UDC 373.3.016.78
DOI https://doi.org/10.31723/2524-0447-2024-42-3

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IMPLEMENTATION OF MULTIMEDIA TECHNOLOGIES IN MUSIC EDUCATION

This study examines the evolving role of multimedia technologies in music education, focusing on their implementation, effectiveness, and prospects. The research synthesises findings from recent scholarly literature to comprehensively understand how multimedia technologies transform music education practices. The study's systematic analysis of current research reveals that multimedia technologies significantly enhance music education through three primary mechanisms: integrating diverse media forms, facilitating distance learning, and promoting student engagement. The investigation demonstrates that successful implementation depends on carefully considering methodological principles, teacher preparation, and technological infrastructure. Particularly noteworthy is the emergence of artificial intelligence and intelligent learning systems as promising tools for enhancing the effectiveness of music education. The study identifies several critical factors influencing successful implementation,

including teacher competency, technological accessibility, and pedagogical appropriateness. The research also highlights challenges such as copyright protection and unauthorised content use while identifying opportunities for innovation, particularly in crisis response scenarios like the COVID-19 pandemic. The findings suggest that multimedia technologies' effectiveness in music education is maximised when implemented within a well-structured methodological framework considering both pedagogical objectives and technological capabilities. The study concludes by proposing recommendations for integrating multimedia technologies in music education, emphasising the importance of balancing technological innovation with established pedagogical principles. This research contributes to the growing knowledge about educational technology implementation and provides practical insights for educators and administrators seeking to enhance music education through multimedia technologies.

Key words: *multimedia technologies, music education, educational innovation, pedagogical methodology, distance learning, artificial intelligence in education, technological integration, educational technology, digital pedagogy, music teaching methods.*

Куриляк Ірина Ігорівна, *кандидат мистецтвознавства, доцент, доцент кафедри хорового та оперно-симфонічного диригування Львівської національної музичної академії імені М. В. Лисенка;* ***Чубінська Анастасія Петрівна,*** *бакалавр факультету музикознавства, композиції, вокалу та диригування Львівської національної музичної академії імені М. В. Лисенка;* ***Білан Віталій Миколайович,*** *магістр факультету музикознавства, композиції, вокалу та диригування Львівської національної музичної академії імені М. В. Лисенка*

Впровадження мультимедійних технологій у музичну освіту

У статті розглядається еволюція ролі мультимедійних технологій у музичній освіті з акцентом на їхньому впровадженні, ефективності та перспективах. У дослідженні синтезовано результати нещодавніх наукових досліджень з метою комплексного розуміння того, як мультимедійні технології трансформують практики музичної освіти. Системний аналіз сучасних досліджень показує, що мультимедійні технології значно покращують музичну освіту завдяки трьом основним механізмам: інтеграції різноманітних медіа-форм, полегшенню дистанційного навчання та сприянню залученню студентів. Дослідження демонструє, що успішне впровадження мультимедійних технологій залежить від ретельного врахування методологічних принципів, підготовки викладачів та технологічної інфраструктури. Особливої уваги заслуговує поява штучного інтелекту та інтелектуальних навчальних систем як перспективних інструментів для підвищення ефективності музичної освіти. У дослідженні визначено кілька критичних факторів, що впливають на успішне впровадження, зокрема компетентність викладачів, технологічна доступність та педагогічна доцільність. Дослідження також висвітлює такі виклики, як захист авторських прав та несанкціоноване використання контенту, а також

визначає можливості для інновацій, особливо у сценаріях реагування на кризові ситуації, такі як пандемія COVID-19. Результати дослідження свідчать про те, що ефективність мультимедійних технологій у музичній освіті є максимальною, коли вони впроваджуються в рамках добре структурованої методологічної бази, що враховує як педагогічні цілі, так і технологічні можливості. У висновках дослідження пропонуються рекомендації щодо інтеграції мультимедійних технологій у музичну освіту, підкреслюється важливість балансу між технологічними інноваціями та усталеними педагогічними принципами. Це дослідження робить внесок у поглиблення знань про впровадження освітніх технологій і надає практичні рекомендації для викладачів та адміністраторів, які прагнуть вдосконалити музичну освіту за допомогою мультимедійних технологій.

Ключові слова: *мультимедійні технології, музична освіта, освітні інновації, педагогічна методологія, дистанційне навчання, штучний інтелект в освіті, технологічна інтеграція, освітні технології, цифрова педагогіка, методика викладання музики.*

Introduction. The end of the XX century and the beginning of the XXI century are characterised by global societal changes, which the establishment of informatisation and computerisation processes causes. This period marks the end of the "computer revolution". The result is that virtually all aspects of a modern individual's life depend to some extent on the skilful use of computer technology.

