

THE IMPORTANCE OF ELECTRONIC DEVICES IN THE DEVELOPMENT OF MUSIC EDUCATION

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Abstract. *This article examines how music education has evolved in terms of digital technology, its current implementation and proposes efficient methods for its future expansion.*

Keywords: electronic devices, music education, digital technology, learning tools

1. INTRODUCTION

Global communication technology is everpresent, relevant to every field, and influences each aspect of our lives. Its growth and evolution greatly impact the educational process, increasing efficiency and significantly altering curriculum design and implementation. Music technology encompasses every device that has influenced the process of teaching-learning-evaluation, be it software, instruments, or other musician tools.

The end of the 20th century, specifically during 1980-1990, is a representative time of evolution in music technologies. This advancement is closely linked to computers, networks, and sounds, and thus, various software programs have emerged that allow certain processes, such as recording, editing, or mixing music. Additional progress was achieved years later, concerning musical devices and other components (applications, platforms) catered to the users' preferences [1].

Electronic devices play a crucial role in the development of music education, providing various tools and resources that enhance learning, creativity, and the overall musical experience.

Here are some ways in which electronic devices contribute to the development of music education:

Access to Learning Resources:

Online Tutorials and Courses: Electronic devices provide access to a wide range of online tutorials, courses, and educational materials. Students can learn music theory, instrumental techniques, and composition from experts worldwide.

Digital Scores and Sheet Music:

Convenience: Electronic devices allow musicians to access digital scores and sheet music, facilitating organization, annotation, and sharing of music. This reduces dependence on traditional printed materials.

Practice Tools and Applications:

Metronomes and Tuners: Electronic devices offer digital metronomes and tuners, helping students develop their sense of rhythm synchronization and pitch accuracy during practice sessions.

Practice Apps: There are numerous apps designed to assist musicians with practice routines, aural training, and exercises specifically targeted to their instrument practice.

Digital Audio Workstations (DAWs):

Composition and Arrangement: Electronic devices allow the use of DAWs for composing, arranging, and producing music. This enables students to experiment with different sounds, create their own music, and gain insights into the production process.

Virtual Instruments and Simulations:

Sound Exploration: Electronic devices provide access to virtual instruments and simulations, allowing students to explore a wide variety of sounds and instruments beyond what is available in a traditional classroom.

Recording and Playback:

Self-assessment: Electronic devices with recording features allow students to record their practice sessions and performances. This enables self-assessment, helping students identify areas for improvement and track their progress over time.

Interactive Learning Apps:

Engagement: There are interactive apps that make music learning more engaging and enjoyable. Gamified platforms can help students reinforce music theory concepts, improve ear training, and enhance their overall musical knowledge.

Electronic Instruments:

Innovation: Electronic devices include electronic instruments such as synthesizers and electronic drums, expanding the range of sounds students can explore. Learning how to use these instruments stimulates creativity and understanding of electronic music production.

Accessibility and Inclusion:

Adaptability: Electronic devices can be adjusted to meet the needs of individuals with different learning styles and abilities. They offer accessibility features that make music education more inclusive.

Music notation software:

Efficient composition and arrangement: Music notation software simplifies the process of composing and arranging music. It allows for easy editing, playback, and sharing of musical scores, enhancing the overall efficiency of the composition process.

Augmented Reality (AR) and Virtual Reality (VR):

Immersive learning experiences: AR and VR technologies provide captivating learning experiences. Students can explore virtual concert halls, practice with virtual ensembles, or participate in interactive music lessons in a three-dimensional environment.

In short, electronic devices significantly contribute to the modernization and enrichment of music education, providing diverse tools, resources, and opportunities for students to learn, practice, and showcase their musical talents.

2. STUDY ON THE EVOLUTION OF MUSIC EDUCATION

Contemporary music technology, as recorded after 1990, is based on electronic devices controlled by a microcontroller/microprocessor. These devices were found in manufacturing players, music recording equipment, synthesizers, and tuners. Over time, and as further research was gathered, the musicians involved in the field utilized a wide selection of technological instruments. Instruments controlled by microprocessors were highly sought after, particularly in electroacoustic music [2].

