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**Information Technologies and Artificial Intelligence in the Training of Future Teachers
(Experience of the Department of Music Art at H.S. Skovoroda Kharkiv National Pedagogical
University)**

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Abstract

The relevance of this research is driven by the need to generalize the unique experience of Ukrainian educators in utilizing information technologies and artificial intelligence in the professional training of future teachers in artistic disciplines: music and the integrated course "Art".

The aim of this research is to outline and summarize the main technological solutions used by the faculty of the Department of Music Art in conducting choral classes, choral conducting, and teaching methodology of the integrated course "Art", among others.

The research methodology primarily involved the analysis and generalization of personal experience, observation during classes, surveys of students and colleagues, and more.

The results demonstrated the presence of a unique experience in Ukraine, and possibly beyond, in using information technologies in areas previously considered least adaptable for this purpose: working with choirs, teaching choral conducting and vocals, and even preparing and conducting the qualifying exam in choral conducting and preparation for event-art activities in a remote format.

The conclusions outline the prospects for further research, which will detail the pedagogical technologies developed by the faculty of the Department of Music Art at H.S. Skovoroda Kharkiv National Pedagogical University and compare them with similar international experiences.

Keywords: distance learning, information technologies, artificial intelligence, teachers of artistic disciplines.

The relevance of this study is driven by the need to synthesize the unique experience of Ukrainian educators in utilizing information technologies and artificial intelligence in the professional training of future instructors of artistic disciplines, including music teachers and teachers of the integrated "Art" course for general secondary education institutions, as well as music discipline instructors for higher education institutions.

At the turn of the millennium, global musical culture entered a new phase of development characterized not only by the increasing influence of new technologies on musical art but also, according to Ukrainian researcher L. Havrilova, by a conceptual transformation in the very nature and forms of music's existence (Havrilova, 2024). These profound changes, in turn, necessitate the modernization of arts education and the emergence and rapid development of new forms of public musical life – artistic musical events that facilitate communication between representatives of different cultural communities, sociocultural interaction, the exchange of creative, social, and spiritual experiences, and the creation of fundamentally new creative products (Yuryeva, 2023a). Consequently, it becomes essential to involve students – future musician-educators – in participating in event-art activities in a remote format, preparing them for the new realities and opportunities of the contemporary musical world (Krechko, 2021).

The study of issues related to remote music education, particularly choral training and education, has been reflected in various scientific fields and encompasses diverse aspects, including music education, educational technologies, psychology, sociology, and other related disciplines. These aspects include the development of strategies and approaches to teaching musical art in a remote format; the creation of distance technologies in music education; the exploration of psychological aspects of distance learning; the sociocultural perception of choral creativity, including virtual choirs; and the preparation of instructors and conductors for effective remote choral training.

The aim of this study is to outline and summarize the main technological solutions employed by the faculty of the Department of Musical Arts in courses such as choral class, choral conducting, methodology of teaching the integrated course "Art", and other disciplines involved in the training of future teachers.

The research methodology primarily involved the analysis and generalization of the faculty's own creative teaching experience, observations during classes, analysis of feedback from students participating in remote learning, discussions with colleagues about their experiences, and more.

The results demonstrated the existence of a unique experience in Ukraine, and possibly beyond, in the use of information technologies in areas traditionally considered least suited for such applications. These areas include choral work, teaching choral conducting and vocal performance, and even preparing and conducting the qualifying examination in choral conducting (Vasilyeva, 2023) and preparation for event-art activities in a remote format (Vasilyeva, 2024). Additionally, the study highlighted the use of artificial intelligence (Yuryeva, 2023b) in music-pedagogical activities and the professional training of future music educators.

The contemporary art world has undergone radical transformations, as evidenced by the emergence of new forms of music and musical activity. This transformation requires turning ordinary artistic events into genuine experiences that evoke special emotions and contribute to lasting impressions. These trends are also observed in choral art, where new forms such as choral assemblies, flash mobs, and multimedia shows have emerged. Today, attending a conventional music concert is becoming less appealing than participating in an art picnic, festival, or performance. Traditional concerts are evolving into show programs that combine several art genres (Krechko, 2021).

Thanks to the unique possibilities offered by technological art in the late 20th and early 21st centuries, we now witness choral performances and virtual choral concerts. In Ukraine, work in this direction addresses the challenge of continuing the creative activities of choral ensembles that are compelled to operate in a remote format during martial law. The development of this experience began with the quarantine restrictions and later evolved due to the martial law imposed as a result of Russia's full-scale invasion of Ukraine.