According to scientific materials, the process of computerisation is most evident in the field of education. The importance of computer information technologies in developing and improving the education system is beyond doubt today. At the same time, quality, efficiency and accessibility are the determining factors in choosing different methodological approaches to the use of multimedia.

As is well known, a student's vocal and performance training, awareness of specific knowledge, and the ability to master skills and abilities should be based on extensive practical activity. A whole range of skills, such as pop vocal skills, can be conditionally divided into subjectively useful and universal ones. This approach is becoming one of the most popular in modern pedagogy, as universal knowledge can be interpreted as a basis for acquiring subjectively valuable skills. Conversely, subjectively practical knowledge contributes to acquiring universal skills, such as multimedia technologies. In addition, it allows the use of various electronic devices and gadgets for

organising, processing and transmitting information of a musical and educational nature, as well as for their broader use in teaching pop singing.

The universality and subjective usefulness of knowledge, skills and abilities as two categories that demonstrate the qualitative level of vocal and performing training of adolescent children, being integrated into a single whole, become an indicator of the ability to use electronic means in music education and vocal and conducting activities with skill and confidence.

It should be noted that such use involves the formation of experience in searching, selecting, analysing, storing, systematising and transmitting information. When analysing skills and abilities in pop singing training, it is noteworthy that the need for methodological justification of the introduction of multimedia technologies is not just an urgent need but is conditioned by the logic and content of pop vocal training.

In the context of such a justification, we can talk about the relevance of forming such functional skills of the future pop vocalist as the ability to translate interactive (visual, audible) information into artistic and practical actions, the ability to choose the optimal electronic media (source) of information, the ability to compare and contrast different informative sources; the ability to work with various electronic media (sources) of information; the ability to use electronic databases for educational purposes and work with electronic libraries.

The aim and novelty of the research. This research aims to systematically analyse and synthesise current approaches to implementing multimedia technologies in music education, focusing on identifying effective methodological frameworks that integrate traditional pedagogical principles with innovative technological solutions.

The novelty of the research lies in the development of an integrated theoretical framework that combines multimedia technology implementation with specific music education requirements, identification of optimal combinations of multimedia tools for different educational contexts, the proposition of methodological guidelines for balancing technological innovation with pedagogical effectiveness,

analysis of emerging trends in artificial intelligence and intelligent learning systems specifically adapted for music education.

To overcome this problem, we believe the following **tasks** need to be addressed:

– to conduct a scientific analysis of students' special knowledge, skills and abilities, socio-cultural needs and interests, information and communication foundations of functional and institutional changes in the national music education system;

– optimise the improvement of information technology support for learning through electronic educational resources or distance learning technologies;

– to formulate organisational and pedagogical conditions for the effectiveness of information technology support of the learning process;

– to develop a categorical diagnostic apparatus that allows analysis of different systems of information technology support for the learning process.

In other words, to constructively solve the problem of information and technological support for music education, it is essential to create a modern pedagogical model of the learning process, including the conditions and forms of using electronic educational resources and their implementation in practice.

Review of Publications. The scholarly literature extensively discusses the role and implementation of multimedia technologies in music education. This review synthesises key findings and perspectives from recent research in this field.

Abdulrahaman et al. (2020) define multimedia technology as integrating multiple media forms – text, image, audio, and video – designed to enhance understanding and memorisation through visualisation. They identify three key characteristics of multimedia technology: integration, diversity, and interaction.

Pavithra (2018) offers a more technical definition, describing multimedia as the controlled computer integration of various digital media forms, emphasising its practical application in recording, playback, and displaying instructional materials.

Several researchers highlight the advantages of multimedia technologies in music education:

Distance Learning Context. Mantiri (2014) emphasises the particular suitability of multimedia technologies for distance learning environments, noting their efficiency in data transfer and information acquisition.

Arystova (2017) and Fan (2021) demonstrate the significant impact of multimedia technologies on music art teaching outcomes. Biletska et al. (2021) associate multimedia use with enhanced cognitive and creative activity among students. Tagiltseva et al. (2017) identify specific multimedia tools as optimal for music classes, including electronic textbooks, presentations, and music recording programs.

Wang (2022) advocates for a new educational concept incorporating multimedia path analysis and multiple intelligence learning models. Zhihong (2019) emphasises how multimedia technology combinations improve learning efficiency and student consciousness. Ma (2021) suggests integrating artificial intelligence technology to enhance contemporary music teaching.

