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Utilization of music technology in secondary education in China: An in-depth study of Shandong Province

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ABSTRACT

The current investigation explored the use of music technology in secondary schools in Shandong Province, using technological determinism theory and the Technology Acceptance Model (TAM). The qualitative approach employed semi-structured interviews and observational methods to elicit views of music educators and students in three secondary schools in Shandong Province. The analysis of the gathered data indicates that the inclusion of music technology increases student engagement, stimulates creativity, and enables personalized learning experiences through varied resources and interactive tools. Educators reported that music software was useful in lesson preparation and student performance evaluation, but also faced challenges such as insufficient training, technical issues, and uneven resource distribution. Additionally, the use of music software appeared to facilitate greater interaction and self-regulation among learners; however, it also posed challenges related to unequal access and a decline in the use of traditional musical instruments. The results suggest that music technology significantly enriches music learning, making it more dynamic and learner-centered. Nonetheless, they also highlight areas requiring development, including professional training and equitable resource allocation. The findings underscore the necessity for ongoing research to assess the long-term impacts and applications of music technology across diverse educational settings, thereby contributing valuable insights to music education in China and globally.

Contribution/Originality: This is the first empirical study on the use of music software in secondary school music instruction in Shandong Province, China. By integrating the Technology Acceptance Model and Technological Determinism, it compares teachers' and students' perspectives through interviews and classroom observations analyzed with ATLAS.ti.

1. INTRODUCTION

1.1. Introduction

In contemporary learning settings, the role of technology is increasingly visible in improving pedagogical approaches and instructional methods (Wise, Greenwood, & Davis, 2011). Recent studies indicate that incorporating music technology into learning frameworks has the potential to increase student motivation and engagement by providing dynamic, interactive learning experiences that go beyond traditional instructional methods (Yan & Zhou, 2017). Digital audio software programs allow learners to produce their own music pieces, thereby developing their creative potential and innovative capabilities (Wise et al., 2011). The use of music technology also presents a set of

challenges. Incorporation of these tools into learning curricula tends to be challenging for educators, mainly due to a lack of training and inadequate infrastructure (Yan & Zhou, 2017). An impressive percentage of educators report having a sense of unpreparedness in their ability to apply music technology in learning settings, hence indicating a need for professional development and training programs (Yu, 2020).

The complete capabilities of music software in the field of music remain largely untapped, with these tools often regarded mainly as enhancements to human creativity instead of independent entities that can play a substantial role in the creative process (Nart, 2016). The current viewpoint is set to transform as advancements in music software pave the way for new opportunities at the convergence of technology and music (Yu, 2020). Given the rapid advancements in modern computer technology, there is an increasing abundance of intelligent software for music creation. These advanced software applications, equipped with robust features and intuitive interfaces, have effectively taken over the responsibilities of conventional music editors (Wise et al., 2011). It is essential to recognize that not every middle school in Shandong Province incorporates music software as a teaching tool (Wang, 2019). This shift has significantly improved the processing abilities for music, while also increasing the storage capacity of music data. Furthermore, sophisticated software used in music has demonstrated high proficiency in performing tasks such as recording, editing, trimming, and copying musical pieces, thereby enabling the personalization of musical works (Crawford, 2020). In parallel, the close link between music software and music education has emerged as a key aspect that has become more relevant in recent times (Nart, 2016). This convergence represents the relentless endeavors of educators and the ongoing advancement of science and technology. The amalgamation of music education and music software signifies a significant advancement in the realm of music education and constitutes the central theme of modern music education (Wise et al., 2011). Contemporary educational technology has significantly influenced educational reform. The incorporation of multimedia is now widespread in educational technology (Crawford, 2020), and the utilization of computerized music software is also prevalent; this research will implement it in middle school instruction.

