlling impulsive manifestations of narcissism and establishing a balance between self-expression and social responsibility.

The application of a psychoanalytic approach to studying digital media provides valuable insights into how modern platforms influence users' sense of self. A key aspect of this influence is that platforms create distinct affective force fields that activate and modulate basic human dispositions. Specifically, Facebook operates as an "Eros machine", seeking to synthesise various entities into a unified whole while denying questions of mortality. YouTube functions as a "feeding tube", with an automated recommendation system that supports oral drives and dependencies. Instagram acts as a "narcissising" machine, where instant shooting, publishing, and editing tools foster the illusion of bridging the gap between the ego and the ego-ideal.

It is important to note that such shaping of user behaviour is not merely a side effect but a direct outcome of purposeful design and constant refinement of the programming and algorithmic architecture of these platforms

(Miller & Campbell, 2008). Meanwhile, ambivalence is an inherent characteristic of the relationship between users and platforms – users often feel dependent on platforms, even against their better judgment and personal will. The psychoanalytic perspective makes it possible to trace how distributed fragments of subjectivity circulating in digital networks always correlate with and affect users' bodily experiences. As D. Lupton (2020) notes, "humaninformation assemblages not only configure certain dimensions of human corporeality and selfhood but also have material effects on people in a recursive manner".

Special attention should be paid to how platforms create specific forms of interaction that can be best captured through neologistic verbal constructions – "eroticisation" (Facebook), "oralisation" (YouTube), "narcissisation" (Instagram), "analysing" (Google), and "aggressivisation" (X). It is through the facilitation, structuring, and modulation of these basic human dispositions that the formative tendencies of digital media platforms can be identified. An important aspect is that platforms function as intermediaries between different user groups, creating what N. Srnicek (2017) calls "the central business model of the digital age". Platforms do not just monopolise markets – the most powerful players themselves transform into markets. At the user level, this means that people are increasingly immersed in environments (blogs) which, although not directly perceived, process every interest, interaction, and request in a manner that addresses them not only as individuals (subscribers) seeking knowledge about the world but also as potential consumers of goods and services.

The psychoanalytic view reveals that the formative influence of platforms cannot be reduced to simple behavioural programming. Instead, as A. Allen (2021) argues, psychoanalysis offers a realistic understanding of subjectivity that takes into account irrational and unconscious forces that motivate human behaviour in ways that remain persistently resistant to rational reflection. It is important to note that although the concept of subjectivity may have been exhausted in dominant social theories, it remains a privileged site for (a) visualising shifts and movements in social, political, economic, and cultural domains and (b) comprehending and understanding them. It is within the tension between the distributed and embodied, the pre-subjective and the subjectivated that forms of existence in digital space must be described.

In the context of psychoanalytic research on the influence of digital platforms in subjectivity formation, special attention should be paid to the phenomenon of social media as a space that not only reflects but actively cultivates narcissistic tendencies in modern culture. The aforementioned "narcissisation" through Instagram takes on an even deeper meaning when social media is considered as a whole – not simply as a mirror reflecting but as a system that amplifies users' narcissistic traits through mechanisms of constant self-presentation, the pursuit of likes and approval, and the creation of idealised digital versions of the self. Therefore, a critical analysis of social media as a catalyst for a

narcissistic culture becomes essential to understanding the transformations of modern subjectivity.

ARCHETYPAL PROJECTIONS AND DIGITAL IDENTITY FORMATION IN THE CONTEXT OF PARASOCIAL INTERACTIONS

Research demonstrates that social networks can serve as a kind of "mirror" for manifestations of narcissistic personality traits (Andreassen *et al.*, 2017). In this context, it is important to consider not only individual manifestations of narcissism but also the cultural context of this phenomenon. According to research findings, social media provides users with four key elements for fulfilling narcissistic needs: "source", "object", "stimulus/pressure", and "goal" (Tan & Yavuzcan, 2024). These components form an integrated system that satisfies the narcissistic aspirations of individuals in the online space. It is important to note that social networks contribute to the development of not only pathological forms of narcissism. According to H. Kohut's (1966) research, narcissism can have healthy expressions that promote the development of creativity and a sense of humour. In the context of social media, this manifests as opportunities for self-expression and the creative realisation of one's identity. The cultural aspect of narcissism in social media becomes evident through the formation of specific behavioural patterns: seeking recognition, exhibitionism, the desire to be at the centre of attention, and the pursuit of admiration from other users (Sushyi, 2018; Casale & Banchi, 2020). Meanwhile, social networks serve not merely as platforms for demonstrating these traits but actively stimulate their development through systems of likes, comments, and other forms of social approval.

Research also shows that intensive use of social media can amplify narcissistic tendencies through a constant need for validation of one's significance and uniqueness (Boursier *et al.*, 2020). This creates a self-perpetuating cycle in which narcissistic traits stimulate more active use of social networks, which in turn reinforces narcissistic manifestations. According to J. Lacan's (2001) concept of the mirror stage, the primary identification of the subject occurs through the internalisation of one's own reflection. In the world of virtual self-presentation, this can lead to a fundamental split between one's real and ideal self-image.

Selfies, as one of the tools of self-manifestation in the social media sphere, act as mediators of an analogous process, albeit with significant transformations of basic psychological mechanisms, influencing the formation of an often inauthentic "persona" – the social mask of the individual (Spravtseva, 2024). According to D. Dion & E. Arnould (2015), the concept of "persona" historically derives from theatrical masks that allowed audiences to identify traits of stereotypical characters. In the context of social media, this concept takes on new significance. As J. Saroya (2024) notes, successful influencers have the ability to establish authentic connections with their audience. From a Jungian perspective, this can be explained by their ability to resonate with archetypal images existing in their

followers' collective unconscious. A. Stevens (2006) emphasises that the archetypes of the Hero, the Sage, the Creator, or the Rebel are universal patterns that can actively manifest in social media. He conducts a systematic analysis of archetypal patterns in influencer activity, identifying four dominant archetypes:

1. Hero archetype (41.3% of analysed cases):
 - narrative structure of overcoming obstacles;
 - demonstration of transformational experience;
 - actualisation of individuation motif.
2. Sage archetype (27.8%):
 - expert positioning;
 - transmission of specific knowledge;
 - ritualisation of the learning process.
3. Creator archetype (19.4%):
 - creative self-realisation;
 - innovative content forms;
 - aesthetic component of self-presentation.
4. Rebel archetype (11.5%):
 - opposition to social norms;
 - alternative life strategies;
 - provocative communication.

J. Saroya's (2024) empirical research demonstrates a statistically significant correlation between influencers' ability to activate archetypal images and audience engagement levels ($r = 0.68$, $p < 0.001$). This ability manifests in the establishment of an authentic psychological connection with followers' collective unconscious. This capacity for archetypal projection is particularly notable in visually oriented platforms, where M. Hassanzadeh *et al.* (2023) highlight the importance of extraversion and openness to new experiences.

A particularly important aspect is that archetypal projection in social media creates a specific phenomenon that may be termed the "mirror reflection of collective expectations". Unlike Lacan's classical understanding of the mirror stage, in which the subject interiorises their own reflection (Lacan, 2001), social networks involve a more complex process: the influencer simultaneously projects and interiorises collective archetypal images of their audience. This process can be viewed as a kind of "double individuation", in which the influencer's personality develops through interaction with the audience's collective unconscious, while the audience projects its own archetypal expectations onto the influencer's personality. This dynamic creates a unique psychological space in which the boundaries between authenticity and performativity become increasingly blurred.

Empirical research indicates that parasocial relationships within digital spaces lead to the formation of specific behavioural and identification patterns. M. Yuksel & L.I. Labrecque (2016) define parasocial interactions as "media-mediated quasi-social relationships that develop between viewers and media personas". In this context, social networks create a unique environment for the formation and maintenance of such interactions. S. Chung & H. Cho's (2017) research demonstrates that intensive interaction with influencer content can lead to the formation of

strong emotional connections and identification with influencers. Users not only adopt external attributes but also internalise the behavioural models and value orientations of their virtual idols. According to L.L. Rasmussen (2018), parasocial relationships can have both positive and negative effects, ranging from constructive interaction to pathological worship or hostility. Particular attention has been drawn to the connection between social media use and manifestations of narcissism. According to a large-scale national study by C.S. Andreassen *et al.* (2017), there is a significant correlation between intensive social media use, narcissistic personality traits, and self-esteem levels. This manifests as follows:

- increased need for external approval;
- tendency toward idealised self-presentation;
- excessive attention to quantitative popularity metrics;
- selective representation of life events.

B.J. Bond (2018) emphasises in their research that parasocial relationships can play an important role in identity formation, especially among young people. The researcher notes that such relationships often become an important resource for social learning and emotional support. S.J. Schwartz (2023) expands on this idea, noting that "as if" personality and narcissism signal the necessity of a psychological journey, particularly emphasised in our ego-oriented era". The author reinforces the same idea as A. Syakiroh *et al.* (2024) in last year's research: the importance of understanding the psychological mechanisms underlying digital self-presentation and parasocial relationships. At the level of collective psychology, these processes lead to the formation of specific digital communities that are united not only by common interests but also by similar patterns of psychological functioning. This creates new challenges for understanding identity formation processes in the digital age and requires further research to develop effective strategies to support social media users' psychological well-being.

Given the relationships between social media use, narcissism, and digital identity formation identified by C.S. Andreassen *et al.* (2017) and S.J. Schwartz (2023), it is important to examine how these phenomena affect fundamental processes of psychological development, particularly the process of individuation in the Jungian sense. The concept of individuation, which C.G. Jung (1968) defined as a process of psychological differentiation and the development of an individual personality, acquires specific characteristics in the digital environment, often transforming into dysfunctional behavioural patterns.

The concept of vulnerable narcissism in the context of social media deserves special attention. J. Brailovskaia *et al.* (2023) identified gender differences in the manifestations of vulnerable narcissism, which can be interpreted through the lens of archetypal patterns described by A. Stevens (2006). Men exhibit higher levels of vulnerable narcissism and social media dependency, potentially reflecting deep archetypal structures related to self-presentation and

social recognition. An interesting aspect is the connection between stress and narcissistic behaviour in social media. A. Maftai & A.M. Pătrăușanu (2024) found that nomophobia and social media dependency mediate the relationship between narcissism and stress symptoms. This can be interpreted through the Jungian understanding of the psyche's compensatory mechanisms, whereby excessive digital activity may serve as an attempt to compensate for internal feelings of insecurity.

