Proceedings of the 8th International
Scientific and Practical Conference
«Recent Advances in Global Science»
(August 26-28, 2026).
Vilnius, Lithuania

No
307

PEDAGOGY AND EDUCATION

Specific Characteristics of Intelligent Information Technologies in the Innovative Governance of Philological Education: Navigating Complexities of the Warmi Environment

Goncharenko Svitlana[1]

[1] Senior Lecturer at the Department of philology and translation
Kyiv National University of Technologies and Design, Ukraine

Abstract. The article explores the features and specifics of the application of intelligent information technologies in innovative management of philological education in the WARMI environment. The directions of intellectualization of educational management are determined, the possibilities of natural language processing technologies, Big Data and generative artificial intelligence are revealed. Special attention is paid to the prospects of hybrid intelligent technologies as the basis for adaptive and human-centric development of philological education.
Keywords: *pedagogy; philological education; intelligent information technologies; innovative management; digital transformation; artificial intelligence; natural language processing; Big Data; hybrid intelligent technologies; adaptive management; WARMI environment; systemic risks.*

Introduction.

The modern transformation of education is taking place in conditions of significant environmental complexity [1], characterized by accelerating change, increasing uncertainty [2], increasing turbulence, the emergence of new forms of systemic risks and the constant complication of the relationships between technological, economic [3], social, cultural and institutional factors. These processes are especially noticeable in the field of higher education, where digitalization is no longer limited to the implementation of individual information systems, but is gradually transforming into a complex intellectualization of educational, management and research processes [4]. In this context, the WARMI concept of the environment acquires special importance, which

considers the modern space of functioning of educational organizations as a dynamic, multi-component and difficult to predict system, in which uncertainty, turbulence and systemic risks can simultaneously affect the goals, resources, processes and results of educational activities.

Philological education occupies a special position in this system: its content is related not only to the transfer of knowledge about language, literature, culture and communication, but also to the development of interpretative, analytical, critical, communicative and research competencies. At the same time, modern philology is increasingly interacting with digital linguistics, computational linguistics [5], corpus research, natural language processing, text mining [6], big data, generative artificial intelligence and automated decision support systems. Therefore, the digital transformation of philological education should be considered not only as a technological update of the educational process, but also as a change in the principles of its organization, management, quality assessment and development.

In these conditions, traditional information technologies, which mainly provide storage, transmission and processing of data, are gradually giving way to intelligent information technologies [7], capable of analyzing large arrays of heterogeneous information, identifying hidden patterns, recognizing the context, forming forecasts, supporting decision-making and adapting to changes. Their application creates the prerequisites for the transition from a predominantly administrative-reactive model of philological education management to an intellectual, adaptive and proactive model.

Therefore, the relevance of the study is determined by the need for a theoretical understanding of the features of the application of intelligent information technologies in the management of philological education, since the specificity of humanitarian knowledge places additional requirements on digital tools. Here it is not enough to ensure only the speed of information processing or the automation of individual operations. It is necessary to take into account the semantic complexity of language, the contextuality of interpretation, the cultural conditionality of the text, the variability of human communication, the ethical limitations of the use of artificial intelligence and the need to maintain the leading role of the teacher and researcher.

PEDAGOGY AND EDUCATION

Thus, the main goal of this article is to systematically identify the features and specifics of intellectual information technologies in innovative management of philological education, taking into account the complex and complex conditions of the WARMI environment.

Main Part.

I. WARMI-external environment and intellectualization of philological education management.

Modern philological education is developing in conditions of a complicated external environment, which is characterized by dynamic uncertainty, turbulence, acceleration of technological changes and growth of systemic risks. Within the framework of the WARMI concept, such an environment is considered as a complex, interconnected and difficult to predict system, in which changes in technological, social, economic, institutional and cultural factors can quickly transform the conditions of functioning of educational organizations.

For philological education, this transformation is especially important due to the active development of digital linguistics, computer text processing, corpus research, artificial intelligence, automatic translation and generative technologies. Therefore, the management of educational programs can no longer rely mainly on static indicators and reactions to problems that have already arisen. A transition to adaptive and proactive management based on constant monitoring, intellectual analysis, forecasting and prompt correction of decisions is necessary.

II. Intelligent information technologies as the basis of innovative management.

Intelligent information technologies differ from traditional information systems in their ability not only to store and process information, but also to identify patterns, analyze large arrays of heterogeneous data, predict changes, form recommendations and support decision-making. These include machine learning, intelligent data analysis, natural language processing, Big Data technologies, expert and recommender systems, generative artificial intelligence and intelligent analytics.

