

Peculiarities of teaching art in the era of digital technologies: challenges and opportunities

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ABSTRACT

The modern digitalization of the educational process in art teaching is a relevant topic for research. The purpose of the article is to study the peculiarities of teaching art in the time of active use of digital technologies, the challenges and opportunities of this process in further use. To achieve this task, scientific methods of comparison and content analysis of scientific literature were used. A survey of 77 students (bachelor's, master's, and PhD students) who studied art with the use of modern digital technologies was also conducted. The results show that modern digital technologies are used at least several times a week. Important tools are virtual and augmented reality technologies, multimedia, and digital resources. Artistic digital platforms for creation or modeling allow the use of various digital tools to create new works or explore new styles. The problems are described: untimely access to technology, lack of personal interaction, lack of practical skills, certain limitations in the use of creativity, and the need for self-discipline. The conclusions summarize the general tendency to deepen the use of digital technologies in art education.

Keywords: Visual culture, Media education, Online platforms, Artistic practice, Technological innovations, Digital platforms.

1. Introduction

Considering the current trends of digitalization, the transformation of approaches to teaching art is noticeable. In particular, the professional training of specialists is based on the use of innovative forms and methods of pedagogical activity. On the one hand, it opens up a wide range of new opportunities for teachers and students. However, on the other hand, it creates new challenges and difficulties, which are primarily related to digital adaptation [30], [28]. Accordingly, an urgent task is to determine not only certain challenges in the way of implementing technologies but also the advantages of their use in the field of art teaching.

Currently, the training of specialists in art specialties goes beyond traditional methods (i.e., regular classes in the classroom or work in the studio); it is aimed at integrating both innovative and traditional methods, integrating digital tools and virtual platforms [11], [21]. An important research problem is to find out the main challenges and opportunities of such integration, since digitalization enables the use of different technologies, opens access to wide resources, and experiments with different art forms. Modern researchers have emphasized the importance of using digital technologies, especially during education in a crisis period [30], [20]. This two-sided nature of digitalization is emphasized by many modern scientists [11], [32], [27]. In particular, the work of [11] emphasized the importance of using virtual reality in mastering the skills of artistic disciplines [11]. Reference [21] characterized the peculiarities of the implementation of virtual reality in higher education. The authors analyzed the current trends and characterized their possibilities for optimizing education. Reference

[35] characterized the role of social networks in modern educational discourse [35]. The work of [36] describes modern trends in the development of education. The authors drew attention to the fact that digitization is the main current trend [36]. This opinion is held by many modern scientists who described the main aspects of the transformation of education due to the large-scale trend of digitalization [16], [12], [9], [22] described the influence of digital technologies on the development of modern higher education; the authors drew attention to both the emergence of new opportunities and new challenges. Fromm et al. [10] determined the importance of using virtual reality within modern education, as it affects the development of practical skills in students. In addition, digital technologies affect the optimization of communication between teachers and the audience [13], [19], [31]. However, the wide implementation of digital technologies creates problems with preserving the authenticity of the artistic process and the emotional connection with the work, which can be lost due to technology. Therefore, taking into account the fact that modern scientists have characterized certain features of teaching with the involvement of digital technologies, pointing out their possibilities and shortcomings.

A gap in the study of this topic is a comprehensive description of the peculiarities of teaching art disciplines with the involvement of modern digital tools. In addition, it is also worth characterizing the opinions of modern students regarding learning with the help of these technologies. This will make it possible to identify additional difficulties in the digital education system. Accordingly, this study will try to characterize the peculiarities of art teaching in the era of digitalization through a comprehensive characterization of the main challenges and opportunities.

The purpose of the research is to analyze the key aspects of teaching art with the involvement of digital technologies and to highlight the main challenges and opportunities in the way of using digital tools. The main research questions are as follows:

1. What digital technologies are used in the process of teaching art?
2. What capabilities do these technologies have?
3. What are the difficulties in implementing these innovative tools?

2. Methodology

2.1. Research design

This study is mixed-methods research in order to fully address the research problem. Through the use of quantitative and qualitative methods such as surveys and interviews, respondents have the opportunity to share their opinions on the implementation of digital technologies in the art teaching process. This will also allow for a deeper understanding of the main difficulties in their use.

