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ANALYSIS OF PRACTICAL EXPERIENCE IN USING ARTIFICIAL INTELLIGENCE TOOLS IN THE SCIENTIFIC ACTIVITIES OF FUTURE DOCTORS OF PHILOSOPHY

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Abstract. The exploration of artificial intelligence (AI) capabilities, compliance with ethical and regulatory principles governing its use, the provision of robust knowledge to learners, and the development of AI literacy and AI competence remain issues of paramount relevance in contemporary education and research. The scope of this problem also includes the integration of AI-based tools into academic and research activities within higher education institutions. Despite growing scholarly attention to the pedagogical and scientific applications of AI technologies, the practical implementation of AI in the research activities of doctoral (third-cycle) students remains an underexplored area.

To identify and systematize the primary directions of AI tool utilization in postgraduate research, a selection of academic works addressing this issue was reviewed and analyzed. The findings indicate that researchers focus on a variety of aspects, including automated feedback mechanisms (linguistic error correction, preliminary logical assessment), generation of learning materials, development of adaptive learning pathways, chat-based assistants for students and educators, intelligent decision-support systems (for academic administration and dropout risk prediction), as well as novel algorithms for plagiarism detection.

The analysis allowed for the delineation of six key domains of AI application in the scholarly activity of prospective Doctors of Philosophy: (1) research conception and design; (2) content development and structural organization; (3) literature review and synthesis; (4) data management and analytical processing; (5) editing, peer review, and publication support; (6) scholarly communication, outreach, and adherence to ethical and academic integrity standards.

Overall, the study underscores the transformative potential of artificial intelligence in advancing the research culture of higher education while emphasizing the necessity of cultivating responsible and ethical AI use among early-career researchers.

Keywords: artificial intelligence; AI tools; research work; prospective Doctors of Philosophy (PhDs).

Problem statement. At present, higher education cannot be envisaged without artificial intelligence technologies, which have become an integral part of the professional activity of academic and teaching staff and of the learning of students. The concepts of "generative artificial intelligence," "artificial intelligence competence," and "artificial intelligence literacy" have entered scholarly discourse, and mastery of artificial intelligence tools as well as well-developed skills in using artificial

intelligence instruments have become an indispensable prerequisite for the successful implementation of educational and professional activities and for the personal development of every individual. In addition, artificial intelligence tools assist contemporary researchers in conducting searches, generating ideas, reviewing the literature, editing scholarly texts, and so forth.

Developed countries of Europe and America, non-governmental organizations, and foundations pay considerable attention to the incorporation of artificial intelligence into all spheres of life: public administration, business, medicine, culture and the arts, and education. In 2023 the Artificial Intelligence Act (AI Act) was adopted by the European Parliament; in 2024 the UNESCO developed Artificial Intelligence Competency Frameworks for teachers and learners (AI competency framework for teachers; AI competency framework for students). In general, a significant number of documents have been published that create the regulatory and legal framework for the use of artificial intelligence tools in various domains; however, many issues remain unresolved. For example, in a special report by A. Xanthaki at the eightieth session of the United Nations General Assembly, attention was drawn to the risks of artificial intelligence for creativity, in particular the undermining of creative potential, the deepening of inequality, restrictions on the right to participate in cultural life, bias and discrimination in the field of artificial intelligence, and others (Artificial intelligence and creativity, 2025).

Thus, the study of the possibilities of artificial intelligence, compliance with the rules of its use, and the provision of solid knowledge in this field to learners currently remain exceptionally relevant. In this article, the problem field encompasses the involvement of artificial intelligence tools in research activities in higher education.