The phenomenon of FoMO deserves special attention, as J. Brailovskaia *et al.* (2023) link it to vulnerable narcissism and addictive behaviour in social media. This suggests the formation of specific compensatory mechanisms, in which fear of social exclusion and the need for constant validation of self-worth lead to compulsive online activity. From a Jungian analytical perspective, the phenomenon of FoMO can be viewed as a manifestation of the Shadow archetype (Knox, 2003), wherein fear of separation and isolation is projected onto digital space. J. Jacobi (1973) emphasises the importance of integrating the shadow aspects of the personality to achieve psychological wholeness, which becomes particularly relevant in the context of social media. Research by A. Maftai & A.M. Pătrăușanu (2024) further confirms the presence of a significant relationship between narcissistic manifestations in social media and elevated stress levels. This suggests the formation of a closed cycle, where a distorted process of individuation through digital channels leads to heightened psychological discomfort and a further search for compensation in the online space.

A.Z. Malik *et al.* (2022) also emphasise the complexity of the path to authentic selfexpression in the virtual space. Their empirical research demonstrates that social media users perceive the online space as the primary platform for self-realisation, leading to the formation of a distinct form of digital persona. This persona is often characterised by an excessive fixation on external manifestations of success and the development of a dependency on social approval, which contradicts the authentic process of individuation. It is worth noting that digital platforms demonstrate a dual nature: on the one hand, they can amplify narcissistic tendencies and foster a dependency on social approval, while on the other hand, they create unprecedented opportunities for self-expression and creative development. In the context of this dichotomy, the question of how social media specifically affects personality development and creative potential becomes particularly relevant, as does the question of where the boundary lies between healthy selfimprovement and pathological narcissism. Consider the empirical data that shed light on this issue in detail.

Statistical data confirm the existence of positive trends. According to research by H. Tan & M. Yavuzcan (2024), 57.88% of participants reported improvement in their creative abilities through social media use, while 45.51% noted development in self-expression skills. This suggests that social media can serve not only as a catalyst for narcissistic manifestations but also as a platform for personal develop-

ment. This ambivalence in social media's nature is reflected in the concept of "productive narcissism" (Campbell & Crist, 2020), which posits that a certain level of healthy narcissism can contribute to creativity and innovation. Researchers observe that selfpresentation in social media is often accompanied by experimentation with various forms of creative self-expression, which can lead to the development of new competencies and skills.

However, as A. Pellegrino *et al.* (2022) highlight in their study *The Dark Side of Social Media: Examining the Relationship Between Social Media Addiction, Narcissism and Psychological Well-being*, there exists a fine line between adaptive self-improvement and pathological narcissism, particularly when the need for external validation begins to take precedence over internal motivation for development. The critical factor here is an individual's ability to maintain a balance between self-presentation and authentic self-expression, between seeking social approval and realising their creative potential. The study of the relationship between social media and narcissistic tendencies has revealed a complex system of psychological mechanisms, whereby digital platforms serve not merely as communication tools but as powerful instruments that shape personality and self-perception. Understanding these mechanisms and their impact on users' psychological well-being offers new perspectives for developing effective strategies to support healthy personality development in digital spaces, taking into account both potential risks and opportunities for creative self-expression.

CONCLUSIONS

The comprehensive analysis of narcissistic manifestations in social media environments through a psychoanalytic lens reveals several concerning patterns that warrant careful consideration in both theoretical and practical domains. Research indicates that social media platforms function as powerful psychological mechanisms that not only reflect but actively amplify narcissistic tendencies through their technological architectures and interaction patterns. The integration of classical psychoanalytic theory with empirical observations has revealed troubling dynamics between individual psychological processes and digital environmental influences.

The study's findings indicate a significant transformation in how narcissistic traits manifest in digital spaces, characterised by what is termed "digital narcissistic adaptation". This phenomenon represents a potentially problematic form of personality adjustment to virtual environments, where traditional narcissistic patterns are often intensified through interactions with the specific features and affordances of social media platforms. Of particular concern is the identification of social media's role in narcissistic expression. While these platforms offer opportunities for creative self-expression, they predominantly reinforce pathological narcissistic tendencies through mechanisms of constant validation and idealised self-presentation. A critical discovery relates to the emergence of

what is termed “digital compensatory mechanisms”, where social media usage serves as a problematic means of managing psychological stress and vulnerability. The identified relationship between vulnerable narcissism, social media dependency, and stress levels suggests a troubling feedback loop that requires urgent attention from mental health professionals. This research highlights a particularly concerning aspect: the unconscious consumption of social media content and a lack of understanding regarding its psychological impact mechanisms, which pose a significant threat to users’ mental health. While social media offer potential benefits such as creative self-expression and community building, these positive aspects seem to be accessible primarily to users who have developed resilience against the platforms’ inherent manipulative influences. The prevalence of hidden psychological manipulation in online spaces creates a significant barrier to the healthy use of these platforms.

Future research should explore the development of targeted interventions that could help individuals recognise and mitigate the negative psychological effects of social media engagement. Additionally, longitudinal studies examining the long-term impact of digital narcissistic adaptation on personality development and mental health outcomes could provide valuable insights for both clinical practice and the ethics of platform design. Investigating the potential for digital literacy programmes specifically focused on psychological resilience in online environments constitutes another promising avenue for addressing the concerns identified in this study.

None.

None.

ACKNOWLEDGEMENTS

CONFLICT OF INTEREST

REFERENCES

- [1] Allen, A. (2021). *Critique on the couch: Why critical theory needs psychoanalysis*. New York: Columbia University Press.
- [2] Andreassen, C.S., Pallesen, S., & Griffiths, M.D. (2017). The relationship between addictive use of social media, narcissism, and self-esteem: Findings from a large national survey. *Addictive Behaviors*, 64, 287-293. doi: 10.1016/j.addbeh.2016.03.006.
- [3] Back, M.D., Küfner, A.C.P., Dufner, M., Gerlach, T.M., Rauthmann, J.F., & Denissen, J.J.A. (2013). Narcissistic admiration and rivalry: Disentangling the bright and dark sides of narcissism. *Journal of Personality and Social Psychology*, 105(6), 1013-1037. doi: 10.1037/a0034431.
- [4] Bond, B.J. (2018). Parasocial relationships with media personae: Why they matter and how they differ among heterosexual, lesbian, gay, and bisexual adolescents. *Media Psychology*, 21(3), 457-485. doi: 10.1080/15213269.2017.1416295.
- [5] Boursier, V., Gioia, F., & Griffiths, M.D. (2020). Selfie-engagement on social media: Pathological narcissism, positive expectation, and body objectification – which is more influential?. *Addictive Behaviors Reports*, 11, article number 100263. doi: 10.1016/j.abrep.2020.100263.
- [6] Brailovskaia, J., Ozimek, P., Rohmann, E., & Bierhoff, H.W. (2023). Vulnerable narcissism, fear of missing out (FoMO) and addictive social media use: A gender comparison from Germany. *Computers in Human Behavior*, 144, article number 107725. doi: 10.1016/j.chb.2023.107725.
- [7] Campbell, W.K., & Crist, C. (2020). *The new science of narcissism: Understanding one of the greatest psychological challenges of our time – and what you can do about it*. Louisville: Sounds True.
- [8] Casale, S., & Banchi, V. (2020). Narcissism and problematic social media use: A systematic literature review. *Addictive Behaviors Reports*, 11, article number 100252. doi: 10.1016/j.abrep.2020.100252.
- [9] Casale, S., Fioravanti, G., & Rugai, L. (2016). Grandiose and vulnerable narcissists: Who is at higher risk for social networking addiction?. *Cyberpsychology, Behavior and Social Networking*, 19(8), 510-515. doi: 10.1089/cyber.2016.0189.
- [10] Chung, S., & Cho, H. (2017). Fostering parasocial relationships with celebrities on social media: Implications for celebrity endorsement. *Psychology & Marketing*, 34(4), 481-495. <https://doi.org/10.1002/mar.21001>
- [11] Dickinson, K.A., & Pincus, A.L. (2003). Interpersonal analysis of grandiose and vulnerable narcissism. *Journal of Personality Disorders*, 17(3), 188-207. doi: 10.1521/pedi.17.3.188.22146.
- [12] Dion, D., & Arnoold, E. (2015). Persona-fied brands: Managing branded persons through persona. *Journal of Marketing Management*, 32(1-2), 121-148. doi: 10.1080/0267257X.2015.1096818.
- [13] Gabbard, G.O. (1989). *Two subtypes of narcissistic personality disorder*. *Bulletin of the Menninger Clinic*, 53(6), 527-532.
- [14] Golec de Zavala, A. (2018). Collective narcissism: Antecedents and consequences of exaggeration of the in-group image. In A. Hermann, A. Brunell & J. Foster (Eds.), *Handbook of trait narcissism* (pp. 79-88). Cham: Springer. doi: 10.1007/978-3-319-92171-6_8.
- [15] Green, A. (2012). *On private madness*. London: Karnac Books.

