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Innovative Technologies in Vocal Training: Technological Culture Formation of Future Musical Art Teachers

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Abstract

Under the conditions of present-day modernization of education, the urgency of dealing with educational issues and challenges in terms of the coronavirus pandemic, the teacher's technological culture enhancement who is capable to effectively apply innovative technologies in the educational process has acquired particular significance. Therefore, special attention is paid today to the formation of future music teachers' technological culture by means of applying innovative technologies in vocal training at the institution of higher artistic and artistic-pedagogical education. The technological culture of the teacher is considered as a professional and personal phenomenon based on value-and-technology worldview and way of thinking, skills in the application of technological knowledge, those formed and implemented in creative artistic and pedagogical activities as well as the ability to creatively use pedagogical tools. Students have to master a wide range of technologies for teaching singing and then use them in their practical activities as music teachers, namely: technologies aimed at mastering performing and methodological foundations of singing for future teachers; information and computer technologies, including remote ones, aimed at teaching the art of singing in remote access and mastering the basics of sound amplification equipment by both future performers and music teachers; technologies that have a music therapy and healthcare effect. The methodological basis for technological culture formation of future music teachers in the process of vocal training features such scientific approaches as: culturological, technological, competence approach along with creative one. In order to effectively form the technological culture of future musical art teachers, the following elements have been determined: the structure of this phenomenon, which includes axiological-culturological, epistemological-emotional, technological and activity approaches as well as creative-professional one; their level of formation is determined by the identified criteria, in particular: value-axiological, cognitive-emotional, vocal-operational and creative-professional.

Keywords: Methods, pedagogical technology, technological culture of the teacher, technology in vocal training, musical art teacher.

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Introduction

One of the most important tasks of modern educational policy on a global scale is to improve the quality of art education with the use of innovative learning technologies. The solution to such a problem becomes especially important in the context of the coronavirus pandemic, as the educational functions of the teacher ought to be carried out with the active use of advanced educational and artistic technologies, including remote ones. The increased requirements for the level and quality of education encourage scholars to find new ways of teaching enhancement (Iryhina, Sbruieva, Chystiakova, & Chernyakova, 2020, p. 51). In this context, the issue of increasing the level of technological culture of future music teachers in the process of vocal training is of particular importance, which, in its turn, involves mastering innovative vocal and pedagogical technologies, singing technologies in the context of world vocal and pedagogical experience by students in higher music and music-pedagogical education.

In Ukraine, the formation of a technological culture of future music teachers is based on the provisions of the Law of Ukraine "On Education" (2017), the Law of Ukraine "On Higher Education" (2014), the Concept of the new Ukrainian school (2016) and other regulations. Mastering the basics of technological culture by future music teachers increases their own vocal-performing and vocal-pedagogical level, which affects the effectiveness of children's musical training in both typical conditions as well as quarantine ones; activation of students' interest in vocal music-making; increasing the level of formation of children's vocal knowledge and skills; formation of their value attitude to vocal art in general.

Literature Review

In modern scientific works, researchers pay much attention to the identification of various aspects of culture, including the properties of a certain culture to have dialogical connections with other cultures, as it is presented in the works of M. Bakhtin (1979), the properties of culture to be the context of various arts, namely, musical - which is revealed in the monograph by O. Samoilenko (2002), etc. Such culturological principles are the basis for the study of the teacher’s culture phenomenon by present-day Ukrainian scholars, which, according to the expedient definition by I. Zyazyun, is significantly influenced by education, and has a high educational potential (2008, p. 88). Scientists consider technological culture an important indicator of the professional culture of a teacher, and it is thoroughly dwelt upon in the study of O. Piekhota, which, according to the researcher, characterizes their creative professional activity: a set of technological knowledge and skills that perfectly provide it and involves appropriate skills in applying pedagogical technologies (2010, p. 8). Moreover, scientists outline various effective technologies of teacher training, which are: pedagogical technologies based on activation, intensification, effective learning management (Selevko, 2005), integrative technologies of adult learning (Sysoyeva, 2011), pedagogical technologies in formation of professional and personal qualities of a specialist (Yerastova-Mykhalus, 2016).