Analysis of recent research and publications. The specific features of the incorporation of artificial intelligence into the research process in higher education have for several years been the focus of active investigation by national and foreign scholars, among them Borodiienko, Drach, et al. (2025), Vorotnikova, Morze, et al. (2025), Huraliuk (2023), Dotsenko and Sobchenko (2024), Kolomiiets and Kushnir (2023), Polonevych, Morozova, et al. (2024), Bittle and El-Gayar (2025), Golan, Reddy, et al. (2023), Lee, Kim and Gómez-Ramos (2025), Ravšelj, et al. (2025), Spivakovsky, Omelchuk, et al. (2023), Twabu (2025), Wagner, Lukyanenko and Pare (2022), Yusuf, Pervin and Román-González (2024), and others. Researchers analysis various aspects, in particular: automated feedback (correction of language errors, basic assessment of logic), generation of learning materials, construction of adaptive learning trajectories, Chabot assistants for students and lecturers, intelligent decision-support systems (administration, prediction of dropout risk), new plagiarism-detection

algorithms, and other issues.

Despite considerable scholarly attention to the problem of using artificial intelligence tools in education and research, the issue of the practical application of artificial intelligence in the works of learners at the third (educational and research) level remains topical.

The purpose of the article is to determine the main directions of the use of artificial intelligence tools in research, which is extremely useful for future PhD in the field of education.

Research methods. In preparing the article, a complex of theoretical research methods was applied to the problem of practical use of artificial intelligence tools in the research activities of future PhD in the field of education, in particular the search for scholarly sources in scientometric databases such as ResearchGate, Scopus, Google Scholar and others, analysis of selected studies, classification, and generalization. In addition, empirical methods were employed to test artificial intelligence tools and to study the possibilities of their practical use in the research activities of learners at the third (educational and research) level of higher education.

Artificial intelligence tools (AskYourPDF Research Assistant, ChatGPT 5.1) were used to search for scholarly sources.

Presentation of the main material. To generalize the main directions of the use of artificial intelligence tools in research, a number of scholarly studies related to this problem were selected and analysed.

Vorotnikova, Dziabenko and Morze (2025), on the basis of a survey of higher education lecturers in different specialties, identified challenges and obstacles to the introduction of artificial intelligence for personalized learning in higher education institutions: the absence of institutional educational policies for the use of artificial intelligence and the lack of administrative support for such policies, insufficient funding, inadequate technological infrastructure, insufficient training of lecturers and their fear of using artificial intelligence, as well as unclear ethical and legal issues of its use.

Borodiienko, Drach, et al. (2025) analysed the experience of academic and teaching staff at Ukrainian universities in using artificial intelligence, which proved to be rather limited. Lecturers do not see ways of using artificial intelligence to optimize the research process, improve the quality of scholarly texts, or develop new skills; they express concern about the possible deterioration in the quality of research and the risk of plagiarism. Dotsenko and Sobchenko (2024) examined the possibilities of implementing artificial intelligence in the research environment of higher education institutions in Ukraine and determined that such artificial intelligence technologies as

speech recognition, natural language processing, image recognition and processing, intelligent data mining for prediction, machine creativity, and others significantly improve the productivity of research and permeate all stages of the research process.

In an analytical review, Huraliuk (2023), on the basis of an overview of a significant number of national scholarly works, identifies the most widespread areas of application of artificial intelligence in pedagogical research and emphasizes that artificial intelligence has currently become an integral component of the digital transformation of education, an important instrument of the pedagogical process, and at the same time an object of research in the context of the development of digital pedagogy and an information technology that entails certain challenges that will need to be addressed in the future.

Spivakovsky, Omelchuk, et al. (2023) stress that in order to delineate the boundaries for the use of artificial intelligence in educational and research activities in higher education institutions, there is an urgent need to develop institutional policies that will enable the academic community to define appropriate spheres of application of artificial intelligence in the educational process and to prevent violations of ethical norms. The authors provide the experience of Kherson State University as an example of the formation of institutional policies for the use of artificial intelligence in education. Golan, Reddy, et al. (20235) investigate the domain of academic writing, which is one of the areas that has experienced particularly intensive use of tools and methodologies based on artificial intelligence. Khalifa and Albadawy (2024) aptly point out that artificial intelligence is revolutionizing academic writing by handling complex ideas and large amounts of information. Artificial intelligence tools improve academic writing in six areas: idea generation, content structuring, literature synthesis, data management, editing, and compliance with ethical standards.