Creating virtual versions of choral works requires proficiency in remote choral work tools. Establishing a media environment for working with a choir under remote conditions is a key task in the modern educational process, particularly given the constraints of wartime, which limit the possibility of in-person meetings and offline classes. It is important to choose or create a media

platform that supports collaborative remote work. To facilitate the rapid exchange of information, we created a general choir group on Viber, which we use for urgent notifications, sharing sheet music, and MIDI scores necessary for lessons. All information needed for rehearsals is centralized on the interactive Padlet board, where choir members can access historical and news updates, a sheet music archive, MIDI scores, rehearsal schedules, announcements, choir recordings, and students' creative works (Vasilyeva, 2023).

Organizing online rehearsals is particularly important in preparing the choir for participation in remote festivals and competitions. For daily choral class sessions, we use the digital resource ZOOM. Video conferencing tools allow real-time rehearsals, enabling each participant to engage in vocal and rhythmic exercises. This also opens up the possibility of forming working groups using breakout room functionality. This feature allows us to work on choral parts, distribute students according to their skill level and progress with the musical material, and develop an individualized, student-centered approach for each singer. The instructor-organizer of the conference can change the group leaders during the online session and oversee the entire process by moving from one breakout room to another.

In discussing the preparation of a student vocal ensemble for participation in event-art activities, it is important to highlight the use of MIDI scores in the rehearsal process. MIDI scores are digital tools for preparing and performing musical compositions, including choral works. The ability to play notated material in MIDI format on various devices makes it simple and accessible for use. This allows choir members to study and practice the music anytime and anywhere. In addition to visualizing the choral score, the MIDI score provides audio support. It simulates the sound of the choir and can be used in both synchronous and asynchronous modes. Utilizing the MIDI score in synchronous mode during choir practice enables efficient time use, allowing all participants to better prepare for collective sessions and focus on the details of the work. Singing with a MIDI score is highly beneficial and engaging for students, giving them a sense of being part of the choir, albeit virtually, and significantly enhancing their performance skills.

An essential component of preparing a choir for participation in event-art activities is working in asynchronous mode, which involves remotely recording and combining audio into a

unified choral sound. According to L. Kachurynets, recordings of choir singers can be used both to correct the quality of choral part performances and as material for creating a virtual choir (Kachurynets, 2020). Choir members send MP3 audio files to individual teacher chats via Telegram, as this messenger allows for the storage of large files. We also use Telegram to collect and store video recordings of choral performances, creating a separate Telegram group for each project.

A key aspect of creating a virtual choir is working with audio editors such as Audacity, Adobe Audition, BandLab, and others. At this stage, the recorded voices undergo digital processing, including error correction, noise reduction, and consistent volume leveling. During audio mastering, the parts are synchronized into a single sound, and the use of mixers and special effects significantly enriches the sound of the virtual choir.

The final stage of preparing the choir for participation in remote artistic events is video editing. The creation of a high-quality video version of the virtual choir depends on developing a concept for the creative project. Based on this concept, a scenario for the plot's development needs to be drafted, considering the placement of singers in the frame, transitions between clips, text effects, overall background, and other visual elements. In our practice, we have employed various concepts to realize our creative ideas, such as video collage, song story, virtual journey, and music video style.

The virtual journey through the locations of Slobozhanshchyna was the most successful in reflecting the contemplations and emotional experiences of Hryhorii Skovoroda. In this project, the singers, along with the famous philosopher, traveled through picturesque corners of their native land, immersing themselves in the artist's world of thoughts (Department of Musical Art of KhNPU, 2023). When creating a music video-style rendition of B. Segin's choral work "Shchedryi vechir", we used a play of light and shadow to convey the mood of a cozy Christmas evening with friends (Vasilyeva, 2024, January 1).

Thus, the remote format of preparing a choir for participation in event-art activities online allows the choir to continue its creative endeavors despite the constraints of wartime and requires an adaptation of rehearsal methods. The use of digital tools and software enables the effective organization of the rehearsal process, facilitates the exchange of materials and communication in the

media environment, ensures an individualized approach to each student, and promotes the development of self-organization and collaboration skills, which can be key to success in their future professional activities.

The ability to utilize digital technologies in creative musical and music-pedagogical activities finds ample space for application and enhancement in the process of mastering the integrated course "Art" and its teaching methodology. Various digital resources are employed at different stages of lessons, providing students with opportunities to learn how to use, for example, the Mentimeter instant polling service to activate prior knowledge at the beginning of a lesson (Fig.1) and to summarize at the end (Fig. 2), as well as for feedback after completing the course (Figures 3, 4).



Fig.1. Activation of prior knowledge using the Mentimeter service

З чим Ви ідете з сьогоднішнього заняття?

