The Effectiveness of using Artificial Intelligence for Building Professional Competencies of Future Specialists in Art Majors in Higher Education Institutions

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Abstract: - The research aims to study the impact of the use of artificial intelligence (AI) tools in higher education institutions (HEIs) on building professional competencies of future art specialists. The research employed quantitative and qualitative methods (in particular, modeling methods, pedagogical experiments, and survey of respondents to assess the impact of AI tools on building professional competencies). The author's definition of the concept of "professional competencies of art specialists" is proposed. Targeted tools were selected and used for building components of professional competencies. For example, VocalAnalysis AI tools were used to form the perceptual component — for students majoring in Musical Art; Art Vision AI — for students majoring in Fine Arts; ChoreoVision AI — for students majoring in Choreography. The results of the study show that students rated their level of ability to use AI as higher than medium. The questionnaire designed to study the impact of the use of AI on building professional competencies of future specialists in art majors, demonstrated a high level of agreement between the assessment of the impact of the use of AI tools on the formation of various components of professional competencies. Further research can be aimed at the development and testing of an algorithm for objective expert evaluation of specific AI tools for the implementation of art projects by students of the specified art majors.

Key-Words: - training of future specialists in art majors, professional competencies, components of professional competencies, competitiveness of future art specialists, artificial intelligence tools, professional and creative self-realization.

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1 Introduction

The development and integration of AI in the art field create conditions for studying the features of AI as a tool in the further professional activities of future specialists in art majors. The use of AI in art has wide application opportunities, in particular, the

creation of basic projects and the generation of prototypes of author's works in various types of art, performing routine work faced by art specialists (accounting, systematization of texts, etc.), providing information support, schematic analysis of finished works of art, testing art solutions at the stage of creating an art project. This creates prerequisites for studying the peculiarities of the use of AI in the art field and the impact of AI on building professional competencies of future specialists in art majors in HEIs. According to [1], the integration of AI into the learning process in HEIs (including art majors) contributed to the improvement of several educational indicators (such as satisfaction with learning, compliance with trends in modern technology development, quality and results of learning, specialists' readiness for real working conditions). In contrast, in [2] researchers noted a biased attitude of people towards artistic artifacts created by AI. However, in [3] the authors, state that some professionals in the arts consider their work with AI to be effective co-creation. So, in addition to the applied level of AI in relation between the students studying to become specialists of art majors, the problem is also the value level, which determines the general attitude and the very possibility of AI being related to the world of true art.

The study of the impact of AI use on building professional competencies of future specialists in art majors is a new area of researchers' interest. The concept of "professional competencies of art specialists" is supposed to mean a complex characteristic of business and personal qualities, which includes content (knowledge) and procedural (skills) components, which in their unity reflect the level of their professional maturity and readiness for effective and creative professional activities, [4]. Professional competencies of art specialists include flexibility and creative nature of thinking; independence in making rational and creative decisions; creative application of methods of professional activity; the ability to manage an artistic team; the development of skills to critically evaluate professional situations and problems; the ability to analyze and predict the results of one's own creative work, etc. Therefore, building professional competencies enables an art specialist to mobilize his knowledge, skills, and experience in professional activities for the effective achievement of the goal, thereby determining his professional mastery, [5].

The integration of AI into educational programs has the potential to fundamentally transform the process of building the professional competencies that the students need for further work and creative realization. In particular, for students studying Fine Arts, Decorative Arts, and Restoration, programs using AI for pattern recognition can facilitate the search for effective solutions in terms of color, form, working techniques, and materials to be used, [6]. For future specialists majoring in Choreography, the use of AI will also contribute to the creation of virtual models for scenography and visualization of dance movements. AI can always perform the role of an outside critic-art critic in analytical terms, thereby increasing the skill level of students and art specialists, helping them to project public reaction in advance, and adapt the work to specific needs, thus minimizing the factor of fear before students display their creative work (fear of judgment, a lack of self-confidence). Therefore, the use of AI contributes to the formation of practical skills in art students, as it allows them to assess their strengths from the outside, receive a critical assessment, create certain content, and evaluate it.

As mentioned above, there is no consensus of opinion among scholars dealing with the interaction between classical art education and AI on to what extent should AI be involved in art education and whether it is worth it at all. However, art has always resonated with objective reality, adapting to the realities of the time and partly determining these realities themselves. This means that in today's world, where art is noticeably technocratic and AI has an increasingly high influence, it is better not to distance art and AI, but to look for optimal ways of their interaction instead. According to [7], AI should be integrated into art education with caution, as there is a threat of a negative impact on the development of creativity and creative confidence for students of art majors. At the same time in [8], authors argue that the use of AI tools has a positive impact on students' academic experience, creativity, and productivity. Therefore, the selection of effective forms of using AI for training in artistic majors contributes to the improvement of professional competencies and preparedness of future specialists for the developing and technological labor market. In particular, the performance of routine AI tasks allows employees of the creative sphere to relieve themselves, focusing on the actual creative tasks, and not on the technical aspects of the creative process, which contributes to the improvement of the practical work of the future specialist, [9].

The problem of the research was to study the impact of AI tools on the development of professional competencies of students of art majors. The focus is on determining how effectively these

tools can be integrated into the educational process and how they affect various aspects of the professional development of future specialists.