Following this introductory period of music technology, new digital formats such as CDs and MP3 files gradually emerged. Consequently, this domain ceased to be solely confined to leisure activities and became an integral part of everyday life. It has been demonstrated over the years that music is not merely a form of entertainment but that it holds unique and additional meaning in our lives. Music may also play an essential role in self-awareness for individuals and groups alike. Thanks to portable devices, music can now be stored in vast capacities, therefore music and digital technology devices transformed the users' daily routines [3].

The introduction of features that enabled engineers to combine, slow down, or speed up multiple recordings, add reverb (effects), or make other sound modifications, gradually evolved. Initially, this was characterized by a binary option for activating/deactivating a recording, followed by the integration of volume adjustment and equalization, allowing listeners to tailor their tapes according to their preferences [4].

Scholars in the field have documented the evolution of technology and its application in music education. In 2009, Crawford analyzed the inclusion of technology in

secondary music education. Additional pedagogical approaches emerged from figures such as Orff, Kodály, and Dalcroze, discussing the development of music technology in Australia. This approach is rooted in the technological methods of music teaching and learning, profoundly impacting music education [5].

Musical Devices from the 1800s

Before audio technology transformed into the wireless listening gadgets we have nowadays, it started in the shape of phonographs, gramophones, and melody boxes. With the arrival of Edison's phonograph and other comparable creations, a period of originality and advancement emerged in the realm of sound playback machines, leading to the invention of gramophones, automatic pianos (pianolas), and jukeboxes.

1. Phonograph: Alexander Graham Bell, recognized for creating the telephone, was also the first to enhance Edison's model to construct the phonograph. He utilized wax cylinders rather than tin foil ones as they provided superior audio fidelity and were more effective in capturing sounds. The phonograph was initially developed to document telephone discussions but was later adjusted for application in the musical industry.

2. Gramophone: Simultaneously, Emile Berliner, a German-American innovator, was designing his apparatus, the gramophone. Although "gramophone" and "phonograph" are frequently used interchangeably, they possess slight distinctions. In 1887, he secured a patent for the first audio recording contraption that utilized flat discs with grooves instead of cylinders, making them simpler to replicate and distribute to the general populace. The gramophone was a crucial advancement in the progression of musical devices and set the stage for the expansion of vinyl records. Eventually, the discs we now call "78s" surfaced, an early variety of recordings played at a speed of 78 revolutions per minute. With some fortune, one can still find 78s in collector markets today. Before long, additional enterprises refined Berliner's concept. Thanks to businesses like the Victor Talking Machine Company and their trademarked Victrola system, by the 1900s, gramophones were primed for widespread consumer adoption.

3. Music Boxes: As the exact period of the first music boxes remains unclear, many historians concur that these early musical players existed before the familiar devices already mentioned. Unlike the phonograph, however, music boxes were not created to capture sound. Instead, they incorporated small metallic combs, tuned and positioned within a disc. When activated, the steel pins glided across the comb, generating a delicate tune. One of the earliest known pioneers of this technology was the Swiss horologist Louis Favre, who significantly influenced the increasing fame of these devices. By 1815, music boxes were elaborate and intricately built, with some even capable of playing several tunes. Over time, these mechanisms became more sophisticated, integrating additional sound-producing components such as bells and cymbals.

Musical Devices from the 1900s As the twentieth century commenced, musical technology rapidly progressed, bringing forth breakthroughs and machines that revolutionized how individuals experienced and relished melodies. Throughout the 1900s, sound players advanced swiftly and consistently.

1. Radios: By the 1920s, radios were predominantly utilized for maritime and military transmissions. However, after World War I concluded, civilians started purchasing radio receivers for personal use. Soon, public broadcasting networks – including the British Broadcasting Company (BBC) – began filling the airwaves with news updates and entertainment. KDKA from the Westinghouse Corporation was the first radio station to receive official government licensing. In the initial phase of private radio, entertainment emerged in serialized shows, similar to modern audiobooks and television series. Listeners tuned in daily or weekly for a new episode of an ongoing tale. By World War II, radios were playing tunes for audiences of all ages, rendering earlier inventions like the gramophone nearly obsolete, though later adaptations of disc players continued to rise in popularity.