65 responses

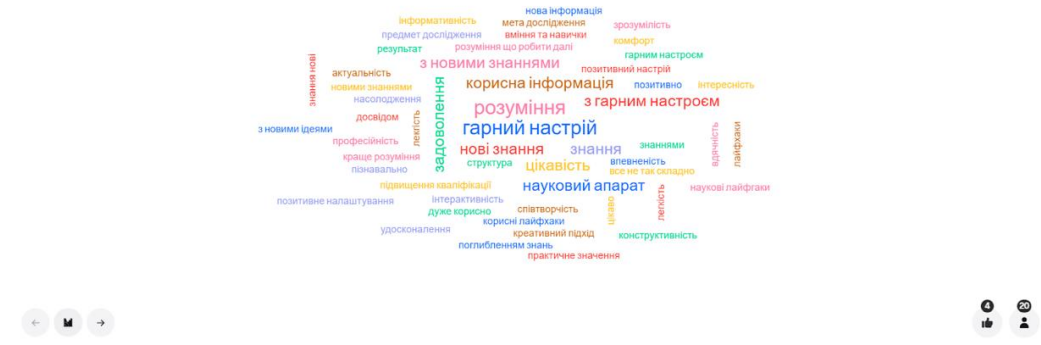


Fig. 2. Summarizing the lesson using the Mentimeter service

Join at menti.com | use code 5257 9335

Що в цій навчальній дисципліні виявилось для вас найбільш корисним?



Fig. 3. Feedback after completing the course

ОЦІНІТЬ СТУПІНЬ ВАШОЇ ЗГОДИ З КОЖНИМ ТВЕРДЖЕННЯМ

Оцініть ступінь вашої згоди з кожним твердженням

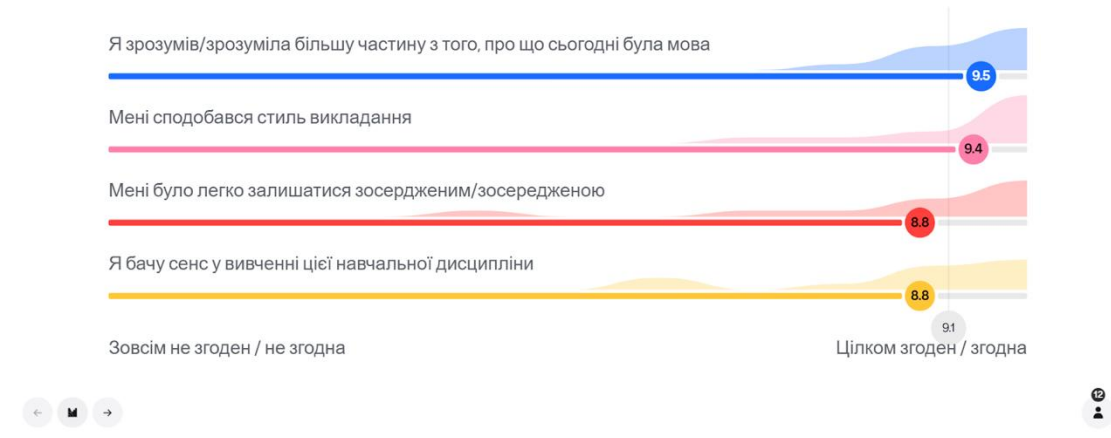


Fig. 4. Feedback after completing the course

Feedback after completing the course is also obtained using the virtual interactive whiteboard Jamboard (Fig. 5).

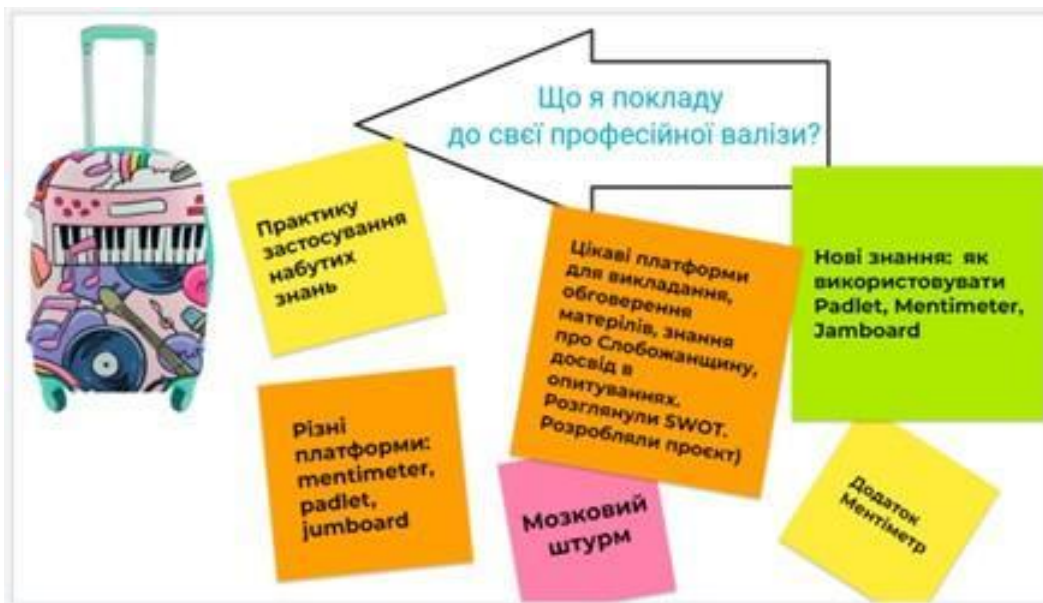


Fig. 5. Reflection after completing the course using the virtual interactive whiteboard Jamboard

