

Investigating the Impact of Digital Game-Based Learning on Musical Education

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Abstract

In this study, we investigated the impact of digital game-based learning (DGBL) on learners' musical learning, in particular in piano performance. 30 piano majored students were recruited from a southern Chinese university and we expanded our previous work by using qualitative data analysis. Specifically, we adopted a thematic analysis through one-on-one interviews. We found several initial themes from this work, i.e., motivation and engagement enhancement, learning autonomy, and skill acquisition improvement. Our findings advocate for the integration of DGBL into music education to enhance the learning experience and point the way for future research to address existing challenges and expand the use of DGBL in a variety of educational settings.

Keywords: DGBL, Music Education, Qualitative, Higher Education, Piano

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Introduction

Emerging technologies have enabled the implementation of DGBL in various educational fields. Research on its effectiveness has spanned multiple disciplines, including STEM (Plass et al., 2020) and languages (Xie & Huang, 2022). However, the application of DGBL in music education has not been widely explored and remains limited compared to these fields (Chauhan, 2017).

Music education plays a vital role in the overall development of learners. Hargeaves and North (1997) noted that musical learning could cultivate students' appreciation of music, maintain their interest and improve their concentration. In addition, learning music is anchored in its potential to enhance learners' cognitive, emotional, and social development. In other words, music education is not merely a form of artistic expression but a catalyst for growth academically and personally. It can improve memory, attention, and reasoning skills, which are beneficial across all areas of study (Schellenberg, 2005). Nevertheless, while learning music, many students could have a sense of discouragement during the procedure of playing unfamiliar melodies using non-familiar instruments in conventional classrooms. Other than this, the school systems oftentimes prioritize "serious" academic subjects (e.g., STEM) for the sake of academic achievement. Such an oversight could lead to a significant underutilization of music education's potential to contribute to a well-rounded academic experience.

Thus, we call for more attention to address music education. This article aims to address the gap in the application and evaluation of DGBL in music education within higher education contexts. By exploring how DGBL can be effectively integrated into music curricula, this study seeks to demonstrate the potential for the enhancement of piano learning skills.

Literature Review

As the advance of technology, researchers have explored how emerging technologies could afford learning (Xie et al., 2024). Digital game-based learning (DGBL) refers to a method to promote learning and improve educational outcomes through digital games. Such an approach originates from the intersection of computer science and social science, and applies digital games on computers and mobile devices to educational settings.

Research has indicated several advantages of DGBL in education. Based on Chen et al (2020), they conducted a meta analysis reviewing the empirical studies from a twelve year perspective. Results showed that DGBL was efficacious in the field of STEM and language, however, no salient effect was detected in other subjects. Compared to other aged group learners, DGBL was efficient for students in K-12 and tertiary levels. Echoing Raziunaite et al (2018), they found that the development of educational musical computer games for preschool children has demonstrated great interest and engagement, which enriched the learning process with elements of creativity and emotional learning. In the language educational field, for instance, Xie and Huang (2022) explored how DGBL could be leveraged to support 98 high school English as a Foreign Language learners' grammar learning in China. Quantitative results from the quasi-experimental design indicated that students who adopted DGBL outperformed those who utilized the conventional methods. In other words, DGBL could be used as an efficacious tool and made learning more engaging, which provided implications for supporting those who sensed difficulty or less engagement while learning. This study aligns with the results of Chen et al (2020)'s finding. Moreover, in STEM education, for instance, Wang and Zheng (2021) examined the effect of DGBL on Chinese middle schoolers' science learning performance using

the experimental design, where they found that learners in the DGBL group outperformed those who did not. Furthermore, when DGBL was combined with instructor assistance, it could lead to higher mean scores of learners in music classrooms (Lesser, 2020). Other than this, STEAM-based digital learning applications in music education have been proven to increase students' creativity, improve music learning, and boost interest in lessons, making learning more effective and enjoyable (Özer & Demirbatir, 2023). Overall, DGBL plays a crucial role in modernizing music education, making it more interactive, engaging, and effective in fostering musical skills and knowledge acquisition.

Despite its potential, DGBL faces challenges and criticisms, particularly concerning the quality and design of educational games and their effectiveness in achieving educational goals. For example, the optimal approach to measure the effects of DGBL embedded in formal education remains debatable. However, as digital technologies continue to evolve, this technology remains a promising area for enhancing learning experiences across various disciplines.

Methodology

In this study, we extended our work from Qian and Jiang (2024) and aim to explore the influences of DGBL on Chinese university students' piano skills improvement from the qualitative perspectives.

Participants

In the fall semester of 2023 to 2024, we recruited our 30 medium-level participants from a university in the southern part of China. All of them majored in arts and performance, specifically in piano. We previously conducted a quasi-experiment during this semester. Based on our previous quantitative results, learners in the experimental group outperformed the control group. However, it is needed to understand from the students' perspectives with regard to the effectiveness of DGBL in this sense. Thus, we expanded the work (Qian & Jiang, 2024) on inquiring students' perceptions with regard to their experience in DGBL. After the DGBL intervention, we followed up on one-on-one interviews with participants who utilized the tool.

Results

In this study, we employed thematic analysis concerning the data analysis. Specifically, the thematic analysis of the one-on-one interviews conducted post-DGBL intervention yielded initial key themes that highlight the perceptions and experiences of the participants regarding the use of digital game-based learning in enhancing their piano skills. The three key themes are listed as follows, i.e., motivation and engagement enhancement, learning autonomy, and skill acquisition improvement (see Table 1).

Key Themes	Descriptions
Motivation and engagement enhancement	Many participants reported that DGBL significantly increased their motivation to practice piano. The gamified elements of the learning tool made the practice sessions more engaging and less monotonous, encouraging students to spend more time practicing and exploring new pieces.
Learning autonomy	Participants noted that the DGBL platform enabled a more self-directed learning experience. They appreciated the ability to control their learning pace and revisit complex sections as needed, which is often less feasible in traditional piano instruction settings
Skill acquisition improvement	A number of students highlighted specific skills that were improved through the use of DGBL, such as sight-reading, rhythm accuracy, and finger dexterity. The interactive nature of the digital games provided immediate feedback, which was crucial for correcting mistakes and refining technique in real-time

Table 1: Key Themes of Interviews

Conclusion

This study clearly demonstrates the great potential of digital game-based learning (DGBL) to enhance piano instruction in higher education. Through in-depth interviews with 30 university students, we gained a deep understanding of the effectiveness of DGBL in improving the motivation, engagement, and self-directed learning of students in arts and performance majors, especially in piano learning. The results highlight the importance of incorporating DGBL into music instruction, which not only makes the learning process more engaging, but also improves teaching effectiveness. Although we encountered some technical challenges and content limitations, the generally positive feedback from students shows that DGBL can indeed play a key role in modern music education. Future researchers should continue to explore this area, overcome these challenges, and apply DGBL to a wider range of music disciplines and educational settings. Ultimately, we hope that educational institutions can use these digital tools to create a more dynamic, efficient, and enjoyable learning environment for students studying music.

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