Current tendencies in artistic and pedagogical thought of today intensively present scientific knowledge concerning the effective formation of teacher culture as the one based on the mastery of innovative learning technologies, such as: artistic and pedagogical technologies for training students in the system of art education (Padalka, 2010); musical and pedagogical technologies of musical culture formation of the future teacher (Cherkasov, 2014).

Naturally, scientists consider singing teaching technologies to be an effective means of professional development of a future music teacher, which include: singing teaching technology in a language mode (Riggs, 2000), teaching technology in different singing styles (Sadolin, 2000), singing teaching technology using a voice training algorithm (Ogorodnov, 1981), technology of students’ cross-style vocal training (Semina & Semina, 2015), technology of vocal-methodical training of students (Vasylenko, 2003), computer technologies of distance vocal training (Ovcharenko, 2020), technology

of voice development on the basis of phonopedic exercises (Yemelyanov, 2010), technology of rehabilitation and restoration of speech and singing voice (Pustynnikova, 2005) and others.

However, despite the significant interest of the scientific community into the problems of forming various components of the professional culture of future music teachers, the issue of forming a technological culture of future music teachers by means of innovative technologies in vocal training has not been the subject of comprehensive research so far.

The objective of the study is to theoretically substantiate the formation of a technological culture of future music teachers by means of innovative technologies in vocal training.

Discussion

To solve the problem of forming a technological culture of future music teachers by means of innovative technologies of vocal learning, there is a need to understand what is "culture" and "pedagogical technology".

Nowadays, according to many musical and pedagogical researches, culture is considered as a characteristic of the way of human existence, the form by which everything social acquires the meaning of human self-determination (Shcholokova et al., 2004). The concept of "pedagogical technology" in scientific works is studied in a discursive context contrasting "methodology". Thus, modern scientists (Goncharenko, 1997; Piekhota, 1997; Selevko, 2005 et el.) distinguish the categories of "technology" and "methodology" and determine their distinctive features: pedagogical technology manages to replicate and transfer the study of various disciplines with a guarantee of high quality performance of tasks; teaching methods are much narrower, able to operate only within a particular subject or several disciplines. The scientists believe that the methods can be brought up to the level of technology, as an example: modern methods of assessing knowledge meet the requirements of objectivity, reliability, validity, which gives reason to call it pedagogical technology. According to S. Sysoyeva, pedagogical technology is a complex integrative system that covers operations and actions providing the pedagogical whole of the definition, content, information-subject and procedural aspects aimed at mastering the systematic knowledge by the learners, and are provided by the learning purposes (2011, p. 148).

In fact, today there are varieties of pedagogical technologies taking into account the subject area of education. Thus, in the field of music pedagogy, there is a complex concept of "vocal-pedagogical technology", which includes features of both pedagogical and vocal technologies. Nowadays, the importance of vocal-pedagogical technology has increased due to the modernization of the content of art education. We consider vocal-pedagogical technology as an integrative synergetic system that covers the content and procedural-operational components which ensure the achievement of the goal and result of vocal training, development, education of learners (students, students of advanced training courses, etc.).

Evidently, some scientists understand the teacher’s technological culture as the degree of development of personal traits of the teacher (Rubtsova, 2009, p. 37), the formation of technological worldview, thinking, skills in applying knowledge, skills formed in creative pedagogical activities and as the ability to use pedagogical tools - a set of pedagogical activities, covering the following technologies: information and orientation, communication and evaluation (Aniskin, 2003, p. 145). Whereas we consider the technological culture of the teacher as a professional and personal phenomenon, which is based on their value-and-technology worldview and way of thinking, skills in the application of technological knowledge, those that are formed and implemented in creative artistic and pedagogical activities, the ability to creatively use pedagogical tools.