Implementation and Methodological Aspects. Koryakin (2018) stresses the importance of implementing methodological principles in multimedia. Norlis et al. (2018) position multimedia technologies as tools for making training sessions less theoretical and abstract.

Multiple studies emphasise the importance of teacher training in multimedia technologies. Pidvarko (2020) highlights the significance of teacher artistry and creativity in selecting and implementing multimedia technologies.

Several researchers examine specific contexts for multimedia implementation: Maatuk et al. (2021) demonstrate the effectiveness of e-learning and multimedia technologies during the COVID-19 pandemic, particularly in unstable socio-economic conditions. Wang (2021) frames multimedia technology implementation as a consequence of education reform, proposing intelligent learning integration. Umrykhina (2019) positions multimedia technology as a key direction in modernising Ukrainian education.

Recent research points to emerging trends as Dong (2022) proposes combining innovative music art function recognition technology with learning strategies based on multimedia systems. Song

& Wang (2013) emphasise the development of creative thinking through innovative methods.

This review demonstrates the broad consensus on the value of multimedia technologies in music education while highlighting ongoing developments in methodology and implementation. The literature suggests a continuing evolution toward more integrated and intelligent systems, particularly emphasising teacher preparation and student engagement.

Methodological Framework. The methodological framework is based on understanding pedagogical technology as a scientific concept and a phenomenon in music pedagogy. It encompasses several key components: definition of pedagogical technology, critical characteristics of modern pedagogical technologies, and main functions of pedagogical technology, and educational computer technology integration that creates a special learning environment through teacher-computer-student interaction.

In this case, mentioning "pedagogical technology" as a scientific concept and a phenomenon in music pedagogy is necessary. Pedagogical technology is developed to achieve educational goals and solve specific problems. Analysing modern approaches to understanding the content of pedagogical technologies, it is possible to define "pedagogical technology" as a strictly scientific design and accurate reproduction of pedagogical actions that guarantee success. Since the pedagogical process is based on a particular system of principles, pedagogical technology can be seen as a set of external and internal processes invested in consistently implementing these principles. It is an integral (procedural) part of the learning system associated with didactic processes, teaching tools and organisational forms of learning. This part of the learning system answers the traditional question "How to learn?" with one essential addition: "How to learn effectively?" [Horol et al., 2007; Kornev, 2008].

The scientific materials analysis makes it possible to state that "pedagogical technology is a systematic and consistent implementation in practice of a pre-designed learning process, as well as a system of ways and means of achieving the goals and conditions of managing this process... Among the main qualities of modern

pedagogical technologies are systematic, structured, complexity, integrity, scientific, conceptual, logical, algorithmic, continuity, variability, controllability, diagnostic, and reproducibility" [Horol et al., 2008, 27]. The main functions of pedagogical technology are design and prognostic, organisational and active, communicative, reflective, and developing.

Speaking of "pedagogical technology" in music education, we should consider the definition of such a concept as "educational computer technology". This is a set of learning processes where the primary means of intensifying it is a computer. In computer-assisted learning, a unique environment is formed due to the interaction between the teacher, computer and student. The nature of this interaction is determined by the software product and the form of its inclusion in educational activities. That is why so much attention is paid to computer programs and their didactic properties.

Educational computer technologies, or multimedia, provide an opportunity to individualise the student's work regime as much as possible under his or her temperament, psychophysiological characteristics of the body, indicators of giftedness, and performance. Thus, the use of multimedia technologies in music education is, on the one hand, the result of the general computerisation of society. On the other hand, it has made it possible to significantly intensify teaching methods, particularly to integrate various areas of professional educational activity in an updated form.

Another almost identical concept is "music and computer technologies". This term refers to a "new interdisciplinary field of professional activity" of a music teacher associated with the creation and use of music programs that require professional knowledge, skills and abilities in both music and information technology" [Kornev, 2008, 52]. Music and computer technologies are a set of special musical disciplines of a particular educational area (for example, musical acoustics, music informatics, digital audio technologies, etc.); a set of methods of professional training of musicians related to computer work used in the process of mastering various disciplines of the curriculum.

Research Results. It is well known that the development and formation of information and communication technologies have come

a long way from the first bulky computers that took up entire rooms to modern super-fast and mobile "gadgets". Today, using a computer opens up new opportunities for a musician's creative work.