2.2. Data collection and participants

The data collection involved the use of a purposive sample aimed at involving those students who studied art with the use of modern technologies. The inclusion criteria were based on the study of art and the ability to distinguish between modern digital technologies. To participate in the survey, all participants had to provide informed consent to participate.

Inclusion criteria:

1. Study of art
2. Having previous knowledge of basic digital technologies;
3. Ability to distinguish between modern digital technologies;
4. Providing informed consent;

Additional criteria that were not taken into account:

1. Year of study: students from different years of study were involved in the survey.
2. Experience of learning with the use of digital technologies: students with different experience of learning with the use of digital technologies (from 1 year) were involved in the study.

3. Study program: the study involved students from different study programs.

This sample included 77 students (42 women and 35 men) who studied art with the use of modern digital technologies (virtual reality, augmented reality, use of digital resources, integrative technologies). The participants of this study represented three different educational levels (bachelors, masters, and postgraduate students). This sample allowed us to cover students with different levels of training and experience in using digital tools (see Appendix A). Thus, the total number of participants in the study is 77 students, including 44.16% of bachelors, 42.86% of masters, and 12.98% of postgraduate students. Such a sample allowed us to analyze in detail how students with different backgrounds and levels of education evaluate the experience of learning using digital technologies.

2.3. Instruments and procedure

At the first stage of the study, a survey was conducted among the selected students. It covered the frequency of using digital technologies, the main tools, the main opportunities and difficulties in implementing these tools. Some of the questions were based on a Likert scale (scoring from 1 to 5). This was done so that students could assess the main opportunities for implementing these technologies (see Appendix B).

Using a qualitative methodology (semi-structured interview), respondents had the opportunity to share their own stories and points of view on the implementation of technologies. This allowed for a deeper understanding of the main capabilities of these technologies, as the interviews are based on a description of their own experiences. This is superior to survey responses, as they have predefined parameters. This interview was conducted in a focus group. All participants gave consent to participate in the interview. A total of 15 participants (10 persons were female and 5 were male) were selected for the interview.

The interview questions were as follows:

1. How do you generally assess the interaction between teachers and students in a digitalized learning space?
2. What opportunities for teaching art based on digital technologies do you find most useful?
3. What are the difficulties in the process of digital learning? (See Appendix C).

2.4. Data analysis

The methodological strategy for this study was based on qualitative research methods. All the data from the survey was entered into Excel spreadsheets, including such data as opportunities, assessment, and challenges. All the results and responses of the participants were transferred to these spreadsheets. This allowed for better data processing and systematization. In order to analyze the data qualitatively, the process of inductive coding of semi-structured interviews was chosen. This made it possible to organize the richly detailed data and develop new key ideas about the peculiarities of teaching art in the digital age.

The use of inductive coding made it possible to formulate the main themes and categories from the responses received without the use of existing theoretical frameworks or hypotheses. Despite the fact that inductive coding has a number of rigorous advantages, it is also worth pointing out the shortcomings of this method. It is worth noting that interpretations may be influenced by the views or points of view of the researchers. Accordingly, there are difficulties with subjectivity on the part of researchers. To reduce this risk, data validation was used. In particular, the data obtained from different literature and sources were carefully checked. The comparison method was used to compare the data obtained with the information available in the peer-reviewed scientific literature.

3. Results

Contemporary art teaching is based on the use of various technologies that promote the development of creative thinking, creativity, and practical skills in students. The frequency of their use mostly involves several times a

week, as evidenced by the answers. In particular, 51.95% used digital technologies several times a week, 36.36% once a week, and 11.69% several times a month (see Table 1).

Table 1. Frequency of using digital technologies

Frequency	N	%
Several times a week	40	51.95%
Once a week	28	36.36%
Several times a month	9	11.69%
Total	77	100%

Various innovative technologies are used in the art teaching system, which are aimed at optimizing the learning process in general. They provide broader teaching perspectives for teachers and students and allow for the expansion of certain approaches to both learning and creativity. In particular, digital tools for creativity play an important role. In particular, Adobe Photoshop, Procreate, and Krita programs allow you to create digital works and experiment with techniques and styles. At the same time, they can also work remotely and not use physical materials. These programs also make it easier to correct mistakes and test new ideas. Virtual reality is also important in the training of art professionals.