In the process of analyzing the activity functions of music teachers (awareness of the value of technological activities, mastering of innovative educational and artistic technologies, their use in

practice, creative modeling of elements of different technologies, creating their own), we determined the structure of technological culture of future music teachers: axiological-culturological, epistemological-emotional, technology and activity component and creative-professional one. Each component, in its turn, comprises motivational, professional, personal characteristics of the phenomenon under study.

The axiological-culturological component of the structure of the future musical art teacher's technological culture characterizes: the ability to realize the ideological world-viewing value of the technological culture formation; the presence of professional interest in mastering the values of music teacher's technological culture; ability to self-actualization in mastering the values of technological culture in the process of vocal training.

The epistemological-emotional component of the structure of the future musical art teacher's technological culture characterizes: the presence of cognitive interest, needs and emotional focus on the knowledge of vocal-performing and vocal-pedagogical technologies; knowledge of basic vocal-technological concepts as well as traditional and innovative vocal-performing and vocal-pedagogical technologies in different manners of singing; ability to cognitive and emotional growth in the process of mastering the technologies of vocal training.

Technology and activity component of the structure of the future musical art teacher's technological culture characterizes: the presence of motivation, the goal to master the technological activities of the teacher in the practice of vocal training; ability to master and apply optimally effective vocal-performing and vocal-pedagogical technologies in the educational process; ability to personal and activity mobility in perception and use of technologies in vocal training.

The creative and professional component of the structure of the future musical art teacher's technological culture characterizes: the presence of interest and need for professional creativity; skill to integrate elements of traditional technologies, to create new technologies of vocal training.

Hence, these components of the structure of technological culture are based on the whole sum of knowledge, skills, and abilities in which level of formation is determined by the criteria identified by us as: value-axiological, cognitive-emotional, vocal-operational and creative-professional. Thus, the value-cultural criterion provides an opportunity to identify the awareness degree of the ideological world-viewing value of the formation of technological culture; the level of formation of professional interest in mastering the values of technological culture of a music teacher; degree of self-actualization in mastering the values of technological culture in the process of vocal training; cognitive-emotional criterion makes it possible to identify the level of cognitive interest formation, needs and emotional focus on the knowledge of vocal-performing and vocal-pedagogical technologies; level of knowledge of basic vocal-technological concepts as well as traditional and innovative vocal-performing and vocal-pedagogical technologies in different manners of singing; degree of cognitive and emotional growth in the process of mastering the technologies in vocal training; technology and activity criterion allows us to find out the degree of motivation formation to master the technological activity of the teacher in the practice of vocal training; the level of skills to master and apply optimally effective vocal-performing and vocal-pedagogical technologies in the educational process; the degree of formed ability to personal and activity mobility in the perception and use of vocal learning technologies; creative and professional criterion makes it possible to identify the level of interest and need for professional creativity; degree of skills formation to integrate elements of traditional technologies, to create new technologies of vocal training; the degree of the formed ability to creative activity and positive attitude to technological activities and focus on vocal and pedagogical self-education. The identified criteria and their indicators make it possible to determine the formation level of the components in the structure of future music teachers' technological culture as: low, medium, high.

The low level of future music teachers' technological culture is characterized by the initial degree of motivation to master technological activities, technological knowledge, skills, and abilities; the medium - insufficient degree of formation of some technological knowledge, skills, and abilities with students; the high level – the formation of technological knowledge, skills and abilities of future music teachers as well as creative approach and skill in the application of vocal training technologies.

The formation of future music teachers' technological culture in the process of vocal training is provided by the following scientific approaches' implementation: culturological, technological, competence and creative approaches. Consequently, we identified culturological and technological approaches to be the key conceptual ones in technological culture formation of future musical art teachers, along with the ideas and principles implemented in individual practical classes on "Vocal Class" and lectures on "Methods of Voice Production" in the fourth year of Bachelor Degree studies to prepare them for pedagogical practice and further activities in the institutions of general secondary education. To ensure the quality of students' technological education in the process of vocal training, the content of these disciplines was enriched through the selection, classification and implementation of educational technologies in the teaching of singing. Analyzing the current technologies of future specialists in vocal training, we classified the following technologies as follows:

- technologies aimed at mastering the performing and methodical basics of singing by future teachers;

- information and computer technologies, in particular remote ones, aimed at teaching the art of singing, mastering the basics of sound amplification equipment by future performers and music teachers;

- technologies that have a healthcare effect.