These complex software solutions, equipped with strong capabilities and intuitive interfaces (Crawford, 2020), have supplanted the roles of conventional music editors. This transition has significantly improved music processing capabilities and increased the storage capacity for music data. Moreover, intelligent music software proficiently executes functions such as editing, clipping, recording, and playback of musical compositions, hence facilitating customized alterations to these works. Multiple investigations indicate that music technology may significantly enhance students' engagement and participation, while also offering additional learning resources and varied educational methods (Yan & Zhou, 2017). Nevertheless, there exists a scarcity of research regarding the viewpoints of instructors and students on the implementation of music technology in classes at secondary schools. Despite previous research examining the application of music technology in education and its potential advantages, there remains a deficiency of comprehensive studies regarding its unique impact on Chinese secondary education, especially in Shandong Province. The current literature predominantly emphasizes the practical experiences of European and American nations, but the majority of research about China is theoretical, devoid of empirical data and case analyses.

Moreover, current research frequently overlooks the personal viewpoints and contributions of educators and learners, inadequately representing the advantages and disadvantages of music technology in real classroom instruction. Consequently, further investigation is required on the practical impacts of music technology in Chinese secondary school music education, together with a comprehensive review of its advantages and disadvantages from the viewpoints of both teachers and students.

Comprehend the attitudes of teachers and students regarding music technology while providing a comprehensive analysis of its specific application in secondary music education in Shandong Province, China. This study specifically aimed to address the following two research questions:

i. How do students and teachers assess music technology's impact on secondary education compared to traditional teaching methods?

ii. What are the specific advantages and disadvantages of using music technology in secondary school curricula as seen by teachers and students?

1.2. Underlying Theories

This research is grounded in a variety of essential theories and concepts that pertain to music software applications and instructional practices. The Theory of Technological Determinism explores how technology influences social development, suggesting that advancements in technology are the main catalysts for social change. The theory highlights the significant influence of technology on human behavior and social structures, underscoring its importance in examining how music software affects music education and transforms conventional teaching approaches (Drew, 2016). Technological determinism highlights the compelling nature of technology (Zhang & Li, 2021). Nevertheless, scholars tend to adopt a more nuanced viewpoint, considering technology as a significant element in societal development rather than the only driving force.

The present research is set in the backdrop of the Technology Acceptance Model (TAM). By investigating educators' and learners' beliefs and attitudes towards technology, it is possible to formulate advice that is in line with their beliefs, hence ensuring that software technology is integrated into secondary school music education in China effectively. The Technology Acceptance Model is a theory that explains and predicts a system's user behavior in information systems, thereby improving the understanding and prediction of individual behavior in using information technology (Davis, 1989). The two basic components of this model are perceived usefulness and perceived ease of use. "Perceived usefulness" is a measure of the extent to which a person feels that using a given technology will help improve their productivity (Davis, Bagozzi, & Warshaw, 1989).

Moreover, the Technology Acceptance Model has the capability to accommodate different extrinsic factors, such as subjective norms and perceived behavioral control. Researchers can use TAM to determine and encourage the adoption of music software-assisted learning among learners and music educators. The Technology Acceptance Model (TAM) has been widely used to define and predict users' acceptance of various information technologies, such as mobile devices and software applications. The model has gained great popularity in scholarly studies and practical applications due to its strong structure and simplicity in design (Davis, 1989).

Lastly, technology acceptance models provide a unified approach to defining and forecasting the behavior of learners and music educators in using music software. In practical applications, scholars and practitioners can use technology acceptance models to determine and build the readiness of users to adopt new technologies. Figure 1 presents these two theories, which constitute this study

