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Integration of Electronic Music Looping in Orchestra as an Innovative Teaching Resource

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Abstract
This study introduces an innovative approach to orchestral education by blending classical music principles with popular music elements and electronic looping technology. In a landscape where classical music often struggles to captivate students drawn to contemporary genres, this approach aims to maintain classical music's discipline while delivering a dynamic and engaging learning experience. The research evaluates student responses to the use of looping technology, examining its impact on learning outcomes and identifying associated benefits and challenges. A mixed-methods approach was employed, involving 37 students from an orchestral course at Universitas Negeri Padang. Data were collected through questionnaires, semi-structured interviews, and observations over one semester. The results reveal that electronic looping technology significantly enhances student interest and engagement, offering a fresh perspective on orchestral practice. The technology not only bridges classical and modern musical expressions but also facilitates individualized learning, enabling students to explore creativity within structured compositions. Most participants demonstrated a higher interest in repertoires incorporating looping technology than in traditional classical pieces. Furthermore, the integration of partiture-based learning with digital tools improved students' technical skills, rhythmic accuracy, and ensemble cohesion. However, challenges related to synchronization and technical setup highlight the need for targeted instructional strategies and technological support. The novelty of this study lies in its exploration of how digital tools like looping technology can revitalize classical music education, making it more relevant to today's students. These findings offer practical insights for music educators seeking to innovate teaching methods and adapt to the evolving digital landscape in education.

Keywords: Electronic Looping; Innovative; Orchestra; Popular Music; Teaching Materials

INTRODUCTION

In the field of music education, orchestras are traditionally associated with classical repertoires that emphasize the dominance of acoustic music. This traditional approach has long been a foundation in orchestral learning across various educational institutions, offering structured use of notation, clear guidance, and a focus on discipline, attention to detail, and teamwork. By learning to read scores accurately, students not only develop musical skills but also gain a deeper understanding of how each part contributes to the overall orchestral performance. However, the perception of classical music as less relevant to today's culture, particularly among younger generations, presents a challenge for music educators. Many young people are more accustomed to contemporary music genres, such as popular music, which are often perceived as more dynamic and relatable. This generational shift can hinder classical music's ability to attract new audiences and maintain its relevance in the modern era (Montsion et al., 2023; Prieur et al., 2023; Alvarez et al., 2025). As technology and societal tastes evolve, there is an increasing need for innovation in orchestral teaching methods that preserve the classical tradition while embracing modern music trends.

Music educators are responding to global changes and technological advancements by seeking ways to create a more dynamic and engaging learning environment (Camlin & Lisboa, 2021; Bautista et al., 2024; Pattananon et al., 2024). One promising strategy is the integration of popular music elements into orchestral education, combining the structured discipline of classical music with the appeal of contemporary genres. This approach aims to bridge the gap between tradition and modernity, making orchestral training more accessible and engaging for students. A specific approach to this integration involves the selection of popular music repertoires and the incorporation of electronic music looping into teaching materials. Looping technology, widely used in popular music, allows musicians to create and manipulate repeating sound patterns using computer applications. This technology not only offers creative possibilities but also aligns well with the interests of younger generations. When combined with orchestral music, looping introduces a fresh dimension to the learning experience, fostering creativity and encouraging students to explore new musical ideas (Parkita, 2021; Gallo & Kruse, 2024; Cohen, Armon, & Hershkovitz, 2025).

Existing literature suggests that innovations in teaching techniques and the integration of technology can significantly enhance music education (Michalko et al., 2022; Ng et al., 2024; Bai, 2025). The incorporation of technology in educational settings has been proven to support 21st-century learning, emphasizing critical thinking, collaboration, and digital literacy. However, effective implementation of these innovations depends not only on technological availability but also on the competence of educators to integrate technology into their teaching practices (Akram et al., 2021; Almusawi et al., 2021). This study aims to explore student responses to innovations in orchestral learning by merging classical music education—renowned for its disciplined and structured notation with popular music materials and the addition of electronic music looping. This blended approach is intended to offer a fresh perspective that aligns more closely with contemporary music trends while maintaining the educational value of classical orchestral training. The study will also investigate how students interact with technology in orchestral learning, and identify the benefits and challenges associated with its implementation.