Admittedly, in the process of vocal education, future music teachers have mastered the technology of teaching performing and methodical basics of singing, which is related to their professional activities at school. Moreover, students get acquainted with effective technologies, which are revealed in the works of modern foreign and Ukrainian scientists and are the first group in the structure of classified technologies. Such technologies include the technology of working with students by L. Vasylenko, which includes four stages of implementation. The first stage is professional-oriented, carried out within the framework of individual classes on "Voice Production"; at this stage, students are acquainted with the laws of the singing process and the initial foundations are laid for understanding the essence of the methodological aspect of vocal training (the methods are used to understand the techniques of voice production). The second stage is information analysing, covering lecture and seminar forms of future music teachers' training, in which the course "Methods of schoolchildren's vocal training" developed on a comprehensive basis and is implemented; the third stage - executive and organizational, involves the development of students' ability to compose educational vocal programs, concert programs, increasing attention to honing their own vocal skills and the development of psychological stability in the performance of vocal pieces in public; the fourth stage – methodical and generalizing, is carried out in the conditions of pedagogical practice on the final courses of students' professional training and provides activity according to the scheme: from realization of the generalized model of professional activity of the future music teacher through creating projects of students' own methodical actions up to mastering the methods of using and analyzing the necessary methods and techniques in vocal training (Vasilenko, 2003, p.19). We believe that L. Vasylenko's technology combines forms, methods, and means of students' vocal-methodical activity and prepares future musical art teachers for vocal activities with secondary school students.

The next technology mastered by future music teachers, important for vocal work with secondary school students, is D. Ogorodnov's (1981) advanced technology, which embodies many years of experience working with children in secondary school and created a universal technology for

children's voice development. In general, the essence of technology is revealed in several fundamental provisions, such as: it is necessary to develop the voice from obscure natural tones; the volume of the voice range to be worked on at the beginning should not be greater than an octave, so that there is no tension; it is necessary to work gradually without forcing; sing in a moderate sound; special attention should be paid to sound quality and freedom when singing; of great importance is the work on the equality of the volume. An important condition for the formation of vocal skills is the choice of a vowel for the initial work on the voice. According to D. Ogorodnov's well-founded opinion, the vowel /u/ is the most convenient for the beginning of vocal work. Further, the author proposes to gradually include other phonemes in different combinations. To develop the child's vocal abilities, a combination of two components is needed: intonation-mode and phonetic, which are connected with the stages of technology implementation: work on musical hearing (mode and rhythmic sense) in the process of singing notes; artistic timing, which helps children feel the rhythm better, meter and shape of piece; work on the algorithm of voice production, due to which optimal singing breathing is achieved, the ability of sound production freely, the ability of good and free articulation (Ogorodnov, 1981, p. 97). D. Ogorodnov's technology promotes algorithmic, gradual, careful training of children's voice, gradual detection and enrichment of voice timbre, development of general and vocal abilities of children.

Obviously, of particular interest to students were the technologies of vocal training by American vocal teachers Seth Riggs and Catherine Sadolin. The students mastered the technological experience of vocal teacher Seth Riggs, who became extremely popular due to his own technology of teaching singing. The author of the technology has successfully tested it on the voices of many world pop vocal stars and has prepared many singing teachers for vocal and pedagogical activities who, in their turn, promote the vocal basics of Seth Riggs and teach singing not only individually but also in groups. The teacher pays considerable attention to the emancipation of the voice and the education of self-confidence. Central to Seth Riggs' authorial technology is singing in a linguistic position. Seth Riggs notes that the main thing is how balanced the voice sounds, and exercises for the development of vocal technique should be included only when the singer can clearly sing each note in a speech position at a moderate pace (2000, p. 80). It should be noted that the technology of singing in the language position of Seth Riggs is effective in vocal training, provided that the author's vocal principles are strictly adhered to and purposefully managed by the vocal teacher.