The use of virtual reality technologies makes it possible to develop students' creativity, practical skills, and influence the formation of their own unique style. Augmented reality also plays an important role in teaching art. When integrated, these technologies facilitate the visualization of knowledge, allow for immersion in artistic spaces, and create various three-dimensional objects. Educational platforms also play a significant role in teaching art. Modern teachers use online platforms to create interactive lessons, video lectures, or courses. Ultimately, multimedia technologies (interactive presentations, videos, podcasts, etc.) contribute to making learning more interesting and integrative. They also allow teachers to demonstrate specific techniques and styles. Figure 1 illustrates the main technologies and their characteristics.

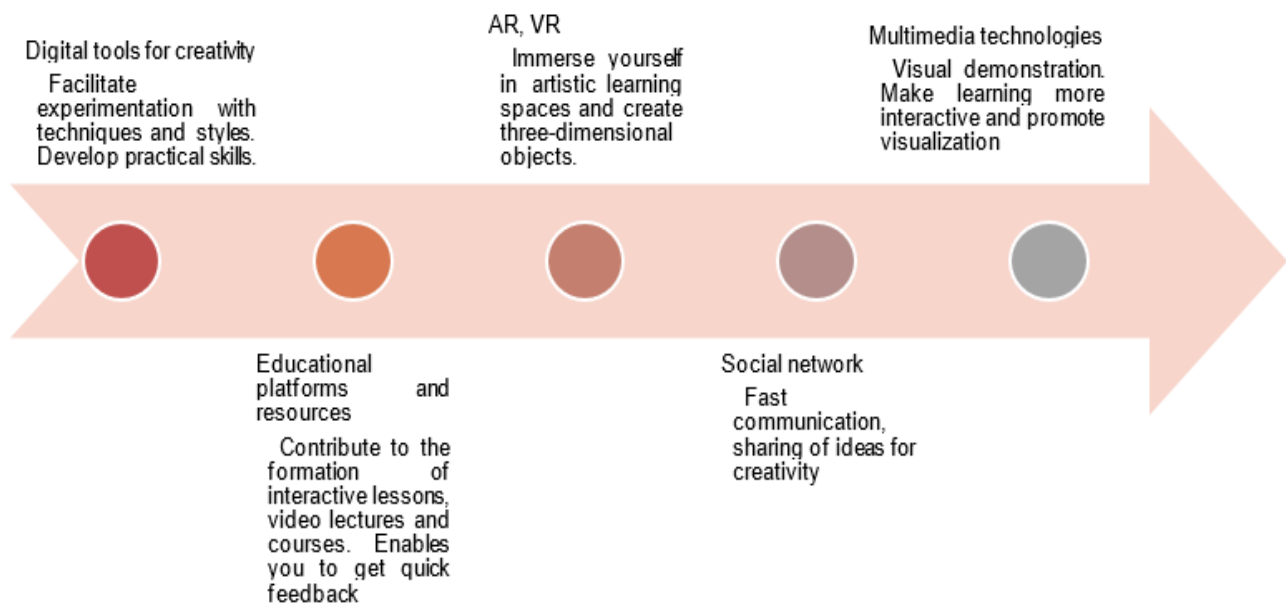


Figure 1. Main technologies and their features

These technologies make the learning process more interactive and flexible, as evidenced by the overall assessment of respondents. In particular, students rated the overall level of art teaching with the use of digital technologies highly (mostly by 4 points on the Likert scale). At the same time, they also believe that modern technologies play an important role in their training. In particular, they rated the level of importance of these technologies at 5 (44, 16%) and 4 (41, 56%) on the Likert scale).

Besides, research has shown that digital technologies improve communication between students and teachers. Accordingly, a separate task was to assess the interaction between teachers and students in the digital learning space. Given that there are many digital communication channels nowadays, students rated this interaction at 4 points on the Likert scale (38.96%). In the semi-structured interviews, some noted that communication problems and untimely responses from teaching staff negatively affect such communication. Figure 2 presents and summarizes all the Likert scores.