The researchers hypothesize that integrating technology with classical and popular music elements can enhance students' motivation and accelerate their learning process. This aligns with Michalko's research, which highlights the potential of technological tools to improve music education by supporting students' physical, cognitive, and social development (Michalko et al., 2022). Additionally, the ease of using technology can facilitate the expression of creative ideas in music learning (Schiavio et al., 2021; Leavy et al., 2023). However, despite the growing adoption of technology in education, there are often insufficient resources and training to maximize its potential. This underscores the importance of focusing on improvements in technology application, particularly within music education (Serrano & Casanova, 2022; Wan, Crawford & Jenkins, 2023).

While previous studies have examined the general benefits of technology in music education and the significance of preserving classical music traditions, there is limited research specifically focused on the integration of popular music and electronic looping within orchestral education. Additionally, the impact of such innovations on student engagement, learning outcomes, and their perceptions of orchestral relevance has not been thoroughly explored. This study aims to address this gap by investigating how combining classical orchestral training with modern music elements and technology can enhance the learning experience, align with students' musical preferences, and contribute to sustaining the relevance of orchestral music in contemporary educational settings. The findings from this study are expected to provide valuable insights for music educators, helping them develop more effective teaching methods and adapt instructional approaches to better meet the needs and preferences of students in the digital age.

RESEARCH METHODS

This study employs a mixed-methods approach to evaluate the integration of electronic music looping in orchestral education. The methodology consists of two phases: quantitative data collection through questionnaires and qualitative analysis through interviews and observations. This approach has proven effective in exploring music education practices due to its ability to combine numerical and narrative data (Creswell & Clark, 2017). Participants and respondents include students enrolled in the orchestral course at the Music Education Program, Faculty of Language and Arts, Universitas Negeri Padang, with a total of 37 students completing the questionnaire. The research instruments include a questionnaire designed to gather data on students' experiences and perceptions of using electronic music looping in orchestral learning, and semi-structured interviews with both students and faculty to gain insights into the benefits and challenges of this technology. In this study, the instructor-researcher provided several music repertoires, including classical music without looping elements and pop music rearranged for orchestra with adjustments in orchestration and the addition of electronic music looping, to compare the effectiveness of student responses.

Observations were conducted during orchestra rehearsal sessions to monitor students' interactions with the new teaching materials. This participatory observation technique has been utilized in music education research to obtain authentic data on student behavior and participation (Patton, 2002). Interview and observation data were analyzed thematically to identify key themes and findings. Data collection for this study occurred over one academic semester, allowing for longitudinal observation of students' skill development and attitudes (Yin, 2011).

RESULTS AND DISCUSSION

3.1. Student Perceptions of Teaching Materials

Key aspects focused on when evaluating students' perceptions of teaching materials include the clarity of score notation, the integration of scores and music looping, students' understanding of orchestration concepts, and the effectiveness of teaching materials in enhancing students' ability to comprehend musical notation presented in scores. In terms of score clarity, the researcher utilized a questionnaire with questions addressing the clarity of notation, accuracy of rhythmic notation, dynamic markings, articulation, repetition symbols, tempo instructions, and phrase divisions.

Based on the questionnaire results regarding the clarity and organization of the score design used in the teaching materials, the majority of respondents provided positive feedback. Seventeen out of 36 respondents (approximately 47%) stated that the score design was very clear and well-structured, indicating that most students found the teaching materials to be presented with highly effective and easily understandable notation. Fourteen respondents (39%) rated the score design as clear and structured, which also reflects a positive perception, although there is still room for minor improvements in notation

presentation. Meanwhile, only 2 respondents (about 6%) felt that the score design was somewhat clear and structured, suggesting that a small number of students may have experienced some difficulty in understanding the structure and clarity of the provided score.