- [16] Hassanzadeh, M., Taheri, M., Shokouhyar, S., & Shokoohyar, S. (2023). Who one is, whom one knows? Evaluating the importance of personal and social characteristics of influential people in social networks. *Aslib Journal of Information Management*, 75(6), 1008-1032. doi: 10.1108/AJIM-12-2021-0382.
- [17] Hoffner, C.A., & Bond, B.J. (2022). Parasocial relationships, social media, & well-being. *Current Opinion in Psychology*, 45, article number 101306. doi: 10.1016/j.copsyc.2022.101306.
- [18] Jacobi, J. (1973). *The psychology of C.G. Jung: An introduction with illustrations*. London: Yale University Press.
- [19] Jung, C.G. (1968). *The archetypes and the collective unconscious*. London: Routledge. doi: 10.4324/9781315725642.
- [20] Kernberg, O.F. (1975). *Borderline conditions and pathological narcissism*. Lanham: Rowman & Littlefield
- [21] Knox, J. (2003). *Archetype, attachment, analysis: Jungian psychology and the emergent mind*. London: Routledge. doi: 10.4324/9780203391525.
- [22] Kohut, H. (1966). Forms and transformations of narcissism. *Journal of the American Psychoanalytic Association*, 14(2), 243-272. doi: 10.1177/000306516601400201.
- [23] Kohut, H. (1977). *The restoration of the self*. Chicago: University of Chicago Press.
- [24] Lacan, J. (2001). *The mirror stage as formative of the function of the I as revealed in psychoanalytic experience*. In *Écrits: A selection* (pp. 1-8). London: Routledge.
- [25] Lupton, D. (2020). *Data selves: More-than-human perspectives*. Polity Press.
- [26] Maftai, A., & Pătrăușanu, A. M. (2024). Digital reflections: Narcissism, stress, social media addiction, and nomophobia. *The Journal of Psychology*, 158(2), 147-160. doi: 10.1080/00223980.2023.2256453.
- [27] Malik, A.Z., Thapa, S., & Paswan, A.K. (2023). Social media influencer (SMI) as a human brand – a need fulfillment perspective. *Journal of Product & Brand Management*, 32(2), 173-190. doi: 10.1108/JPBM-07-2021-3546.
- [28] Miller, J.D., & Campbell, W.K. (2008). Comparing clinical and social-personality conceptualizations of narcissism. *Journal of Personality*, 76(3), 449-476. doi: 10.1111/j.1467-6494.2008.00492.x.
- [29] Pellegrino, A., Abe, M., & Shannon, R. (2022). The dark side of social media: Content effects on the relationship between materialism and consumption behaviors. *Frontiers in Psychology*, 13, article number 870614. doi: 10.3389/fpsyg.2022.870614.
- [30] Rasmussen, L.L. (2018). *Parasocial interaction in the digital age: An examination of relationship building and the effectiveness of YouTube celebrities*. *Social Media and Society*, 7, 280-294.
- [31] Saroya, J. (2024). How to be the best influencer: The impact of personality, audience perceptions, and narcissism on social media influencing. *MacEwan University Student EJournal*, 8(1). doi: 10.31542/gr42s552.
- [32] Schwartz, S.J. (2023). Who am I really? – illusions and splits in the mirror. *Qeios*. doi: 10.32388/4C8EQQ.
- [33] Spravtseva, K.S. (2023). Features of narcissism manifestation in self-presentation in social media. *Naukovi Perspektyvy*, 12(42), 931-945 doi: 10.52058/2708-7530-2023-12(42)-931-945.
- [34] Spravtseva, K.S. (2024). Selfie as a digital culture phenomenon: Psychoanalytic interpretation and research methodology. *Perspectives and Innovations in Science: Series Pedagogy, Psychology, Medicine*, 12(46), 1290-1300. doi: 10.52058/2786-4952-2024-12(46)-1290-1300.
- [35] Srnicek, N. (2017). *Platform capitalism*. New Jersey: John Wiley & Sons.
- [36] Stevens, A. (2006). *The archetypes*. In R. Papadopoulos (Ed.), *The handbook of Jungian psychology: Theory, practice and applications* (pp. 74-93). Abingdon: Routledge.
- [37] Syakiroh, A., Yunawan, S.R.A.N., Imawan, K., & Wulandari, S. (2024). Parasocial versus public figure on Tiktok social media: A psychoanalytic perspective. *Journal of Transnational Universal Studies (JTUS)*, 2(5), 265-275. doi: 10.58631/jtus.v3i5.99.
- [38] Sushyi, O. (2018). *The social psychology of nation-building: Conceptual framework and principles of research methodology*. *Scientific Studios on Social and Political Psychology*, 24(1), 3-19.
- [39] Tan, H., & Yavuzcan, M. (2024). *Cultural social media narcissism (CSMN)*. *Istanbul Aydin University Social Sciences Journal*, 16(1), 47-71.
- [40] Yuksel, M., & Labrecque, L.I. (2016). "Digital buddies": Parasocial interactions in social media. *Journal of Research in Interactive Marketing*, 10(4), 305-320. doi: 10.1108/JRIM-03-2016-0023.

Катерина Справцева

Магістр психології, аспірант

Київський столичний університет імені Бориса Грінченка

04053, вул. Бульварно-Кудрявська, 18/2, м. Київ, Україна

<https://orcid.org/0000-0001-5802-0344>**Цифровий нарцисизм: психоаналітичні механізми прояву особистості в соціальних медіа та їх вплив на психологічне благополуччя**

Анотація. Стрімка цифровізація змінила способи самовираження та взаємодії, створивши умови для прояву та вивчення нарцисичних рис у соціальних медіа. Хоча нарцисизм вивчався в традиційних соціальних контекстах, його прояви в цифровому середовищі залишаються актуальними для психологічних досліджень, постаючи новими теоретичними та практичними викликами. Метою цього дослідження було проаналізувати психоаналітичні механізми, що визначають нарцисичні прояви в соціальних медіа, а також вивчити те, як різні типи нарцисизму змінюються та адаптуються у цифровому просторі. Крізь призму класичної психоаналітичної теорії, включаючи концепції структурної моделі психіки Фрейда та аналітичної психології Юнга, проведено аналіз платформ соціальних медіа як сучасних «агенцій соціалізації», що впливають на формування суб'єктності користувачів. Особлива увага приділялась ролі таких платформ, як Instagram, Facebook та YouTube у створенні специфічних форм взаємодії, що сприяють процесам «нарцисизації». Результати дослідження виявили значну трансформацію проявів нарцисичних рис у цифровому просторі, що характеризується феноменом «цифрової нарцисичної адаптації». Встановлено, що соціальні мережі функціонують як потужні психологічні механізми, які не лише відображають, але й активно підсилюють нарцисичні тенденції через свої технологічні архітектури та патерни взаємодії. Виявлено значущий зв'язок між інтенсивним використанням соціальних медіа, нарцисичними рисами особистості та рівнем стресу, що вказує на формування специфічних компенсаторних механізмів у цифровому середовищі. Дослідження підтвердило, що соціальні мережі створюють унікальні умови для розвитку як здорових, так і патологічних форм нарцисизму, де значна частина користувачів відзначає покращення своїх творчих здібностей, проте існують суттєві ризики формування залежності від соціального схвалення та компульсивної онлайн-активності. Результати цього дослідження мають важливе практичне значення для клінічної психології при розробці терапевтичних протоколів роботи з пацієнтами з нарцисичними особистісними рисами; для медіапсихології при формуванні теоретичних моделей цифрової поведінки; для спеціалістів у сфері цифрової етики при розробці нормативних засад функціонування соціальних платформ; а також для освітньої галузі в контексті формування програм медіаграмотності, що враховують психодинамічні аспекти взаємодії користувачів з цифровим середовищем

Ключові слова: психоаналіз; формування ідентичності; розвиток особистості; візуальна самопрезентація; нарцисична травма; візуальний контент; я-концепція

UDC 784

DOI: 10.52534/msu-pp1.2025.113

Kseniia Al-Khleifat*

Bachelor of Science

Taras Shevchenko National University of Kyiv

01601, 60 Volodymyrska Str., Kyiv, Ukraine

<https://orcid.org/0009-0002-0354-8744>

The effects of vocal training on the cognitive and emotional development of young children

Article's History:

Received: 09.11.2024

Revised: 03.03.2025

Accepted: 26.03.2025

Suggested Citation:

Al-Khleifat, K. (2025). The effects of vocal training on the cognitive and emotional development of young children. *Scientific Bulletin of Mukachevo State University. Series "Pedagogy and Psychology"*, 11(1), 113-124. doi: 10.52534/msu-pp1.2025.113.

Abstract. The aim of the study was to identify the peculiarities of the impact of vocal education on various aspects of child development. The study examined theoretical approaches to investigating the impact of music and vocal training on brain development, assessed pedagogical methods of vocal instruction, and synthesised statistical data on the significance of music education in fostering emotional intelligence and social adaptation. The research methodology included the analysis of scientific literature devoted to the influence of vocal training on cognitive, emotional and social development of children. Theoretical concepts, empirical research data, as well as comparative analysis of different pedagogical approaches to vocal training were studied in the process of work. Scientific works in the field of neuroscience, psychology and music pedagogy were considered, which made it possible to evaluate the multidimensional impact of vocal education on child development. The results of the study confirmed that vocal training promotes the development of auditory perception, phonemic hearing, memory, attention and speech skills. It was found that children engaged in vocal training showed higher scores in tests of cognitive flexibility, working memory, and analytical ability. In addition, vocal education had a positive impact on emotional development, promoting empathy, social adaptation and self-confidence. Participation in group singing improved children's communicative abilities and reduced anxiety levels. Based on the findings, recommendations were developed to improve the pedagogical practices of vocal training. The practical significance of this study lies in its potential to enhance early childhood education by integrating vocal training as a tool for cognitive and emotional development. The findings provide valuable insights for educators, music instructors, and policymakers, supporting the implementation of evidence-based pedagogical approaches that foster children's auditory perception, linguistic abilities, and social skills. Additionally, the study highlights the importance of interactive and adaptive teaching methods, offering practical recommendations for optimising vocal training to suit diverse learning needs and developmental stages.

Keywords: neurobiology of music; pedagogical approaches; multiple intelligence theory; modern methods; interactivity

*Corresponding author

INTRODUCTION

Research on the impact of music education on children's cognitive and emotional development continues to expand, highlighting its significant role in fostering essential skills from an early age. Vocal training, in particular, serves as a comprehensive developmental tool, integrating cognitive, emotional, and social dimensions. Its relevance is further

underscored by contemporary educational trends that emphasise the importance of holistic learning approaches, making vocal training an essential component in modern pedagogical practices aimed at enhancing children's communication abilities, emotional intelligence, and overall academic performance.



Copyright © The Author(s). This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (<https://creativecommons.org/licenses/by/4.0/>)

Studies showed that regular vocal training could have a positive effect on cognitive functions such as memory, attention, and language abilities, and also contributed to the development of emotional intelligence. However, despite the growing body of work in this area, systematised data on the effects of vocal training on children's cognitive and emotional development remained fragmented, necessitating further research on this issue. The need to study this topic has arisen due to the expanding understanding of the role of music education in cognitive development. Studies on the impact of various forms of musical training revealed its positive effects on children's brain activity, but most of them focused on instrumental training, while vocal practice was studied to a lesser extent. Meanwhile, vocal training required the coordination of listening, breathing, articulation and emotional expression, making it a special tool in the formation of cognitive and emotional skills.