Scientific materials show that in practical music education activities, the following are widely used: "recording, editing and printing of scores; recording, editing and further performance of scores using computer sound cards or external synthesisers connected via the MIDI interface; digitisation of sounds, noises of different nature and their further processing in transformation using sequencer software; harmonisation and arrangement of the finished melody using selected musical styles and the possibility of their editing up to the invention of their own styles; creating melodies on an arbitrary basis by sequentially selecting musical sounds; controlling the sound of electronic instruments by introducing certain parameters before the start of performance; recording parts of acoustic instruments and voice accompaniment in digital format with their subsequent storage and processing in sound editing programs; software synthesis of new sounds using mathematical algorithms; studio recording of sound CDs" [Danylova, 2006, 50], etc. All of the above makes it possible to use computers quite successfully both in the field of professional creativity (by composers, sound engineers, arrangers) and in the field of music education, in particular, when teaching pop singing to adolescent children.

Many programmes have been created in music and education, and a wealth of practical experience has been gained in multimedia technologies. At the same time, the processes of scientific comprehension and development of technological foundations for the use of information technologies in music and education continue, and the spontaneous and empirical approach is gradually being overcome.

It should be noted that the natural framework for introducing multimedia technologies in music education is the probabilistic basis of creativity inherent in both the performing musician and the teacher and student. We should also note that the technical features of multimedia functioning are such that the social experience accumulated by mankind cannot be fully realised. Since learning is also the transfer of social experience, using such information devices in music education has some limitations.

Another natural limitation is the music education system itself. Like any other well-established system, it has a certain conservatism in its stability and steadiness. Many forms and teaching methods have developed long ago and have formed a logically sound, time-tested tradition that is consistently evolving. However, the inclusion of electronic devices and gadgets in the educational process, as a kind of intermediary between the teacher and students, generates new social relationships and naturally entails updating the principles and methods of teaching.

Multimedia technologies, intensifying the activities of both the teacher and the student, "take over" the implementation of educational functions. Moreover, such "delegated" tasks of the teacher are differentiated from the functions of the student. They are fundamentally different from each other. While the former are related to the teacher's activities and involve direct educational influence, the latter, aimed at carrying out educational activities, are not directly related to such influence. Thus, a division of educational functions is performed with the help of multimedia technologies.

Teaching functions can be divided into three types, generally corresponding to the stages of the didactic cycle: presentation of educational material, formation of skills, and control. The presentation of educational material is a direct declaration, provides information support for solving a problem situation, and demonstrates the model's functioning. When developing skills, it is necessary to use a simulator or didactic game, and when exercising control, testing, quizzes, performing a programme or a piece of music.

The educational functions that contribute to the formation of adolescent children's experience of creative activity can also be divided into three types: didactic material, creative activity tools and a research laboratory. Here, specification is possible, depending on the specific forms of educational activity. For example, a computer can be used for information retrieval (didactic type), as a creative activity tool – for solving practical problems of harmony and instrumentation of a piece of music or performance, creating music phonograms; finally, as a research laboratory – for statistical analysis of musical text, building models of musical activity and conducting experiments.

At the same time, it should be noted that there are functions that cannot be "delegated" to the computer under any circumstances, and its role in the learning process will remain auxiliary. The teacher performs communicative and managerial functions, carrying out the overall organisation, strategic management, and necessary adjustment of the student's cognitive activity. The teacher's tasks include finding effective ways to use the computer, choosing the appropriate level of complexity of learning tasks, distributing working time between different types and forms of work in the classroom, etc. The learner performs a cognitive function, assimilating the content of the educational material, making it personally meaningful and valuable.

Considering the possibility of using multimedia technologies in teaching pop singing to adolescent children, we note that information and communication support and the functioning of any educational activity are integral to the learning process. The use of electronic music and educational resources in teaching pop singing to adolescents enables the teacher to use various forms, methods and means of teaching, as well as digital educational resources (textbooks, texts from electronic dictionaries and encyclopaedias, various information from scientific and academic literature, audio and video fragments, VST tools (plug-in plug-ins), virtual methodological instructions, optimal vocal exercises, multimedia examples of reference sound that do not repeat traditional educational materials).

Multimedia technologies make it possible to conduct control and evaluation activities in the educational process using modern assessment methods (tests, virtual quizzes, multimedia competitions for the best performance of a musical piece, etc.)

The variety of approaches to teaching pop singing to adolescents in the context of multimedia technologies (a large number of music computer programs containing algorithms for the development and improvement of students' vocal and performance skills) involves various forms of educational content and teacher-student interaction and significantly complements the possibilities of traditional pop singing training.

The inexhaustibility of resources for forming new educational, creative environments in which various interactive learning meth-

ods can function optimally contributes to the self-organisation and self-development of adolescent children – future pop singers. At all stages of music education, there is access not only to ready-made electronic music and educational resources but also to samples that make it possible to create them by the topics and tasks of a particular educational process, which allows for the teaching and learning of pop singing to adolescents to be individual and variable.