On the basis of a review of forty-one works on the impact of generative artificial intelligence on academic integrity in higher education, Bittle and El-Gayar (2025) summarize risks (fabrication, dishonourable authorship) and advantages (personalization, engagement). The conclusions highlight the need to improve digital literacy and propose a research agenda that includes new integrity metrics, assessment design that takes artificial intelligence into account, and ethical frameworks.

Yusuf, Pervin and Román-González (2024) express concern about the continual increase in the complexity of artificial intelligence tools and examine the use, advantages, and challenges of generative artificial intelligence in higher education from a multicultural perspective. A survey of more than 1,000 respondents from seventy-six countries covered a wide range of gender categories, academic disciplines, geographical locations, and cultural orientations. The survey results demonstrated a

high level of awareness and familiarity with generative artificial intelligence tools among respondents and their predominant use to search for information and paraphrase text. A significant correlation was noted between cultural dimensions and respondents' views of the benefits of these tools, as well as concerns about academic dishonesty and the need for ethical guidelines. Recommendations are proposed for researchers, lecturers, and policy-makers aimed at promoting the ethical and effective integration of generative artificial intelligence tools into higher education.

A global review of seventy-eight studies (2016–2024) on the use of artificial intelligence in science, technology, engineering, and mathematics (STEM) education at universities in North America and Europe, carried out by Lee, Kim and Gómez-Ramos (2025), made it possible to identify a significant impact on improving students' learning outcomes and developing their research skills. The factors of success are an instructor with artificial intelligence competence and a clear design of integration. The challenges are technological infrastructure, the culture of teaching interaction, and assessment of learning outcomes.

Another global student survey (more than 23,000 respondents from 109 countries) on the use of ChatGPT was conducted by a large group of researchers from different countries (including three representatives from Ukraine: V. Kobets, Kherson State University; N. Mospan, Borys Grinchenko Kyiv University; and M. Tolmach, Kyiv National University of Culture and Arts) (Ravšelj, et al., 2025). The results showed that higher education learners used artificial intelligence to generate ideas, summarize texts, and search for scholarly articles, and occasionally for professional and creative writing. Most respondents noted the benefits for learning, but expressed concern about its contribution to cheating, plagiarism, social isolation, and ethical issues. Learners observed that ChatGPT is effective in potentially improving artificial intelligence literacy, digital communication, and content-creation skills, while artificial intelligence is less productive for interpersonal communication, decision-making, mastery of the native language, and the development of critical thinking. Emotionally, the overwhelming majority of students perceive the use of ChatGPT positively.

Carrasco-Aguilar, Camacho-Ruiz, et al. (2025) propose a methodology for validating educational content created by artificial intelligence based on the Delphi method. This method is used to define the problem, select an expert group, and develop questionnaires, and it makes it possible to formulate a number of recommendations for educators that will ensure responsible and ethical implementation of artificial intelligence in academic practice. The study makes a significant contribution to elaborating the issue of the use of artificial intelligence in research activities.

Twabu (2025) examines the specific features of J. Schumpeter's innovation

theory in the context of the contemporary integration of artificial intelligence into higher education, analysing revolutionary and incremental innovations, institutional transformations, and strategic policy adaptation. The author argues that artificial intelligence has the potential to transform pedagogical models, administrative efficiency, and knowledge production, which is consistent with Schumpeter's concept of creative destruction. The study provides a theoretical foundation for institutional adaptation strategies, offering educators, policy-makers, and researchers insights into the use of artificial intelligence for sustainable academic innovation.