2. Accordeo-Boy: During the 1920s, sound players had evolved sufficiently for inventors to introduce imaginative and whimsical variations. A prime example of this, reflecting the artistry of the 1920s, was the Accordeo-Boy. This automaton was a type of mechanical musician, complete with moving lips, head, fingers, and eyebrows. The Accordeo-Boy was portrayed holding an accordion with a sizeable drum at its feet. Once a spectator inserted a coin, it would begin "performing" music, frequently serving as entertainment for customers in bistros. Today, Accordeo-Boys are rare finds. The musical automaton exhibit at the Volo Auto Museum houses a 1923 Accordeo-Boy imported from France, one of just two known machines in the United States.

3. Player pianos (Pianolas): Self-playing pianos might evoke scenes from a ghost story, but in the 1920s, they were a widely cherished form of musical amusement. Player pianos, including the finely crafted 1927 Steinway Duo-Art grand piano from the Volo Auto Museum, used perforated music rolls to mimic the performance of two pianists. While these pianos could also be played manually, they were engineered to imitate live renditions. If you closed your eyes, you might struggle to believe that no one was physically performing the piece.

4. Bodson double tino: The Bodson Double Tino, dating back to 1928, resembled the Accordeo Boy in that it featured animated musical figures. The distinction, however, was that instead of a solo performance, the Double Tino showcased two band members. One figure, resembling the original Accordeo Boy, handled the accordion, while the other played a drum kit, including a bass drum, snare drum, and cymbals. The Double Tino was a fascinating contraption, and the one displayed at the Volo Auto Museum is a scarce relic originating from Nice, France.

5. Steam calliope organ: Steam calliopes were steam-powered organs that emitted loud tunes and sound effects

to attract onlookers. Many were constructed within vehicles for increased mobility, including the specimen preserved at Volo. The circus calliope at Volo is positioned atop a Ford Model A, creating a remarkable sight for those intrigued by both music and automotive heritage.

6. Dance organs: Before World War I, dance organs were extremely popular throughout Europe. These massive organs were sold to dance halls and traveling performances as alternatives to full orchestras. The 1947 Mortier Dance Hall Orchestrion, featuring 91 keys, on display at Volo, is a stunning Art Deco masterpiece, originally intended for the Crystal Palace Dance Hall in Belgium. Renowned organ builder Johnny Verbeich meticulously restored this historical piece—an endeavor costing \$150,000—revitalizing its authentic orchestral sound. Since Mortier used mechanical rather than digital means to reproduce instrumental sounds, it delivers an authentic orchestral experience. A forklift was required to position this 1.5-ton marvel within the exhibit, but once you hear its music paired with the color-changing light spectacle, you will appreciate the effort.

From that point forward, record labels and musicians have urged audiences to purchase digital albums or select individual tracks for their music libraries. MP3 players signified a pivotal shift in the music industry, as digital media formats began to dominate the market, surpassing physical media from the mid-2000s onward. The 1900s ushered in a transformative era in music, laying the groundwork for the technology we rely on today. Below is an overview of the impact of portable music player advancements:

1. Music streaming: Since YouTube's introduction in 2005, online music streaming and platforms such as Spotify have enabled users to effortlessly browse and play specific tracks. Listeners no longer require extensive storage for their favorite songs. Instead, we can now create, store, and modify numerous personalized playlists and share them with others with just a few taps.

2. Wireless listening: With the advent of Bluetooth technology, there is a growing focus on enjoying music privately without the need for wired headphones. Instead, many modern listeners opt for wireless or rechargeable earphones.

In addition to contemporary innovations, several foundational devices from the evolution of music players continue to exist today. Variations of well-known machines such as jukeboxes, player pianos, and phonographs remain in entertainment venues across the globe. (Volo Museum).