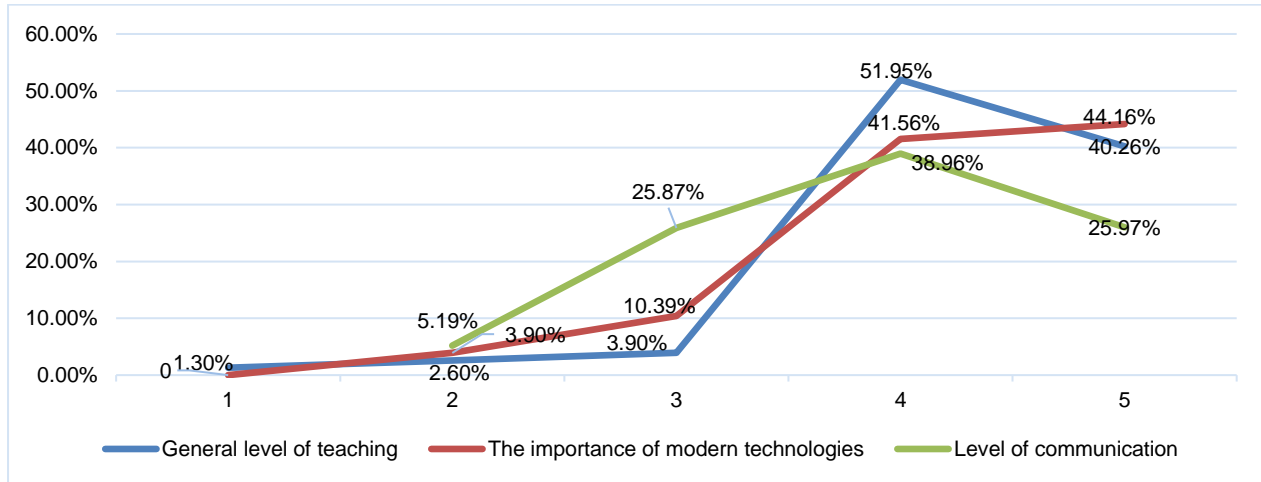


Figure 2. Level of student learning and interaction in the digital environment

The possibilities for teaching art in the digital age are also diverse. For example, digital artistic creation or modeling platforms allow the use of various digital tools to create new works or explore new styles. Multimedia resources allow teachers to use images, video, audio, or virtual exhibitions to teach theoretical material or showcase specific works. Virtual reality makes it possible to interact with 3D objects and immerse oneself in virtual art spaces. Access to global learning platforms is also becoming important. This allows students to learn new techniques from teachers from all over the world and share experiences. Quick feedback is also becoming an important advantage of studying art in the digital age. Students have the opportunity to communicate with each other and with teachers and to exchange ideas or consult outside of class hours. Figure 3 summarizes the main opportunities, benefits, and potential outcomes of using modern technology to teach art.

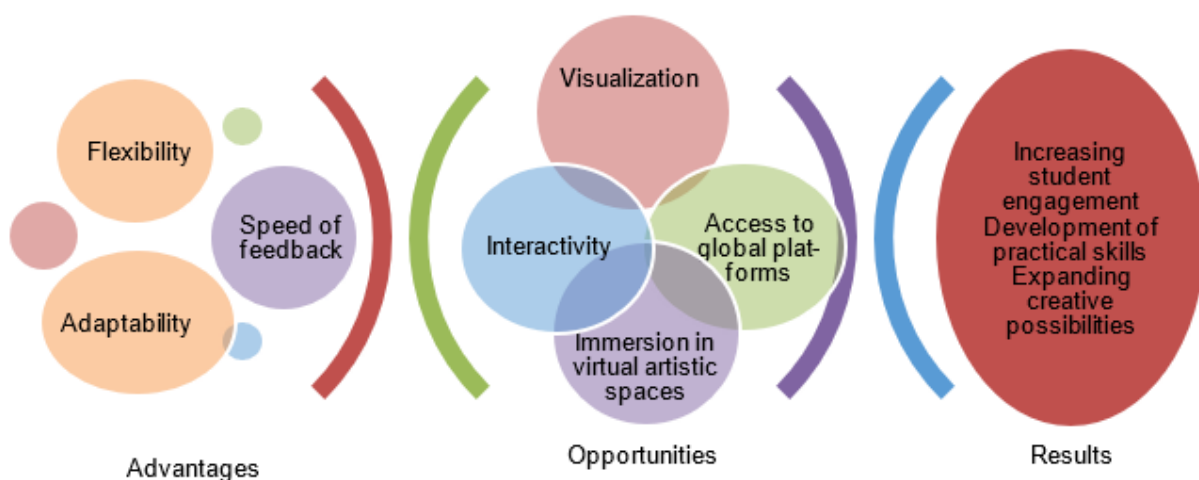


Figure 3. Advantages, opportunities and potential outcomes of using modern technologies in art teaching