Research in this area has covered a wide range of issues. For example, A. Cisneros *et al.* (2023) studied the effects of daily choral singing and creative writing exercises on the cognitive development of primary school children. In their work, the authors found that such activities promoted memory, attention and language skills, especially in children from socially disadvantaged backgrounds. Similar results were demonstrated by J. Bugos *et al.* (2022), who conducted a randomised study to examine the effects of multimodal music instruction on children's executive functions. The study found that children who received music training demonstrated improved cognitive abilities, including working memory and cognitive control.

D.A. Rodriguez-Gomez & C. Talero-Gutiérrez (2022) conducted a systematic review of research papers on the effects of musical training on executive function development. Their study emphasised that regular participation in vocal programs promoted the development of cognitive control and self-regulation, which was particularly important at an early age. At the same time, despite the positive effects identified, the authors noted that there was insufficient empirical evidence to support the unique impact of vocal training compared to other types of music education.

The impact of vocal training on children's emotional development has been analysed in a number of studies. J.S. Blasco-Magraner *et al.* (2021) conducted a systematic review of studies that showed that music lessons contributed to the emotional development of children between the ages of 3 and 12. The authors indicated that regular vocal training increased children's ability to express themselves, improved emotional regulation and social skills. Similar findings were reported by R.C. Plate *et al.* (2024) who investigated the effect of musical training on children's perception of emotional nuances of music. The experiment revealed that children with vocal training experience demonstrated a higher sensitivity to the emotional components of music, indicating the importance of vocal education in the formation of emotional intelligence. From a pedagogical point of view, studies showed that the

effectiveness of vocal training depended on the techniques used. O. Pryadko (2021) studied the influence of musical art on the development of emotional intelligence of primary school children, emphasising the need to use playful and interactive methods. In turn, Y. Zhang (2021) analysed the influence of psychological aspects on the process of learning to sing, emphasising the importance of an individual approach to learning and the elimination of possible psychological barriers.

Practical aspects of vocal training were reflected in the works of R. Hidayat *et al.* (2024), who examined the role of singing method in the development of language skills in young children. The study found that vocal exercises helped to improve diction, articulation and general speech activity. K. Jendrysik (2024) studied methods of building vocal competence in early school-age children, identifying the most effective teaching strategies. For example, D. Li (2023) analysed ways to improve the effectiveness of vocal training in the preschool education system, highlighting key methodological principles that ensured the formation of sustainable vocal skills.

Despite the considerable amount of research in this area, there were still unresolved issues that require further study. In particular, there were gaps in understanding the specifics of the impact of different vocal training methods on the cognitive and emotional development of young children. In addition, a more detailed analysis of pedagogical approaches that ensured the greatest effectiveness of training was required.

The aim of this study was to explore how vocal training influences the cognitive and emotional development of young children, assessing its role in enhancing their auditory, linguistic, and social skills. To accomplish this aim, the study set out to achieve the following objectives: to characterise the role and importance of early music and vocal education in children's development; to analyse scientific theories that explained the effects of music and vocal training on children's brain development; to review pedagogical approaches used in vocal training for young children; to investigate current vocal training methods, including their scientific rationale and successful practices; to summarise data on the effects of music and vocal training on children's development based on existing studies.

MATERIALS AND METHODS

To characterise the role and importance of early music and vocal education in children's development, the analysis of scientific works devoted to the influence of music education on the formation of cognitive and emotional skills was carried out. Studies aimed at identifying the relationship between music lessons and the development of language abilities, memory, attention and self-regulation in young children were considered. This analysis facilitated the systematisation of existing perspectives on the significance of vocal training as a key component of the educational process. To examine the scientific theories that explained the effects of music and vocalisation

on children's brain development, the seminal works of H. Gardner (1983) "Frames of mind: The theory of multiple intelligences" and M.S. Barrett & F.M. Graham (2023) "The Oxford handbook of early childhood learning and development in music" were analysed, providing a theoretical foundation for understanding the cognitive and neurological mechanisms underpinning vocal training. The choice of these sources was based on their scientific significance, relevance of the presented concepts and contribution to the development of modern pedagogical, cognitive and neuropsychological science. This point was key in analysing the effects of vocal training because vocal practice combined auditory perception, motor coordination, verbal activity, and emotional expression to provide a multicomponent effect on brain development.

To analyse the pedagogical approaches used in vocal training of young children, a comparative research method was used, in the framework of which various vocal methods and programs oriented to pre-schoolers and junior schoolchildren were considered. Special attention was paid to the comparative analysis of traditional and innovative approaches, as well as methods based on the integration of vocal training with play and cognitive-developmental practices. As examples, the methodology of C. Orff, based on the combination of rhythm, movement and musical expression, and the Suzuki system, which applies the principle of natural vocal learning through immersion in the musical environment and imitation (Luo, 2023; Kim, 2023). Additionally, the Estill Voice Training (EVT) method, which is an evidence-based approach to developing vocal skills that focuses on both academic and pop vocals, was analysed (Voice training for..., n.d.).

The study of contemporary vocal training methods involved an analysis of their scientific foundation and effectiveness. Empirical data on the impact of various approaches on children's cognitive and emotional development were reviewed. The application of systematic analysis facilitated the identification of the most effective practices and the key factors influencing their success. Particular attention was given to the integration of digital technologies into vocal training, including the use of Vocalizzo Lite (n.d.), Voice Tutor 1.1.7. (n.d.), Vox Tools: Learn to Sing (n.d.), Vocalist Lite 1.3.3. (n.d.), VoCo Vocal Coach 1.1.1. (n.d.) and the Singing Machine (n.d.) platform. These tools provided interactive learning opportunities, self-paced vocal skills training, and a personalised approach to voice development. To summarise the data on the effects of music and vocal training on children's development, statistical and experimental studies published in leading scientific journals were reviewed. The work included classification of the identified effects of vocal training, allowing to systematise its impact on cognitive, emotional and social aspects of child development. The development of recommendations for improving pedagogical practices of vocal training was based on the analysis of successful educational programs aimed at integrating music and vocal training into the early education system.

RESULTS AND DISCUSSION

The multidimensional effects of vocal training on early childhood development

Early music and vocal education have been important in shaping children's cognitive, emotional, and social skills. Early exposure to music plays a crucial role in stimulating different areas of the brain associated with perception, memory, attention, and executive functions. Unlike instrumental training, vocal training requires the intricate coordination of breathing, articulation, and auditory perception, fostering not only musical abilities but also enhancing verbal, cognitive, and emotional skills. Vocal training, unlike instrumental training, involved complex coordination of breathing, articulation, and auditory perception, which contributed to the development of not only musical abilities but also verbal, cognitive, and emotional competencies.

Early vocal education played an important role in the complex development of the child, contributing to the formation of various cognitive and motor skills. One of the key aspects of the impact of vocal training was the development of auditory perception and phonemic hearing, which was crucial for the subsequent acquisition of speech and the formation of language abilities. During vocal training, children learned to distinguish tonal and rhythmic structures, which improved their ability to perceive and reproduce sounds. Neurobiology research demonstrated that regular vocal training had a positive effect on the development of phonological awareness, helping children to better perceive and distinguish the sound elements of speech. This, in turn, contributed to the development of speech motor skills and facilitated the acquisition of native and foreign languages.

In addition, vocal training had a significant impact on the development of memory and attention. Singing required holding complex sequences of lyrics, melodies, and rhythms in the mind, which strengthened working and long-term memory mechanisms. Children who practiced vocals regularly showed higher scores on tests of sequential memorisation and cognitive flexibility, which had a favourable effect on their academic performance. Also, vocal practice had a positive effect on motor skill development. Performing songs required coordination of breathing, articulation, and facial expressions, which promoted the development of fine motor skills. The relationship between motor and cognitive functions has been widely confirmed in scientific studies, and vocal practice had a significant effect on general sensorimotor coordination. Children who mastered vocal techniques not only improved their musical abilities, but also developed skills of self-control, concentration and confident self-expression. Vocal training fostered emotional intelligence and self-regulation. The process of singing required conscious control of voice, breathing and expression, which had a positive effect on the development of emotional control. Music, as a means of self-expression, helped children to better understand and express their emotions and to interpret the emotional states of others (Zuk *et al.*, 2022). Thus, early music and vocal education served a multifaceted function in children's

development, influencing not only their musical abilities but also broader cognitive, emotional, and social aspects of development. The benefits of vocal training went far beyond musical development, encompassing cognitive, emotional

and social aspects. Contemporary research confirmed that vocal training improved memory, concentration, language skills, as well as emotional intelligence and communication abilities (Fig. 1).

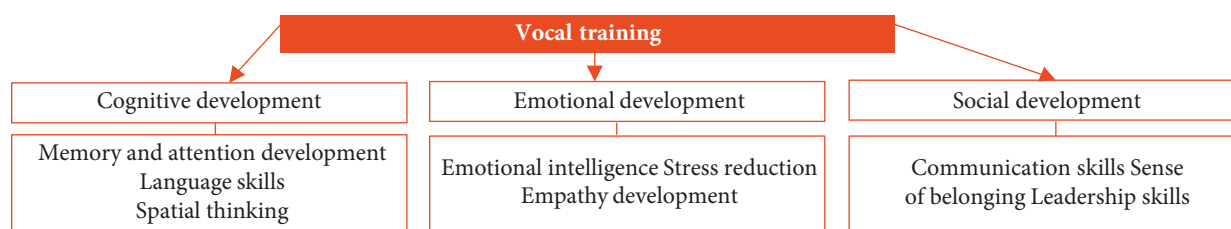


Figure 1. Aspects of benefits in vocal training

Source: compiled by the author based on L. Neves *et al.* (2021), H. Feinstein & K.V. Abbott (2021)

Vocal training activates different areas of the brain, including the frontal lobes, which are associated with executive functions, and the temporal and parietal regions, which are responsible for processing sound information. Studies have shown that children who regularly practiced singing showed higher scores on tests of cognitive flexibility, working memory and problem-solving ability. In addition, singing promoted the development of language abilities. The vocal exercises included complex speech patterns that promoted the acquisition of grammatical structures, the development of phonemic hearing, and the enrichment of vocabulary. Experimental studies proved that children engaged in vocal exercises mastered reading and writing skills faster, which supported the hypothesis of a close relationship between musical and language development. Another important cognitive benefit of vocal training was the development of spatial reasoning. Singing requires coordination of sound structures, which has a positive effect on the child's ability to analyse complex patterns and anticipate their development. Studies confirmed that children with musical training showed higher scores on tests of spatial reasoning, which could have a positive impact on their success in math and science (Neves *et al.*, 2021).