Catherine Sadolin's vocal technology, which has four stages of implementation, was important for the release of the singing voice and the teaching the basics of singing to future music teachers. At the first stage – the singer should learn the three general principles; respiratory resistance of sound (with the awareness of the role of the diaphragm and muscles involved in breathing), opening of the epiglottis and laryngeal part of the pharynx to make the sound resonant and get a brighter color, prevent protrusion of the jaw and clamp the labial muscles. In the second stage – it is necessary to master four vocal modes of singing: 1) Neutral training mode from very quiet (pp) to medium volume (mf), which is characterized by sound without "metal" (if necessary, with a pre-attack for pop singers); 2) semi-metallic (Curbing) singing mode, which is characterized by a soft plaintive and restrained metallic sound. Used in academic as well as pop and folk singing at medium volume (for men – mf throughout the range, for women – f in the middle part of the range). This mode is not too calm and loud; 3) overdrive – one of the all-metal singing modes, which is characterized by loud singing in the lower and middle part of the range, overdrive is used in rock music when you need a metallic sound; Edge (Belting) – all-metal mode, which is characterized by aggressive, sharp, loud sound (imitation of a diving plane), is used in popular music in some styles. At the third stage – it is necessary to master the ability to use lighting and dimming the tone of sound, i.e. its color. Catherine Sadolin expediently reveals the dependence of sound color on the shape and size of the voice-forming organs. If the volume of the vocal tract is large, the sound will be dark in color and vice versa. In the fourth stage, there is a mastery of effects that emphasize the image and style of the singer. The author appropriately believes that each effect should be specially designed for each singer, taking into account the anatomy,

physiology, energy level and temperament (for example: distortion, screaming, rhythm, growth, basis, intentional vocal pauses, inspiratory sound attack, vibrato, singing decoration technique) (Sadolin, 2000).

Innovative technology of students' cross-style vocal training at higher music educational institutions was proposed by L. Semina and D. Semina. The technology is based on the consistency and subordination of the elements of the curricula of professional major disciplines. The authors emphasize the positive result of technology, that in 4 - 5 years the student masters all existing genres, styles, and trends. The proposed technology is traditionally offered at the beginning of drilling exercises and vocals (including pop and jazz), then practice on musical works in Italian, English, German, French or Spanish (which allows students to feel the phonetics of the language and get acquainted with the best vocal pieces of different countries) (Semina & Semina, 2015, p. 29). At the final stage of this technology implementation there is a creative project production, which is demonstrated at the interdisciplinary exam in vocal, choral conducting and basic musical instrument; which reflects the synergetic result of the implemented cross-style learning technology.

The second group of technologies that students have mastered in the process of vocal training is information and computer – in particular, a remote one, aimed at teaching the art of singing and mastering the basics of sound equipment by future music teachers. Computer technology designed for the diagnosis of vocal talent, substantiated by V. Morozov, makes it possible to determine such indicators of vocal talent as: physiological data, hearing (emotional, vocal, fricative-harmonic) (2008). The students' mastery of information technology is considered important in the field of vocal-performance analysis in order to reveal the phenomenon of creative personality of the singer on the basis of information collection and analysis, as it is revealed in the study by N. Drozhzhina (2008). The technology includes four stages of implementation, which is based on four positions: 1) identification of the psychological structure of the performer's personality (genotype, individual character traits, the influence of society, the formation of creative individuality); 2) study of the system of artistic principles and methods of performance (poetics of style, organization of stage space; value and communicative aspects of interaction with the public; 3) identification of semantics of the performance image (essence of performance uniqueness, plasticity, stage movement, poetic text, features of stage behavior); 4) study of the specifics of vocal-professional technique.

