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APPLICATION OF ARTIFICIAL INTELLIGENCE IN TEACHING GRAPHIC DISCIPLINES

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Abstract. The article is devoted to the possibilities of using artificial intelligence (AI) technologies in teaching graphic disciplines. Its new possibilities for creativity, analysis and learning are analyzed. The advantages, risks and prospects of introducing AI into the educational process are determined. The need to maintain a balance between the technological and creative components of training future specialists is emphasized. The article also considers the distribution of areas of use in teaching and analyzes the current use of AI. The comparative effectiveness of traditional and AI-supported learning is analyzed. The prospects for using artificial intelligence in teaching graphic disciplines are considered.

Keywords: artificial intelligence, graphic disciplines, computer graphics, generative technologies, education, digitalization of learning.

Introduction. Modern education is undergoing revolutionary changes brought about by the integration of artificial intelligence (AI), which opens up new horizons for teaching. Transformations are taking place, which necessitates the renewal of teaching methods, especially in disciplines where visualization, spatial thinking and creativity are important. In the context of graphic disciplines, where creativity, technical skills and speed of task completion are crucial, AI offers unique opportunities to personalize the learning process, automate routine checks and provide instant feedback.

Analysis of recent research and publications. Recent studies confirm that Artificial Intelligence (AI), especially Generative AI (GenAI), is rapidly transforming the teaching of graphic disciplines, acting as a powerful tool, not a replacement for teachers and students. The main conclusions focus on increasing the effectiveness of learning, personalization, developing creativity and the need to update curricula. Studies show that groups of students who used AI systems demonstrated a significant increase in design skills. This is explained by the possibility of individually designed suggestions and real-time feedback, which accelerates the learning process [1-8].

Statement of the objective. The aim of the article is to analyze the possibilities of using AI in teaching graphic disciplines, identify the benefits, risks and prospects for its implementation.

Main material and results. In modern teacher practice, artificial intelligence is actively integrated into the educational process, changing the role of the teacher and the structure of interaction with students. The use of artificial intelligence in the study of graphic disciplines is an

extremely relevant issue today, as it opens up new opportunities for creativity, analysis and learning [9-11] , namely:

1) AI assistance in automatically creating sketches, compositions and color solutions and in creative search – variations of forms, styles, structures. This is extremely convenient, because in seconds you can get a visual idea, with which you can create many options to choose the best. As an example, the creation of a majestic and mysterious letter G is proposed, which immediately evokes associations with the magical world of Harry Potter. It creates a holistic and fascinating image, combining key magical attributes (Fig. 1)

Fig. 1. Creating a drop cap using AI (created with Gemini)

2) Automatic 3D modeling and visualization of architectural solutions. Creating a complex 3D module “from scratch” using AI is not yet 100% convenient, easy and perfect. However, AI helps at some stages, significantly simplifying the modeling process. As an example, 3D modeling of an architectural cornice is shown according to the following plan: choosing a style and collecting references, setting up the workspace, creating a shape, creating a 3D trajectory (path) (Fig. 2).

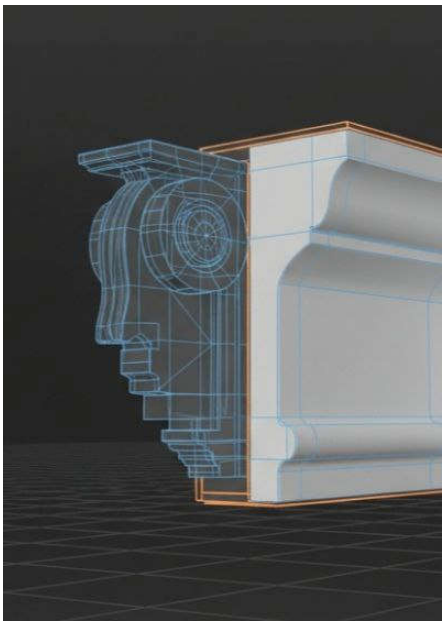

Fig. 2. 3D modeling of an architectural cornice using AI (created with Gemini)

3) Computer graphics and image processing - improving quality, detail, color, recognizing shapes, objects, textures, creating graphic elements from text descriptions. For example, image processing in AI is the use of AI algorithms, in particular neural networks, to analyze, modify, improve, or generate images (Fig. 3).