Vocal training played a key role in the development of emotional intelligence and self-regulation. Music is a natural means of self-expression, and participation in vocal training allowed children to better understand and manage their emotions. Studies have shown that children who engaged in vocal activities demonstrated higher levels of emotional stability and social adjustment. Singing also helped to reduce stress and anxiety levels. Physiological studies confirmed that the parasympathetic nervous system was activated during singing, promoting relaxation and reducing levels of cortisol, a stress hormone. This effect was especially important for children with high anxiety or socialisation difficulties. Another important aspect was the development of empathy. In the process of collective singing, children learned to listen to each other, to take into account the rhythm and intonation of the partner, which contributed to the formation of empathy skills and social

interaction. Collaborative music-making required coordination and synchronisation, which fostered a sense of unity and cooperation. Vocal training promoted social skills such as cooperation, communication, and self-confidence. Vocal instruction often took place in groups or choirs, which required children to work in teams, consider the opinions of other participants, and adapt to group tasks. Children participating in choral singing showed higher levels of social engagement and self-confidence. Collective singing contributed to children's sense of belonging to a group, which had a positive impact on their psychological well-being. In addition, vocal training contributed to the development of leadership skills. Children participating in vocal competitions and performances developed self-presentation skills, self-confidence and the ability to cope with excitement in front of an audience. These skills proved useful in further learning and professional development (Feinstein & Abbott, 2021). Vocal training had a multifaceted impact on child development. It improved cognitive functions such as memory, attention and language abilities, developed emotional intelligence and promoted social adaptation. Together, these benefits made vocal training an important part of the educational process, with long-term positive effects on the child's development.

Theoretical foundations and modern approaches to vocal training of young children

Early music and vocal training have a profound impact on a child's cognitive development. Scientific research in neurobiology and cognitive psychology demonstrates that vocal training promotes enhanced neuroplasticity, improves executive functions of the brain and forms stable neural connections responsible for coordination, memory, attention and language abilities. The neurobiology of music examines the effects of musical activity on brain function and development. Vocal performance engages complex neural mechanisms involving several key areas such as the frontal, temporal, and parietal lobes. The frontal lobes coordinate executive functions including movement control, planning, and regulation of breathing, which plays an important role in the singing process. The temporal lobes, in

turn, are responsible for the processing of sound signals, enabling accurate perception and reproduction of pitch, rhythm and timbre. An important element of the neurobiological effects of music is the synchronisation of the brain hemispheres. Vocal activity stimulates the corpus callosum, the main structure that provides the connection between the left and right hemispheres. This promotes the development of cognitive flexibility, improves coordination of movements and accelerates information processing, which is especially important during the period of active formation of the nervous system in children. In addition, vocal performance influences the limbic system, which is responsible for emotional regulation. Music activates dopaminergic mechanisms associated with motivation and feelings of pleasure, which makes the learning process more exciting and contributes to the consolidation of acquired skills. Musical activity also activates areas involved in sensorimotor integration, which has a positive effect on motor and language development. Thus, vocal training not only builds musical skills, but also has a complex impact on the cognitive, emotional, and psychophysiological development of the child (Barrett & Graham, 2023).

H. Gardner (1983) theory of multiple intelligence views intelligence as a set of independent but interacting cognitive systems. One of the key types of intelligence in his model is musical intelligence, which is responsible for perceiving, analysing, reproducing, and creating musical structures. Vocal training is directly related to the development of this type of intelligence and influences a wide range of cognitive and psycho-emotional processes. According to H. Gardner's approach, musical intelligence is closely related to linguistic, spatial, and interpersonal intelligence.

For example, the development of musical hearing and intonation in the process of vocal training contributes to the improvement of phonemic perception, which facilitates the mastery of native and foreign languages. It has been proven that children engaged in vocal training demonstrate higher results in language literacy tests. In pedagogical practice, H. Gardner's theory is applied through the integration of vocal training with other activities. For example, educational programs use techniques that incorporate singing into math (rhythmic counting), literature (learning poetry through melody), and social skills (collective music-making). This approach allows to engage several types of intelligence at the same time, which contributes to the child's all-round development.

In addition, vocalising develops emotional and interpersonal intelligence because it requires control of voice, intonation, expression of emotion, and interaction with the audience. Vocal training, especially in the form of group singing, promotes empathy, self-regulation and self-confidence, making vocal training not only a musical but also a psychologically significant tool for children's development. Pedagogical approaches to vocal training of young children are based on the principles of individual development, consideration of age-specific characteristics and the complex impact of music on the cognitive and emotional spheres. Several key approaches can be distinguished in modern vocal pedagogy. The choice of method depends on the age and cognitive characteristics of the child, as well as on the educational goals set. Among the most effective strategies are the cognitive-oriented approach, game methods, the C. Orff system, the Estill Voice method, and the Suzuki method (Table 1).

Table 1. Comparison of approaches to vocal training

Approach	Substance	Pros	Cons
Cognitive-centred approach	Development of hearing, memory and analysis of musical material. Conscious perception of melody, rhythm and harmony.	Improves musical thinking, builds analytical skills, and develops auditory perception.	Requires high concentration; difficult for very young children.
Game method	Teaching through games, chants, musical skits. Formation of skills in a relaxed form.	Increases interest, reduces anxiety, makes the process natural.	Possible difficulties in discipline, a balance between playing and learning is needed.
Carl Orff method	Combining singing with movement and speech. Development of rhythm and hearing through bodily practices.	Improves coordination, helps learn rhythm, and integrates vocals with other activities.	Requires special equipment (percussion instruments); difficult to organise.
Suzuki System	Vocal training according to the principle of mastering the native language: multiple repetition, gradual complication.	Builds musical intuition, develops memory, and involves parents in the process.	Dependence on parental involvement, requires systematic practice.
EVT	A scientifically based method of vocal training based on conscious control of the physiological processes of vocal formation.	Versatility for different vocal genres. Avoids vocal clamps and overstrain. Gives a clear understanding of the anatomy of the vocal apparatus. Improves control over sound, dynamics and articulation.	Requires knowledge of voice physiology, making it difficult to learn on your own. Implies a long learning curve, especially for children. Does not always take into account artistic expression, focusing more on technique.

Source: compiled by the author based on W. An (2023), J. Luo (2023), H. Kim (2023)

Cognitive-oriented learning in vocal pedagogy is based on the development of conscious musical perception, which forms children's ability to analyse and interpret musical works. Unlike traditional methods, where learning is based on mechanical memorisation of melodies, this approach emphasises understanding the structure of musical material. One of the key elements of the cognitive method is the development of auditory analysis. Children learn to recognise intervals, rhythmic patterns, dynamic changes and harmonic structures. This contributes to the formation of musical thinking, which helps not only in vocal training, but also in mastering instrumental music and improvisation. Additionally, this approach develops cognitive functions including memory, concentration and the ability to make logical sense of sound relationships. Importantly, children learn not just to sing, but to understand the principles of musical language, which makes their performance more meaningful and expressive. However, this method requires advanced analytical skills, so it is most effective when used in conjunction with other methods adapted for younger age groups (Foo, 2023).

The game approach to vocal training is based on the use of game technologies, role-playing tasks and interactive techniques that help children to master musical skills in a natural, relaxed environment. This method is especially effective for pre-schoolers and younger schoolchildren, as it takes into account their psychological characteristics and the need for active interaction. The main forms of play sessions include musical quests, where children learn to sing by performing tasks, interactive chants that develop articulation and diction, musical skits that help develop emotional expression, and song dialogues, in which children learn vocal intonation through interaction with partners. The use of the game approach contributes to the development of auditory perception, vocal coordination and improvisational skills. However, its implementation requires the teacher to structure the lessons in a structured way to maintain a balance between fun and learning. It is important to maintain discipline and guide play activities while ensuring student interest and engagement (An, 2023).

The Carl Orff method is based on the principle of synthesizing music, movement and speech, which makes it one of the most effective systems of music education for children. Central to this approach is the development of a sense of rhythm through physical activity. Children do not simply learn melodies, but experience music bodily, using claps, steps, strokes and plastic movements. Percussion instruments (xylophones, metallophones, drums) play an important role in Orff's methodology as they help children intuitively learn rhythmic structures and coordination. Movement is synchronised with the melody, making the process more meaningful and helping to deepen the understanding of musical form. The method is particularly effective in group lessons, as it develops listening, interaction and ensemble thinking. However, its use requires the teacher to have specialised knowledge and skills in movement and improvisation. The availability of instruments is also

important, which may limit its implementation in mass education (Luo, 2023).

Shinichi Suzuki's system is based on the principle that musical learning should occur as naturally as a child learns his or her native language. The main methodological principle is to immerse the child in a musical environment from a very early age, which helps to develop hearing, rhythmic perception and memory. One of the key elements of the method is learning by ear – children first listen to musical pieces repeatedly, then repeat them by imitating a sample, and only then master musical notation. This process allows for the development of musical intuition and natural mastery of the voice, without an initial emphasis on technical details. The role of parents in the Suzuki system is also fundamental. They are actively involved in the learning process, creating a favourable environment and helping the child form the habit of regular practice. However, the method requires systematic practice, and without family support, progress may slow down (Kim, 2023).

EVT is a scientifically based approach to developing vocal skills that is used in both academic and pop vocals (Voice training for..., n.d.). Unlike traditional techniques, EVT focuses on the anatomical and physiological basis of vocal sound, teaching singers to control the various mechanisms of vocalisation. A key feature of this method is the separation of vocal technique into controllable physiological processes. EVT trains vocalists to isolate and control the workings of the larynx, soft palate, vocal cords and breath, enabling them to consciously control the timbre, volume, articulation and vibration of sound. The technique offers six vocal qualities: speaking voice, falsetto, operatic sound, whistling register, belting and twang, making it versatile for different vocal styles. EVT is particularly useful in children's vocal training as it helps prevent vocal clamps and vocal cord strain. It gives children and educators a clear understanding of how sound is formed and teaches safe vocal techniques. However, the method requires a deep understanding of the anatomy of the voice, making it difficult to master on your own without a qualified teacher. Nevertheless, its principles have been successfully integrated into modern vocal programs, complementing traditional techniques.