In the process of vocal training, future music teachers have the opportunity to master various singing techniques using modern ones aimed at using special effects with changes in timbre characteristics, reverberation, amplification of high and low frequencies based on the use of sound amplification equipment. An innovative technology that should be used in the teaching of pop and jazz singing is the technology Live looping (loops – a fragment of sound recording, locked in a loop for its cyclic reproduction), which is described in the study by A. Popova (2017, p. 629). Live looping can be considered, according to the scientist, as a process of performing a vocal activity, which is based on recording with sequential reproduction of looped audio samples (the segment of audio information) in real-time, and it can be done using devices and special software. The peculiarity of using this technology is that on the basis of the created accompaniment of the music piece with the use of percussion instruments loops, certain creative opportunities in the singing repertoire (performance of hip-hop and jazz standards) are revealed. The use of such technology contributes to the level of professional skills of the singer, the development of creative abilities, improvement of vocal technique, which will be characterized by the correct intonation of vocal technique, appropriate sense of metrorhythmic design of musical components, development of vocal apparatus associated with various sound techniques and language articulation (Popova, 2017, p. 631).

In vocal classes, the performance requires the future music teacher to master the technology of using sound amplification equipment, including a microphone as a means to achieve an artistic goal. The microphone, according to N. Drozhzhina, is the main and most important of all elements of the

singer's activities on the modern stage, which stands between the real acoustic sound and its representation to the listener (2008, p. 8). N. Drozhzhina classifies the dynamic and condenser microphones as the main types of microphones, the variety of which is reduced to four types of sound directionality. In the process of learning in the vocal class, the skills of performing with a microphone should be brought to automatism, but the formation of the skills and abilities of the future specialist in the use of the microphone is impossible without deep knowledge of its existing types.

For modern higher education, the transition to distance learning is becoming important today during the coronavirus pandemic. This problem is especially acute in art education, because, as we know, art education takes place in an individual practical form of education. Therefore, solving the issue of vocal training of future musical art teachers using distance learning technologies is innovative in the organization of art and educational process. Distance-and-information training allows you to practice the necessary training material conveniently and taking into account the capabilities of teachers and students as well as their individual pace of learning.

The use of distance technologies for mastering lecture-practical courses "Methods of voice production", "Methods of teaching vocals" creates an opportunity for students to significantly deepen their knowledge of vocal disciplines. We have developed electronic databases of content data, which include: textbooks, methodical recommendations, educational and creative tasks and bibliographies on topics, lecture notes, video master classes of outstanding singers and teachers with the teacher's analysis and recommendations, chants for all types of voices; recordings of performances of famous singers, etc. The vocal-methodical educational material is systematized in interconnected web pages, and is carried out by means of hyperlinks. The information environment for the organization of the activity provides an opportunity to choose two formats, namely: thematic - the study of educational material distributed by topic and video conferencing - communication between teacher and students using Zoom, Skype through a webcam. Communication and control assessment of students is an essential part of distance technology. For these courses, we consider it appropriate to use the designed blitz polls, creative tasks and tests, webinars, presentations of creative tasks, and exercises that can provide comprehensive information about the level of students' vocal training due to the presence of feedback in the system.

Mastering the core of the discipline "Vocal class", the direct response/feedback from the teacher is extremely important in the course of individual classes. Therefore, it is appropriate to use Viber, Messenger, Skype, which allow the teacher to work in direct contact with students, to use traditional and innovative methods in singing and mastering their vocal repertoire. Practicing a cappella pieces in distance learning is not difficult. The problem of singing some accompanied works of music can be solved by recording the performance of an accompanist, which future music teachers can use as a phonogram minus in their further practice. It is expedient to evaluate students' performances in the Zoom program for listening by teachers or through listening to recorded video files (Ovcharenko, 2020).