The most effective technologies for studying art are digital platforms that facilitate the creation of new works. This was mentioned by 25 students, or 32.47%. Multimedia technologies also play an important role in training: 18 respondents, or 23.38%, rated their effectiveness. VR and AR were mentioned as the most effective technologies by 15 students (19.48%). Learning platforms received 8 marks (10.39%). Online communities

(courses) or social networks received a smaller number of marks (9.09% and 5.19%). Accordingly, the current survey demonstrated the high efficiency of digital platforms for content creation, virtual reality, and mood media technologies (see Figure 4).

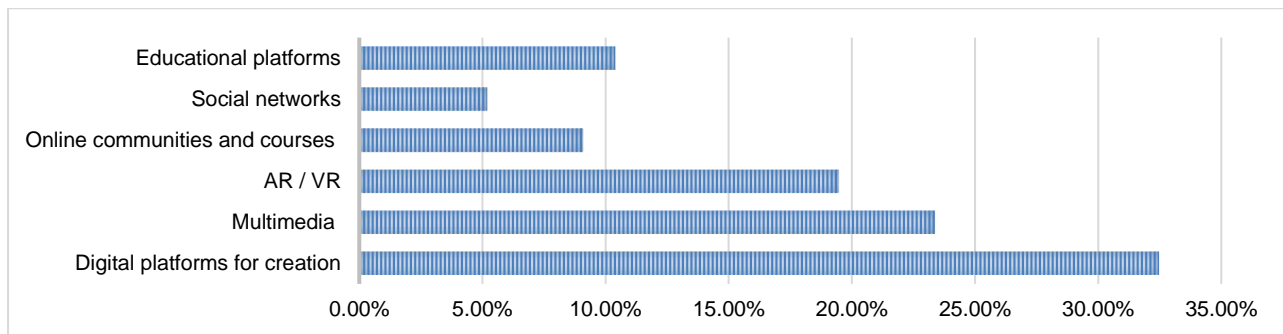


Figure 4. Effectiveness of technology in art teaching

At the same time, a third of the respondents had some difficulties studying art with the help of modern technologies. Based on the interviews, it was found that access to technology stands out among these difficulties. In particular, the functioning of these technologies is based on access to high-quality equipment and the Internet. Some students stated that they have always had access to a stable connection. In addition, in a digital environment, there may be problems with the lack of personal contact. Consequently, the teaching process may be hampered by the lack of sustained contact, which is particularly important in art education for individualized guidance. In the system of acquiring practical skills, digital technologies do not always provide an opportunity to develop motor skills that are important for traditional art forms. In addition, the interviews also revealed that some students had problems with self-discipline in the digital learning environment. Such difficulties can make independent learning difficult. Creative limitations were also evident. Although different digital technologies have different capabilities, some respondents stated that they felt their creativity was limited by certain technical tasks or simple program interfaces. Final Figure 5 outlines the main difficulties in the art teaching system based on modern technological solutions.