Relevant studies show that AI tools that enable to analyze, provide feedback and personalize learning can be useful in the educational process. For example, AI is used to analyze works of art, musical compositions, and choreography. This allows students to gain useful knowledge that will help them to improve their work. Other studies emphasize the importance of teaching students digital literacy so that they can make the most of AI, [1], [2], [3], [4], [5], [6], [7], [8], [9]. The research is significant for higher education because it demonstrates how AI tools can improve the learning process, promote the development of students' professional competencies, and increase their competitiveness in the labor market.

Given the foregoing, *the research aims* to study the effectiveness of the use of AI in building professional competencies of the future art specialist. The aim involves the fulfillment of the following research objectives:

1. Study the specifics of the professional competencies of art specialists and compare them with existing AI tools that can be used for their improvement;
2. Introduce students of art majors to the possibilities of using AI tools to perform various types of tasks;
3. Study the students' opinions regarding the impact of using AI tools on the formation of components of professional competencies.

2 Literature Review

A review of the existing studies reveals the uncertainty and even opposite views we have noticed regarding AI use for the education of future art specialists. In this article, the authors try to distance themselves from the often unsubstantiated polemics about the harm of AI to true art, especially to students at the stage of their formation as art specialists and professional artists. So, the literature review should focus on the benefits of using AI in the context of the issue under research. In particular, [9], stated that AI contributes to individualization and increases the efficiency of the educational process and the study of art theory. According to future choreographers, they appreciate the use of AI during training, [10]. They also note that it helps to develop creative, professional, and leadership skills. The study by [11], shows the effectiveness of using AI algorithms to optimize the creative process, in particular, searching for relevant images or musical works, searching for analogs, or creating different versions of similar works, and other possibilities. In [12] the authors see the effectiveness of AI in the processing of large arrays of data, which provides ample opportunities for understanding varieties of art. The study of [13], on the evaluation of human-generated and AI-generated artworks shows that human-generated artworks were rated higher: this was influenced by the emotional content of the human-generated artworks. In [14], the researchers investigated that the evaluation of black and white drawings created by a person with a certain intention (subtext, content) was higher than similar drawings created by AI. The work [15] emphasizes the use of AI for the objective analysis and assessment of creativity, which enables the development of creativity and critical thinking in future art specialists. The researchers pay attention to the moral aspects of using AI in art and training future artists, [16]. They also pay attention to the problems of data privacy, authorship in creativity, and the influence of smart systems on the creative process.

Art students can benefit from applying AI tools to their learning process. In particular, [17], emphasizes the significant and beneficial role played by interactive learning in the use of AI in the classroom for real-world tasks, the use of virtual reality, the development of platforms for group collaboration, and activities that help future art specialists to develop their professional skills. The researchers [18] emphasize the importance of creating new pedagogical approaches with the integration of intellectual systems in the educational process, exploring new possibilities for using AI in teaching art subjects.

As the author, [19], states, the use of AI in ballet helps analyze the accuracy of ballet poses: this is achieved thanks to computer vision technology. In [20] the authors divide the possibilities of using AI in art into five main categories - creation, analysis, content improvement, information extraction and improvement, and data compression. Besides, various AI tools enable future specialists to collaborate, analyze data, and evaluate creative activity, which largely helps to develop critical thinking and cooperation skills, and promotes the acquisition of practical work skills and other professional qualities.

The consequences of applying AI methods were interpreted by taking into account the unique professional competencies of future art specialists. The components of the professional competencies of future specialists of various artistic majors were systematized based on the interpretation of the work

of [21], in particular, in the following arts: music (pop vocals), visual art, and choreography, considering the potential of their use for shaping the capabilities of the AI tools. An experimental sample was created to empirically study the specifics of the relationship between EI and dependence among migrants. The study involved 400 citizens of Ukraine aged 18 to 50, who left Ukraine because of military operations in Ukraine and stay in EU countries now. There were 95 men and 305 women among the respondents. A total of 56% of respondents migrated from the eastern regions of Ukraine, 24% — from the southern regions, 9% — from the central regions, and 11% — from the western regions. The distribution by education level is the following: 34% of respondents have higher education, 38% have secondary special education, and 28% of respondents have secondary special education. Survey participants were found through contextual advertising on Facebook and Instagram. The main inclusion criteria were Ukrainian citizens, who had temporary protection status in the EU country and moved to the EU country after February 24, 2022.

The Higher Education Standard for students majoring in Fine Art, Decorative Art, and Restoration of the first (bachelor's) level of higher education defines thirteen general competencies, [22]:

- the ability to realize one's rights and responsibilities as a member of society, to recognize the values of civil society and the need for its sustainable development;
- the ability to preserve and multiply cultural and artistic values, ecological values, moral values, and scientific achievements of society based on an understanding of the history and patterns of development of the subject, its place in the general system of knowledge about nature and society;
- ability to communicate in national and foreign languages;
- ability to abstract thinking, synthesis, and analysis;
- the ability to apply knowledge in real-life situations;
- other abilities.

As AI is used in many different fields and allows arts students to develop a variety of abilities, it can help future specialists to develop the professional competencies identified in the Higher Education Standards, [22]. The analysis of the literature revealed a lack of research that would experimentally study the issue of using AI tools for the development of professional competencies of art students, especially those that help in the performance of routine procedures but do not negatively affect the creative aspect.