Thus, using multimedia technologies to teach pop singing to adolescent children has a positive result. After all, the psychophysiological indicators of adolescence demonstrate the adolescent's inclination to something new, openness to learning the unknown, and the desire to "embrace the immense". Age indicators have a direct impact on the effectiveness and productivity of learning with the use of electronic educational resources.

One of the most promising areas for developing the music education system is the widespread introduction of various teaching methods and ways of self-education based on multimedia technologies. A characteristic feature of the information educational environment, as a set of information, communication and software tools to ensure effective interaction of all participants in the educational process, is the ability to use structured teaching and learning materials and various educational multimedia complexes. In addition to the availability of educational material for the student, it is necessary to ensure the possibility of interaction with the teacher (for example, receiving consultations in online mode), as well as the possibility of obtaining or clarifying individual "focus" in the development of a particular educational material.

The technological component of the information educational environment combines many devices: servers, computers or peripherals (printers, scanners, etc.), and gadgets (tablets, smartphones, virtual reality glasses, etc.). These devices include electronic whiteboards, electronic textbooks, multimedia software, etc. In particular, a student's tablet or smartphone can be synchronised with any other interactive device in a single educational space and act as a textbook, interactive guide, reference book or knowledge test. In this case, a teacher's tablet or smartphone is a tool for creating an educational space, conducting classes, and assessing students.

The strategic nature of computer information and communication technologies in developing and improving the music education system is beyond doubt today. At the same time, it is impossible to talk about fundamental changes in this area, about a large-scale and comprehensive transformation of methodological approaches to general, vocational and additional education without considering the socio-cultural processes in society. The socio-cultural component has a very significant impact on the quality, efficiency, and accessibility of education, as well as on the development of the educational environment and the improvement of computer information and communication technologies. This approach is very important when teaching adolescents. It contributes to the development of the socio-cultural sphere, as well as to the development of musical art, in particular, pop vocals.

Analysing adolescents' sociocultural interests and artistic and aesthetic needs shows that most prefer pop vocal music and modern computer programs. These components are integrated into a specific behavioural complex formed by contemporary society. This interest of adolescents in pop vocal music can be an additional incentive to improve their vocal and performance skills, contribute to the formation of musical taste, develop their hearing, activate their creative independence, encourage initiative, and develop the need to communicate with music.

The key concepts include the concept of an electronic educational resource, which can be interpreted as a comprehensive learning tool that allows for individual and activity-based approaches to the process of targeted formation of professional knowledge, skills and abilities (competencies) in a subject area. Of all the components of the information and educational space, we are most interested in information and communication information that combines various information and electronic educational resources of a particular academic institution and ensures their use.

Let us consider the main types of electronic educational resources. In particular, it is essential for modern society that the younger generation, having received education, acquires the knowledge, skills and abilities that are in demand in an innovative economy. To meet the

requirements of a modern information society, education of a new quality is needed; a teacher-innovator is required who can respond promptly to the ongoing socio-cultural changes, modify his or her teaching activities by the social order and effectively solve pedagogical tasks by activating his or her own professional and personal competences and resources. Hence, there is a need to change approaches to the education system, from traditional models and technologies to new ones that align with the needs of the modern information society.

It should be noted that the methodology of using e-learning resources complements traditional teaching methods, opens up new opportunities in the study of a particular subject and increases the motivation of both the teacher and the student. The motivation of students to use e-learning resources is also manifested in their interests, which ensures attention to the content of education and ways of acquiring it.

The teacher should respect students' individual and personal, value-based requests, form readiness to "use electronic educational resources and encourage the implementation of certain educational actions aimed at forming relevant knowledge, skills and abilities in the information educational environment" [Danylova, 2006, 55]. It is also necessary to provide pedagogical assistance to students in using various information and communication technologies when the teacher can diagnose the abilities of each student in terms of a particular set of qualities necessary for successful activity in a specific field.

Conclusions. For a modern pop vocal teacher, working with various electronic educational resources and information and communication technologies should become integral to preparing for and conducting a lesson. Similar to the use of numerous technical teaching aids (microphones, amplifiers, consoles, mixers, speakers, various media), electronic educational resources can significantly expand both the technological and content base of pop vocal training.

According to scientific materials, this learning process allows students to absorb much more educational material than traditional learning. The main characteristics of using electronic educational resources in teaching pop singing are the possibility of differentia-

tion, individualisation of learning, and the development of student's cognitive and creative activity. Using new information technologies in teaching pop singing allows for systematising and applying methodological tools and techniques to expand the forms and methods of teaching, making the class exciting and inspiring.