All these methods have their advantages and limitations. Effective vocal training for children is often based on a combination of several approaches, which allows you to take into account the individual characteristics of students, their level of training and musical preferences. Modern technologies are actively integrated into the vocal training process, giving children the opportunity to practice their vocal skills in a convenient and fun way. The use of mobile applications allows teachers to diversify lessons and students to improve their singing technique independently. Among the most effective vocal training tools are Vocalizzo Lite (n.d.), Voice Tutor 1.1.7. (n.d.), Vox Tools: Learn to Sing (n.d.), Vocalist Lite 1.3.3. (n.d.) and VoCo Vocal Coach 1.1.1. (n.d.).

Vocalizzo Lite (n.d.) is a specialised vocal training application offering exercises for warming up the voice, developing breathing support, intonation and diction. It

is suitable for beginners and more experienced students alike, allowing you to customise your training sessions to meet your individual needs. Voice Tutor 1.1.7. (n.d.) uses elements of artificial intelligence to analyse vocal performance and offers personalised recommendations. This app provides exercises for breathing, articulation, and controlling voice dynamics, making it useful for both independent work and teacher-led lessons. Vox Tools: Learn to Sing (n.d.) is an application developed by professional vocal educators. It includes personalised lessons, exercises to control breathing and intonation, and real-time voice analysis. Vocalist Lite 1.3.3. (n.d.) focuses on developing range and vocal technique. It offers interactive exercises that allow users to track their own progress and gradually improve their vocal skills. VoCo Vocal Coach 1.1.1. (n.d.) is another innovative application that uses artificial intelligence algorithms. It analyses voice parameters and provides adaptive training, offering exercises that help improve vocal control and monitor performance quality. In addition to mobile applications, Singing Machine (n.d.) occupies a special place among interactive methods. This platform combines traditional vocal exercises with game elements, turning the learning process into a fun and interactive experience. It offers karaoke functionality, training exercises, competitive tasks and real-time feedback. With gamification elements, Singing Machine makes the learning process more dynamic and motivating, which is especially important for children.

The integration of modern digital tools into the vocal training process not only facilitates the work of teachers, but also contributes to the formation of sustainable vocal skills in children. The use of mobile applications and interactive platforms makes it possible to adapt lessons to the individual needs of students and makes the learning process more accessible and effective. Music education has a significant impact on the development of children's emotional intelligence and social adaptation. Music, as an art form, is a powerful means of emotional expression and communication, enabling children to recognise, understand and manage their emotions and to interact effectively with others. Emotional intelligence includes several key aspects: awareness of one's own emotions, management of emotional states, empathy, and social interaction. Music instruction fosters the development of each of these components, as the process of performing and experiencing music requires active engagement with emotional nuances and shades. During music lessons, children learn to distinguish emotional states by analysing the melody, harmony, rhythm and dynamics of pieces. This contributes to the formation of emotional awareness, an important component of emotional intelligence. In addition, performing music requires self-control and concentration, which develops the ability to manage their emotions and adapt to different situations (Zhou, 2024).

Music is also a powerful tool for expressing feelings. Children learning music are given the opportunity to express their emotions safely and constructively through vocalising or playing an instrument. This process promotes emotional regulation – the ability to cope with anxiety,

stress, and other emotional distress. Thus, music education builds children's resilience to stress and helps them adapt more easily to changes in their environment. Another important aspect is the development of empathy – the ability to recognise and understand the emotions of others. Music education requires children to listen attentively to and interpret musical works, which contributes to the development of their capacity for emotional perception. For example, performing in an ensemble or choir requires participants to be sensitive to the musical context and the emotional state of other performers, which further helps them to better understand the feelings of others in everyday life (Váradí, 2022).

Social adaptation includes the ability to interact with others, find a common language in a collective, understand social norms and cooperate effectively with others. Music education creates the conditions for developing these skills, as music learning often takes place in a collective environment. One of the key aspects is the development of communication skills. Music lessons require active interaction between students and teacher, as well as among students themselves, especially within ensembles, choirs, and orchestras. In these settings, children learn to listen to each other, work as a team and respect the opinions of others. These skills prove useful in later learning and social life. Music also fosters a sense of community and belonging. Collective music-making creates an atmosphere of cooperation and mutual support, which is especially important for children with socialisation difficulties. In a musical group, each participant plays his or her own role, and success depends on the coherence of the work of all members of the group. This shapes children's understanding of collective responsibility and develops the ability to work as a team. In addition, music education contributes to the development of self-confidence. Regular performances in front of an audience help children overcome their fear of public speaking, develop artistry and self-presentation. The ability to be confident on stage is transferred to other areas of life, fostering leadership skills and social resilience. Music lessons also promote discipline and self-control. Mastering a musical instrument or vocal technique requires regular practice, patience and concentration. These qualities help children not only in musical activities, but also in their studies and daily life (Lupu *et al.*, 2022; Demchenko *et al.*, 2023). Music education plays an important role in the formation of emotional intelligence and social adaptation of children. It helps them to better understand and express their emotions, develop empathy and self-regulation. In collective music classes, children learn to interact with others, develop communication skills, a sense of responsibility and self-confidence. Thus, music teaching becomes not only a way of mastering musical skills, but also a powerful tool for the personal and social development of the child.

Music and vocals training in children's development – Synthesis of research findings

Early music and vocal education have a significant impact on children's cognitive, emotional, and social development.

The results of this study confirmed that vocal education contributes to the formation of verbal, cognitive and emotional competencies, and plays an important role in the development of memory, attention and self-regulation. These findings are consistent with the results of studies presented in the works of other authors, which allows for comparative analysis and identification of common trends and differences. One of the key aspects of the impact of vocal training is the development of auditory perception and phonemic awareness, which is critical for speech acquisition. In this study, it was found that children who were systematically engaged in vocal training showed higher scores on tests of phonemic awareness and verbal motor skills. These results are supported by the study of M. Martins *et al.* (2021), which analysed the effects of musical training on the ability to recognise emotions and phonological structures. Regular vocal training was found to enhance phonological awareness and improve the ability to discriminate speech sound nuances. In addition, vocal training had a positive effect on memory and attention development. As shown in the results of this study, children who participated in vocal programs performed better on tests of working memory, concentration ability, and cognitive flexibility. Regular vocal training required memorisation of complex melodic sequences, rhythmic structures, and song lyrics, which strengthened long-term and short-term memory mechanisms. In the process, children developed the ability to retain information, organise sequences of sounds, and reproduce them, which had a positive effect on their general learning skills. These results are consistent with the findings of M. Janurik & K. Józsa (2022), who found that early development of musical abilities contributes to improved academic performance by strengthening cognitive mechanisms related to memory and attention. The authors noted that musical exercises that included vocals developed children's auditory memorisation abilities, improved task concentration, and increased cognitive self-regulation. In their study, children who participated in vocal training performed better on tasks requiring retention of information in working memory than their non-musically trained peers. Thus, vocal training had a long-term positive effect on memory and attention development, contributing to a child's academic and cognitive growth. Emotional regulation and self-expression through music are important aspects of vocal training. While singing, children learned to recognise and express their emotions, which contributed to the development of their ability to self-regulate. Vocal exercises required control over breathing, dynamics and intonation, which allowed children to better manage their emotional states. In addition, performing vocal pieces with different emotional tones developed their ability to emotionally interpret and recognise their feelings. In this study, it was found that children who practiced vocal training showed higher levels of emotional awareness, self-regulation and empathy.

Regular vocal training helped them to cope with anxiety, increased self-confidence and contributed to a positive emotional background. These results are confirmed in the

work of E.M.G. Morgado *et al.* (2023), which emphasises the importance of musical interaction in the formation of emotional intelligence. It was shown that vocal training activates the limbic system of the brain associated with emotion processing, which contributes to the development of the ability to recognise and manage emotional states. The authors noted that children who practiced vocal training showed greater empathy towards their peers because they had to take into account the mood and emotional expression of other participants during the process of collective singing. In addition, vocal training helped to reduce stress levels because musical activity triggered the production of dopamine, which is associated with feelings of joy and satisfaction.

Additionally, this study noted that vocal activity reduced children's anxiety levels by creating a comfortable environment for self-expression. During vocal training, children learned to control their breathing, which promoted physiological relaxation and reduced stress levels. Slow and rhythmic vocal exercises activated the parasympathetic nervous system, helping to stabilise heart rate and reduce levels of cortisol, a stress hormone. Children who regularly participated in vocal exercises showed higher levels of emotional comfort and self-confidence, making it easier for them to adapt to new situations and cope with emotional stress. These findings are consistent with the study by K.R. Weimer & J. Rutkowski (2023), which emphasises the role of music education in building emotional resilience. It was shown that participation in vocal activity enhanced neurobiological mechanisms of positive emotional reinforcement. Musical activity induced the production of dopamine, which is associated with feelings of pleasure, motivation, and emotional well-being. In addition, collective singing had an additional supportive and socialising effect, reducing children's anxiety levels and creating a positive emotional environment. Children participating in musical groups felt more confident in social interactions, which confirmed the importance of vocal training not only for individual emotional development, but also for social adaptation.

Social adjustment is an important component of music education. This study found that children who participated in vocal groups demonstrated improved communication, teamwork, and self-confidence skills. Collective singing required participants to coordinate actions, follow a common tempo and intonation, which developed the ability to collaborate and built teamwork skills. In addition, regular performance in front of an audience helped to reduce anxiety and develop self-confidence. These findings are consistent with the study of Ö. Apaydın (2023), which analysed the method of C. Orff as a way of involving children in musical interaction through group activities. In his work, it was shown that musical learning through movement, rhythm and group activities promotes communication skills, empathy and coordination. This study also noted that incorporating rhythmic elements and movement into vocal learning helped children to better synchronize with their partners and fostered a sense of collective

responsibility. However, in contrast to the results of Ö. Apaydın, it was found in this study that Orff's method may not always contribute to the development of individual vocal skills because his emphasis on rhythmic activity sometimes limited attention to the development of vocal techniques.