These results indicate that the score design used in the teaching materials is considered relatively effective and successful in delivering content clearly to the majority of students, although improvements are needed to enhance their learning experience. Interviews with several students revealed complaints about the notation size being too small, which hindered their ability to read and comprehend the score when printed. This suggests that font size and spacing between elements in the score need to be adjusted to ensure optimal readability. Additionally, attention should be given to using standard notation software and how scores are printed (Vear, 2019). Moreover, narrow spacing between notation lines and the placement of musical elements such as dynamic markings and tempo indications also made reading somewhat difficult for students. Therefore, it is important to adjust score writing to make it easy and clear to read. These adjustments can impact the overall effectiveness of the teaching materials (Gould, 2016)

The next aspect is the integration of scores and electronic music looping. In this aspect, the researcher focused on the synchronization between the music written in the score and the looping elements. The researcher also evaluated the use of Ableton Live hardware and software from the students' perspective, as well as the musical communication established when using the looping technology. Data from the questionnaire distributed on this aspect of integration is as follows:

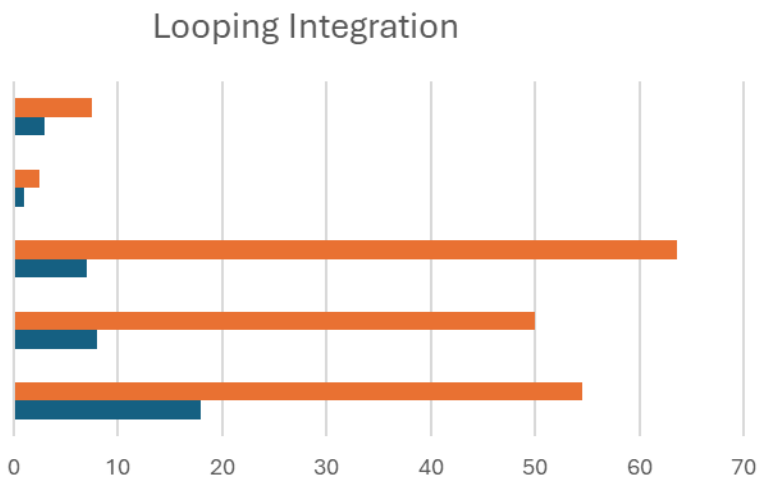

Figure 1. Looping Integration

Based on the questionnaire results regarding the ease of integrating score-based teaching materials with electronic music looping, the majority of respondents provided positive feedback. Eighteen respondents (54.55%) stated that the teaching materials were very easy to use. Additionally, 8 respondents (50.00%) found the materials easy to follow, although some elements required further attention. On the other hand, 7 respondents (63.64%) considered the materials reasonably easy, indicating that while usable, some aspects needed clearer explanations and instructions. Only 1 respondent (2.44%) found the materials difficult to understand, while 3 respondents (7.50%) chose not to provide feedback.

In addition to the questionnaire data, interviews with several students were conducted to gain deeper insights into their perceptions of the integration of scores and electronic music looping. One student mentioned that while looping introduced a new level of innovation, some parts were confusing when trying to synchronize with the score. Another student added that although the score was relatively clear, aligning

the tempo with the looping was sometimes challenging. This suggests that attention is needed in synchronization when using looping, as there is a possibility of the conductor making errors in tempo cues.

In the integration of looping with orchestras, the conductor and drummer play key roles in controlling the tempo. A metronome is routed through a soundcard to the conductor's and drummer's headphones. This setup is necessary because visually, the conductor provides cues through gestures while the drummer maintains rhythm cues. Careful attention is required when implementing these teaching materials, as there is a risk of errors from either party in maintaining tempo alignment. Regarding the application used, student feedback was varied. One student commented, Ableton Live is a very interesting software because it includes a variety of sounds. Additionally, Ableton is very user-friendly (Chambers, 2022; Ivascu et al., 2023). However, for some students unfamiliar with this technology, understanding it takes longer, and coordination between the conductor and players in looping synchronization can be hampered, especially when sound systems or technical equipment experience issues, such as unclear or distorted looping sounds.

In terms of musical communication and interaction, some students experienced challenges adapting to the use of loops in ensembles. One student noted that coordination between orchestra players and loop usage was intriguing but required different communication methods, both visually and through conductor cues, as rhythm was not always controlled by the players but by the electronic loop. These interviews suggest that Ableton Live and related devices offer opportunities for innovation in learning, although students still face challenges, both technically in using the software and in communication, particularly in synchronizing live and looping elements.