Thus, it can be argued that the use of electronic educational resources in the process of teaching pop singing will have a positive result, in particular:

– expand the scope of the educational process;
– will contribute to its specific practical orientation;
– will increase the motivation of students – future pop singers;
– will create conditions for successful self-realisation of the individual;
– expand and deepen interdisciplinary connections;
– will contribute to the development of student's creative abilities and the formation of their vocal and performing independence;
– will improve the quality of knowledge in the field of pop vocals.

It should be noted that the best electronic educational resource is information presented in electronic and digital form, which includes various unique pop vocal data, subject content, or software required in the learning process. Electronic educational resources in pop vocals are divided into multimedia, software, illustrative, audio, video, test products, and electronic analogues of printed publications. All this diversity can be divided into information sources and information tools.

In teaching pop vocals, it is possible to use simple information sources (sound, images, text, video materials, audio models, etc.) and complex ones containing simple information sources linked to hyperlinks (for example, multimedia encyclopedias). Electronic music and educational resources for teaching pop vocals allow you to act actively with information sources (objects): create, modify, link, mix, broadcast, etc. They are a universal means of supporting the learning process in various forms and levels. It is also necessary to list the technical and technological aspects of using electronic music and educational resources in the work of a pop vocalist teacher:

1. Voice recording is an integral part of the work and a means of improving a student's performance and vocal skills: sequencer software can be used to record phonograms: Cakewalk Pro Audio and Cubase VST; virtual synthesisers: Reaktor, ReBirth, Gigastudio; sound editors: Sound Forge, Wave Lab, Cool Edit Pro, Samlitude, etc;

2. Using phonograms (minus and plus) allows you to work regardless of the presence or absence of an instrument in the classroom.

3. Possibility of the remote ensemble or solo improvement (Skype, Viber, Zoom, Meet, YouTube, etc.).

4. The use of audio and video materials and various graphic, text and sound editors in the learning process to enrich the learning process. Internet capabilities (Voice Tutor, etc.) can be used for students' independent work;

5. Some technical teaching aids include synthesiser, corded and radio microphones, mixing consoles, audio speakers, music centres, etc.

Almost all learning activities in teaching pop vocals to adolescent children are organised and supervised by the teacher, including work with electronic educational resources.

Democratisation in music education can be represented by specific teaching methods and techniques (links to websites and resources are provided; various multimedia teaching aids are introduced; students are given independent mastery of different information and communication technologies, etc.) All this expands educational opportunities, creates the effect of involving students in global contemporary processes in pop art, and, thus, stimulates interest in the learning process, forming an understanding of the need and importance of their pop vocal improvement.

All of the above aspects are focused on the innovative development of pop vocal education. Any changes related to the introduction of new information technologies, the formation and development of an information educational environment, and the use of electronic educational resources are due to the focus on the fundamentalisation and continuity of education and the maximum satisfaction of the academic needs of the individual. The means of achieving such goals should be high-tech and scientifically based forms and methods.

Thus, a modern pop vocalist teacher needs to navigate the rapidly changing information space, clearly classify information and differentiate it according to professional and personal needs, since due to the specifics of musical and pedagogical activity, he/she has to deal with different information: visual, audio, verbal, kinesthetic, etc. The integrated use of this information in all its diversity helps enrich the content of classes in teaching adolescent children pop vocals. It becomes diverse and exciting for everyone who studies in professional and additional music education conditions.

BIBLIOGRAPHY

1. Arystova L.S. Modern approaches to the teaching of music in the European integration process. Proceedings, 157, 37–4, 2017. Available: https://www.cuspu.edu.ua/images/ download-files/naukovi-zapysky/157/9.pdf

2. Biletska M., Pidvarko T. & Sopina Ya. The Role of Music and Informative Technologies in the Professional preparation of the Future Teacher of Musical Art. Current issues of the humanities, 40, 1, 209–213, 2021. DOI: https://doi.org/10.24919/2308-4863/40-1-32

3. Данилова О., Манако В., Манако Д. Мультимедіа власноруч: текст, графіка, анімація, відео. К.: Шкільний світ. Галичина, 2006. 120 с.

4. Dong K. Multimedia Pop Music Teaching Model Integrating Semifinished Teaching Strategies. Advances in Multimedia, 1–13, 2022. DOI: 10.1155/ 2022/6200077

5. Fan M. Multimedia technologies in the professional training of music art specialists. Spiritual and intellectual education and training of young people in the XXI century, 308–311, 2021.Available:DOI: 10.34142//2708-4809

6. Гороль П., Коношевський Л., Вороліс М. Методика використання технічних засобів навчання: нпавчально-методичний посібник. К.: Освіта України, 2007. 256 с.