The evolution of music education is a complex and multifaceted theme that has undergone significant changes over the centuries. Several studies have explored various aspects of this advancement, examining historical developments, pedagogical approaches, technological

influences, and societal changes. Here are some key themes and findings from studies on the evolution of music education:

Historical perspectives: Studies often trace the historical development of music education, examining how it has evolved from ancient civilizations to the present day. This includes the role of religious institutions, court patronage, and the establishment of formal music education institutions.

Pedagogical approaches: Research explores different methods and pedagogical approaches used in music education. This includes the transition from traditional rote memorization learning to more student-centered and experiential approaches, such as the Orff and Kodály methods.

Role of technology: Studies investigate the impact of technology on music education, from the introduction of printed music scores to the integration of electronic devices and digital platforms. The use of audio recordings, computer software, and online resources has transformed the way music is taught and learned.

Inclusion and diversity: The research addresses the evolution of inclusion and diversity in music education, considering how educational programs have become more inclusive of diverse musical genres, cultures, and perspectives. Efforts to expand representation and promote equity in music education are common themes.

Assessment: Research studies explore the evolution of assessment methods in music education, including traditional performance evaluations, standardized tests, and more contemporary approaches that consider a broader range of musical skills and competencies.

Professional development for educators: Research examines the ongoing professional development of music educators. This includes studies on teacher training programs, the impact of continuing education, and the evolving role of music educators in contemporary educational settings.

Social and political influences: Studies analyze the influence of social and political changes on music education. This includes examinations of how educational policies, funding structures, and cultural attitudes toward the arts influence the provision and quality of music education in schools.

Global perspectives: Some studies address the global perspective, comparing the evolution of music education in different countries and regions. This cross-cultural analysis helps identify common trends, challenges, and innovations in music education worldwide.

Impact on cognitive and emotional development:

Research explores the impact of music education on cognitive development, emotional intelligence, and overall well-being. This includes studies on the cognitive benefits of musical training and the role of music in promoting social and emotional learning.

Contemporary challenges and innovations: Studies examine current challenges facing music education, such as budget constraints, prioritization of STEM fields, and the impact of the digital age. Researchers also explore innovative approaches to addressing these challenges, including the integration of technology, community partnerships, and new pedagogical models.

Overall, the evolution of music education is a dynamic and ongoing process that reflects broader changes in society, technology, and educational philosophy. Research in this field helps educators, policymakers, and stakeholders understand the historical context, current challenges, and potential future directions for music education [7].

3. THE CURRENT SITUATION ON HOW MUSICAL EDUCATION IS CONDUCTED

The incorporation of digital tools can offer a vast array of advantages within a music classroom or studio environment. The proficient application of modern resources holds tremendous promise in enriching both instruction and comprehension, as numerous technological advancements in music are "capable of fostering more enduring knowledge," enabling study "at the preferred pace and in the required volume." Assessing the significance of digital tools in music instruction, alongside the efficiency of particular technological aids used for teaching, rehearsal, and evaluation of distinct musical abilities, can greatly assist educators in deciding how to seamlessly integrate technology into their lessons. In contemporary education, technology is being increasingly utilized as an instructional asset, and the field of music pedagogy is no different; digital resources for teaching, practicing, and exploring music are expanding daily, transforming the manner in which musical education is delivered. Instructors can play a crucial role in shaping this fresh artistic and cultural perspective on the world (Small, 1996). As digital innovations continue advancing, so too can the strategies through which educators design and implement instructional experiences. Although the integration of modern tools can be highly advantageous in a musical learning setting, the instructor must ensure that technology is incorporated in meaningful ways that positively influence student progress [8].