In the next aspect, the researcher explored the potential of these teaching materials in providing a novel experience that could enhance students' understanding of music. This includes students' comprehension of orchestration, understanding musical style notation, music structure, and rhythm reading skills.

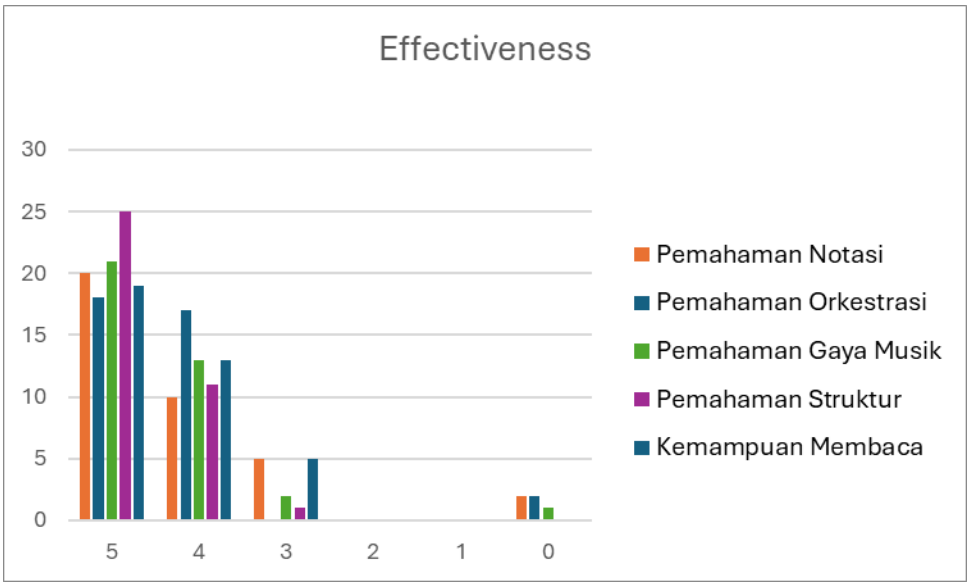

Figure 2. Effectiveness of looping technology in various aspects of orchestral practice

The graph above presents the data from a questionnaire evaluating students' perceptions of the effectiveness of looping technology in various aspects of orchestral practice. The effectiveness data is converted into a Likert scale, with the highest effectiveness level represented by a score of 5, while a score of 0 indicates respondents who did not answer.

This effectiveness graph illustrates how five key aspects of orchestral learning—understanding of musical notation, orchestration, musical style, rhythm and music structure, and notation reading skills within the context of looping—are rated by students. Overall, the majority of students assigned high scores, specifically 4 and 5, to these five aspects, indicating that the teaching materials used are highly effective in enhancing their understanding. Most students rated the effectiveness of notation mastery through the provided materials as a 5, reflecting that they found the materials very helpful in mastering notation. Similar results were observed for orchestration understanding, where scores of 4 and 5 were predominant, indicating a positive perception of students' understanding of orchestration in orchestral learning. This improvement in understanding can be attributed to the difference in teaching materials that enhance motivation and curiosity, leading students to engage more seriously in learning and practice (Inayat & Ali, 2020). Furthermore, for the aspect of understanding musical style, a similar trend is evident, with most students giving high ratings, although some rated it as 3, suggesting that a few students might still require a deeper understanding. Overall, the musical style taught is considered well-understood by the students.

Understanding rhythm and music structure also showed excellent results, with the majority of students giving scores of 5 and 4, indicating comfort in understanding the rhythmic structure taught, particularly within the orchestral context. Only a small number experienced difficulties, as evidenced by a few scores of 3 or lower. Lastly, for the aspect of reading musical notation in the context of looping technology, the majority of students provided high scores, demonstrating that the integration of looping technology in teaching effectively improved their ability to read musical notation. This is consistent with findings that appropriate technology use can significantly enhance students' skills in reading musical notation. Rexhepi et al., (2024), as well as the notion that mental representation used in music reading, and how this representation is manifested in the brain, can be stimulated by the auditory responses of looping sounds which also represent the orchestration of the created score. Nevertheless, some students provided lower scores, indicating that challenges still exist in applying this technology in an orchestral context.