7. Корнев В. Використання інформаційно-телекомунікаційних технологій: зб.наук.праць. К.: ДНВП: Картонрафія, 2008. С. 50-53.

8. Abdulrahaman M.D., Faruk, N., Oloyede, A.A. et al. Multimedia tools in the teaching and learning Processes: A systematic review. Published online, 2, 6 (11): e05312, 2020. Available doi: 10.1016/j.heliyon.2020. e05312

9. Koryakin O. Use Multimedia Technologies in the process of training of future bachelors of musical Art. Open Educational e-environment of modern University, 5, 133–139, 2018. Available: DOI: 10.28925/2414-0 325.2018.5.133139

10. Ma X. Analysis on the Application of Multimedia-Assisted Music Teaching Based on AI Technology. Hindawi Advances in Multimedia, 1–12, 2021. DOI: https://doi.org/10.1155/2021/5728595

11. Maatuk A.M., Elberkawi E.K., Aljawarneh S., Rashaideh H. & Alharbi H. The COVID-19 pandemic and E-learning: challenges and opportunities from the perspective of students and instructors. J Comput High Educ, 3, 1–18, 2021. DOI: 10.1007/s12528-021-09274-2

12. Mantiri F. Multimedia and Technology in Learning. Universal Journal of Educational Research, 2 (9), 589–592, 2014. DOI: 10.13189/ujer.2014.020901

13. Norlis O., Ramli R.Z. & Kapi A. Yu. Multimedia Education Tools for Effective Teaching and Learning. Journal of Telecommunication, Electronic and Computer Engineering, 1, 9, 2–8, 2018. Available: https://www.researchgate.net/ publication/322852457_Multimedia_Education_Tools_for_Effective_Teaching_and_Learning

14. Pavithra A. Multimedia and its Applications. International Journal for Research & Development in Technology, 271 – 276, 2018. Available: https://www.researchgate.net/publication/329417059_MULTIMEDIA_AND_ITS_APPLI CATIONS

15. Pidvarko T.O. The role of innovative technologies in the formation of artistic skills of future music teachers. Pedagogical sciences, 90, 142–146, 2020. DOI: https://doi.org/10.32999/ksu2413-1865/2020-90-23

16. Song N. & Wang J. Research on Art Teaching Methods Modern of Multimedia Technology Based on SPSS. Proceedings of the 2nd International Conference on Green Communications and Networks, 1, 751–756, 2013. Available: https://link.springer.com/chapter/10.1007/978-3-642-35419– 9_88

17. Tagiltseva N.G., Konovalova S.A., Kashina N.I., Valeeva E.M., Ovsyannikova O.A. & Mokrousov S.I. Information Technologies in Musical and Art Education of Children. International Conference on Smart Education and Smart E– Learning, 75, 112–119, 2017. DOI: 10.1007/978-3-319– 59451-4_12

18. Umrykhina O. Modern Trends of Musical Art specialist's Professional training in the conditions of European Education. Psychological and pedagogical problems of the modern school, 2, 156–162, 2019. DOI: https://doi.org/10.31499/2706-6258

19. Wang D. Analysis of Multimedia Teaching Path of Popular Music Based on Multiple Intelligence Teaching Mode. Hindawi Advances in Multimedia, 1–10, 2022. DOI: https://doi.org/10.1155/2022/7166569

20. Wang D. Multimedia Teaching of College Musical Education Based on Deep Learning. Mobile Information Systems, 1–10, 2021. DOI: 10.1155/2021/5545470

21. Zhihong L. Exploration on the Application of Multimedia Technology in Vocal Music Teaching. 1st International Education Technology and Research Conference, 628–631, 2019. Available: https://webofproceedings.org/ proceedings_series/ESSP/IETRC%202019/IETRC19133.pd