3 Research Material and Methods

3.1 Research Design

The research was carried out by employing a quantitative method, using also qualitative methods of statistical data evaluation for their generalization and interpretation. The AI tools that can be used for work by art specialists were analyzed, and lecture material was developed to introduce students to the features of AI tools. Students were given a task they could complete using AI tools. Training with the use of AI tools was conducted during one academic year. The use involved learning about specific AI tools for specific tasks, as shown in Table 1 (Appendix 2). This occurred during lectures at the beginning of the year, when performing tasks, or use (optionally) during the academic year in the free version or the paid version up to $10 per month. The students were offered the use of AI tools in the process of learning, as presented in Table 2 (Appendix 2).

3.2 Methods

The research employed quantitative methods, modeling, and a pedagogical experiment. As part of the experiment, a curriculum was developed and implemented, which included the use of AI tools in the educational process for training students of various art majors. After the implementation of the program, a survey of students was conducted to assess how the use of AI affected the development of their professional competencies.

A survey was conducted that assessed the level of students' literacy in the use of AI with the help of the author's questionnaire. The collected data were analyzed to establish the relationship between the level of AI literacy of students and their professional competencies. This made it possible to determine how effectively students apply AI in their educational and creative activities, as well as how it affects their professional growth.

3.3 Sample

The study employed 440 fourth-year students who studied Art as a branch of knowledge, majoring in Musical Art, educational and professional program Vocal Art (the number of students - 187, of them 98 girls and 89 boys), Fine Art, Decorative Art, Restoration (number of students - 155, of them 76

girls, 79 boys) and Choreography (number of students - 98, of them 52 girls, 46 boys).

3.4 Instruments

Two questionnaires were used to survey students after the experimental academic year (Appendix 1).
The first, regarding AI literacy, was proposed by [23]. The questionnaire consists of four subscales, which contain certain subscales, namely: learning effectiveness (subscales: internal motivation - 4 questions, self-efficacy - 5 questions, career interest - 5 questions, confidence - 5 questions); educational behavioral skills (subsections: formation of behavior - 3 questions, involvement in educational activities - 4 questions, cooperation - 4 questions); cognitive learning (subsections: knowledge and understanding – 5 questions, use, evaluation, creative thinking – 4 questions), and ethical learning (AI ethics – 16 questions).

The second questionnaire was created that helped to find out how students evaluate the use of AI tools for the development of their professional competencies. The definition of the components of professional competencies, which was described and systematized in the work of [21], given the issue under research, was given in the literature review.

The obtained results were processed using SPSS Statistics. The results of descriptive statistics and research on the existence of interrelationships between the level of literacy in the field of mastering AI tools and the students' opinions regarding the impact of using AI tools on building professional competencies are presented.

After the survey, in addition to the general assessment of the impact of AI use on building professional competencies, a correlation between the indicators of AI literacy and the assessment of their impact on building students' professional competencies was studied.

3.5 Ethical Criteria

The survey was conducted in compliance with the principles of anonymity. The results of the survey did not affect students' grades during the semester control. Students could voluntarily refuse to participate in the survey, which did not affect the results of their studies or the attitude of teachers or administration towards them. The use of paid versions of the AI tools was purely voluntary. The use of AI tools required the students' consent (signing an agreement to understand the consequences of using and publishing content that would violate copyright, degrade or criticize the creative activity of people regardless of skill level, cultural affiliation, or other characteristics).

4 Results

The students' survey regarding their AI literacy is presented in Table 3 (Appendix 2).

Music, visual arts, and choreography are the three majors represented in the table, which shows students' level of literacy in using AI tools. All specialties have the same average values on all scales and subscales, which indicates that literacy in the use of AI is equal. The Use, Assessment, and Creative Thinking subscale has the highest mean values for each of the three majors, indicating the significant role that AI plays in promoting creative thinking. Different standard deviations show that the variability of student responses is similar between majors.

The obtained results show the absence of significant differences between the indicators of AI literacy among students of different majors. It was found that the general level of AI literacy is higher than medium. A survey of students regarding the effectiveness of the use of AI tools in building their professional competencies is presented in Figure 1.

Students who studied in the three different art majors involved in the research highly appreciated the impact of AI tools on expanding their knowledge and a deeper understanding of the theory of cultural and artistic processes, art history, and innovative technologies in art, and had a positive attitude towards the AI use for building different components of professional skills. Students majoring in Choreography rated the impact of using AI tools on building the perceptual component the highest (3.51 points). In general, all students positively evaluated the AI use to realize their future role as a professional, an auxiliary factor in understanding the art field and determining a place in the system of professional direction (estimates of all components by students of various specialties who participated in the study were higher than 3 points).