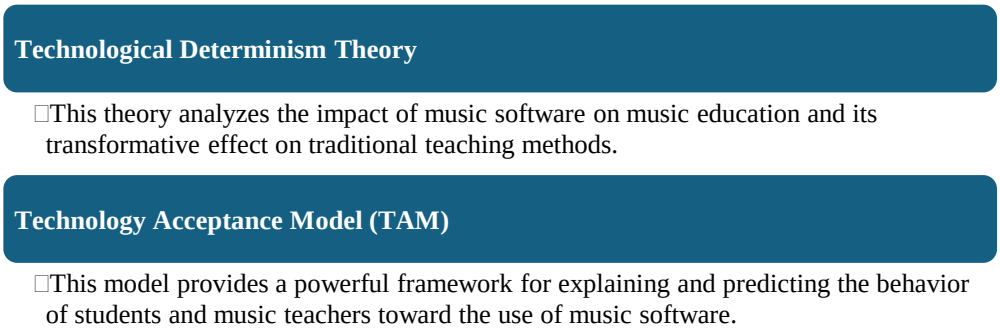

Figure 1. Underlying theories for the study.

2. MATERIALS AND METHODS

2.1. Research Design

This study employed qualitative research techniques to explore student viewpoints regarding the incorporation of music software in music classes. The research involved gathering data through interviews with both teachers and

students. In addition to this primary method, classroom observation was incorporated as an additional tool in the research design. This tool aimed at revealing hidden dimensions of student involvement, instructional strategies, and the educational setting.

Qualitative interviews and observations offer detailed, complex, and specific insights into the genuine experiences of students and teachers regarding the utilization of music software in music classes. The qualitative research data analysis software ATLAS.ti was employed for the purposes of transformation, coding, and thematic analysis of the data.

The Ethical Committee of the University of Malaya, Malaysia, granted approval for this study on 8 November 2024 (Ref. No. UM.TNC2/UMREC_3947).

2.2. Data Collection Procedure

This research aimed to gather insightful feedback from music educators and students about the incorporation of music software into classroom instruction. Consequently, a thorough selection process was implemented to identify middle schools in Shandong Province that aligned with the defined research objectives. The factors involved in the selection of secondary schools in Shandong Province encompassed various considerations:

1. Public secondary institutions: This should refer to public secondary institutions located in Shandong Province, China.
2. Degree of music software integration: Institutions dedicated to incorporating music software within the music classroom, including those with advanced technological resources, technology-enhanced teaching methods, and a strong emphasis on enhancing education through music software.
3. Access to technological resources: Institutions possess the essential technological resources, including computerized multimedia and Internet-enabled equipment, to support the effective application of software.
4. Creative teaching methodologies: The institution enhances teaching methodologies through the adoption of technological innovations.
5. Strong musical achievement: Institutions demonstrating notable academic success in music.

Following the established criteria, the researcher identified five secondary schools that fulfilled the requirements via the Shandong education website.

Following email correspondence, two secondary schools declined the researcher's request, citing irregular use of the music software and the absence of music teachers due to leave. Consequently, the selected institutions for this study include the First Middle School of Jinan, Shandong Province; the Fifteenth Middle School of Zao Zhuang; and the Thirty-ninth Middle School of Qingdao, which exemplify the application of music software in secondary school music education within Shandong Province. This guarantees that the research findings are applicable to a broader spectrum of educational environments throughout the province.

Following preliminary research, it was made evident that each middle school comprised three grade levels, with generally 2-3 music educators assigned to each level. Consequently, the researcher needed to thoughtfully choose one music teacher from each grade level for interviews. The following outlines the specific criteria for including music teachers in this research:

1. Teaching experience: music educators with a range of backgrounds, encompassing early career, mid-career, and veteran professionals to gather perspectives from various stages of their careers.
2. Grade levels: educators encompass music instructors from all secondary school grades to guarantee a variety of viewpoints.
3. Variation in software application skills: Educators displayed a range of skills in using software applications, from highly proficient to those requiring assistance, along with differing levels of experience with technology for data collection.

4. Gender: Educators of various genders were incorporated to guarantee representation and a thorough understanding of classroom software applications.
5. Readiness to engage: Music educators who expressed a readiness to participate in the research interviews and were accessible during the specified interview period.
6. Communication abilities: Music educators possessing strong communication skills to guarantee they can clearly articulate their experiences and viewpoints during the interviews.