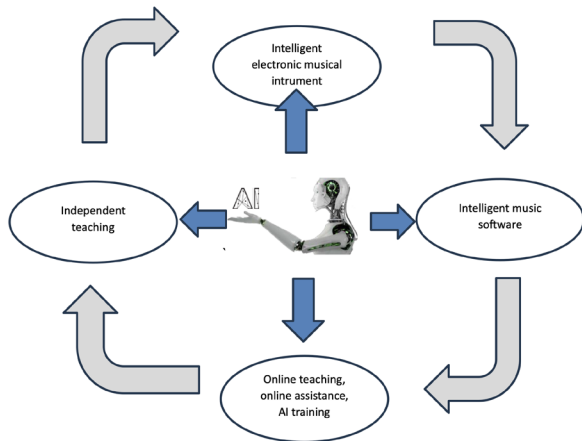


Figure 1. The Relationship between AI and Music Education [8]

Artificial Intelligence (AI) is a new technical science exploring the research and development of the theory, method, technology, and application system for simulating and extending human intelligence. The emergence of computers has promoted the development of modern electronic music technology. It supports personalized learning, analyzes the melody and rhythm of music, evaluates the teaching effect efficiently, and inspires music teachers to use artificial intelligence technology to innovate music education (Figure 1). It is a branch of computer science that involves philosophy, cognitive science, mathematics, neurophysiology, psychology, and several other disciplines. The organic integration of AI technology and music education has enriched teaching resources in the classroom, extended the functions of intelligent instruments, and improved the technical means of music education. Music technology is an interdisciplinary subject, divided into sections of art and technology. When it comes to applying AI in the field of music, music technology must be mentioned [9].

Recent studies underline the significant adoption of digital technologies in music education. Bauer and Dammers (2016) found that 85% of music teachers regularly use digital tools such as recording software and online learning platforms. Similarly, Dorfman (2013) observed that 68% of students engaged in technology-assisted music programs reported a substantial increase in motivation compared to traditional methods. In Romania, according to the ICILS 2023 study, 74% of teachers stated that their school is sufficiently equipped with ICT tools, and 76% mentioned those tools work properly, showing increasing readiness for digital integration [10].

There are many ways in which technology contributes to achieving educational objectives, from which the following are significant to mention:

- Simultaneous appearance of notations and sounds.
- Programs that help develop knowledge of musical notation or improve note-reading skills.

- Programs based on studying methods of learning musical notation, including auditory exercises consisting of writing rhythmic patterns, musical intervals, or melodic examples.
- In most schools of developed countries, music study focuses on computer-based composition, and competitions for musical writing and reading are encouraged. Through technology, students create original scores that they can present publicly or post online.

Table 1. Music software currently used

Music software	The purpose it fulfills
All Audio to MP3 Converter 4.0	The ability to convert various types of music files into MP3s.
Music Goals Rhythm	Provides easy learning of rhythmic notation and musical memory skills.
Starting GNU Solfege 3.16.0	Singing intervals only when prompted by the computer; Identifying chords; Musical listening.
MagicScore	A music notation and composition software that provides the most advanced capabilities for music enthusiasts.
Midiocre	The application allows recording and editing standard MIDI files using the computer keyboard instead of an external keyboard.
Mussette	Mussette is a free and flexible music notation editor that simplifies the process of creating and distributing music through small-sized files. It can also edit MIDI files.

Among the significant benefits of integrating IT resources in music, identified through the use of ICT in music education, are personalized preparation, increasing objective and efficient evaluation, as well as growing the students' interest [11].

From a research update in January 2022, the current state of music education practice has been influenced by a combination of traditional methods, contemporary pedagogical approaches, integration of technology, and evolving cultural and societal perspectives. Note that the state of music education continues to evolve, and there may be new developments beyond my last update. Here

are some key aspects characterizing the current state of music education:

Integration of technology:

Technology plays a significant role in music education. Digital instruments, software, and online platforms are commonly used for teaching music theory, composition, and performance. Virtual instruments, music production software, and distance learning technologies contribute to a more diverse and interactive learning experience.

Diversity and inclusion:

Diversity and inclusion are becoming increasingly important in music education programs. Efforts are being made to incorporate a wider range of musical genres, cultures, and traditions. This includes recognizing and celebrating contributions from musicians from diverse backgrounds.

Project-based and experiential learning:

Music educators are increasingly adopting project-based and experiential learning approaches. These methods focus on practical experiences, collaborative projects, and the practical application of musical skills in everyday life. This shift aims to increase engagement and deepen understanding.