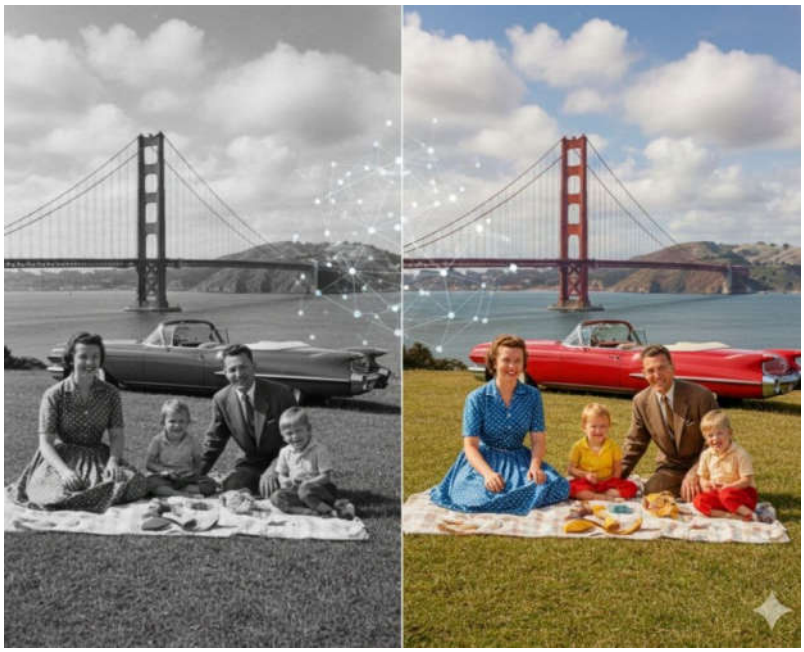

Fig. 3. AI-driven colorization (created with Gemini)

4) Educational process in graphic disciplines. AI offers a number of advantages for both students and teachers, such as: intelligent learning systems and virtual assistants, generation of tasks, visual examples, checking work, visualization of complex concepts (perspective, composition) (Fig. 4).

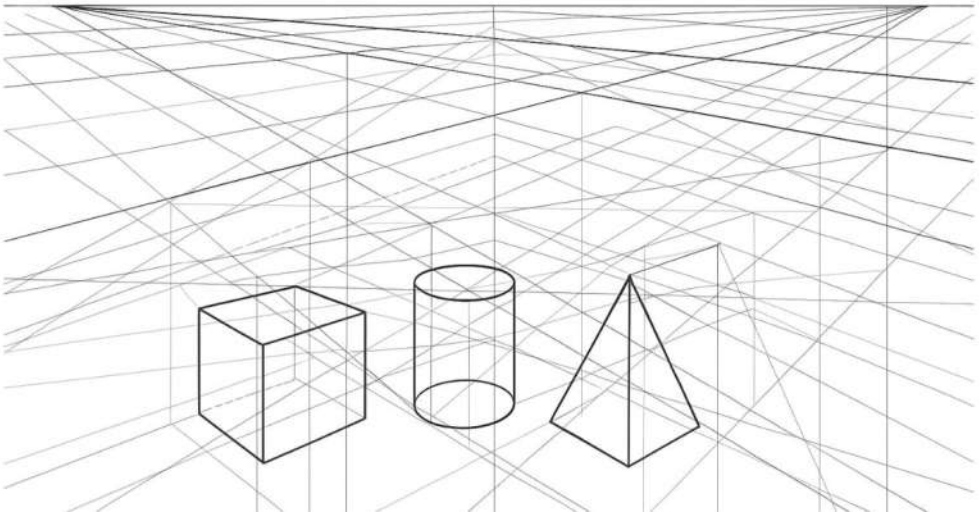

Fig. 4. Creating a perspective image based on a voice query in GPT

Tips for teachers on using AI in teaching subjects:
- changing the format of tasks, namely the transition from simple reproduction to analysis,
- creating multi-step and complex questions,
- using AI as a tool, not as a final product,
- assessing the thinking process.

The teacher should consider AI not as a replacement, but as a tool for automating many processes, accelerating idea generation and increasing productivity [12].

5) Creative experiments with artificial intelligence cover a wide range of areas: art and creativity, synthesis of styles, interactive installations, design of new materials. Architects, artists and designers use generative AI modules to create unique digital images and illustrations based on text descriptions. Artificial intelligence can also generate thousands of design variations or propose innovative architectural forms that are difficult for humans to imagine (Fig. 5).