Following initial investigations, the team discovered that each middle school typically hosted around 10 to 15 classes, with an average of 60 students per class across each grade level. Considering the substantial student population, the researchers opted to conduct interviews with three students from each grade level, culminating in a total selection of nine students from each school. The selection criteria for these students were outlined as follows:

1. Students who appreciate music lessons and maintain strong academic performance.
2. Adaptability: learners who are proficient with music software applications for music lessons to guarantee the reliability of the interviews.
3. Gender: Participants from various genders and age groups to guarantee a thorough exploration of the research topic.
4. Readiness to engage: individuals who demonstrate a robust readiness to engage and can articulate their thoughts clearly.

2.3. Data Collection Methods

The research process was initiated using a preliminary survey that included interviews with children in a middle school and music educators to obtain details of prevailing circumstances regarding the application of music software in learning environments. The primary objective of these interviews was to gain a basic understanding of current practices and initial sentiments concerning the inclusion of music software in learning curricula. The insights gained from these initial discussions proved instrumental in guiding subsequent phases of the research, providing a solid foundation for continued inquiry.

Systematic observations in classrooms contributed a fundamental aspect to the research by assessing the impact of instruction using music software on children's learning achievements and engagement levels. These observations were thoroughly documented across various aspects, such as explicit instructional strategies, engagement patterns of children, and prevailing learning settings in classrooms. The aim was to offer insights into learning situations influenced by music software, children's engagement, and to verify the actual use of such software in educational contexts.

The observational approach offered instant comprehension of patterns of interaction and response patterns in learning situations. The evidence accrued in such research was ensured to be reliable in that it was maintained using the application of data triangulation. Information accrued using interviews and observations was cross-verified to offer a three-dimensional perception of questions of concern in such research. Triangulation was utilized as a method of cross-validation of evidence using multiple sources and means to ascertain the credibility and precision of the results of such research.

3. RESULTS

The aim of this current inquiry was to explore the use of music software in secondary school music instruction in Shandong Province. The gathered data was carefully coded and categorized using thematic analysis, facilitated by specialist software ATLAS.TI. This method of analysis was used to identify key themes and patterns. The findings of the thematic analysis are presented in Figure 2.