In the management of philological education, their importance is manifested at three interrelated levels. At the operational level, they automate individual educational and administrative operations; at the tactical level, they

PEDAGOGY AND EDUCATION

provide quality analysis, problem identification and recommendation generation; at the strategic level, they support forecasting and scenario modeling of the development of educational programs. Therefore, intelligent technology should be considered not as a separate digital tool, but as an element of a single information and analytical infrastructure of an educational organization.

III. Specificity of the application of intelligent technologies in philological education.

The specificity of philological education is due to text-centricity, semantic ambiguity of language, contextuality of interpretation and cultural conditioning of communication. As a result, intelligent technologies must work not only with the formal characteristics of the text, but also take into account its semantic, genre, discursive and cultural context.

Technologies for natural language processing, intelligent analysis of texts and corpus data are especially promising. They allow to identify linguistic patterns, thematic and stylistic structures, typical errors, connections between texts and the dynamics of the use of language units. However, quantitative analysis cannot completely replace humanitarian interpretation. The final assessment of the results should remain with the teacher or researcher.

Thus, the main feature of the intellectualization of philological education is the need to combine algorithmic information processing with expert, critical and interpretative analysis.

IV. Main directions of application of intelligent information technologies.

Intelligent technologies can be used to analyze educational data, monitor student success and activity, early detection of educational difficulties and formation of personalized recommendations. Recommendation systems are able to adapt educational materials, texts, tasks and educational trajectories to the individual needs of students.

Natural language processing and text mining open up possibilities of automated work with written tasks, corpora, scientific publications and educational materials. Generative artificial intelligence can support the creation of tasks, language practice, modeling of communicative situations, preparation of draft materials and research search. In this case, mandatory verification of the reliability and quality of the generated content is required.

At the level of educational program management,

intelligent systems can identify gaps and duplications in the content of disciplines, analyze the compliance of competencies with the requirements of the professional environment, evaluate the effectiveness of educational components, and support decision-making regarding their updating.

V. Prospects for hybrid intelligent information technologies.

A particularly promising direction is the development of hybrid intelligent information technologies that combine the capabilities of several approaches [8]: machine learning, natural language processing, expert systems, big data, generative artificial intelligence, formal rules and expert knowledge of a teacher or researcher.

The advantage of the hybrid approach is the ability to combine the computational performance of algorithms with the contextual and professional competence of a person. This is fundamentally important for philological education, since an automated system can effectively detect statistical and semantic patterns, but their philological interpretation often requires taking into account the cultural, historical, genre and communicative context.

Hybrid systems are promising for the creation of intelligent educational assistants, adaptive learning platforms, intelligent analysis of written works, corpus research, automated support of scientific activity, personalization of educational trajectories and intelligent management of educational programs. In the future, they can become the basis for the formation of human-machine educational ecosystems, in which artificial intelligence does not replace the teacher, but expands his analytical and organizational capabilities.

VI. Adaptive management and systemic risks.

In the WARMI environment, adaptability becomes the key principle. An intelligent management system should provide a continuous cycle: monitoring the environment - data collection - intellectual analysis - identification of risks and deviations - forecasting - formation of alternatives - decision-making - result evaluation - adjustment.

This approach allows you to move from reactive to proactive management, in which potential problems are identified before they turn into crisis situations. Intellectual early warning mechanisms are especially important, capable of detecting changes in educational

outcomes, student needs, professional environment requirements and technological environment.

At the same time, it is necessary to take into account the risks of technological dependence, low data quality, algorithmic bias, violation of academic integrity and excessive technologization of humanities education. Therefore, intelligent technologies should be implemented based on the principles of transparency, expert verification, academic responsibility and preserving the humanitarian nature of philological knowledge.

VII. Conceptual provisions of innovative management of philological education.

Innovative management of philological education in the WARMI environment should be built as a single adaptive system that connects environmental monitoring, educational data, intelligent analytics, forecasting and management decisions. At the same time, the teacher and the student should remain active participants in the management circuit.

The transition from the digitalization of individual functions to the intellectual transformation of the education system is fundamentally important. Its result should not be maximum automation, but an increase in the ability of the educational organization to timely recognize changes, adapt to them, reduce systemic risks and at the same time use technological changes as a source of innovative development.

In this context, hybrid intelligent information technologies are one of the most promising areas for the further development of philological education, as they allow combining the advantages of artificial intelligence, analytical technologies, formalized knowledge, and professional human expertise.

Conclusions.

The analysis shows that intelligent information technologies are becoming one of the key tools for innovative management of philological education in a complex and dynamic external environment. Their importance is determined not so much by the ability to automate individual educational operations as by the ability to ensure the transition to management based on continuous data analysis, forecasting, intellectual support of decisions and adaptation to changes.