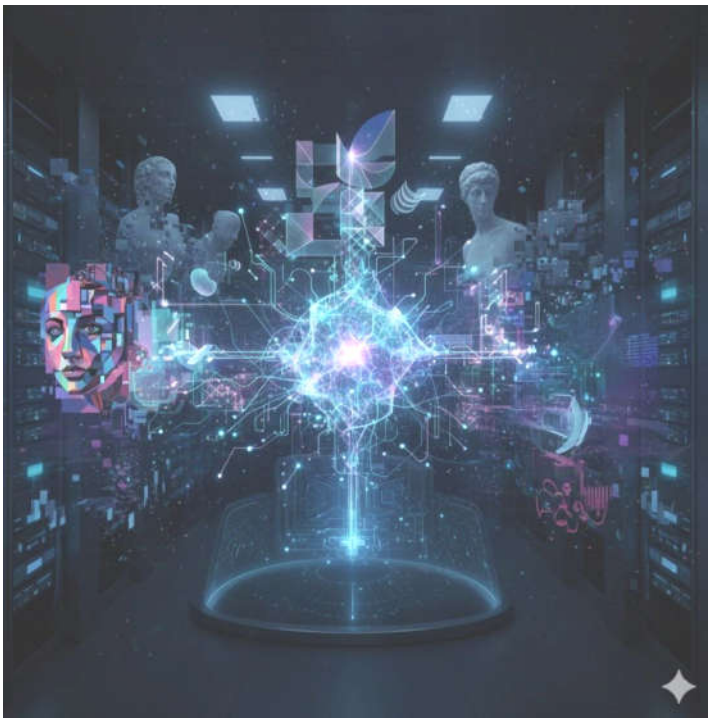

Fig. 5. Creative experiments with artificial intelligence (created with Gemini)

While AI offers many benefits in the learning process, its uncontrolled or improper use can have significant negative consequences for students:

- Reduced critical thinking and analysis: Overuse of AI to get answers quickly can lead to students being less engaged in deep analysis, independent information search and formation of their own opinions (according to some studies, this can lead to "synthetic cognition", where the speed of thinking dominates its depth) (Fig.6).

- Dependence on technology: Students can become dependent on AI tools to complete tasks, losing their skills of independent learning, problem solving and creativity

- Loss of creative skills: Some students note that the use of AI limits their creative abilities and reduces the need for independent idea generation [13, 14].

- Errors and "hallucinations" of AI: AI systems can provide inaccurate, incorrect or fictional information ("hallucinations"). A student who trusts AI implicitly may use false data in their work.

- Academic integrity, ethics, and lack of transparency. The biggest threat is the use of plagiarism.

Using AI to generate essays, reports, or answers to assignments without proper referencing or independent work undermines academic integrity and is a form of fraud. If a student does not indicate how they used AI in their work, this is also a problem, but of an ethical nature.

To analyze the current state of AI use, a survey was conducted among three groups of first-year students (n = 100 people). Fig. 6 (pie chart) shows the distribution of AI application areas in educational activities. The most common areas are task verification automation (28%), educational content creation (25%), and adaptive learning systems (25%). Less attention is paid to educational data analytics (22%).

Fig. 6 (bar chart) shows a comparison of the effectiveness of traditional teaching and learning with the use of AI technologies according to three key criteria: success rate, student engagement,

and preparation time. As can be seen from the chart, the use of AI helps to improve academic results by an average of 18% and reduces the time for preparing educational materials by almost a third.

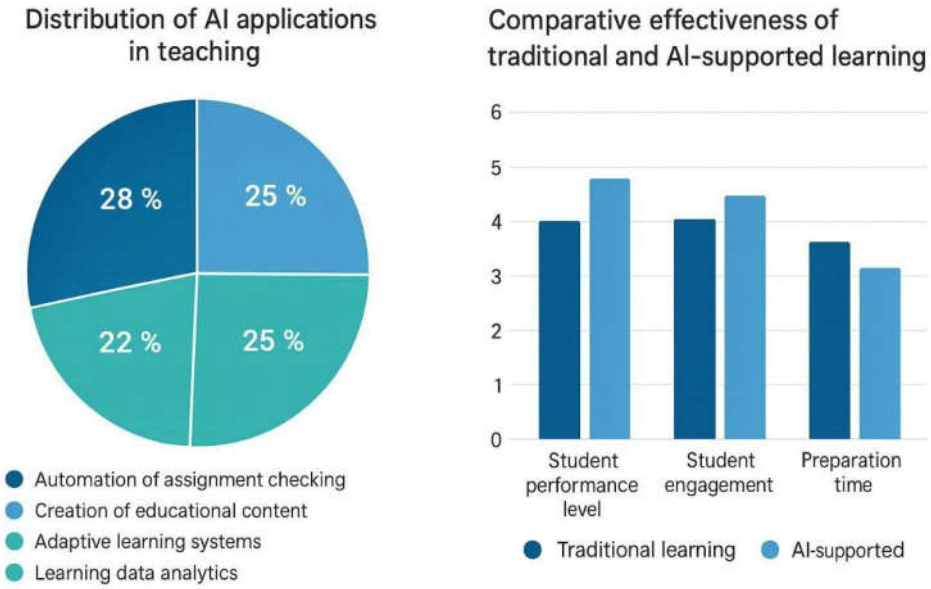

Fig. 6. Distribution of AI application areas in teaching (pie chart).
Comparative effectiveness of traditional and AI-supported learning (bar chart)