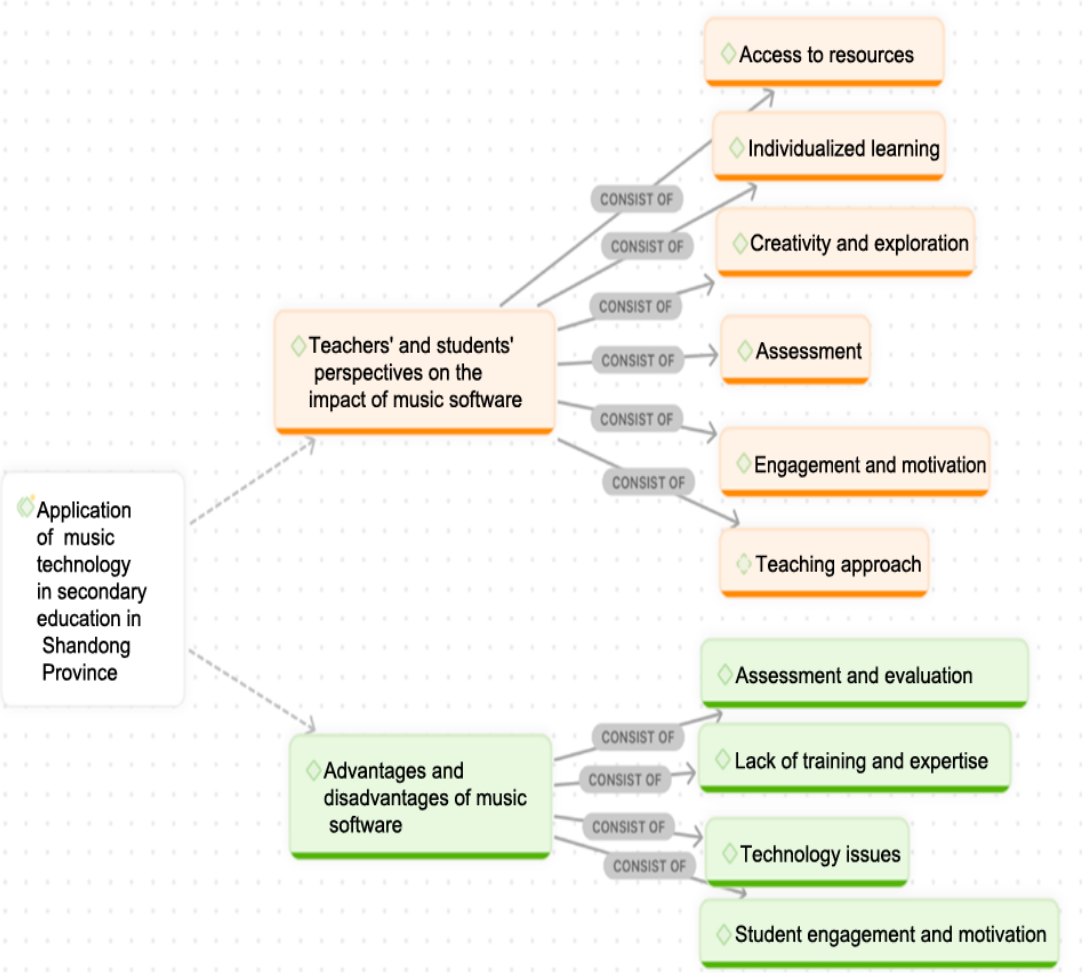

Figure 2. Thematic analysis map.

3.1. Main Finding of Research Question 1

A significant example of observation carried out by the researcher was during the "Music Appreciation" class, when the participants displayed a high level of interest. The participants took a keen interest in the music appreciation session and asked questions regarding the music playback software used by the instructor. The teacher provided prior notice to the students regarding the songs required for the lesson and subsequently designated specific students to locate and play them using the software on the computer. This approach empowers students to select and enjoy the music, fostering an engaging and dynamic learning environment. A specific music can be selected to be played repeatedly based on individual preference. This approach enables students to appreciate the blend of music and software while enhancing their ability to effectively use the software for musical enjoyment.

A preliminary survey gathered insights from teachers and students regarding the practicality of utilizing music software to enhance classroom instruction. Through data coding and thematic analysis, six themes emerged concerning the differences between teachers' and students' views on the influence of music software in contemporary secondary school music education versus conventional teaching approaches. Table 1 clearly illustrated the perceptions of teachers and students regarding traditional teaching methods and music software.

Table 1. Comparing innovation and tradition in the music class.

Aspect of comparison	Traditional teaching methods		Music software	
	Teacher's perspective	Student's perspective	Teacher's perspective	Student's perspective
Teaching approach	Teacher-centered, focused on lecture and demonstration.	More lecture-based and less interactive.	More student-centered, interactive, and engaging.	Provides a more engaging, hands-on learning experience.
Access to Resources	Limited to physical resources (Instruments, sheet music).	Limited to the materials obtained from the school.	Make sure students have access to a range of digital tools and music software.	Students can access learning materials from anywhere.
Creativity and Exploration	May be more limited due to constraints of physical resources.	Maybe restricted by the physical limits of tools and resources, as well as a set of standards.	Encourage students to experiment with sound design, composition, and music production using music software.	Provides instruments for sound editing, mixing, and music creation.
Individualized learning	Can be challenging to cater to individual learning needs in large classes.	The class's tempo may hinder each student's advancement.	Utilize the flexibility of music software to customize lessons and homework to each student's aptitude and interests.	The software allows it to adjust to the speed of the student, providing them with immediate feedback and enabling personalized instruction.
Assessment	Often relies on traditional methods	Feedback might not come in right away, and informal assessment is given less importance.	Use digital tools for both formative and summative evaluation.	Offers ongoing evaluation and immediate feedback through interactive tools.
Engagement and motivation	May not be as engaging for some students, especially those who are not naturally drawn to music.	Depending on the student's interest in traditional music instruction, engagement levels might vary.	Incorporating gamification and interactive features in music software makes learning enjoyable and fun.	Permits students to compose music they are enthusiastic about and to hear the results of their work, which boosts motivation.