Innovative pedagogical approaches:

Educators are exploring innovative pedagogical approaches such as flipped classroom models, gamification, and interdisciplinary collaborations. These approaches seek to make music education more dynamic, interactive, and relevant to students' interests.

Assessment beyond performance:

Methods of assessment in music education are expanding beyond traditional assessments of performance and musical interpretation. There is increasing recognition of the importance of assessing broader musical skills, including composition, improvisation, music theory, and critical listening.

Advances in music technology education:

With the rise of electronic and digital music, education is increasingly focusing on music technology. This includes teaching students about electronic instruments, music production, sound engineering, and using software instruments for creating and manipulating music.

Professional development for educators:

Continuous professional development for music educators is essential. Training programs and workshops cover topics such as technology integration, curriculum diversity, and new teaching methodologies. This helps educators stay informed and adapt to evolving educational practices.

Community involvement and partnerships:

Music education programs are increasingly engaging with the community and forming partnerships with local

organizations, professional musicians, and arts institutions. These collaborations provide students with opportunities for performance, mentorship, and exposure to the broader musical community.

Challenges:

Despite the evident advantages of digital tools in music education, several limitations persist. In Romania, disparities in access to modern devices between urban and rural schools remain a key issue. According to UNESCO (2021), 60% of global educators lack specialized training for technology integration. Financial barriers and insufficient institutional support also hinder widespread implementation. Acknowledging and addressing these limitations is essential for sustainable and equitable digital transformation in music education.

Music education faces challenges, including budget constraints, pressures from standardized testing, and the need for advocacy to emphasize the value of music in a comprehensive education. Educators and stakeholders actively advocate for the importance of music education in fostering creativity, critical thinking, and emotional well-being [12].

Hybrid and flexible learning models:

The COVID-19 pandemic has accelerated the adoption of hybrid and flexible learning models in music education. Distance learning, virtual rehearsals, and online performances have become integral components, allowing for continuity during periods of disruption.

The current state of music education reflects a dynamic landscape where traditional practices meet contemporary innovations. Music educators navigate these changes to create engaging and inclusive student learning experiences, incorporating technology, diverse musical traditions, and evolving pedagogical approaches.

4. THE IMPACT OF DIGITAL TECHNOLOGY ON THE EVOLUTION OF MUSIC EDUCATION

This study explored music education techniques and the integration of intelligent technology in teaching. Three primary methods were identified:

Active Learning Method (46%) – The most widely used approach among teachers, focusing on choral singing, solfege, rhythm, auditory training, and proper music listening.

Objective-Based Method (38%) – Aims to develop students' emotional and technical understanding of music, including notation, rhythm, composition, and personal musical expression.

Element-Based Method (16%) – A structured, progressive approach centered on theoretical concepts, classical music study, and thematic lesson development.

While these methods are widely used, different areas of music education, such as solfege, choir, and practical lessons, require tailored approaches. The study's

methodology combined these techniques with modern technology, incorporating educational videos, interactive games, and practice applications to enhance student engagement.

The integration of emerging technologies such as Artificial Intelligence (AI), Virtual Reality (VR), and Augmented Reality (AR) is transforming the landscape of music education globally. These innovative tools not only enhance the learning experience but also open new avenues for personalized, immersive, and collaborative music education. Apps like Yousician, which leverage AI to provide real-time personalized feedback, enable students to practice and learn at their own pace, making music education more accessible. With these platforms, learners receive immediate responses on their playing technique, pitch, rhythm, and other aspects of music performance, improving their skills faster and with greater precision.

AR and VR technologies, on the other hand, have expanded the scope of music education by enabling virtual ensemble rehearsals and stage performance simulations. This offers students a way to rehearse with others despite geographical distances, and to experience performing in various environments, from concert halls to smaller venues, without the logistical challenges of organizing physical rehearsals. Such technologies allow learners to gain a more interactive and realistic experience that enhances both their musical skills and performance confidence.

