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DEVELOPMENT OF THE CREATIVE ABILITIES OF FUTURE MUSIC TEACHERS THROUGH DIGITAL EDUCATIONAL TECHNOLOGIES

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Abstract: This article analyzes the role of digital educational technologies in developing the creative abilities of future music teachers. It highlights the application of modern digital tools (MIDI, DAW, virtual instruments, interactive notation software, online platforms, mobile applications) in music education and their role in fostering creative thinking. Additionally, the article examines the factors hindering the use of digital technologies and proposes ways to overcome them.

Keywords: digital educational technologies, music teachers, creative abilities, DAW, MIDI, virtual instruments, interactive notation software, mobile applications.

Introduction

The modern education system is developing at a rapid pace, and digital technologies are becoming an inseparable and important part of the pedagogical process. Since the beginning of the twenty-first century, the unprecedented development of information and communication technologies has had a significant impact on all levels of education, including music education. The introduction of digital technologies into music education serves as an important catalyst for developing the creative abilities of learners, especially future music teachers, shaping their professional competencies, and increasing the effectiveness of instruction.

This article analyzes the role of digital educational technologies in enhancing the creative potential of future music teachers, their successful integration into the educational process, their pedagogical effectiveness, as well as the existing problems in this field and ways of solving them. It also considers the role of digital technologies in ensuring that future music teachers are adaptable to new trends in modern music pedagogy.

The broad integration of digital educational technologies into the learning process not only increases students' interest in acquiring knowledge, but also develops important skills such as independent learning, information analysis, and creative thinking. The flexibility and convenience of technology-based learning, as well as the availability of diverse approaches, create broad opportunities for future music teachers to apply innovative methods in their professional activity.

1. The Impact of Digital Technologies on Creative Thinking

Digital technologies create unique and effective opportunities for the comprehensive development of the creative thinking of future music teachers. Creative thinking is the intellectual activity aimed at generating new ideas, original solutions, innovative methods, and works of art. In the context of music pedagogy, the development of the creative thinking of future teachers may be carried out in the following key areas:

Composition and arrangement. Modern programs such as digital audio workstations (DAWs) allow students to create music in various genres and styles, arrange existing works, and experiment with different sounds and timbres. This process develops their musical thinking and their ability to visualize ideas and evaluate them through listening. For example, with the help of

DAW software, students can create their own short musical compositions, arrange them for different instruments, and experiment with various genres of electronic music. This enables them not only to produce creative outcomes but also to gain a deeper understanding of musical form, harmony, rhythm, and related elements.

Interactive learning. Virtual learning environments and interactive software allow future teachers to conduct practical activities in new formats, model various musical scenarios, and increase student engagement. For example, through virtual music laboratories, students can simulate different acoustic environments, study the operating principles of musical instruments interactively, and monitor their level of mastery in real time. Through interactive learning materials (tests, quizzes, and assignments), students can independently assess and reinforce their knowledge.

Multimedia learning. The use of audio, video, animation, and graphic elements enriches the process of learning music, making it more engaging and memorable. By creating multimedia presentations, interactive study guides, and video lessons, future teachers can visually explain complex musical concepts, demonstrate various musical instruments and their sounds, and show the performance techniques of well-known works. This not only enhances their pedagogical mastery but also develops their creative approach.

Development of analytical thinking. The digital environment allows students to analyze the works of famous composers in depth, examine their technical and creative approaches, view scores visually, and compare different interpretations. With the help of digital notation software, students can analyze the formal structure of works, harmonic development, rhythmic characteristics, and other important elements, and identify the distinctive features of musical works from different periods and styles. This becomes an important foundation for the formation of their musical taste and for use in their own creative activity.

2. Digital Technology Tools

A wide range of digital technologies is used in music education to develop the creative abilities of future teachers. The most effective and promising of them are discussed below:

MIDI technologies. Musical Instrument Digital Interface (MIDI) technology allows students to exchange data between electronic musical instruments and computers. Through this, they can create their own compositions, experiment with different sounds, write and edit notation, and visually review and analyze the music they create. MIDI technology is a convenient means for rapid prototyping and arranging musical ideas.