Table 2 highlights the differences between innovation and tradition in music education, focusing on various sub-themes such as teaching approach, access to resources, creativity and exploration, individualized learning, assessment, and engagement and motivation.

Table 2. Innovation enriching traditional teaching methods.

Main theme	Sub-theme	Relevant quotation
Innovation enriches the traditional approach.	Teaching approach	"In traditional music schools, we use real instruments and written music. This method isn't perfect, especially when it comes to imagination and unique learning." (Interviewee 1)
	Access to resources	"Wider range of resources, including virtual instruments, digital libraries, and online tutorials." (Interviewee 3)
	Creativity and exploration	"Creativity and exploration are at the heart of music education." (Interviewee 3)
	Individualized learning	"Can provide more opportunities for personalized learning experiences." (Interviewee 5)
	Assessment	"This is quite technical and can be rather hard." (Interviewee 5)
	Engagement and motivation	"Everything changes when we use music tools in class! It becomes more interesting and participatory." (Interviewee 2)

The incorporation of music software in contemporary secondary school music education highlights significant distinctions from conventional approaches that depend on physical instruments and notated music. While conventional methods emphasize the basics with constrained resources, the incorporation of music software introduces fresh opportunities for involvement, innovation, and personalized education. Music software allows students to engage with music in vibrant ways, offering interactive connections, immediate feedback, and collaborative tools that foster creativity and innovation. While traditional methods focus on fundamental skills, leveraging technology allows for a more varied and engaging educational experience, preparing students for the

challenges of a digital landscape. While recognizing the importance of traditional resources, embracing music software paves the way for a more enriching and adaptable music education landscape in secondary schools.

3.2. Main Finding of Research Question 2

Table 3 shows the following comparative aspects or dimensions in tabular form to investigate teachers' and students' perceptions of the advantages and disadvantages of using music software in secondary music classes.

Table 3. Advantages and disadvantages according to teachers and students' perspectives.

Perspective	Advantages	Disadvantages
Teachers	Enhanced teaching tools	Technical issues: Teachers may face difficulties with software installation.
	Improved lesson planning: Teachers can use software to plan lessons more effectively.	Lack of training: Some teachers may lack the necessary training to effectively use music software, leading to underutilization of its features.
	Assessment and feedback: Music software often includes tools for tracking student progress and providing immediate feedback.	Dependence on technology: Over-reliance on music software reduces the emphasis on traditional music skills and techniques.
Students	Personalized learning: The music software supports a variety of learning methods and speeds, allowing students to learn at their own pace.	Access inequality: Students may not have an internet connection at home or the necessary equipment to use music software.
	Interactive learning: can make learning more interactive and engaging.	Reduced physical interaction: Heavy use of software can lead to decreased physical interaction with real instruments, which is crucial for developing certain musical skills.
	Diverse resources: Students have access to a wide range of musical resources that can help expand their understanding of music.	Distraction Potential: Students may be distracted by non-educational features of the software or other apps on the device.