Future prospects for using artificial intelligence in teaching graphic disciplines are:

- creation of intelligent educational systems, where AI will coordinate the educational process – from course planning to analysis of results and correction of the educational strategy,
- emergence of adaptive learning environments, in which AI will adjust tasks in real time to the individual thinking style, pace of work and artistic approach of the student;
- emergence of virtual mentors who will be able to analyze aesthetic and compositional solutions, offer constructive advice on improvement, and teach students to critically evaluate their own work [15-17].

Conclusions. Thus, AI becomes a powerful tool for rapid prototyping and experimentation, freeing up student time for critical thinking and creative reflection instead of routine drawing. But students must learn to use it critically and ethically to prevent a decrease in the quality of their learning and the development of negative skills.

Analysis of the results confirms that the introduction of artificial intelligence into the educational process not only improves the quality of education, but also optimizes the activities of the teacher, allowing more time to be devoted to the creative and communicative aspects of learning.

References

[1] Bearman M., Ryan J., Ajjawi R. Discourses of Artificial Intelligence in higher education: A critical literature review // Higher Education. 2022. DOI: 10.1007/s10734-022-00937-2. [in English].

[2] Crompton H., Burke D. Artificial Intelligence in higher education: The state of the field // International Journal of Educational Technology in Higher Education. 2023. Vol. 20, no. 1. DOI: 10.1186/s41239-023-00392-8. [in English].

[3] Dembitska S., Kuzmenko O., Savchenko I., Demianenko V., Hanna S. Digitization of the Educational and Scientific Space Based on STEAM Education // Towards a Hybrid, Flexible and

Socially Engaged Higher Education. Lecture Notes in Networks and Systems. Vol. 901. Cham : Springer, 2024. DOI: 10.1007/978-3-031-53022-7_34. [in English].

[4] Drach, I., Petroie, O., Borodiienko, O., Reheilo, 1., Bazeliuk, O., Bazeliuk, N., & Slobodianiuk, O. Vykorystannia shtuchnoho intelektu u vyshchii osviti//. Mizhnarodnyi naukovyi zhurnal Universytety i liderstvo». 2023. №15, 66-82. https://doi.org/10.31874/2520-6702-2023-15-66-82. [in Ukrainian].

[5] Katkova, T. H. Shtuchnyi intelekt v Ukraini: pravovi aspekty // Pravo i suspilstvo,2020. № 6, 46-55.

[6] obylianskyi O., Stavnicha N., Dembitska S., Kobylianska I., Miastkovska M. Innovative Learning Technologies in the Process of Training Specialists of Engineering Specialties in the Conditions of Digitalization of Higher Education // Towards a Hybrid, Flexible and Socially Engaged Higher Education. Lecture Notes in Networks and Systems. Vol. 911. Cham : Springer, 2023. DOI: 10.1007/978-3-031-53382-2_1.. [in English]

[7] Kuzmenko, O., Rostoka, M., Dembitska, S., Topolnik, Y., & Miastkovska, M. (2022) Innovative and Scientific ECO Environment: Integration of Teaching Information and Communication Technologies and Physics Lecture Notes in Networks and Systems, 390 LNNS, pp. 29-36. DOI: 10.1007/978-3-030-93907-6_4. [in English].

[8] Kuzmenko O., Rostoka M., Dembitska S., Topolnik Y., Miastkovska M. Innovative and Scientific ECO Environment: Integration of Teaching Information and Communication Technologies and Physics // Lecture Notes in Networks and Systems. 2022. Vol. 390. P. 29–36. DOI: 10.1007/978-3-030-93907-6_4. [in Ukrainian].

[9] Miastkovska M., Dembitska S., Puhach V., Kobylianska I., Kobylianskyi O. Improving the Efficiency of Students' Independent Work During Blended Learning in Technical Universities // Towards a Hybrid, Flexible and Socially Engaged Higher Education. Lecture Notes in Networks and Systems. Vol. 899. Cham : Springer, 2023. DOI: 10.1007/978-3-031-51979-6_21. [in English].