In order to become acquainted with artificial intelligence policies in higher education institutions, it is advisable to refer to the article by Ally and Mishra (2024), who provide a detailed analysis of institutional norms governing the use of artificial intelligence (transparency, ethics, development of appropriate competencies) and propose step-by-step recommendations for their adoption.

The article by Luo (Jess) (2024) critically analyses the policies of leading universities (twenty institutions) regarding generative artificial intelligence in assessment. Using the "What's the problem represented to be" (WPR) approach, the author investigates how the "problem of artificial intelligence" is formulated in these policies: as a risk to academic integrity, as technological assistance, or as a creative resource. It is determined that policies are often more focused on control than on teaching the use of artificial intelligence; it is recommended to shift the emphasis towards supporting the competencies of lecturers and students.

Despite the advantages of artificial intelligence technologies in education for supporting students and providing advanced practices for lecturers, Dadson, Mohammed, et al. (2025) express concern about ethical and privacy issues associated with the use of these technologies in higher education, including algorithmic bias and fairness, transparency, accountability and human oversight, data privacy and security, as well as student autonomy and consent. The authors note that these challenges may affect students' learning, academic performance, well-being, and holistic educational experience, and this is particularly relevant to vulnerable groups of students.

The analysis of scholarly studies in recent years confirms that the prospects for the use of artificial intelligence in the professional training of future researchers and in their research are quite broad. We fully agree with Polonevych, et al. (2024), who believe that the integration of artificial intelligence into research has potential at every stage of the research process: from hypothesis generation and construction of mathematical proofs to experimental design and monitoring, data collection and analysis, modelling, and rapid inference. Spivakovsky, Omelchuk, et al. (2023) identify data search, analysis and interpretation, as well as improvement of the peer-

review process for scholarly materials, as the main opportunities for artificial intelligence in research activities. Wagner, Lukyanenko and Pare (2022) demonstrate how, with the support of artificial intelligence, a literature review can be made more in-depth and a sketch and design of future research can be created. Meyer, Urbanowicz, et al. (2023) present examples of the effective use of ChatGPT and large language models to enhance academic writing.

Conclusions and prospects for further research. On the basis of an analysis of national and foreign scholarly sources on the involvement of artificial intelligence tools in higher education, six key directions for the use of artificial intelligence technologies in the research activities of future PhD are identified and characterized: development of ideas and research design; development and structuring of content; literature review and synthesis; data management and analysis; editing, peer review, and publication support; communication, outreach, and adherence to ethical standards. Each of these will be considered in more detail.

1. Development of ideas and research design. Artificial intelligence tools effectively implement brainstorming processes; due to advanced natural language processing, they can thoroughly examine thousands of documents, analysing contemporary trends, historical data, and interdisciplinary research. Artificial intelligence uses existing data to predict potential correlations or causal relationships, thereby assisting in the formulation of robust hypotheses. The influence of artificial intelligence also extends to research planning. It offers critical recommendations on research design by suggesting methodologies that best correspond to the research question.

2. Development and structuring of content. Artificial intelligence tools such as ChatGPT can significantly enhance the efficiency and quality of writing scholarly review articles. Artificial intelligence can assist in drafting document outlines, ensuring logical flow and coherence, and structuring research content. It can facilitate the integration of graphics, tables, posters, and presentations into research content, thereby enhancing its visual appeal and comprehensibility. Artificial intelligence tools can generate infographics that visually represent data trends, making complex information more accessible to a wider audience. At the same time, it is necessary to exercise caution regarding potential misuse of artificial intelligence for the production of fraudulent scholarly articles and to remain vigilant in upholding academic integrity.

3. Literature review and synthesis. In the area of literature review and synthesis, the integration of artificial intelligence is crucial, as it increases the efficiency and depth of academic research. Artificial intelligence facilitates the extraction and analysis of information from existing literature and synthesizes these findings into coherent

overviews. In this direction, the contribution of artificial intelligence is particularly significant, because artificial intelligence tools process and analyse large volumes of data, thereby assisting in the creation of detailed and up-to-date literature reviews.