Respondents' answers show that AI tools help them to better master the specifics of their professional activities. Students pointed to several advantages of using AI tools, including:

- consideration of their motivational factors, goals, and interests;
- development and maintenance of professional orientation and interest in future activities, stimulation of self-improvement;
- regarding the cognitive component: this is an opportunity to gain and expand knowledge in the field of understanding the basics of directing mass events, arrangement, analysis of artistic works,

theory of cultural and artistic processes, art history, and other aspects of artistic activity;

- regarding the organizational and activity component: facilitating the performance of routine tasks, developing the ability to consciously and rationally organize one's educational activities and to cooperate with other participants of the educational process or creative team;
- support of the ability for self-analysis and self-criticism;
- obtaining several professional skills and abilities that contribute to effective work in future activities;
- the opportunity to examine the various professional roles of an art specialist (manager, critic, performer, etc.), which contributes to the development of versatile abilities and practical skills;
- self-expression, readiness for creative experimentation.

The analysis of the reliability of the developed questionnaire by calculating the Cronbach's alpha coefficient, separately for the students' answers for each major, is presented in Table 4 (Appendix 2).

A strong positive correlation between self-assessment indicators of AI literacy and their impact on the formation of professional literacy of future art specialists was found. This is predicted because students rated both components above medium. No significant differences were found between the indicators of self-assessment of AI literacy and the assessment of the impact of the use of AI tools on the professional literacy of students of different majors. Therefore, the correlation coefficients between the average grades of students of all majors were calculated. The indicators of relationships are presented in detail in Table 5 (Appendix 2).

The use of AI tools contributes to the acquisition of the necessary knowledge and skills of future art specialists. Given the development of AI tools and the range of their use in various types of activities, the need to involve AI in the professional training of art students can be stated observing several limitations that were discussed in the introduction and literature review. This is also determined by the numerous threats that AI poses in case of abuse or incorrect use, in particular, about violations of the academic integrity rules.

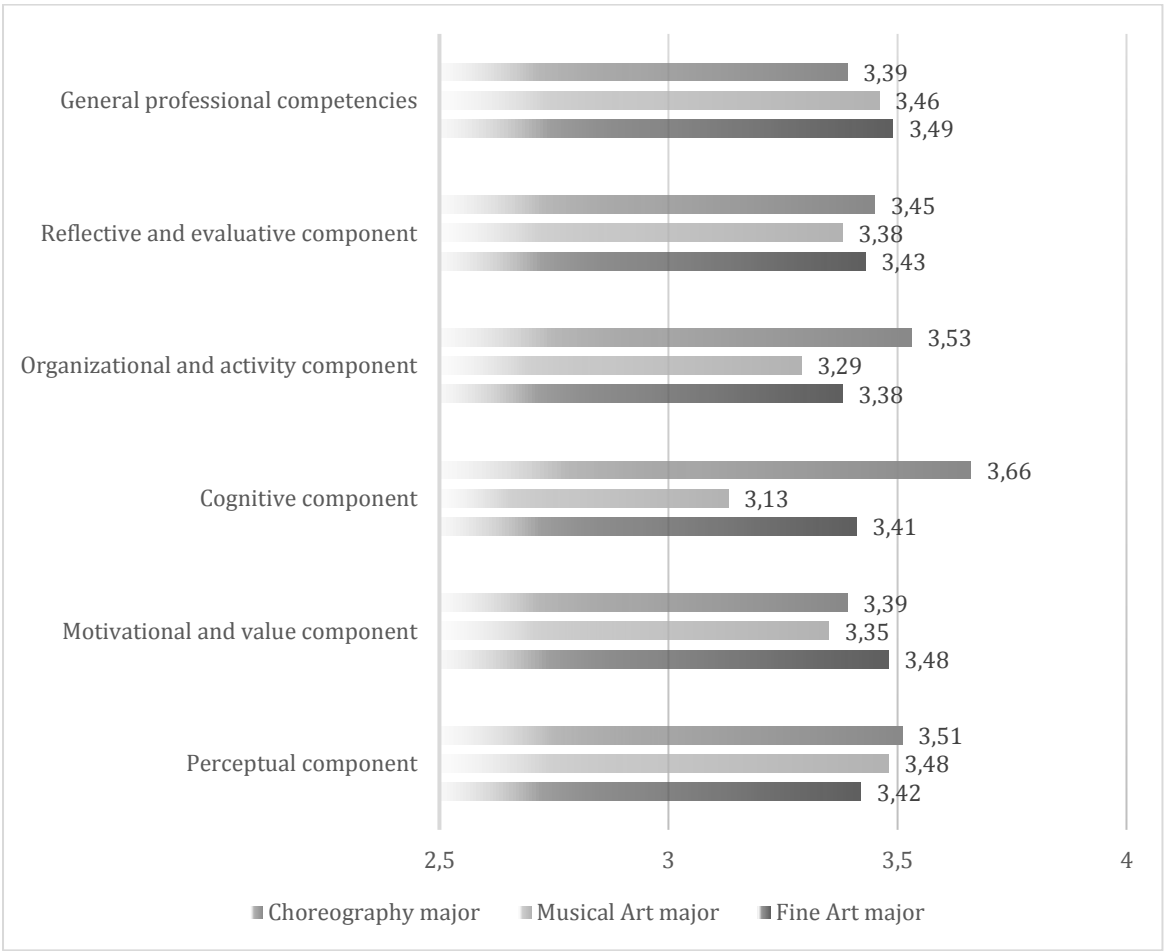

Fig. 1: Survey Results Regarding the Impact of Using AI Tools on Building Professional Competencies of Future Art Specialists