[10] Ouyang F., Zheng L., Jiao P. Artificial Intelligence in Online Higher Education: A systematic review of empirical research from 2011 to 2020 // Education and Information Technologies. 2022. Vol. 27, no. 6. P. 7893–7925. DOI: 10.1007/s10639-022-10925-9. [in English].

[11] Sharov, S. V.. Suchasnyi stan rozvytku shtuchnoho intelektu ta napriamky yoho vykorystannia //Ukrainski studii v yevropeiskomu konteksti, 2023. № 6, 136-144. [in Ukrainian].

[12] Marushchak, O.M. Poniattia kompetentnosti u pedahohichnii diialnosti.// Kreatyvna pedahohika. 2016. №11, 97-108. [in Ukrainian]

[13] Metz C. The Godfather of A.I. Leaves Google and Warns of Danger Ahead // The New York Times. 2023. URL: https://www.nytimes.com/2023/05/01/technology/ai-google-chatbot-engineer-quits-hinton.html [in English].

[14] Peven, K., Khmil. N., Makohonchuk, N. Vplyv shtuchnoho intelektu na zminu tradytsiinykh modelei navchannia ta vykladannia: analiz tekhnolohii dlia zabezpechennia efektyvnosti indyvidualnoi osvity Perspektyvy ta innovatsii nauky, 2023. 11(29), 306-316. [in Ukrainian].

[15] Shyshkina, M., Nosenko, Yu. Perspektyvni tekhnolohii z elementamy shtuchnoho intelektu dlia profesiinoho rozvytku pedahohichnykh kadriv//Fizyko-matematychna osvita, 2023. 38(1), 66-71. https://doi.org/10.31110/2413-1571-2023-038-1-010. [in Ukrainian].

[16] Ungerer, L., & Slade, S. (2022). Ethical Considerations of Artificial Intelligence in Learning Analytics in Distance Education Contexts// Learning Analytics in Open and Distributed Learning: Potential and Challenges. Singapore: Springer. 2022. https://doi.org/10.1007/978-981-19-0786-98. [in English].

[17] Yatsenko, O. I. (2023). Tekhnolohii shtuchnoho intelektu: osnovni napriamky vprovadzhennia v osvitnii protses zakladu vyshchoi osvity: Proceedings of XI International Scientific and Practical Conference, m. Toronto (24-26 serp. 2023 r.), 252-257. [in Ukrainian].

ЗАСТОСУВАННЯ ШТУЧНОГО ІНТЕЛЕКТУ У ВИКЛАДАННІ ГРАФІЧНИХ ДИСЦИПЛІН

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Анотація. Статтю присвячено можливостям використання технологій штучного інтелекту (ШІ) у викладанні графічних дисциплін. Сучасна освіта переживає революційні зміни, спричинені інтеграцією штучного інтелекту, що відкриває нові горизонти для викладання. Дослідження показують, що групи студентів, які використовували ШІ-системи, демонструють значніше підвищення дизайнерських навичок. Це пояснюється можливістю індивідуально спроєктованих пропозицій та зворотного зв'язку в реальному часі, що прискорює навчальний процес.

У статті проаналізовано нові можливості освітньої нейромережі для творчості, аналізу та навчання. Визначено переваги, ризики та перспективи впровадження технологій ШІ в освітній процес, а також окреслено необхідність формування цифрової компетентності у викладачів і студентів. Особливу увагу приділено проблемі збереження балансу між технологічним і творчим складниками підготовки фахівців у галузі графічного дизайну. При наявності достатньої кількості переваг, які штучний інтелект пропонує у навчальному процесі, його неконтрольоване або неправильне використання може мати значні негативні наслідки для студентів. ШІ стає потужним інструментом для швидкого моделювання та експериментування, звільняючи час студента для критичного мислення та творчого осмислення замість рутинного малювання.

У статті подано рекомендації для викладачів щодо ефективного та етичного використання технологій ШІ в освітньому процесі. Викладач повинен розглядати ШІ не як заміну, а як інструмент для автоматизації багатьох процесів, прискорення генерації ідей та підвищення продуктивності. Проведено аналіз поточного стану застосування ШІ, розподілу основних напрямів його використання у навчальному середовищі, а також порівняно ефективність традиційних і ШІ-підтримуваних методик викладання.

Розглянуто перспективи подальшого розвитку штучного інтелекту в освіті та його потенціал у трансформації графічної підготовки.

Ключові слова: штучний інтелект, графічні дисципліни, комп’ютерна графіка, генеративні технології, освіта, цифровізація навчання.

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