



ENHANCING STUDENTS' MUSICAL-COGNITIVE POTENTIAL THROUGH DIGITAL TECHNOLOGIES IN MUSIC EDUCATION.

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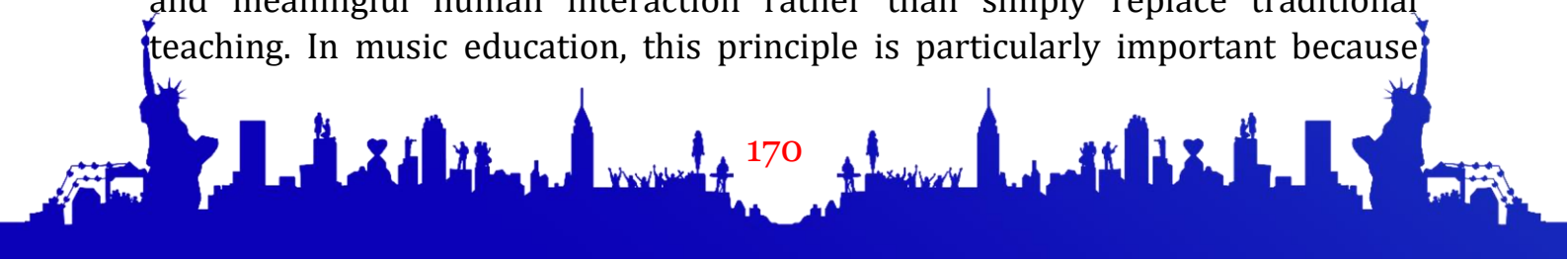
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Abstract - The rapid development of digital technologies is transforming contemporary educational practices and creating new opportunities for improving the quality of music education. Digital tools, multimedia resources, interactive platforms, artificial intelligence-based applications, and gamification can provide students with more flexible and engaging learning environments. This paper examines the potential of digital technologies for enhancing students' musical-cognitive development in music education. Particular attention is given to the development of musical perception, memory, analytical thinking, creativity, and independent learning skills. The study emphasizes that digital technologies should not replace the teacher but should function as pedagogical tools supporting meaningful interaction and individualized learning. The proposed approach integrates digital resources with traditional music education methods and focuses on students' active participation, creative tasks, interactive exercises, and digital assessment. The findings suggest that purposeful integration of digital technologies can contribute to the development of students' musical-cognitive potential and improve the effectiveness of contemporary music education.

Keywords: music education, digital technologies, musical-cognitive potential, artificial intelligence, gamification, multimedia, interactive learning, musical perception, creativity.

Introduction

The digital transformation of education has significantly influenced contemporary approaches to teaching and learning. The development of multimedia technologies, online learning platforms, interactive applications, artificial intelligence, and digital assessment tools has created new possibilities for organizing educational activities. Music education is also experiencing these changes. Traditional methods of listening, singing, performing and analysing musical works can be complemented by digital resources that provide students with opportunities to interact with musical content in different formats. The relevance of this issue is also reflected in international educational research. UNESCO's 2023 Global Education Monitoring Report emphasizes that digital technologies can increase access to educational resources, facilitate interaction and collaboration, and support different forms of teaching and learning. At the same time, UNESCO stresses that technology should serve educational objectives and meaningful human interaction rather than simply replace traditional teaching. In music education, this principle is particularly important because





musical development requires not only technological interaction but also emotional perception, teacher guidance, artistic experience and creative activity. Therefore, the effective integration of digital technologies into music education should focus primarily on **students' musical-cognitive development**, rather than on technology itself.

Main part:

Digital technologies can be used to develop several important abilities:

- **Musical perception** — listening and identifying melody, rhythm and timbre;
- **Musical memory** — remembering musical patterns and compositions;
- **Analytical thinking** — analysing musical structure and style;
- **Creativity** — composing and experimenting with musical ideas;
- **Independent learning** — practising through online platforms and digital resources.

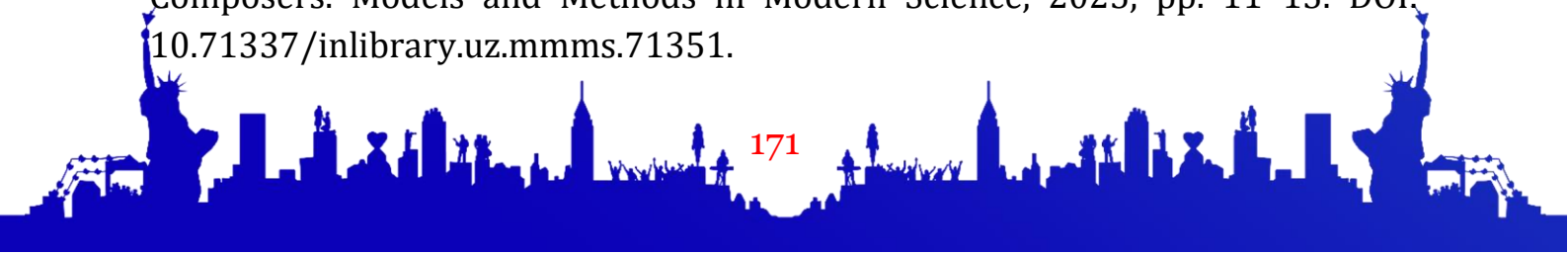
AI can provide individualized exercises and feedback, while **gamification** can increase students' motivation and active participation. A recent 2026 systematic review of technology-enhanced music learning found that digital approaches are increasingly used in music education, with technology supporting areas such as music knowledge, analysis and critical thinking.

Conclusion

Digital technologies can significantly enrich music education when they are used according to clear pedagogical objectives. Their combination with multimedia, AI and gamification can create an interactive learning environment and contribute to the development of students' musical perception, cognitive abilities and creativity. However, technology should **complement rather than replace the teacher**, because effective music education requires pedagogical guidance and artistic interaction.

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