DAW (Digital Audio Workstation) software. Professional programs such as Logic Pro, FL Studio, Ableton Live, and Cubase enable future music teachers to record, edit, mix, and master multi-track audio. These platforms contain libraries of various virtual instruments, effects, and loops, significantly expanding students' creative possibilities. With the help of DAW software, students can not only create their own musical works but also prepare different didactic materials for learners, such as backing tracks, exercises, and musical examples.

Virtual instruments. Synthesizers, orchestral software, and other virtual instruments allow students to create and study the sounds of various acoustic and electronic musical instruments. This is especially convenient in educational institutions where all the necessary instruments may not be available. Through virtual instruments, students can become familiar with different timbres, apply them in their own compositions, and simulate instrumental performance techniques.

Interactive notation software. Programs such as Sibelius, Finale, and MuseScore allow students to write notation professionally, edit it, play it back automatically, and print scores. Through these programs, students can deepen their musical literacy, complete music dictation and theory exercises, and acquire the skills necessary to prepare notation materials for their own learners.

Online platforms. Platforms such as SoundCloud, YouTube, and BandLab allow students to share their creative work globally, collaborate with other musicians, exchange ideas, and find their audience. These platforms enable future teachers to become familiar with the modern music industry and gain valuable experience for application in their pedagogical practice.
Mobile applications. Mobile applications such as Simply Piano, Yousician, and GarageBand make the process of learning music more interactive, engaging, and flexible. Through these applications, students can learn the basics of music theory, practice instrumental performance skills, and develop rhythm and aural abilities. Mobile applications also serve as convenient tools for independent learning and extracurricular music practice.

3. Factors Hindering the Use of Digital Educational Technologies

There are a number of obstacles to the use of digital educational technologies:
Insufficient technical infrastructure. Limited internet access and the lack of modern devices. This is especially problematic in rural areas and for low-income families.

Teachers' level of preparedness for digital technologies. Many teachers do not have sufficient technical knowledge and face psychological barriers to learning new technologies.

Students' digital literacy. Some students do not know how to use digital devices and programs or cannot apply them effectively. They may also lack motivation.
Financial constraints. Digital technologies can be expensive, creating a financial burden for schools and families. Providing devices and technical maintenance also requires additional costs.
Software and content-related problems. Many digital resources are not adapted to the local language and culture, and high-quality content is lacking.

Administrative and organizational barriers. Many schools do not have a digitization strategy, and teacher support is insufficient.

Information security and privacy concerns. There are risks related to the protection of personal data and cybersecurity.

Social and cultural factors. Trust in traditional teaching methods and gender inequality may hinder the introduction of digital technologies.

4. Ways to Overcome the Barriers

Although there are many factors hindering the use of digital educational technologies, effective measures can be taken to overcome them:
Improving infrastructure. Expanding internet access and equipping educational institutions with modern computers, interactive whiteboards, and other necessary devices. This is particularly relevant for schools in rural areas.
Retraining teachers. Organizing regular training sessions, courses, and seminars on the use of digital technologies. Teachers need practical skills in working with modern software, creating interactive lesson materials, and applying digital assessment methods.
Improving students' digital literacy. Introducing special programs aimed at developing digital skills. It is important to strengthen computer science instruction in schools and to cultivate the use of digital technologies within other subjects as well.
Financial support. Allocating targeted funding from governmental and non-governmental organizations to support digital educational technologies. Subsidies may be provided to educational institutions for purchasing modern equipment and maintaining it.

Creating local content. Encouraging the development of high-quality digital educational resources, interactive software, and multimedia materials adapted to the local language and culture. Cooperation among local programmers, educators, and specialists is important in this regard.

Ensuring information security. Strengthening data protection on digital platforms and developing and implementing rules for the storage and use of personal information. Teachers and students should be informed about cybersecurity.

5. Conclusion

Digital educational technologies create exceptional opportunities for developing the creative abilities of future music teachers. The approaches presented in this article open up possibilities for fundamentally improving the modern educational process, equipping music educators with innovative technologies, and bringing their creative activity to a new level. Through digital technologies, students not only develop their own creative abilities but also gain the opportunity to adapt to new trends in contemporary music pedagogy. Therefore, the active and effective use of digital technologies in modern music education serves to improve the overall effectiveness of the pedagogical process.

In the future, it is necessary to expand research on the impact of digital educational technologies on the teaching of music, to test various innovative methods, and to broaden the avenues for sharing experience. In this regard, cooperation among educators, programmers, musicologists, and educational policymakers is of great importance.

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