5 Discussion

The effectiveness of using AI tools for building professional competencies in various fields is quite significant. Were examined the possibilities of AI in the art to understand how the intersection of art and technology can transform people's attitudes toward AI use, [24]. In [25], the researchers believe that machine creativity and human creativity should be differentiated, but the complementarity of human creativity and AI will contribute to the maximization of people's creative capabilities. The use of AI changes the labor market, and contributes to the improvement of production processes. The use of AI In the field of art is quite controversial due to many prejudices against AI in creativity as a substitute for human potential, [2]. However, it is more harmful to ignore the extent of the spread of AI and its potential for the development of practical skills and abilities, and the formation of professional competencies and components using AI. Therefore, the authors of this article argue for the idea of introducing material about the peculiarities of AI tools in art into the curriculum. The rational use of AI capabilities makes it possible to train high-class specialists, while the unqualified will distort the AI potential.

The data of [26], as well as the results of this study, confirm that students are generally positive about AI and consider it useful for education, but are concerned about the disadvantages of its use. Using certain AI tools, students can significantly increase all the competence components of art majors, in particular the perceptual component of professional competencies, which in a broad sense means understanding the requirements for activities in modern art; motivational and value, cognitive, organizational and activity, reflective and evaluative components. The obtained results correspond to the results of the study conducted by [27], which showed that the collaboration of students with AI tools significantly influenced creativity in content, expressiveness, and social benefit of efficiency. This was, however, influenced by students' attitudes towards AI and their level of artistic skills. At the same time, the rational use of AI will contribute to the further effective building of various types of professional competencies in future specialists of art specialties, as determined in the conducted research.

The AI use in education has several advantages and disadvantages, [28]. As a result, to create logical content for inquiry, AI in higher education must be used with the right user skills, [29]. The authors emphasize the importance of quality education and the need to implement AI in teaching and assessment of education, [30]. The use of AI in education changes learning and teaching, and this requires changes in the structure of the educational process, [31], including understanding the ethical implications of using AI in education, publishing specific content, and observing copyright when creating or performing other operations, [32]. In addition, as the use of AI in various forms can expose the participants of the educational process to danger, it is extremely important to prevent potential situations of bullying, [33], [34]. Future specialists in the field of art should be trained in such a way as to strengthen the complementarity of professional competencies, [35]. This can be achieved through the effective use of AI tools.

The obtained results confirm the conclusions of, [36], regarding the decisive influence of the use of AI on building professional competencies in higher education. In addition, the obtained data complement the conclusions of [37], regarding the effectiveness of using AI for the development of the organizational and activity component of competence. In [38], the authors conclude that the development of cooperation in educational activities between students and AI tools can contribute to high-quality performance of creative tasks, and finding solutions to problems. The results of [39], show that the use of AI in higher education is possible in three variants: 1) AI as a new subject; 2) AI as an intermediary; 3) AI as an additional assistant in the relationship between the participants of the educational process. An effective AI use model is possible only under the condition of creative cooperation between students and teachers.

In [40], the researcher suggests the implementation of literacy studies using AI in educational programs. The authors of this article reached a similar conclusion, which is ground to consider it appropriate to offer the study of the possibilities of using AI while learning all mandatory subjects of the educational program. Besides, attention should be paid to the potential of AI specifically within the scope of studying selective subjects, [41]. It is advisable to develop separate subjects for different artistic majors given the peculiarities and unevenness of the potential of using AI in different artistic fields. For example, the use of AI tools in the field of music is almost not limited, [42], but there are more restrictions for choreography and visual arts.

Therefore, high-quality and effective cooperation between humans and AI is possible even in the creative sphere. However, establishing work with AI requires mastering new skills, and

checking the effectiveness of using AI for the development of professional competencies and creative abilities in various spheres of human artistic activity. Theoretical studies and tests will make it possible to improve the processes of professional education using AI.

6 Conclusions

The study showed that the development of professional competencies is positively influenced by the reasoned use of AI tools in art education. According to the subjective self-assessment of literacy in the use of AI, art students have an above-medium level. This level is sufficient for training, creating relevant projects, as well as for self-development. The test check and approbation of the developed questionnaire for surveying students about the impact of AI tools on building professional competencies shows sufficient consistency of its components, and the results of descriptive statistics indicate that students highly appreciate the impact of using AI tools on building their professional competencies. This means that students majoring in Musical Art, Fine Art, and Choreography statistically equally evaluate AI tools for building their professional competencies.

The study shows that AI use contributes to the development of professional skills of art students. It revealed that AI can improve skills in areas such as music, choreography, and the visual arts by analyzing real-world feedback, creating art projects, and evaluating the quality of music recordings. The study found that students highly rate the impact of AI on their professional training. This confirms the importance of incorporating AI into the curriculum if we want future specialists to be well-rounded.

Students noted the ability to provide real-time feedback from AI tools to help them improve their artistic skills. In the field of choreography, students highly appreciate AI tools that help to analyze movements and provide valuable information about their synchronicity and spectacularity, recommendations for selecting or improving musical accompaniment, and creating more exciting and creative dance programs, artwork, or musical accompaniment. In the visual arts, AI tools help in creating constructive projects for the competent organization of space, building relations between light, halftone, and shadow through the creation of complex tonal transitions, which is especially difficult in oil painting. In this field, AI is highly appreciated by students as an auxiliary tool for their activities. In music, AI helps to assess the quality of a recording (of own compositions or created with the help of AI), to create an arrangement that corresponds to the content and mood, which accelerates the work of a future specialist in the field of musical art, in particular, pop vocals, and therefore activates the viewer's attention, contributes to increasing the productivity of his work.