4. Data management and analysis. In the sphere of data management and analysis, artificial intelligence considerably improves the processing and interpretation of complex datasets, which is essential for the integrity and success of research. This includes such important aspects as data interpretation, where artificial intelligence provides detailed analysis and visualization, and data set management, where it automates data curation to ensure accuracy and accessibility. Artificial intelligence enhances the efficiency, accuracy, and depth of data analysis.

5. Editing, peer review, and publication support. This direction is an integral part of the research process, ensuring clarity, coherence, and quality of academic output. It is necessary to distinguish between the functions of improving writing and facilitating publication, each of which plays an important role on the pathway from manuscript preparation to publication. Improvement of writing involves enhancing the textual quality of manuscripts, and artificial intelligence tools are increasingly used for proofreading and editing. However, it is extremely important to use these tools ethically and transparently, maintaining the integrity and originality of research.

6. Communication, outreach, and adherence to ethical standards. This direction plays a decisive role both in disseminating research results and in upholding ethical standards in the contemporary digital world. It encompasses two key areas: dissemination and outreach, and the safeguarding of ethics and integrity. In order to ensure the effective use of artificial intelligence and to minimize potential risks associated with ethical aspects of research, educational institutions must actively work on developing ethical principles and standards for the use of artificial intelligence in research, taking into account national and international norms. In addition, artificial intelligence tools can assist in detecting plagiarism, which is an important aspect of academic integrity, ensuring that research is original and properly attributed.

The most immediate prospect for further research on the use of artificial intelligence in the research activities of future Doctors of Philosophy in the field of education is the development of methodological recommendations and concrete algorithms for the practical application of artificial intelligence technologies.

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АНАЛІЗ ПРАКТИЧНОГО ДОСВІДУ ВИКОРИСТАННЯ ІНСТРУМЕНТІВ ШТУЧНОГО ІНТЕЛЕКТУ В НАУКОВІЙ ДІЯЛЬНОСТІ МАЙБУТНІХ ДОКТОРІВ ФІЛОСОФІЇ

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Анотація. Вивчення можливостей штучного інтелекту, дотримання правил його використання, надання здобувачам освіти міцних знань у цій сфері, розвиток ШІ-грамотності та ШІ-компетентності – ці питання залишаються наразі надзвичайно актуальними. Проблемне поле охоплює й питання залучення інструментів ШІ до наукової діяльності у вищій школі.

Незважаючи на значну увагу з боку науковців до проблеми використання інструментів штучного інтелекту в освіті та наукових дослідженнях, проблема практичного застосування ШІ в роботах здобувачів освіти третього (освітньо-наукового) рівня залишається недостатньо дослідженою. Для узагальнення основних напрямів використання інструментів штучного інтелекту в наукових дослідженнях аспірантів було відібрано й проаналізовано низку наукових розвідок, дотичних до цієї проблеми. Відзначено, що науковці аналізують різні аспекти, зокрема: автоматизований зворотний зв'язок (корекція мовних помилок, базова оцінка логіки), генерація навчальних матеріалів, побудова адаптивних траєкторій, чат-асистенти для студентів і викладачів, інтелектуальні системи підтримки прийняття рішень (адміністрування, прогнозування ризику відрахування), нові алгоритми пошуку плагіату та ін. Виокремлено шість ключових напрямів використання ШІ в науковій діяльності майбутніх докторів філософії: розробка ідей та дизайн дослідження, розробка та структурування контенту, огляд та синтез літератури, управління даними та їхній аналіз, редагування, рецензування та підтримка публікацій; комунікація, інформаційно-просвітницька робота та дотримання етичних норм.

***Ключові слова**:* штучний інтелект; інструменти штучного інтелекту; наукова діяльність; майбутні доктори філософії.

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