Table 4 outlines a range of influences that music software has on educators and learners. As educators face particular challenges, such as technical failure and potential reliance on tools, there are also considerable advantages, such as more functionality in preparing lessons and a wider range of learning materials to choose from. The use of music software allows learners to become engaged in interactive, personalized learning experiences in conjunction with varied resources. Of particular importance is acknowledging potential limitations that arise in using such software, such as potential distraction, diminishing hands-on learning, and inequalities in terms of access. Overcoming such challenges is key to incorporating music software in learning settings effectively.

Table 4. Thematic analysis of the advantages and disadvantages from teachers' and students' perspectives.

Main theme	Sub-theme	Relevant quotation
Advantages	Enhanced teaching tools	"Lessons become more dynamic and enjoyable with the use of music software." (Interviewee 4)
	Personalized learning	"Music software allows students to learn at their own pace and can accommodate different learning styles and speeds." (Interviewee 4)
Disadvantages	Technical issues	"One of the challenges I encounter in teaching with software is the learning curve associated with mastering the software." (Interviewee 4)
	Access inequality	"Not all students have access to the necessary equipment or internet connection to effectively use music software at home." (Interviewee 4)

In the secondary school music education system in contemporary times, educators face a range of notable advantages and challenges in using music software in relation to traditional instructional methods. The use of music software in teaching enriches pedagogical methods by making learning more dynamic and interactive; it also provides a comprehensive set of instructional tools that facilitate greater learner involvement. Additionally, it is a robust system for measurement and feedback, enabling easy tracking of work completed in assignments to identify areas for

improvement. To use music software effectively in their teaching, educators encounter challenges such as technical issues related to installing programs and updating software, as well as a lack of support and guidance. In conclusion, despite the advanced tools and resources that music software offers to facilitate music instruction, there is a significant need for reforms to enable its effective use.

From a learner's point of view, applying music software to secondary school music instruction brings a set of potential advantages and challenges compared to traditional methods of instruction. One of the basic advantages of applying music software is that it has a high potential to be interactive and personalized, allowing learners to work at their desired pace using virtual instruments and interactive components of software packages. The potential is likely to raise learning interest among learners. However, learners face a set of challenges, such as their capability to relate course material of music instruction to software program capabilities, implying that there is a learning process in applying such applications. In conclusion, despite music software having a high potential to enrich learning experiences, it also brings in relevant questions in terms of applying it and in need of support and guidance.

4. DISCUSSION

This section provides a systematic review of each research question, considering demographic variables, content, and related outcomes for each analysis. The study results confirm that educational institutions are committed to enhancing music courses through the substantive application of technology. However, resource inequality presents challenges, as some institutions possess better tools and technical support than others. This inconsistency affects the application and perceived impact of music software, highlighting the need for equitable support and resources to ensure consistent outcomes across various educational settings. The initial research question aimed to explore the beliefs of educators and learners regarding the impact of music software in contemporary secondary school settings compared to traditional methods. The findings indicate a significant need for music software, as it introduces a more interactive and engaging learning process. Educators benefit from the ability to personalize instructional materials and provide instant feedback, aspects that are often lacking in traditional methods. An interactive and engaging learning environment stimulates learners' interest in musical concepts, leading to better comprehension. The results support existing literature emphasizing that instructional technology can facilitate learner engagement and improve learning outcomes (Yu, 2020). Literature also suggests that educational settings that incorporate interactivity and multimedia can make abstract concepts more concrete and understandable (Crawford, 2020).

Educators frequently highlight music software's interactive and collaborative aspects, in line with constructivist learning philosophies that support student-centered learning contexts (Amineh & Asl, 2015). This view aligns with earlier studies that highlight the beneficial effects of technology use in learning settings, particularly in terms of increasing student engagement and improving learning outcomes (Wei, 2024). By using software tools such as GarageBand and Sibelius, educators can provide personalized feedback and facilitate a more dynamic and interactive process of music composition compared to the more formulaic instructional approaches of the past.