The specificity of the application of intelligent technologies in philological education is determined by text-centricity, semantic ambiguity, cultural conditioning, a high

role of interpretation and the need to combine quantitative and qualitative methods of analysis. Therefore, intelligent systems should be considered primarily as tools for expanding the professional capabilities of the teacher, researcher and the student.

In the context of the WARMI-concept of the environment, the adaptive nature of intelligent management becomes of particular importance. An educational organization must be able to timely detect changes in external conditions, assess their potential consequences, predict risks, form alternative scenarios and promptly adjust the educational strategy. This involves a transition from a predominantly reactive management model to a proactive model based on intelligent monitoring and forecasting.

Promising areas of intellectualization are intelligent analytics of educational data, natural language processing technologies, recommender systems, artificial generative intelligence, intelligent support of scientific research, prediction of educational outcomes and scenario modeling of the development of educational programs. It is their complex hybrid application that can increase flexibility, personalization, efficiency and validity of management decisions.

At the same time, intellectual transformation is accompanied by new technological, information, ethical and academic risks. Therefore, the effectiveness of intelligent technologies should be assessed not only by the speed and accuracy of information processing, but also by the reliability of data, transparency of algorithms, peer review capabilities, adherence to academic integrity and preservation of the humanitarian specificity of philological education.

Thus, innovative management of philological education in the WARMI environment should be considered as an adaptive human-centric system in which intelligent information technologies provide information collection and analysis, forecasting, risk identification and support for management decisions, while a person retains the key function of meaningful interpretation. It is the combination of intelligent technologies, professional competence and adaptive management that creates the basis for sustainable innovative development of philological education in conditions of dynamic uncertainty, turbulence and systemic risks.

PEDAGOGY AND EDUCATION

References:

[1] Nevmerzhytska S. M. (2018). Formation of a strategy for the innovative development of enterprises in conditions of uncertainty. *Scientific Bulletin of the Kherson State University. Series: Economic Sciences*. 2018. Vol. 32. pp. 99-103. URL: https://ej.journal.kspu.edu/index.php/ej/article/view/422/418.

[2] Ostapenko T., Onopriienko D., Hrashchenko I., Palyvoda O., Krasniuk S., Danilova E. (2022). Research of impact of nanoeconomics on the national economic system development. *Innovative development of national economies: collective monograph.* – Kharkiv: PC TECHNOLOGY CENTER, 2022. – pp. 46-70. URL: https://er.knutd.edu.ua/handle/123456789/23169

[3] Goncharenko S. (2025). Intelligent management of adaptive education in the era of turbulence. *Innovations and New Directions in Scientific Research* : Proceedings of the 2nd International Scientific Conference (Manchester, United Kingdom, 20 September 2025). - Lulu Press, Inc., 2025. - pp. 40-43. URL: https://er.knutd.edu.ua/handle/123456789/31645

[4] I. Hrashchenko, S. Krasniuk, T. Tsalko, S. Nevmerzhytska, N. Liubymova (2024). Effective computer modeling in educational management. *ScientificWorldJournal*. – September 2024. – Issue 27, Part 3. – P. 3-17. – URL: https://www.sworldjournal.com/index.php/swj/issue/view/swj27-03

[5] Hatzel, H. O., Stiemer, H., Biemann, C., & Gius, E. (2023). Machine learning in computational literary studies. *it – Information Technology, 65*(4-5), 200-217. https://doi.org/10.1515/itit-2023-0041

[6] Краснюк Світлана (2024). Data Science у освітньому менеджменті. *Діалог культур у Європейському освітньому просторі*: Матеріали IV Міжнародної конференції, м. Київ, 10 травня 2024р. Київський національний університет технологій та дизайну. – К. : КНУТД, 2024. – С. 119-124.

[7] Naumenko M., Hrashchenko I. (2024). Suchasnyi shtuchnyi intelekt v antykryzovomu upravlinni konkurentnymy pidpryiemstvamy ta kompaniiamy [Modern artificial intelligence in anti-crisis management of competitive enterprises and companies]. *Grail of Science*. No. 42. P. 120-137. DOI: https://doi.org/10.36074/grail-of-science.02.08.2024.015

[8] Hrashchenko, I. S., Krasniuk, M. T., & Krasniuk, S. O. (2019). Hibrydno-stsenarne zastosuvannia intelektualnykh, oriientovanykh na znannia tekhnolohii, yak vazhlyvyi antykryzovyi instrument lohistychnykh kompanii v Ukraini [Hybrid-scenario application of intellectual, knowledge-oriented technologies as an important anti-crisis tool of logistics companies in Ukraine]. Vcheni zapysky Tavriiskoho Natsionalnoho Universytetu imeni VI Vernadskoho. Seriia: Ekonomika i upravlinnia-Scientific notes of Tavri National University named after VI Vernadskyi. Series: Economics and management, 30(69), 121-129.