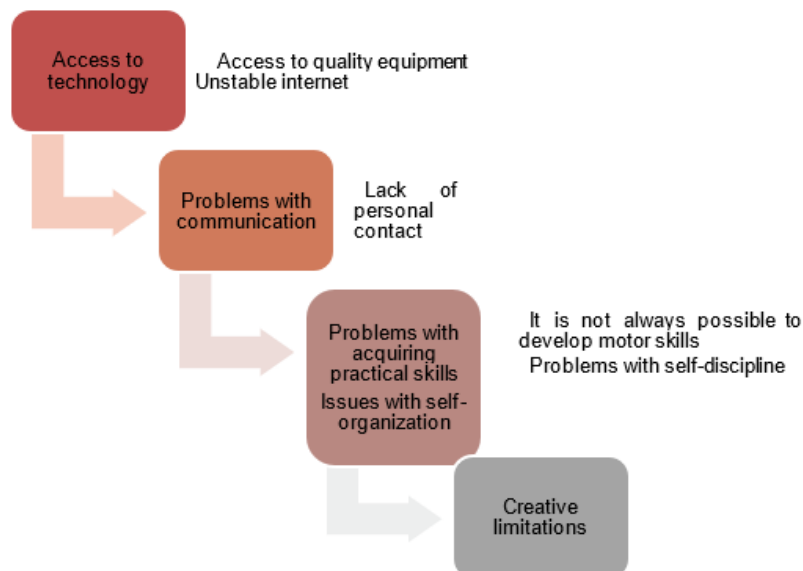


Figure 5. The main difficulties in teaching art in the digital age

Hence, teaching art in the digital age may face various difficulties that will need to be solved in the short term. These problems can be solved through the introduction of powerful material and technical support in educational institutions and an effective support system for the digital development of educational institutions. In addition, it is also worth implementing media education programs for the effective use of modern technologies. These

programs should support not only teachers, but also students and enable effective teaching and learning in the digital arts space.

4. Discussion

The digitalization of art education is a relevant topic for research. The proposed article aims to analyze the peculiarities of teaching art in the time of active use of digital technologies and the challenges and opportunities of this process in the future. The study demonstrates that modern art teaching is based on the use of various technologies that allow students to develop creative thinking, creativity, and practical skills. It has been established that modern digital technologies are used several times a week, as evidenced by the survey. These results confirm the findings of other scholars regarding the high level of integration of digital educational technologies in the process of teaching artistic disciplines [11], [7], [18]. In general, it is said that high efficiency in teaching is one of the prerequisites for the use of the latest technologies, which has also been written about by some researchers [21], [11]. The importance of visualization was particularly emphasized, as demonstrating the history of art development is hardly possible without this important aspect. Besides, digital technologies and their capabilities continue to evolve, so the study of this aspect should not be considered complete.

The results showed that innovative technologies were generally aimed at optimizing the educational process. Important tools included Adobe Photoshop, Procreate, and Krita, which allow creating digital works and experimenting with techniques and styles. Virtual reality technologies were also important, allowing students to develop creativity and practical skills and influence the formation of their own unique style. Augmented reality technologies, online educational platforms, and multimedia technologies (interactive presentations, videos, podcasts, etc.) were also relevant. Other studies have also noted the importance of using virtual and augmented reality and their current capabilities for visualizing cultural and artistic heritage objects [7], [14], [24].

This achieves an important educational aspect – an additional opportunity to get acquainted with the artifacts in detail, which qualitatively complements theoretical knowledge [38], [15], [4]. The respondents highly appreciated the importance of these technologies, which also confirms the results of empirical measurements by other researchers [2], [29]. At the same time, the respondents did not emphasize the importance of artificial intelligence in education, which is emphasized by modern scholars. This may have been due to the need for further development of such technologies, which are still less interactive in art education, or whose paid access makes it difficult for most students to access.

The findings identified that digital artistic platforms for creation or modeling allow the use of various digital tools to create new works or explore new styles, while multimedia resources allow teachers to use images, video, audio, or virtual exhibitions to teach theoretical material or showcase specific works [37], [3]. The respondents also noted the availability of quick feedback, which is an important advantage of studying art in the digital age, as students can quickly communicate with each other and with teachers. The communication factor is also noted by other researchers who also consider speed and efficiency to be important advantages for the organization of the educational process in general [4], [8]. It is important, however, that teachers respond to the needs of students in a timely manner; this negative element is also emphasized in the proposed results of the study.

The results showed that the most effective technologies for studying art were digital platforms that facilitate the creation of new works. The survey identified multimedia technologies, VR, and AR capabilities as slightly less effective. These results confirm the theses of other scholars about the high efficiency of digital platforms for content creation [5], [1], [34]. In fact, educational content, as cognitive and educational elements, will require serious attention in the further integration of digital technologies into art education [7], [26], [33].

The difficulties that arise on the way to the further use of digital technologies are also noted. First of all, such problems as timely access to technologies, lack of personal interaction between students and teachers, lack of improvement of practical skills, certain limitations in the use of creativity by the available software, and the

need to work on self-discipline were noted. The results confirm the findings of other researchers [36], [4], [25]. However, the researchers also emphasize other problems, including the active use of modern neural networks that perform certain tasks independently [17], [23]. Given the experience of the respondents, they may not have paid much attention to this point in their answers.