The use of music software in Shandong Province is a new trend. The issues faced by educators, such as the need for technical support and high demands for training, indicate the continued need to promote software technologies to a higher level. The current investigation found varying levels of adaptability; in particular, younger educators expressed a higher tendency to use computer software technology compared to their older counterparts. The results underscore the need to provide sufficient support and instruction in music software to close the gap between old and new ways of instruction.

The results related to Research Question 1 acknowledge music software's potential to enhance productivity in learning music in secondary school settings, while also considering challenges and contextual issues encountered. This recognition emphasizes the key role of personalized support in realizing the potential benefits of learning technologies, thereby contributing new insights to the existing body of knowledge in this area of study.

The second question sought to determine perceived advantages and disadvantages of music software used in educational settings in secondary school contexts, interpreted by educators and learners. The findings indicate that music software is perceived to provide multiple benefits such as instant feedback during class sessions and easy access to a wide range of musical material. The advantages concur with existing research that highlights the capability of educational technology to support learning processes and shed light on abstract musical concepts (Yusoff, Marzaini, Hassan, & Zakaria, 2023).

The uniqueness of this research lies in its in-depth inquiry into the challenges experienced by educators and learners in educational institutions in China, specifically in comparing their respective views. Most existing studies have largely neglected learners' views, mainly reporting educators' perspectives in their studies (Wei, 2024). The key limitations identified in this study include technical challenges, the high financial costs associated with acquiring high-standard music software, and a critical need for additional music education resources. Institutions facing financial constraints are more susceptible to these challenges, highlighting the importance of equitable access to technology across all educational institutions.

Teachers mainly viewed music software as a supplement to traditional music curricula, offering a range of learning materials to support learning in classrooms. The educators saw interest in the potential of the software to provide more interactive learning settings, in line with constructivist learning theory that highlights learner engagement and learner-centered learning experiences. The educators also highlighted challenges in applying music software, such as technical challenges, the need for computer knowledge, and over-reliance on technology that hampers basic musical knowledge and competencies.

Concurrently, a large percentage of the students expressed a positive appreciation of the wide range of in-depth and interactive learning possibilities presented by music software. The results highlighted that such software provided learners with a varied range of musical resources and allowed them to learn at their own pace in line with the principles of tiered instruction and personalized learning models. Such aspects were considered a considerable improvement over earlier learning methods that depended largely on strict and less interactive learning approaches. Some of the limitations that were found included discrepancies in software accessibility, a probable decline in actual use of regular instruments, and a potential distraction caused by educational material incorporated in the software.

5. CONCLUSION

The present study enhances our knowledge of knowledge-based education by providing a detailed analysis of the effects of music software on various educators and learners in the educational system. Furthermore, this study highlights the need for designing policies and practices that provide fair access to digital software tools for all students. Further studies need to determine the long-term effects of music software on the musical capabilities of students and their career prospects, in addition to evaluating professional support programs for educators in this field. Comparative studies in different educational institutions and various settings would enrich these results, providing a more integrated view of secondary music education impacted by music software.

The current study specifically undertakes a detailed analysis of these issues in Shandong Province. Analysis of the results provides notable observations regarding the challenges related to the use of technology in secondary school education in China, thereby offering a more in-depth explanation of the issues highlighted in earlier studies. The thematic analysis indicates that such challenges relate to the need for regular professional support and technical guidance, thus providing new insights into existing literature on educational technology. A comparison of these results with earlier studies reveals that, although music software has many benefits, the challenges highlighted in this current work require urgent interventions, despite its widely acknowledged advantages.

The findings not only support existing scholarship but also enrich the dialogue by providing practical recommendations that address previously identified challenges. By focusing on educators' and learners' experiences

in Shandong Province, the findings become more practical and actionable, thereby contributing to a more informed understanding of technology's role in contemporary education.

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Institutional Review Board Statement: The Ethical Committee of the University of Malaya, Malaysia has granted approval for this study on 8 November2024 (Ref. No. UM.TNC2/UMREC_3947).
Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
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