In Romania, institutions like the National University of Music Bucharest have embraced these technological advancements by incorporating online platforms and digital tools into their curricula. These platforms facilitate collaborative learning, enabling students to interact with their peers and instructors regardless of their physical location. This shift toward hybrid music education models—blending traditional in-person instruction with digital tools—reflects a broader global trend of adapting to the technological revolution in education. By incorporating AI, VR, and AR into their learning environments, Romanian universities are not only enhancing the quality of music education but are also preparing their students for the future of the music industry, which is increasingly reliant on digital innovation.

The continuous development of such technologies promises to further revolutionize music education, offering more personalized, flexible, and immersive learning opportunities. As the music education landscape evolves, these technologies will likely play an even larger role in bridging the gap between traditional musical training and modern digital demands, ensuring that students can experience a well-rounded, contemporary music education [13, 14].

Music education has evolved significantly, incorporating diverse teaching methods and modern technologies to enhance the learning process. The study identified three

fundamental approaches used by teachers to train and develop students' musical abilities.

The first and most widely used method is active music learning, applied by nearly half of the teachers who participated in the study. This approach focuses on improving choral singing skills, understanding solfege, developing individual musical abilities, refining rhythmic and auditory skills, and fostering proper music appreciation. It is considered the most academic and effective method, widely embraced by educators due to its structured and interactive nature.

The second approach, preferred by over a third of the teachers, is goal-oriented music education. This method emphasizes a deeper understanding of music, encouraging students to interpret compositions with emotional awareness, maintain accurate tempo and rhythm, and grasp musical notation. Additionally, it nurtures creativity by allowing students to experiment with composing, discover their unique vocal style, and develop rhythmic patterns.

The third method, though less commonly used, is centered on the systematic study of individual musical elements. Unlike the previous approaches, this technique involves a progressive exploration of theoretical concepts, fostering cognitive engagement through classical music study. Lessons are structured around a single theme, establishing connections with other musical elements to provide a comprehensive understanding.

While these methods form the core of music education, practical lessons often require different teaching strategies compared to solfege or choir training. Therefore, an adaptive approach is necessary, tailored to the specific area of study.

To enhance the learning experience, intelligent technology has been actively integrated into music education. In early education, younger students are encouraged to engage with music through educational videos, interactive games, and specialized learning applications. These tools make lessons more engaging and cultivate curiosity, ensuring a solid foundation for future musical development. Theoretical concepts are reinforced through practical exercises, where students apply their knowledge using practice apps or their musical instruments. Performance assessments and small rewards further motivate students and enhance their progress.

For middle school students, the focus shifts toward refining practical skills and fostering independent learning. At this stage, time management and structured practice become essential. Music theory is primarily covered in solfege group lessons, emphasizing rhythm, harmony, and metronome training. Interactive and creative elements are introduced, allowing students to take ownership of their learning by setting goals, exploring specific musical topics, and developing personalized study plans.

In high school, music education prioritizes independent study and professional skill development. Students are encouraged to organize their practice schedules, focusing

on mastering musical pieces and preparing for higher education in music. Theoretical instruction is minimized, with an emphasis on ear training, music dictation, and preparation for advanced studies. Specialized software and digital tools support solfege training and theoretical comprehension, ensuring students are well-equipped for future academic or professional pursuits in music.

By integrating structured teaching methods with intelligent technology, music education can be tailored to different learning stages, providing students with a comprehensive, engaging, and effective pathway to musical mastery.

The data discussed in this section derives from a small-scale survey conducted in February 2024, involving 42 Romanian music teachers from secondary and high schools. The survey combined quantitative and qualitative methods and explored the frequency of digital tool usage, preferred teaching strategies, and experienced challenges. Responses were collected via an online questionnaire with both closed and open-ended items [15].

5. EFFECTIVE METHODS FOR IMPROVING MUSIC EDUCATION

Improving music education involves a combination of effective methods that address various aspects of the learning process. Here are some strategies and methods to enhance music education:

Inclusive curriculum design:

Develop a curriculum that includes a diverse range of musical genres, styles, and cultures. This helps students gain a comprehensive appreciation for music and promotes cultural diversity.