Comparison with the work of J.P. Mabini (2024), who conducted a comparative analysis of the methods of Kodai, Suzuki, Orff and H. Gordon's theory of musical learning, showed both similarities and differences. His study emphasised the role of group singing in shaping social adjustment, which is supported by the data in this study. This study also found that children who were taught using Kodai's method demonstrated higher levels of phonemic awareness, but were less likely to develop skills in free musical expression compared to those who were taught using C. Orff. Analysing the results of this study and the data of J.P. Mabini revealed a difference in the influence of individual and collective musical training on social adaptation. The use of modern technology in vocal training is also a significant factor in the educational process. In this study, it was noted that interactive methods, including mobile applications and digital platforms, helped to increase motivation and learning efficiency. These findings are consistent with the research of Y. Shi (2021) who examined the effects of mobile internet platforms and applications on vocal learning. It was found that the use of digital tools such as Vocalizzo Lite (n.d.), Voice Tutor 1.1.7. (n.d.) and Singing Machine (n.d.) optimised the learning process through a personalised approach and interactivity.

H. Deng (2024) also noted that modern technology facilitates the development of vocal skills through cross-cultural interaction, allowing children to learn different vocal traditions and styles. This finding is consistent with the results of this study, which also found that digital learning platforms and mobile applications increase children's access to a variety of vocal techniques and learning methods. However, the difference is that H. Deng emphasises learning about vocal traditions through digital resources, whereas this study emphasises the role of technology not only in expanding cultural horizons but also in developing practical vocal skills. In addition, unlike H. Deng's study, which focuses on teaching different musical styles, this study highlights the importance of interactive technologies in shaping a child's individual vocal writing. These results confirm the importance of integrating innovative approaches into the educational system, but also emphasise the need to adapt digital methods to individual student needs.

The results of this study are largely consistent with the findings of other authors, but some differences can be highlighted. For example, R. Román-Caballero *et al.* (2022), in their meta-analysis, emphasised the beneficial effects of instrumental learning on cognitive functions, especially in the aspect of spatial reasoning and executive functions. Their work indicated that playing musical instruments requires coordination of movements, which promotes motor skills and cognitive flexibility. At the same time, this study shows that vocal learning has not only cognitive but also

significant emotional and social effects. Unlike instrumental learning, vocal training requires working with speech motor skills, intonation, and breathing, which contributes to the development of phonemic hearing and language abilities. In addition, vocal training more often includes collective forms of lessons, which contributes to the formation of social skills and emotional regulation. Thus, this study complements the findings of R. Román-Caballero *et al.*, emphasising the multifaceted effects of vocal training on child development.

A. Asztalos (2021) emphasised the development of children's singing voice, pointing out that the formation of vocal skills requires an individual approach and consideration of age features. His work emphasised that early vocal training should take into account the natural physiological changes of the vocal apparatus and adapt to the child's capabilities. This partly echoes the findings of this study, which also emphasised the need for differentiated techniques depending on the individual needs of the pupils. The difference, however, is that A. Asztalos emphasises the physiological aspects of voice formation, whereas this study places considerable emphasis on the impact of vocal training on cognitive and emotional development. It is important to note that unlike A. Asztalos, where individualisation of learning is considered in the context of biological factors, in this study the adaptation of techniques is also related to students' personality traits, training level and style preferences. Thus, both studies emphasise the importance of individual approach, but from different perspectives – physiological and complex-psychological. This study confirmed the significance of vocal training in the development of young children's cognitive, emotional, and social skills. The findings are consistent with the results of other studies, but highlight the unique and complex impact of vocal training on various aspects of development. Modern techniques, including digital technologies, provide new opportunities to optimise the educational process and require further study in the context of their long-term impact on children's development.

CONCLUSIONS

The results of the study confirmed that early music and vocal education played a significant role in children's cognitive, emotional and social development. It was found that interaction with music at an early age helped to activate different parts of the brain involved in the processes of perception, memory, attention and executive functions. Unlike instrumental training, vocal practice required complex coordination of breathing, articulation and auditory perception, which influenced not only the development of musical abilities, but also the formation of speech, cognitive and emotional competencies.

Analysis of scientific theories confirmed that the neurobiology of music explained the impact of vocal training on children's brain development through activation of the frontal, temporal and parietal lobes, as well as through synchronisation of the brain hemispheres. The study of

pedagogical approaches showed that the most effective methods of vocal training of young children were cognitive-oriented approach, game methods, C. Orff system, Suzuki method and EVT method (Voice training for..., n.d.). Orff, Suzuki method and EVT method. It was found that game technologies helped to relieve psychological tension and create a comfortable educational environment, and cognitive-oriented methods developed conscious musical perception, auditory analysis and interpretation of musical material. The method of C. Orff method was the most effective in developing rhythmic coordination, and the Suzuki system allowed to form musical hearing through the principle of repetition and active participation of parents in the learning process. The EVT method was particularly useful in preventing vocal clamping and vocal cord overstrain in children.

The study summarised data on the effects of music and vocal music on children's development, which confirmed their significant effects on cognitive functions, memory, attention, language abilities, emotional intelligence and social adaptation. Collective singing was found to promote communication skills, reduce anxiety and build a sense of unity and cooperation. Regular vocal exercises had an impact on reducing stress levels and promoted self-regulation of emotional state in children. Statistical data and analysis of existing studies confirmed that music education had a positive effect on the development of emotional intelligence and social adaptation. Children who

participated in vocal programs showed higher levels of emotional awareness, empathy and self-confidence. Collective music-making promoted cooperation and leadership skills and increased social engagement.

Future research on vocal training should focus on such key areas. A comparative analysis of vocal and instrumental training will help identify unique cognitive and emotional benefits. Neuroscientific studies using neuroimaging should explore its impact on brain plasticity and auditory processing. Language development research should assess how vocal exercises enhance multilingual skills and speech therapy. The integration of digital technologies requires evaluation, comparing AI-driven tools and virtual platforms with traditional methods. Long-term studies should investigate the lasting effects of vocal training on social adaptation, mental health, and leadership. Inclusive education research should develop tailored vocal training methods for children with special educational needs. Expanding research through neuroscientific and pedagogical studies will refine teaching methods and reinforce the long-term benefits of vocal education in child development.

ACKNOWLEDGEMENTS

None.

CONFLICT OF INTEREST

None.

REFERENCES

- [1] An, W. (2023). Practice and exploration of teaching mode of Children's vocal music course outside school. *Art and Performance Letters*, 4(12), 65-73. doi: 10.23977/artpl.2023.041212.
- [2] Apaydın, Ö. (2023). [Orff schulwerk approach and teacher in music education](#). *International Online Journal of Education & Teaching*, 10(2), 992-1006.
- [3] Asztalos, A. (2021). Development of children's singing voice. *Studying Music at Babeş-Bolyai University*, 66(1), 39-54. doi: 10.24193/subbmusica.2021.1.03.
- [4] Barrett, M.S., & Graham, F.W. (2023). *The Oxford handbook of early childhood learning and development in music*. Oxford: Oxford Academic. doi: 10.1093/oxfordhb/9780190927523.001.0001.
- [5] Blasco-Magraner, J.S., Bernabé-Valero, G., Marín-Liébaña, P., & Moret-Tatay, C. (2021). Effects of the educational use of music on 3- to 12-year-old children's emotional development: A systematic review. *International Journal of Environmental Research and Public Health*, 18(7), article number 3668. doi: 10.3390/ijerph18073668.
- [6] Bugos, J., DeMarie, D., Stokes, C., & Power, L.P. (2022). Multimodal music training enhances executive functions in children: Results of a randomized controlled trial. *Annals of the New York Academy of Sciences*, 1516(1), 95-105. doi: 10.1111/nyas.14857.
- [7] Cisneros, A., Roussey, J., Inbar, T., Fratacci, A., & Frey, A. (2023). Impact of daily choral singing and creative writing activities on the cognitive development of second-, third-, and fourth-grade French children from low socioeconomic backgrounds. *Children*, 10(9), article number 1515. doi: 10.3390/children10091515.
- [8] Demchenko, I., Kalynovska, I., & Kovtun, K. (2023). Specific characteristics of children social and psychological rehabilitation by means of music therapy during and after the war. *Humanities Studios: Pedagogy, Psychology, Philosophy*, 11(4), 52-60. doi: 10.31548/hspedagog14(4).2023.52-60.
- [9] Deng, H. (2024). Improvement path of singing skills under the influence of cross-cultural communication in vocal music education. *Applied Mathematics and Nonlinear Sciences*, 9(1). doi: 10.2478/amns-2024-2764.
- [10] Feinstein, H., & Abbott, K.V. (2021). Behavioral treatment for benign vocal fold lesions in children: A systematic review. *American Journal of Speech-Language Pathology*, 30(2), 772-788. doi: 10.1044/2020_AJSLP-20-00304.
- [11] Foo, C. (2023). The effect of music training in young children. *Scholarly Review Journal*, Winter 2023/2024(7), 28-35. doi: 10.70121/001c.121706.
- [12] Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic Books.

