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SUMMARY. Recording technologies and information and communication technologies, like the modern world, are transforming in line with the challenges. The changes introduced relate not only to clearly defined technological areas but are also aimed at the aesthetic component of business education and art education in general. Ukrainian choral art has rich traditions that arose under the influence of folk music, whose roots go back to the period of paganism (VI-X centuries), as well as Orthodox singing, which was borrowed from Byzantium after the adoption of Christianity in the tenth century. Advancements in information technology have greatly impacted the creation and distribution of sound recordings, while also fostering a deeper exploration of educational techniques. This study focuses on contemporary conducting and choral art. The main goal of the work is to analyze new perspectives and find out how information and communication technologies have influenced the formation and evolution of conducting and choral activities in Ukraine. As part of the methodological approach to the study, a comparative and structural analysis was applied, including the processing of statistical data on choral performances on the YouTube platform, as well as an analysis of the use of modern technologies in Ukrainian music institutions based on open sources. The results of the study show that videos of performances by professional Ukrainian choirs posted

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on YouTube receive millions of views, while student and children's groups receive hundreds of thousands. Although these developments offer significant advantages for discussing modern communication methods in choral music, they remain less popular than mainstream pop music, despite their potential to reach a much wider audience. Despite the active development of distance learning, its impact on choral art remains insignificant. Studies have shown that modern information and communication technologies cannot fully ensure the coordinated interaction of a choral ensemble due to the delay in digital signal transmission in the network. For this reason, conventional approaches like in-person rehearsals and live performances continue to be essential for achieving high-quality choral renditions.

Keywords: Vocal and Choral Culture of Ukraine; National Choral Art; Artistic Space; Chorus; Performance; Contemporary Conducting and Choral Education

Introduction

Opening up new horizons for musicians and creative teams to create and innovatively disseminate digital cultural technologies, sound, and access to materials on the Internet – all over the world – is something we already have. This also includes digitization of cultural heritage, digital recording, sound processing, access to materials via the Internet, and obtaining information from around the world.

The integration of digital technologies is significantly reshaping the landscape of art education, especially by fostering the growth of online learning and enhancing traditional classroom practices through technology. In this context, how has Ukrainian choral art evolved with the advent of modern digital tools, and what impact has this had on its growth? This question serves as the foundation for our study.

The purpose of this paper is to analyze the results of Ukrainian choral conducting in the context of the expansion of ICT. The solution to this issue is fully focused on the need to consider online representations of professional and university choirs, to identify new opportunities that open up in connection with the development of ICT for choral conductors, and to analyze the methods of modern distribution of choral works.

Literature review

The study of choral performance covers three main aspects: the basics of organizing a choral show, studying choral repertoire, and mastering modern opportunities associated with the development of digital technologies.

As a rule, Ukrainian researchers who have focused on the basics of conducting have aimed to cultivate block control of the choir. For this purpose, they set certain criteria for the quality of choral singing: intonation, timbre, rhythmic and tracking ensemble. There is also the question of the unidirectionality of the choir's repertoire and the formation of control over the moving dynamics.

Among contemporary research on choral performance methodology, the studies of Kovalenko and Johnson stand out. Their significance stems from their efforts to examine the specifics of teaching choral art within Ukraine's credit-modular system. Kovalenko describes a module as "a documented, self-contained component of an educational and professional program, implemented through specific forms of the learning process". Furthermore, she identifies "theoretical classes" and independent study as distinct structural components of education, also referring to them as "modules" (Kovalenko).

Georgaki proposes an alternative approach to the analysis of conducting education, focusing on the division of the educational process into separate modules. In particular, he identifies such thematic blocks as "Fundamentals of Conducting Technique", "Typical Beat Schemes", "Working with Choral Scores", as well as specialized modules dedicated to the analysis of musical works written in different metrical structures (for example, in three- and seven-beat sizes) and complex polyphonic forms.

Some studies focus on the introduction of modern technologies into music education. For example, Vasylevska-Skypa and Kravtsova consider the use of Internet resources to search for quality examples of vocal and conducting art, as well as the use of digital tools to monitor the pedagogical process.

In recent years, scholars specializing in choral repertoire within the field of musicology have increasingly turned their attention to the rediscovered and restored choral works of Ukrainian composers from the 17th and 18th centuries. A significant portion of these compositions carry religious themes, which led to their prohibition during the Soviet period due to the state's officially hostile stance toward church music and religious expression.

Among the key contemporary studies in this area is Gorgoretti's monograph, which explores the works of Artemii Vedel. Additionally, the collective publication "Partes creativity in Ukraine of the 17th-18th centuries"⁶ offers valuable bibliographic and musicological insights, focusing on manuscripts from the Kyiv Collection of Partes Songs.