Professional development for educators:

Invest in continuous professional development for music educators. This includes training on new teaching methodologies, technology integration, and strategies for creating a positive and supportive learning environment.

Active participation and performance:

Encourage active participation through ensemble singing, group performances, and solo opportunities. Regular performances build confidence, improve musical skills, and create a sense of accomplishment.

Project-based learning:

Implement project-based learning approaches that involve students in real-world music projects. This could include composing, arranging, recording, or organizing musical events, fostering creativity and collaboration.

Incorporating improvisation:

Integrate improvisation into music education to develop students' creativity and spontaneity. Improvisation exercises can be included in various genres and styles, allowing students to explore different musical expressions.

Interdisciplinary connections:

Encourage connections between music and other academic disciplines. Explore interdisciplinary projects

that integrate music with subjects such as history, science, mathematics, and literature.

Emphasize music theory:

Provide a solid foundation in music theory. Understanding the fundamentals of music theory enhances students' ability to read and interpret music, stimulating a deeper appreciation for the art form.

Community involvement:

Engage with the local community and involve students in music programs, performances, and collaborations. This connects students to a broader musical network and highlights the importance of music in society.

Supportive learning environment:

Create a supportive learning environment. Encourage a positive attitude towards music learning, celebrate individual progress, and foster a sense of community among students.

Parental involvement:

Involve parents in their child's music education. Encourage participation in performances, provide information about the benefits of music education, and offer parents opportunities to engage in their child's musical journey.

Beyond performance:

Develop comprehensive assessment methods that go beyond traditional performance evaluations. Assess students' understanding of music theory, and their ability to compose, improvise, and critically analyze music.

Accessible instruments and resources:

Ensure access to a variety of musical instruments and resources. Provide opportunities for students to explore different instruments and genres, promoting a more inclusive and adaptable music education program.

Flexible learning models:

Embrace flexible learning models, including online and hybrid options. This facilitates adapting to different learning styles and allows education to continue in unforeseen circumstances.

The integration of emerging technologies in music education has led to innovative ways of learning and collaboration. Below are visual representations that capture the essence of this transformation:

1. Digital classroom setting:

A student using VR or AR while playing an instrument, surrounded by virtual instruments or a simulated orchestra, illustrating the fusion of traditional music learning with digital tools.

2. Music learning app with real-time feedback:

A person using a smartphone or tablet displaying real-time feedback or a personalized learning dashboard, showing how digital platforms support music education by providing guidance on technique and performance.

3. Hybrid learning environment:

A split-screen image showing one side with a traditional music classroom and the other with a digital platform or virtual learning environment, representing the combination of in-person and online learning.

4. Global collaboration in virtual music education:

A world map or network of connected students from different countries, engaged in virtual rehearsals or lessons, demonstrating how technology enables global collaboration in music education [15].

By implementing a combination of these methods, educators can create a more dynamic, inclusive, and efficient music education experience for students, fostering a love and appreciation for music throughout their lives [16].

6. CONCLUSIONS

The importance of electronic devices in the development of music education cannot be overstated. These devices have become indispensable tools that significantly enhance the learning experience for students, educators, and musicians alike.

Electronic devices provide a gateway to a multitude of online tutorials, courses, and educational materials, democratizing access to music education on a global scale. The convenience of digital sheet music, practice apps, and recording capabilities enables students to hone their skills with greater efficiency and precision.

The collaborative potential of electronic devices is evident in the opportunities for online engagement and global connectivity. Musicians can collaborate remotely, share ideas, and collectively create music, fostering a sense of community in the digital realm. Furthermore, electronic devices contribute to the inclusivity of music education by accommodating different learning styles, catering to individual needs, and promoting accessibility.

In conclusion, electronic devices serve as catalysts for innovation, creativity, and connectivity in music education. As technology continues to advance, the integration of these tools becomes not only advantageous but essential in preparing students for the multifaceted and technological landscape of the contemporary music industry. By recognizing and harnessing the potential of electronic devices, music education can continue to evolve, offering enriching and transformative experiences that empower the musicians of tomorrow.

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