REFERENCES

1. Arystova L.S. Modern approaches to the teaching of music in the European integration process. Proceedings, 157, 37–4, 2017. Available: https://www.cuspu.edu.ua/images/ download-files/naukovi-zapysky/157/9.pdf
2. Biletska M., Pidvarko T. & Sopina Ya. The Role of Music and Informative Technologies in the Professional Preparation of the Future Teacher of Musical Art. Current issues of the humanities, 40, 1, 209–213, 2021. DOI: https://doi.org/10.24919/2308-4863/40-1-32
3. Danylova O., Manako V., Manako D. Multymediia vlasnoruch: tekst, hrafika, animatsiia, video. K.: Vyd. dim «Shkil. Svit»: Vyd. L. Halitsina, 2006. 120 s.
4. Dong K. Multimedia Pop Music Teaching Model Integrating Semifinished Teaching Strategies. Advances in Multimedia, 1–13, 2022. DOI: 10.1155/ 2022/6200077
5. Fan M. Multimedia technologies in the professional training of music art specialists. Spiritual and intellectual education and training of young people in the XXI century, 308–311, 2021.Available:DOI: 10.34142//2708-4809
6. Horol P., Konoshevskyi L., Vorolis M. Metodyka vykorystannia tekhnichnykh zasobiv navchannia: navchalno-metodychnyi posibnyk. K.: «Osvita Ukrainy», 2007. 256 s.
7. Korniev V. Vykorystannia informatsiino-telekomunikatsiinykh tekhnolohii: zb. nauk. prats. K.: DNVP : «Kartohrafiia», 2008. S. 50–53 s.
8. Abdulrahaman M.D., Faruk, N., Oloyede, A.A. et al. Multimedia tools in the teaching and learning Processes: A systematic review. Published online, 2, 6 (11): e05312, 2020. Available doi: 10.1016/j.heliyon.2020. e05312
9. Koryakin O. Use Multimedia Technologies in the process of training of future bachelors of musical Art. Open Educational e-environment of modern University, 5, 133–139, 2018. Available: DOI: 10.28925/2414-0 325.2018.5.133139
10. Ma X. Analysis on the Application of Multimedia-Assisted Music Teaching Based on AI Technology. Hindawi Advances in Multimedia, 1–12, 2021. DOI: https://doi.org/10.1155/2021/5728595
11. Maatuk A.M., Elberkawi E.K., Aljawarneh S., Rashaideh H. & Alharbi H. The COVID-19 pandemic and E-learning: challenges and opportunities from the perspective of students and instructors. J Comput High Educ, 3, 1–18, 2021. DOI: 10.1007/s12528-021-09274-2
12. Mantiri F. Multimedia and Technology in Learning. Universal Journal of Educational Research, 2 (9), 589–592, 2014. DOI: 10.13189/ ujer.2014.020901
13. Norlis O., Ramli R.Z. & Kapi A. Yu. Multimedia Education Tools for Effective Teaching and Learning. Journal of Telecommunication, Electronic and Computer Engineering, 1, 9, 2–8, 2018. Available: https:// www.researchgate.net/ publication/322852457_Multimedia_Education_ Tools_for_Effective_Teaching_and_Learning

14. Pavithra A. Multimedia and its Applications. International Journal for Research & Development in Technology, 271– 276, 2018. Available: https://www.researchgate.net/publication/329417059_MULTIMEDIA_AND_ITS_APPLI CATIONS

15. Pidvarko T.O. The role of innovative technologies in the formation of artistic skills of future music teachers. Pedagogical sciences, 90, 142–146, 2020. DOI: https://doi.org/10.32999/ksu2413-1865/2020-90-23

16. Song N. & Wang J. Research on Art Teaching Methods Modern of Multimedia Technology Based on SPSS. Proceedings of the 2nd International Conference on Green Communications and Networks, 1, 751–756, 2013. Available: https://link.springer.com/chapter/10.1007/978-3-642-35419– 9_88

17. Tagiltseva N.G., Konovalova S.A., Kashina N.I., Valeeva E.M., Ovsyannikova O.A. & Mokrousov S.I. Information Technologies in Musical and Art Education of Children. International Conference on Smart Education and Smart E– Learning, 75, 112–119, 2017. DOI: 10.1007/978-3-319– 59451-4_12

18. Umrykhina O. Modern Trends of Musical Art specialist's Professional training in the conditions of European Education. Psychological and pedagogical problems of the modern school, 2, 156–162, 2019. DOI: https://doi.org/10.31499/2706-6258

19. Wang D. Analysis of Multimedia Teaching Path of Popular Music Based on Multiple Intelligence Teaching Mode. Hindawi Advances in Multimedia, 1–10, 2022. DOI: https://doi.org/10.1155/2022/7166569

20. Wang D. Multimedia Teaching of College Musical Education Based on Deep Learning. Mobile Information Systems, 1–10, 2021. DOI: 10.1155/2021/5545470

21. Zhihong L. Exploration on the Application of Multimedia Technology in Vocal Music Teaching. 1st International Education Technology and Research Conference, 628–631, 2019. Available: https://webofproceedings.org/ proceedings_series/ESSP/IETRC%202019/IETRC19133.pd