⁶ Partes creativity in Ukraine of the 17th–18th centuries (according to the catalogue by N. O. Herasymova-Persydska). Eds: L. H. Rudenko, E. S. Klymenko; General Editors: L. V. Ivchenko, O. P. Stepchenko. Kyiv: NBUV, 2023. http://www.irbia.phuv.gov/ue/E_LIP/DE/cr_0004810.pdf

http://www.irbis-nbuv.gov.ua/E_LIB/PDF/er-0004810.pdf.

This is important research, as it contributes to the opening of new pages in the Ukrainian choir and new opportunities in international choral singing, given that a large number of choirs are involved with Ukrainian music (Gorgoretti; Kokareva).

The rapid spread of the latest technologies, services, and online resources has led to the emergence of a new stage in the evolution of the information environment, which is now defined as the "intellectual society." This term gained particular popularity after the G20 Seoul Summit, which identified key vectors for the development of smart technologies in leading economically developed countries such as Germany, South Korea, the Netherlands, etc.

The advancement of digital technologies and communication tools has profoundly transformed artistic discourse. Modern means of communication significantly accelerate the international cooperation of artists and allows us to get acquainted with the cultural heritage of even the most remote countries (Talsik).

As Kovalenko notes, Ukrainian music culture is still little known to the international community. Quite a few studies have been devoted to music education in the digital age. Johnson was the first to emphasize the need for changes in pedagogical approaches in connection with distance learning. Gorgoretti came to similar conclusions, analyzing the role of technology in music education on the example of the University of Northern Cyprus.

Román Álvarez highlights the tools available in the context of music pedagogy, analyzing their quality, stability and level of unlimited use.

A study conducted by Silveira and Gavin aimed to analyze the process of self-evaluation of music school students who listened to recordings of their performances after a concert.

Yefimenko et al. approached the problem from the perspective of the professional competence of information technology teachers, who recognize the need to integrate modern technologies to attract students' interest in art and develop critical thinking.

Methods

The impact of globalization has had a significant impact on the development of socio-cultural ideas, including culture and art, as well as music. In this regard, it is important to conduct a comparative structural analysis of how the principles of digitalization efficiency are determined in modern industrial society in general and in music in particular (Petty, Henry).

For this purpose, statistics from open sources were collected and analyzed, reflecting the level of engagement of the selected audience. These approaches are especially important in connection with a certain intensification of social platforms, in particular YouTube, which rock musicians use to promote their work, as noted by Cheng et al., Cayari.

They analyze not only the number of subscribers, but also, in particular, the views of video content and the total number of videos published on the platform. This makes it possible to assess the level of activity of the creative team in the digital environment and determine public interest in various formats of choral art. The final indicator of views allows us to compare the effectiveness of online content with traditional concert performances, where the number of spectators is limited by the capacity of the halls (Cheng et al.; Cayari).

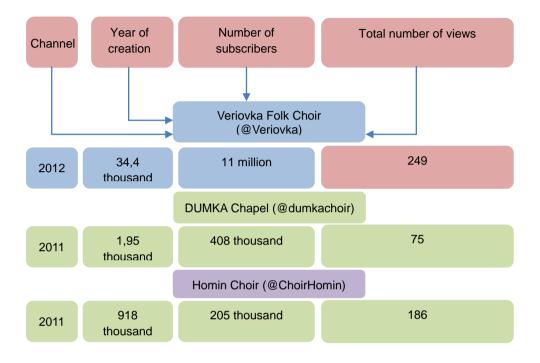
Let us consider separately the remote technologies that have influenced the development of choral art, as during the 2020 quarantine restrictions in many countries, including Ukraine, any gatherings, including rehearsals and concerts, were banned. To analyze this impact, we will examine videos of choral performances posted on the YouTube platform during the period of severe restrictions.

Results

The research highlights that modern approaches to content distribution, particularly through online platforms, play a crucial role in both advertising campaigns and the promotion of choirs as artistic ensembles (Moss et al.).

Analyzing YouTube statistics, the Verevka Folk Choir stands out as one of Ukraine's most recognized choral groups, amassing over 11 million views. This ensemble showcases Ukrainian folk music in classical arrangements, incorporating solo performances in a distinctive folkloric manner (Thorgersen, Mars). Additional accomplishments of other choral groups are illustrated in (Figure 1).

Figure 1



The popularity of YouTube channels of Ukrainian choirs Source: Compiled by the authors as of 1 October 2024

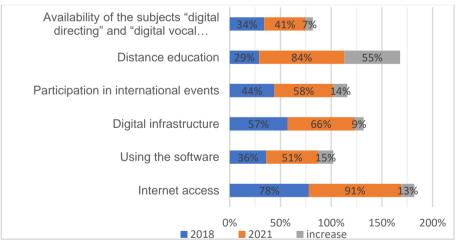
In addition to professional musical ensembles, educational choirs are also actively establishing their own YouTube channels. Table 1 presents performances by choirs from various academic institutions. Notably, the leading position among them belongs to a choir specializing in Ukrainian folk songs, performed in a classical style while incorporating elements of national music (Zubai).