To diversify the forms and methods of work and to familiarize students with gamification possibilities, we use the Wordwall services (Fig. 6) and the Genially Education platform.

0:10

Ритм	<input type="text"/>	автор творів музичного мистецтва, наповнених змістом та емоціями.
Ноти	<input type="text"/>	мистецтво організації музичних звуків, насамперед у часовій, звуковисотній та тембровій шкалі.
Співак	<input type="text"/>	графічний знак, що розташовується на нотному стані та вказує висоту та відносну тривалість якого-небудь звуку.
Музика	<input type="text"/>	система п'яти паралельних горизонтальних ліній для записування нот.
Темп	<input type="text"/>	людина, яка займається музикою професійно.
Нотний стан або нотоносець	<input type="text"/>	людина, що займається співом.
Мелодія	<input type="text"/>	людина, яка керує підготовкою твору до виконання та керує виконанням твору оркестром, хором, ансамблем, зокрема оперної чи балетної трупи і т. д.
Диригент	<input type="text"/>	чергування і співвідношення сильних і слабких долей та акцентів
Музикант	<input type="text"/>	один з основних елементів музики; одноголосно виражена музична думка
Композитор	<input type="text"/>	міра швидкості в музиці.

Здати відповіді

Fig. 6. Interactive exercise on the topic of musical art created using the Wordwall service

Additionally, in the final stage of professional training for future musician-teachers, when they are mastering the methodology of teaching the integrated course "Art", we have actively utilized AI-based tools in recent years.

Undoubtedly, the work of both instructors and future musician-teachers with AI is grounded in a thorough study of ethical principles and the rules for its responsible use. AI becomes a valuable assistant in generating new ideas for themes and structures of integrated lessons, selecting numerous artistic examples, and determining how to use them. We also extensively use AI-generated images to diversify visual content for future school lessons.

Here are some examples of how AI capabilities are used.

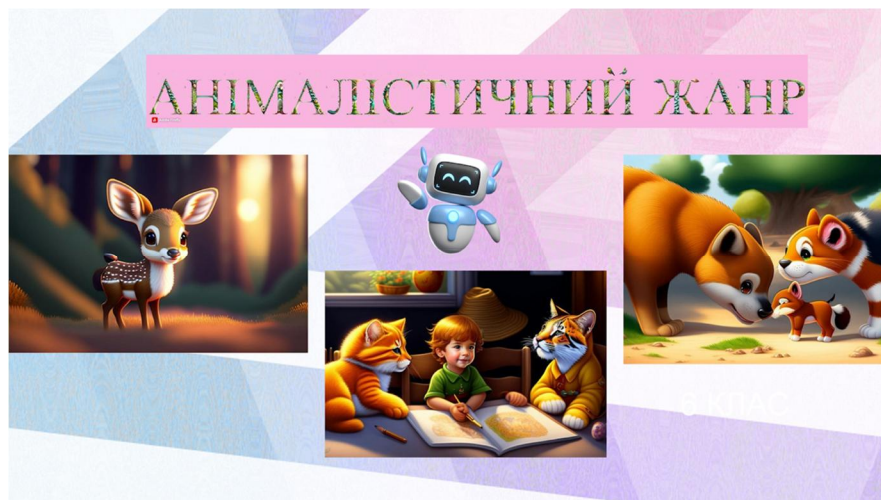


Fig. 7. Example of visualizing a lesson topic in the integrated course "Art"



Fig. 8. Example of visualizing a lesson topic in musical art



Fig. 9. Examples of AI-generated visuals for creating the emotional tone of a lesson

Conclusions. The synthesis and analysis of the experience accumulated by the faculty of the Department of Musical Art demonstrate the creative use of various digital resources and AI capabilities in the professional training of future musician-teachers for schools and higher education institutions in a remote format. They also highlight the development and testing of original approaches and methods for using widely known services and resources. **Prospects for further research** are related to a detailed methodological analysis of the pedagogical technologies developed by the faculty of the Department of Musical Art at H.S. Skovoroda Kharkiv National Pedagogical University and their comparison with similar international experiences.

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