A strong correlation was found between the results of the assessment of literacy in the use of AI tools and the assessment of the impact on the level of professional literacy. In other words, AI literacy also involves the assessment of the impact on building professional competencies of future art specialists. At the same time, a biased attitude or a lack of knowledge about the specifics of using AI tools can be the reason for low assessments of the impact of using AI or understanding their role in shaping the professional competencies of a future specialist. Therefore, it is necessary to acquire AI literacy skills to build professional competencies and their components in the modern world. This will contribute to their effective use and prevent the negative consequences of using AI in art.

6.1 Limitations

The research implies the use of certain free or paid AI tools for building certain professional competencies. The use of free versions only shows the AI potential to a limited extent. Because of this, the possibility of developing additional skills for students in the case of using full-fledged optional AI programs is not taken into account. A limitation is that all students had a certain level of AI literacy offered by higher education institutions and improved in the process of use, but other conditions, for example, lack of training by teachers of HEIs or insufficient self-learning motivation among students, were not taken into account. Potentially, they will cause a lower level of AI literacy and, accordingly, a lower assessment of the role of the formation of professional competencies of future specialists in the field of art. The study did not also take into account the student's academic performance.

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APPENDICES

Appendix 1

Questionnaire for assessing the role of AI in building the components of the professional skills of the future art specialist

Perceptual component:

1. To what extent do AI tools help you to better understand your role in the art industry (1 – I do not support at all (strongly disagree), 5 – I fully support (strongly agree), 1 – I strongly disagree);
2. In your opinion, do AI tools help you to effectively determine your place in the system of artistic professions? 1 – I do not support at all (I do not agree at all), 5 – I fully support (I fully agree), 1 – I do not agree at all);
3. Does the use of AI tools improve your perception of the art major as a future specialist in the context of the cultural space? 1 - I do not support at all (I do not agree at all), 5 - I fully support (I fully agree), 1 - I do not agree at all);
4. How do you assess the impact of AI tools on the ability to analyse and evaluate the cultural space? 1 – I do not support at all (I do not agree at all), 5 – I fully support (I fully agree), 1 – I do not agree at all);
5. How do you evaluate the support of AI tools in determining professional and artistic personal qualities for future professional activity (1 – They have no impact, 5 – They have a positive impact);
6. How effective is the use of AI tools to determine the specifics of the perception of the cultural space by future specialists? (1 – They have no impact, 5 – They have a positive impact);
7. How important is the use of AI tools for building your professional competence? (1 – not very effective, 5 – quite effective);

Motivational and value component

8. To what extent AI tools take into account your motivations, goals and interests in the process of professional training (5 – fully support (fully agree), 1 – completely disagree);
9. How do AI tools affect your ability to develop and maintain a certain professional orientation and interest in future activities (1 – no impact, 5 – positive impact);
10. To what extent does the use of AI tools contribute to the development of your professional orientation and the desire for self-improvement? (1 – no impact, 5 – positive impact);
11. In your opinion, the use of AI tools helps you to maintain interest in future professional activities (1 – no impact, 5 – positive impact);
12. Does the use of AI help to support your creative and personal values in art? (1 – no influence, 5 – positive impact);
13. How do AI tools affect your inclination to perform this particular professional activity and realize the need for self-expression through it? (1 – no impact, 5 – positive influence);
14. To what extent is the use of AI tools important for building your professional competence in the motivational and value component? (1 – no impact, 5 – positive impact);

Cognitive component

15. To what extent do AI tools help you gain and expand your knowledge in your professional field? 1 – I do not support at all (disagree at all), 5 – I fully support (completely agree);
16. How do you assess the impact of AI on your understanding of the foundations of theory, culture, and other aspects of your artistic activity? (1 – no impact, 5 – positive impact);
17. To what extent do AI tools help you to learn the specifics of folk art, the basics of composition and other aspects of art? (1 – no impact, 5 – positive impact);
18. Do you think that AI tools improve your understanding of working with stage and other creative teams and people? (1 – no impact, 5 – positive impact);
19. Do you think AI tools take into account the specifics of work in the art field? (1 – not taken into account, 5 – sufficiently taken into account);
20. How do AI tools help you understand society's perception of art and take this into account in your creative work? (1 – no impact, 5 – positive impact);
21. To what extent does the use of AI tools help you to understand the specifics of communication in creative teams? (1 – no impact, 5 – positive impact);
22. Do you think AI tools support the development of your creative and personal values in the art field? (1 – has no influence, 5 – positively influences);
23. How do AI tools affect your tendency to perform this particular professional activity and

realize the need for self-expression through it? (1 – no impact, 5 – positive impact);
24. In your opinion, the use of AI tools is important for building your professional competence in the motivational and value component? (1 – no impact, 5 – positive impact);