The proposed methodology used in this study has its limitations. In particular, the comparison methodology was based on current scientific literature, primarily written in English. This corresponds to the current state of research on digitalization in teaching art disciplines, as there has been an active use of innovative online platforms during the COVID-19 pandemic. However, this does not preclude the possibility that there were some relevant thoughts in earlier studies that need to be reflected upon. This issue may become a separate vector for future research. The Likert scale used in the study also has its own peculiarities. First of all, we are talking about the difference in scores between 2 and 3 points and 4 and 5 points. When answering, respondents were guided by their personal experience, which, on the one hand, demonstrates the multiplicity of experience, but at the same time, such experience is extremely subjective. What is acceptable for some respondents may be rated lower for others. In view of this, some of the results may be slightly adjusted, but still demonstrate a general trend in assessing the peculiarities of teaching art disciplines in the digital age.

5. Conclusions

Hence, teaching art in the digital age requires the involvement of various modern technologies: virtual and augmented reality, multimedia technologies, the use of digital resources, digital learning platforms, and social networks.

All of these technologies contribute to the development of creative thinking, creativity, and practical skills among students. The frequency of their use varies. Mostly it varies from several times a week to several times a month. Based on the data analysis, the overall level of art teaching with the use of digital technologies is high (mostly by 4 points on the Likert scale). The most effective technologies for teaching art are digital platforms that facilitate the creation of new works, multimedia technologies, VR and AR, and digital learning platforms. Thus, modern teaching of art disciplines relies on the capabilities of digital technologies that allow working on the development of creative thinking and creativity.

The study also identifies certain difficulties that arise on the way to further use of digital technologies. First and foremost, the study identified such problems as timely access to technology, lack of personal interaction between students and teachers, lack of practical skills, certain limitations in the use of creativity by existing software, and the need to work on self-discipline. All of these issues require further improvement of digital learning platforms and optimization of the material and technical support of educational institutions.

This topic is not completely exhausting, but given the limitations of this study, it opens up new promising directions. In particular, it is worth paying attention to the analysis of the role of virtual reality for the training of art specialists, since this study has shown that this instrument has a high potential for the development of practical and creative skills. In addition, an important further direction will be the analysis of the role of modern innovative technologies for the training of art specialists based on a more thorough study of modern scientific literature.

Declaration of competing interest

The authors declare that they have no known financial or non-financial competing interests in any material discussed in this paper.

Author contribution

The contribution to the paper is as follows: M. Kovalova, O. Spolska: study conception and design; O. Spolska, O. Chursn: data collection; M. Kovalova, O. Chursn, L. Arystova: analysis and interpretation of results; L. Oronovska: draft preparation. All authors approved the final version of the manuscript.

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Appendices

Appendix A
Data of the study participants

<i>Educational level</i>	<i>1 year</i>	<i>2 years</i>	<i>3+years</i>	<i>Total</i>	<i>%</i>
<i>Bachelor's degree</i>	15	12	6	34	44,16%
<i>Master's degree</i>	-	5	29	33	42,86%
<i>Postgraduate student</i>	-	-	10	10	12,98%
<i>Total</i>	15	17	45	77	100%

Source: Authors' development

Appendix B
Survey template

<i>Basic data</i>	1. What course are you studying? 2. What year have you been studying with digital technologies?
<i>Frequency of use</i>	3. How often do you study art with the help of these technologies?
<i>Main technologies</i>	4. What innovative tools do teachers use in their training?
<i>The role of technology</i>	5. How would you rate the overall level of digital art teaching (from 1 to 5) 6. What role do digital technologies play in the educational process (from 1 to 5)? 7. Which of the technologies used do you consider the most important and effective? a. Digital learning resources b. Digital learning platforms (Zoom, Google Meet) c. Interactive programs (e.g. Padlet, Miro) d. Social media e. Multimedia technologies - Other 8. Have you experienced any difficulties in learning with the help of digital technologies?

Source: Authors' development

Appendix C
Data for the interview

<i>Data</i>	<i>Description</i>
<i>Focus group</i>	15 students
<i>Conducting time</i>	Up to 10 minutes of conversation with each participant
<i>Basic questions</i>	1. How do you generally assess the interaction between teachers and students in a digitalized learning space? 2. What opportunities for teaching art based on digital technologies do you find most useful? 3. What are the difficulties in the process of digital learning?

Source: Authors' development