- [13] Hidayat, R., Tunajjah, U., Ernasari, S., Susanti, E., Muhimah, L., Rosmiati, M., & Nurliani, L. (2024). Singing method: Can it improve the early childhoods' language skills?. *Journal Corner of Education, Linguistics, and Literature*, 3(3), 289-295. doi: [10.54012/jcell.v3i3.273](https://doi.org/10.54012/jcell.v3i3.273).
- [14] Janurik, M., & Józsa, K. (2022). Long-term impacts of early musical abilities on academic achievement: A longitudinal study. *Journal of Intelligence*, 10(3), article number 36. doi: [10.3390/jintelligence10030036](https://doi.org/10.3390/jintelligence10030036).
- [15] Jendrysik, K. (2024). Methods for developing vocal competences in early school-age children outline of laboratory tests. *Annals of the Maria Curie-Skłodowska University Section J – Pedagogy-Psychology*, 37(2), 123-134. doi: [10.17951/j.2024.37.2.123-134](https://doi.org/10.17951/j.2024.37.2.123-134).
- [16] Kim, H. (2023). *The benefits of the Suzuki method for children's cognitive and physical development: A descriptive phenomenological study of Suzuki specialists*. Lynchburg: Liberty University.
- [17] Li, D. (2023). Research on the path of improving the effectiveness of vocal music teaching in preschool education. *Frontiers in Educational Research*, 6(19), 24-28. doi: [10.25236/fer.2023.061905](https://doi.org/10.25236/fer.2023.061905).
- [18] Luo, J. (2023). Research on the integration of Orff teaching method localization and preschool music teaching in colleges and universities. *Transactions on Comparative Education*, 5(5), 36-40. doi: [10.23977/trance.2023.050507](https://doi.org/10.23977/trance.2023.050507).
- [19] Lupu, S., Roden, I., Krone, M., Chantah, J., Frankenberg, E., Bongard, S., & Kreutz, G. (2022). The influence of school-based musical training on acculturation processes in children: Findings from a longitudinal study. *Psychology of Music*, 51(2), 463-480. doi: [10.1177/03057356221097990](https://doi.org/10.1177/03057356221097990).
- [20] Mabini, J.P. (2024). Comparative analysis of Kodály, Suzuki, Dalcroze, Orff, and Gordon music learning theory in early childhood music education: A literature review. *International Journal of Research Publications*, 150(1), 956-967. doi: [10.47119/ijrp1001501620246690](https://doi.org/10.47119/ijrp1001501620246690).
- [21] Martins, M., Pinheiro, A.P., & Lima, C.F. (2021). Does music training improve emotion recognition abilities? A critical review. *Emotion Review*, 13(3), 199-210. doi: [10.1177/17540739211022035](https://doi.org/10.1177/17540739211022035).
- [22] Morgado, E.M.G., Licursi, M.B., Cardoso, M., Carvalho, C., & Leonido, L. (2023). Expressive-musical playfulness: Reflections on childhood development. *European Review of Artistic Studies*, 14(1), 22-35. doi: [10.37334/eras.v14i1.288](https://doi.org/10.37334/eras.v14i1.288).
- [23] Neves, L., Martins, M., Correia, A.I., Castro, S.L., & Lima, C.F. (2021). Associations between vocal emotion recognition and socio-emotional adjustment in children. *Royal Society Open Science*, 8, article number 211412. doi: [10.1098/rsos.211412](https://doi.org/10.1098/rsos.211412).
- [24] Plate, R.C., Jones, C., Steinberg, J., Daley, G., Corbett, N., & Waller, R. (2024). Children's knowledge and feelings align in response to emotional music. *Developmental Psychology*, 60(2), 265-270. doi: [10.1037/dev0001572](https://doi.org/10.1037/dev0001572).
- [25] Pryadko, O. (2021). Development of emotional intelligence of children of junior school age by means of musical art. *Academic Notes Series Pedagogical Science*, 195, 110-114. doi: [10.36550/2415-7988-2021-1-195-110-114](https://doi.org/10.36550/2415-7988-2021-1-195-110-114).
- [26] Rodriguez-Gomez, D.A., & Talero-Gutiérrez, C. (2022). Effects of music training in executive function performance in children: A systematic review. *Frontiers in Psychology*, 13, article number 968144. doi: [10.3389/fpsyg.2022.968144](https://doi.org/10.3389/fpsyg.2022.968144).
- [27] Román-Caballero, R., Vadillo, M.A., Trainor, L.J., & Lupiáñez, J. (2022). Please don't stop the music: A meta-analysis of the cognitive and academic benefits of instrumental musical training in childhood and adolescence. *Educational Research Review*, 35, article number 100436. doi: [10.1016/j.edurev.2022.100436](https://doi.org/10.1016/j.edurev.2022.100436).
- [28] Shi, Y. (2021). The use of mobile internet platforms and applications in vocal training: Synergy of technological and pedagogical solutions. *Interactive Learning Environments*, 31(6), 3780-3791. doi: [10.1080/10494820.2021.1943456](https://doi.org/10.1080/10494820.2021.1943456).
- [29] Singing Machine. (n.d.). Retrieved from <https://singingmachine.com/>.
- [30] Váradi, J. (2022). A review of the literature on the relationship of music education to the development of socio-emotional learning. *SAGE Open*, 12(1). doi: [10.1177/21582440211068501](https://doi.org/10.1177/21582440211068501).
- [31] Vocalist Lite 1.3.3. (n.d.). Retrieved from https://vocalist-lite.soft112.com/#google_vignette.
- [32] Vocalizzo Lite – Vocal Warm-up. (n.d.). Retrieved from <https://vocalizzo-lite.en.aptoide.com/app>.
- [33] VoCo Vocal Coach 1.1.1. (n.d.). Retrieved from https://voco-vocal-coach-ios.soft112.com/#google_vignette.
- [34] Voice training for speakers. (n.d.). Retrieved from <https://estillvoice.com/>.
- [35] Voice Tutor 1.1.7. (n.d.). Retrieved from <https://voice-tutor.soft112.com/>.
- [36] Vox Tools: Learn to Sing. (n.d.). <https://vox-tools-learn-to-sing.en.softonic.com/android>.
- [37] Weimer, K.R., & Rutkowski, J. (2023). Playing Musically: Developing healthy and expressive singing instrumentalists. *Music Educators Journal*, 109(4), 42-50. doi: [10.1177/00274321231178446](https://doi.org/10.1177/00274321231178446).
- [38] Zhang, Y. (2021). The role of psychology in the pedagogical work aimed at the elimination of bleating in the process of teaching singing. *PHILHARMONICA International Music Journal*, 4, 54-66. doi: [10.7256/2453-613x.2021.4.36369](https://doi.org/10.7256/2453-613x.2021.4.36369).
- [39] Zhou, H. (2024). From notes to knowledge: A comprehensive review of early childhood music education. *Transactions on Social Science Education and Humanities Research*, 11, 561-566. doi: [10.62051/jgdc2t55](https://doi.org/10.62051/jgdc2t55).
- [40] Zuk, J., Vanderauwera, J., Turesky, T., Yu, X., & Gaab, N. (2022). Neurobiological predispositions for musicality: White matter in infancy predicts school-age music aptitude. *Developmental Science*, 26(5), article number e13365. doi: [10.1111/desc.13365](https://doi.org/10.1111/desc.13365).

Ксенія Аль-Хлейфат

Бакалавр

Київський національний університет імені Тараса Шевченка

01601, вул. Володимирська, 60, м. Київ, Україна

<https://orcid.org/0009-0002-0354-8744>

Вплив вокальних занять на когнітивний та емоційний розвиток дітей раннього віку

Анотація. Метою дослідження було виявлення особливостей впливу вокального навчання на різні аспекти розвитку дитини. У ході дослідження було проаналізовано теоретичні підходи до вивчення впливу музичного та вокального навчання на розвиток мозку, здійснено оцінку педагогічних методів навчання вокалу, а також узагальнено статистичні дані щодо значення музичної освіти у формуванні емоційного інтелекту та соціальної адаптації. Методологія дослідження включала аналіз наукової літератури, присвяченої впливу вокального навчання на когнітивний, емоційний та соціальний розвиток дітей. У процесі роботи вивчалися теоретичні концепції, дані емпіричних досліджень, а також порівняльний аналіз різних педагогічних підходів до вокального навчання. Розглянуто наукові праці в галузі неврології, психології та музичної педагогіки, що дозволило оцінити багатоаспектний вплив вокального навчання на розвиток дитини. Результати дослідження підтвердили, що заняття вокалом сприяють розвитку слухового сприйняття, фонематичного слуху, пам'яті, уваги та мовленнєвих навичок. Було виявлено, що діти, які займалися вокалом, показали вищі результати в тестах на когнітивну гнучкість, робочу пам'ять та аналітичні здібності. Крім того, вокальне навчання позитивно впливало на емоційний розвиток, сприяючи емпатії, соціальній адаптації та впевненості в собі. Участь у груповому співі покращила комунікативні здібності дітей та знижила рівень тривожності. На основі отриманих результатів були розроблені рекомендації щодо вдосконалення педагогічних практик вокального навчання. Практична значущість дослідження полягає в його потенціалі для покращення дошкільної освіти шляхом інтеграції вокального навчання як інструменту когнітивного та емоційного розвитку. Результати дослідження надають цінну інформацію для вихователів, музичних інструкторів та політиків, сприяючи впровадженню науково обґрунтованих педагогічних підходів, які розвивають слухове сприйняття, мовні здібності та соціальні навички дітей. Крім того, дослідження підкреслює важливість інтерактивних та адаптивних методів навчання, пропонуючи практичні рекомендації щодо оптимізації вокального навчання відповідно до різноманітних навчальних потреб та етапів розвитку

Ключові слова: нейробіологія музики; педагогічні підходи; теорія множинного інтелекту; сучасні методи; інтерактивність

**НАУКОВИЙ ВІСНИК
МУКАЧІВСЬКОГО ДЕРЖАВНОГО УНІВЕРСИТЕТУ
СЕРІЯ «ПЕДАГОГІКА ТА ПСИХОЛОГІЯ»**

Науковий журнал

Том 11, № 1, 2025

Оригінал-макет видання виготовлено
у редакційно-видавничому відділі Мукачівського державного університету

Відповідальний редактор:

К. Мовчан

Редагування англomовних текстів:

А. Кравченко

Комп'ютерна верстка:

О. Глінченко

Підписано до друку 26.03.2025 р.

Формат 60*84/8

Умовн. друк. арк. 14,7

Тираж: 300 прим.

Адреса видавництва:

Мукачівський державний університет
89600, вул. Ужгородська, 26, м. Мукачево, Україна
E-mail: info@pp-msu.com.ua
<https://pp-msu.com.ua>

SCIENTIFIC BULLETIN
OF MUKACHEVO STATE UNIVERSITY
SERIES “PEDAGOGY AND PSYCHOLOGY”

Scientific Journal

Vol. 11, No. 1, 2025

The original layout of the publication is made
in the publishing department of Mukachevo State University

Managing Editor:
K. Movchan

Editing English-Language Texts:
A. Kravchenko

Desktop Publishing:
O. Glinchenko

Signed for print 26.03.2025.
Format 60*84/8
Conventional printed pages 14.7
Circulation 300 copies

Publishing Address:
Mukachevo State University
89600, 26 Uzhhorodska Str., Mukachevo, Ukraine
E-mail: info@pp-msu.com.ua
<https://pp-msu.com.ua/en>