The next third group of technologies, which are given special attention by vocal scientists and educators, are important for health, as they are aimed at caring, preserving and, if necessary, restoring the voice. In addition, healthy vocal technologies instill the need to comply with the vocal regime, promote awareness of the processes of natural and free sound production and sound release, resistance to stressful situations. These include the technologies of G. Pustinnikova (2005), V. Yemelyanov (2010), N. Likholet and J. Klimontova (2008), N. Folomeeva (2016).

G. Pustinnikova's technology is devoted to the restoration of speech and singing voice. Violation of vocal function may be the result of ineffective professional activity of a music teacher, so the author reveals the problems of voice production, anatomy, and physiology of speech and singing. For those who already have problems with the voice, G. Pustinnikova offers phonopedic and breathing exercises. The latter are aimed not only at achieving physiologically optimal phonation respiration, but also at

the development and consolidation of muscles involved in singing breathing, complete lung ventilation, increased elasticity of chest muscles, recovery of people with heart and lung disorders. Articulation gymnastics, exercises for voice production, which can be a preventive measure that will help all those who work with the voice to constantly perform their professional duties, should also be health-improving (Pustinnikova, 2005, pp. 115-221).

The phonopedic method proposed by V. Yemelyanov is based on voice signals of pre-speech communication (VSPC), such as: hoarse, hissing, screaming, barking, roaring, howling, strohbass, etc. The phonopedic method is aimed at restoring voice function in chronic fatigue, illness, stress, etc. with singers, lecturers, teachers, actors – for all those who need to use the voice in their professional activities. Special training programs with the use of different VSPCs are aimed at understanding: the process of sound formation, different types of sound attack, the formation of vocal sounds, the peculiarities of the development of the range of voice and alignment of register transitions, singing with vibrato, etc. Some intonation-phonopedic exercises have the name, as: "horrible tale", "question-answer", "brontosaurus", "wave", which enhances the emotional and figurative perception and reproduction of the exercises themselves (2010, p. 160). The efficiency of V. Yemelyanov's phonopedic method manifests itself in the objectivity of its application, namely in the fact that it is expedient to use it in work with both adult and children's voices; in individual work with the student as well as with the choir; in teaching singing to vocalists with academic, pop or folk singing style. etc. The scientist notes that the task of all teachers is to create conditions for the student's vocal training, and the phonopedic method is one of the ways of autonomous work on the voice and self-education. It should be noted that the phonopedic method is widely included in the domestic vocal and choral practice (Yemelyanov, 2010, p. 144).

N. Likholet and J. Klimontova (2008) proposed vocal therapy technology for the professional activity of a music teacher when working with children who are depressed, insecure, patients with functional disorders of the organs, bronchial asthma, headaches and so on. Sound vibration has a positive effect on organs, especially the cardiovascular system. In addition, the sound itself helps to prolong exhalation, relieve tension, organize the mood for meditative nature, is one of the most effective educational and health tools. The authors of the technology convincingly substantiate the expediency of using group vocal therapy methods: elementary melodic and rhythmic improvisations, which are reduced to exercises of tension and release with concentration on important organs (e.g. larynx) with arms and legs movement along with visioning different images; dance movements in the process of vocalization; singing canons, which are combined with simple rhythmic movements; breathing exercises with and without singing; special articulation exercises; resonator-acoustic tuning using different sounding musical instruments; method of "reactive form" – listening to contrasting vocal and choral works. The use of vocal therapy involves the teacher's ability to diagnose technology, analyze diagnostic results in psychological and pedagogical context, design the use of vocal therapy methods and techniques, implement them, understand the process and results, promptly and adequately respond to changes, correct and plan new actions (Likholet & Klimontova, 2008, p. 104). We agree with the authors' verified opinion that the technology of vocal therapy can be used in other school lessons (not only humanities) for psychotherapy and relaxation.