Organizational and activity component

25. Do you think that the use of AI tools contributes to the formation of your professional skills for work in the art field? (1 – no impact, 5 – positive impact);
26. Does the use of AI tools affect your ability to organize and collaborate with creative teams and other people? (1 – no impact, 5 – positive impact);
27. To what extent do AI tools contribute to the development of your organizational skills in the context of artistic activity? (1 – no impact, 5 – positive impact);
28. Do you think that AI tools support you in solving tasks and organizing professional activities in art? (1 – no impact, 5 – positive impact);
29. At what level do you think that AI tools facilitate work with creative processes and contribute to increasing its efficiency? (1 – no impact, 5 – positive impact);
30. How do AI tools affect your ability to interact with teachers and fellow students in the context of art training? (1 – no impact, 5 – positive impact);
31. To what extent is the use of AI tools important for building your professional competence? (1 – not important, 5 – very important);

Reflective and evaluative component

32. Do AI tools improve your capacity for introspection and self-observation in the process of professional activity? (1 – no impact, 5 – positive impact);
33. How do you assess the impact of AI tools on your ability to self-criticize and evaluate your own creative abilities? (1 – no impact, 5 – positive impact);
34. To what extent do AI tools help you to form sustainable motivation for self-improvement in art? (1 – no impact, 5 – positive impact);
35. Do you think that AI tools make it easier for you to analyse various aspects of your professional activity and fulfil tasks? (1 – no impact, 5 – positive impact);
36. At what level do you think AI tools take into account your creativity and capabilities in performance evaluation? (1 – no impact, 5 – positive impact);
37. How does the use of AI tools affect your ability to analyse and summarize various aspects of art in your work? (1 – no impact, 5 – positive impact);
38. Is the use of AI tools important in today's world for building your professional competence, given their rapid development and areas of application? (1 – not important, 5 – very important);

General professional competencies

39. The use of AI tools is necessary in today's world in my chosen professional activity;
40. The use of AI tools helps me to fulfil creative tasks in my professional activity;
41. The use of AI tools helps me in finding new ideas and concepts in creative activity;
42. The use of AI tools helps me to store and analyse data on the results of the creative process and the dynamics of achievements;
43. With the use of AI tools, I will be able to work effectively in the art field;
44. The use of AI tools helps me to prepare for professional activity, taking into account the requirements of the modern labour market;
45. The use of AI tools helps me to maintain the competitiveness of future specialists in the labour market.

Appendix 2

Table 1. Components of Professional Competencies of the Future Art Specialist

No.	Component name	Functional content and key characteristics
1	Perceptual	- categorizes the role and place of a specialist of a certain artistic specialty in the system of artistic professions based on the professional artistic qualities of the student's personality; - determines the specifics of perception of the surrounding cultural space from a professional (not amateur) position.
2	Motivational and value	- *motivational aspect:* motives, goals, needs, and interests of the future specialist determined by the ability to comprehensively solve complex professional problems in the field of artistic innovation, in particular, in the field of vocal, visual, and choreographic arts; - *emotional and value aspect:* a complex of professional and personal values, based on the awareness of the role of culture and art in the development of social relations, the formation of the ability to navigate and enrich cultural heritage, by universal humanistic values, aesthetic ideals.
3	Cognitive	The complex of professional knowledge on: - philosophy of art, theory of cultural and artistic processes, history of world artistic culture, musical, visual, and choreographic arts, psychology of artistic creativity, innovative technologies in art, theories, and methods of teaching professional subjects, which determine the mandatory educational and professional training of students of various artistic majors; - the specifics of folk creativity, which helps future specialists of all artistic majors to feel the cultural context and use traditional ethnic elements in their creativity; - hygiene and protection of the voice, elementary theory of music, solfeggio, harmony, composition, analysis of musical works, basics of pop song direction and pop music arrangement (for students studying under the educational program Vocal Art, specialized in Musical Art; - theory of composition, drawing and painting, perspective, colorists, plastanatomy, artistic design, and restoration of works of art (for students majoring in Fine Art, Decorative Art, Restoration; - biomechanics in choreography, acting skills, theory of ballet master's art, methods of working with a choreographic team, direction of mass events (for students majoring in Choreography). The ability to creatively apply theoretical knowledge the professional practices will contribute to the awareness of the phenomenon of "art" in future specialists — as part of the spiritual culture of the individual and the culture of humanity as a whole, and lays the ground for the further formation of one's artistic style.
4	Organizational and activity component	- formation of special (professional, subject) skills and practical skills for the work of a future specialist; It is realized in the process of practical activity (quasi-professional and actual professional activity), depending on the nature of the teacher - students interaction, the level of professionalism and innovativeness of approaches in teaching activity, as well as the readiness of those seeking education for hard work, a creative attitude to the profession and development throughout life.
5	Reflective and evaluative	- the need for self-observation, self-analysis, and self-criticism regarding preparation for future independent professional activity; - persistent motivation for self-improvement, critical assessment of one's abilities and creative potential; - professional reflection is dynamic and depends on changes in one's ideas about the profession given personal professional and artistic experience and social expectations; - the need for self-education.