Table 1

Channel	Year of creation	Number of subscribers	Total number of views	Number of videos
Stanislav Pavlyuchenko Ukrainian Folk Choir of the Kyiv National University of Culture and Arts (@pavluchenko23)	2021	970	115 thousand	37
Pochajna Choir (@OfficialChannel of the Pochajna Choir)	2020	556	54 thousand	243
Choir of Nizhyn College named after M. Zankovetska (@academ_choir)	2009	131	54 thousand	82

The popularity of YouTube channels of Ukrainian student choirs Source: Compiled by the authors as of October 1, 2024

Digital technologies are being introduced into school education not only for the work of artistic groups online, but also for other forms of activity. According to Velychko-Semennyk et al., in Ukraine, from 2018 to 2021, there was a widespread use of digital technologies in the country's artistic universities in the following areas (Figure 2).



Level of digital infrastructure in music institutions and facilities, %* Source: compiled according to the data of the Ministry of Digital Transformation of Ukraine

Figure 2

A particularly notable increase is evident in the field of distance education, with 84% of artistic institutions implementing some form of remote learning. However, this shift has posed significant difficulties for choral performance, given its inherently collective nature and the high level of coordination it requires.

According to Bermes and Polyuga, digital data transmission delays correspond approximately to the duration of an eighth note in Allegro tempo. This results in a substantial rhythmic discrepancy within the ensemble, affecting the overall synchronization of performers. As in other cases, with sudden delays, even if there is less than one beat, it is difficult to leave one beat unnoticed because the musical fragment is very long. However, their decisions can compromise the diction of the ensemble, which requires more courtesy and accuracy (Choi, Lee).

An analysis of video recordings of Ukrainian choirs from 2020 reveals the emergence of a novel genre – remote choral performance. This approach, previously examined by Walton, has garnered widespread recognition and has been actively adopted by choir directors, especially within educational institutions.

Based on this analysis, the main stages of video project implementation were identified:

- the process of selecting parts and their transformation.
- preparation by the conductor of methodological recommendations for the interpretation of the selected work.
- recording a video of the conductor directing the performance of the work.
- individual study of the scores by each performer, taking into account the methodological recommendations and video recording of the conducting.
- video recording of the performance by the performers (Dingle et al.).

In 2020, the trend of virtual choral performances gained traction in Ukraine. This phenomenon is evidenced by research conducted by educators from various institutions, such as Kyiv National University of Culture (Hamalo, Krechko), Khmelnytskyi Humanities and Pedagogical Academy (Khmelnytskyi Humanitarian and Pedagogical Academy), and Kryvyi Rih Music College (Kryvyi Rih Regional Professional Music College).

A notable instance of this practice was the remote recording and subsequent publication of the ANIMA academic choir's rendition of M. Skoryk's piece "Melody", which took place in April 2020.

The video on YouTube received more than 1500 views (Fahey et al.). Although this number exceeds the number of views of many traditional choral

concerts, after the quarantine restrictions were lifted, the popularity of online performances declined, and choirs returned to their usual rehearsals and live concerts (Adams).

Discussion

A comparison of the popularity of Ukrainian choirs and pop singers shows that choral art remains less popular compared to contemporary pop culture trends (Cardoso et al.).

The official YouTube channel of the Ukrainian pop group Okean Elzy (@okeanelzyofficial) has accumulated over 730 million views, while Dzidzio's channel (@dzidzio) has reached 665 million, and Alyona Alyona's (@alyonaalyona) has garnered 250 million views. Such statistics prompt a discussion about the place of choral music within contemporary cultural trends – whether it remains a mainstream phenomenon or is gradually shifting towards a more specialized, elite niche (Jansson et al.; Kravtsova). Similar observations arise when analyzing the performance metrics of symphony orchestras, whose content on YouTube generally attracts less attention compared to choral ensembles. Additionally, assessing how the Russian Federation's aggression since 2022 has influenced the evolution of choral art in Ukraine requires dedicated research (Lewis; Kushnir et al.).

Conclusion

With the advancement of recording technologies and online communication, choirs now have significantly expanded creative opportunities. In addition to traditional live performances, they can produce audio and video recordings, which are easily shared via the Internet. This enables them to engage a vast audience – potentially reaching millions – comparable to the scale of multiple concerts held in large venues with thousands of spectators.

The events of 2020, marked by the COVID-19 pandemic and restrictions on mass gatherings, including concerts, highlighted the role of modern technology in adapting choral art to new conditions. Remote video recording became a crucial tool, allowing choirs to continue their activities despite limitations. However, after the restrictions were lifted in 2021–2022, it became clear that the usual practice of recording live performances would remain important for choirs, and that remote recording technologies were inferior to traditional performance methods.

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