The scope of professional vocal activity of a musical art teacher also includes the activity of caring and hygiene for pupils' and students' voices. To ensure such a process, N. Folomeeva proposed a special technology of hygiene to take care of the voice with students-vocalists at pedagogical universities. The author considers voice hygiene as a scientific field, which in addition to the medical treatment functions of the vocal apparatus deals with determining the causes of disorders and diseases of the vocal apparatus, identifying ways to avoid them, studying the human body, developing rules and regulations of professional vocal regime. Causes of impaired vocal function can be of a different character: overstrain of the vocal apparatus, physiologically inconvenient time for classes, classes in a

room that is not suitable for singing, lack of opportunities to reschedule classes in case of vocal apparatus disease, lack of sufficient experience of vocalists with amplifying equipment, etc. At the initial stage of learning to sing, it is important for students to learn the rules of working with the voice, the basics of the singing regime. N. Folomeeva proposed conditions aimed at preserving the vocal apparatus, such as: compliance with the load on the vocal apparatus of its training; no forced voice; inadmissibility of singing during illness; compliance of the premises with hygienic conditions; regular observation by a phoniatrician. In their further work, students-vocalists should be able to: sing according to the individual singing regime; respond to voice inconveniences in the process of studying the curriculum; be able to deal with the voice in a stressful situation, with diseases and voice fatigue, in different weather and temperature conditions; to produce voice using various sets of sound amplification equipment (Folomeeva, 2016, p. 103).

As a result of mastering the technologies of teaching singing, students had the opportunity to test their technological knowledge, skills, abilities during their pedagogical practice in general secondary education institutions. The method of observation made it possible to find out that future music teachers skillfully used both individual technologies and their elements. Questionnaires and creative tasks to check the degree of acquisition of the content of the covered technologies in vocal training by future music teachers showed that the level of students' technological culture has become much higher compared to the undergraduate students in previous years.

Research Results

According to the results of current scientific research analysis, not having been the subject of any integral research yet, the theoretical aspect of technological culture formation with future musical art teachers by means of innovative technologies in vocal training is considered in the study.

Subsequently, modern technologies in vocal training are determined, and it has been grounded that their integration in the process of future music teachers' vocal training significantly affects the level of technological culture formation with students. The classification of technologies is carried out can be specified as follows: the technologies directed on mastering performing and methodical basics in singing by future teachers; information and computer technologies, in particular remote ones, aimed at teaching the art of singing, mastering the basics of sound amplification equipment by future performers and music teachers; technologies that have a healthcare focus.

So, the introduction of technologies aimed at mastering vocal-performing and vocal-methodical knowledge and skills by future teachers, gave students the opportunity to master the basics of various vocal techniques in the context of world vocal practice. The use of information and computer technologies as well as technologies of distance learning in singing, which in today's coronavirus pandemic are especially relevant and innovative in the organization of art and educational process, enabled students to master the learning material conveniently taking into account the capabilities of teachers and students as well as their individual pace in learning. The use of health-preserving technologies has made it possible not only to increase the level of technical skills of future music teachers in taking care and preservation of the singing voice, but also improve the efficiency of vocal practice with children with special educational needs.

Conclusions

Taking into account the peculiarities of the current learning process in a coronavirus pandemic, the results of the study determine the urgency of the problem of forming future music teachers' technological culture by means of innovative technologies in vocal training, which leads to the need of art education modernization. Correspondingly, we consider the teacher's technological culture as a professional and personal phenomenon based on their value-and-technology worldview and way of thinking, skills in applying technological knowledge, those formed and implemented in creative artistic and pedagogical activities as well as their ability to creatively use pedagogical tools.

Based on the analysis of the activity functions of music teachers, the structure of future music teachers' technological culture is specified, which includes: axiological-cultural, epistemological-emotional, technology and activity, creative-professional components. Such components of the structure of technological culture are based on the sum of knowledge, skills and abilities, and their level of formation, in their turn, is determined by the identified criteria, namely: value-axiological, cognitive-emotional, vocal-operational and creative-professional.

Thus, the study substantiates a wide range of innovative vocal-pedagogical, information-computer technologies, healthcare technologies, and technical means that contribute to the effectiveness of future music teachers' technological culture formation.

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