Table 2. Examples of the Use of AI Technologies and Tools in the System of Training Art Students in HEIs

Components of Professional Competencies	Musical Art major, educational program Vocal Art	Fine Art Major	Choreography major
Perceptual component	To assess and analyze vocal skills, and to provide sound analysis of technical aspects such as range, intonation, and dynamics. Vocal Analysis AI	Using computer vision and machine learning algorithms to analyze works of art. It is used to analyze different styles, techniques, and trends in art. Art Vision AI	The use of computer image processing algorithms for the analysis of choreographic productions and performances. AI can help to detect and refine movements, making them more aesthetic and effective. Choreo Vision AI
Motivational and value component	Development of personalized training programsprograms and recommendations based on the individual vocal capabilities of the vocal artist with the aim of applying a differentiated approach and expanding the variability of the educational process. Through the development of a system of personalized tasks, AI systems activate the self-development processes of each student. Vocal Coach AI	Using emotion analysis through facial recognition systems to study the effects on viewers. Art Inspire AI	Personalized programs and exercises based on the motivations and system of artistic values of a particular student. Intelligent systems can take into account style, previous achievements, and creative preferences. Choreo Craft AI
Cognitive component	The application of intellectual systems for mastering the theoretical provisions of music art, in particular, vocal art, which helps to carry out the conscious analysis of vocal works regarding their construction and structure, belonging to a certain era, authorship, as well as understanding their artistic value and uniqueness. Voice Theory AI	Using generative AI models to create ideas for art projects, taking into account the individual styles of artists of a certain era, ethnic groups, and other factors. Art Genius	The search or generation of new elements of choreographic vocabulary, original technically complex, and aesthetically expressive dance supports for the fullest possible identification of individual students' capabilities and the creation of unique choreographic productions as a whole. Choreo Genius
Organizational and activity component	AI-based vocal trainers help vocalists manage training time, determine and select a repertoire, with an orientation to a certain audience of listeners, and organize performances. Virtual Perfomance Planner	AI-based automated planning systems for optimizing time and resources when organizing collective art projects, personal art exhibitions, etc. Visual Art Studio	Virtual trainers who provide organizational and methodological instructions regarding the coherence of actions in the creative team and modeling of practical situations when preparing the team for participation in art competition programs, and organizing performances. Virtual Dance Coach
Reflective and evaluative component	Using intelligent systems to analyze video recordings of vocalists' performances and provide meaningful advice to improve performances. Vocal Feedback AI	Analysis of possible positive and negative reactions from viewers and art critics to evaluate reactions to artistic projects. Art Critique AI	Using AI to analyze video recordings of performances, identify strengths and weaknesses, and provide recommendations for improving the quality of choreography numbers, in particular, their technical and emotional components. Dance Analyzer AI
General competencies of art specialists	The use of AI-based music synthesizers, as well as systems that create accompaniment and	Using AI technologies to recognize movements and automatically adjust	Using AI to conduct experiments on mastering the technique of performing elements of

Components of Professional Competencies	Musical Art major, educational program Vocal Art	Fine Art Major	Choreography major
	arrangements for vocalists, simplifies the process of creating vocal accompaniment and musical compositions. AI Vocal Arranger	artistic strokes to achieve visual harmony. AI Brush Assistant	choreographic vocabulary in a virtual environment. Motion Composer AI

Table 3. Students' Literacy Level in Using AI Tools

Major	Musical Art major, educational and professional program Vocal Art		Fine Art major		Choreography major	
Scales and subscales	mean	SD	mean	SD	mean	SD
Effectiveness of learning						
Internal motivation	3.13	0.79	3.11	0.87	3.24	0.82
Self-efficacy	3.27	0.85	3.23	0.85	3.22	0.76
Career interest	3.31	0.92	3.26	0.95	3.22	0.98
Confidence	3.28	0.88	3.32	0.67	3.24	0.75
Educational behavioral skills						
Formation of behavior	3.18	0.79	3.15	0.97	3.21	0.89
Involvement in educational activities	3.27	0.86	3.22	0.69	3.31	0.77
Cooperation	3.22	0.98	3.31	0.76	3.29	0.90
Cognitive learning *also lacks the practical component of professional training*						
Knowledge and understanding	3.21	0.87	3.23	0.91	3.30	0.85
Use, assessment, creative thinking	3.35	0.75	3.41	0.73	3.29	0.89
Ethical education						
AI ethics	3.22	0.83	3.23	0.68	3.13	0.77

Table 4. Internal Consistency of the Components of the Developed Questionnaire for Studying the Impact of Using AI Tools on Building Professional Competencies of Future Art Specialists (Cronbach's alpha)

Components of Professional Competencies	Majors		
	Musical Art	Fine Art	Choreography
Perceptual component	87	78	79
Motivational and value component	81	84	82
Cognitive component	78	76	80
Organizational and activity component	81	75	86
Reflective and evaluative component	79	79	77
General professional competencies	83	80	76

Table 5. The Results of Correlation Analysis for Studying the Reliability of the Developed Questionnaire for Studying the Impact of AI Tools on Building Professional Competencies of Future Art Specialists

Components of Professional Competencies	Components of AI literacy	Learning effectiveness	Learning behavioral skills	Cognitive learning
Perceptual component	1.000000	-0.485714	0.579771	0.657143
Motivational and value component		-0.637748	-0.115954	-0.371429
Cognitive component			1.000000	-0.115954
Organizational and activity component				1.000000

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