This data is further supported by research indicating that digital technology can boost understanding and reading of notation more effectively. Learning with digital resources and tools in music education has been shown to enhance interest in learning and better develop creativity (Cayari, 2021; Candel et al., 2022; Liu et al., 2023). Overall, the data suggests that innovative approaches, including the integration of looping technology and modern musical style teaching, are highly beneficial in improving students' comprehensive understanding of orchestral concepts. However, there is still room for improvement, particularly in ensuring that all students can keep pace with the technological advancements applied in teaching. Thus, this research highlights the importance of innovation in music teaching methods, especially in the orchestral context, to accommodate students' needs in the digital age.

3.2. Comparison Analysis of Orchestral Music Repertoire

This comparative analysis is based on data obtained through observations and questionnaires. In this course, students were provided with two different types of repertoires: the first being traditional classical and pop repertoires without looping, and the second being popular repertoires with integrated looping elements. The aim of this comparison is to assess student responses to these two types of instructional materials. According to the observation results, students displayed different responses to the two types of repertoires. For the classical repertoire, students appeared less enthusiastic. While most followed the lessons adequately, they did not demonstrate deep interest or further exploration. Approximately 30% of students expressed interest in studying classical repertoire in depth, while the remaining 70% found it less engaging and less aligned with their interest in more modern music.

In contrast, when provided with repertoire incorporating looping, student enthusiasm significantly increased. About 85% of students showed greater interest, with some actively exploring ways to modify the looping elements to create more personalized interpretations. They were more likely to ask questions, engage in discussions, and show initiative in exploring creative possibilities within the arrangements

In terms of difficulty, classical repertoire is perceived as more challenging for most students. Approximately 60% of students reported that classical pieces require extra effort, particularly in technical and interpretative aspects. Technically, popular repertoire with looping is easier to play, and the addition of electronic elements makes these arrangements more vibrant[20]. Students felt that repertoire with looping is more relevant to their modern musical skills and helps them achieve better results in a shorter time.

Additionally, regarding compositional dynamics, students enjoyed the variety and freedom provided by the repertoire incorporating looping. They felt that these compositions offered greater flexibility in interpretation and expression, resonating more with their youthful emotions, whereas classical repertoire tends to be more rigid and less conducive to improvisation. Overall, repertoire with looping was found to be more engaging for students due to its alignment with modern music trends (Huang, 2023) and its relative ease of play compared to classical repertoire. This finding aligns with Mazur & Laguna (2019) research, which indicates that affect (emotion) has a significant impact on cognitive processes and motivation in pursuing goals, including in the context of learning musical instruments.

3.3. Benefits and Challenges

The benefits and challenges discussed are based on students' perspectives regarding the difficulties they encountered while using the instructional materials. According to interviews with students, several challenges associated with the use of looping-based and orchestral score materials can be categorized into the following aspects: synchronization, tempo alignment, score reading, and students' adaptation to new technology.

Table 1. The findings on the benefits from these interviews

Category	Description	Frequency
Ease and Efficiency of Practice	Facilitates reading scores, understanding rhythm and tempo, and saves practice time with looping that maintains consistent tempo.	16
Increased Creativity and Motivation	Enhances student motivation and creativity by providing interactive material and introducing new elements to music performance.	9
Development of Musical Skills	Facilitates better understanding of musical structure and instrument techniques, and improves musical quality with more precise tempo.	10
Innovation in Learning	Combines score theory with looping technology, creating a more engaging learning experience that aligns with advancements in music technology.	8

The integration of teaching materials such as scores with electronic music looping offers several significant benefits in the music learning process. Generally, the primary benefits of this approach include ease and efficiency of practice, increased creativity and motivation, development of musical skills, and innovation in learning. Ease and efficiency in practice are the most apparent benefits. The use of electronic music looping simplifies students' ability to read scores and understand rhythm and tempo. This aligns with technology-based learning theories, which suggest that technological aids can enhance the efficiency and effectiveness of learning

Looping helps maintain consistent tempo, speeding up the practice process and allowing students to focus more on the technical and artistic aspects of music (Mazur & Laguna, 2019; Trapkus, 2023; Jiang, Cheong, & Tan, 2024). Increased creativity and motivation are other significant benefits. Intention or willingness to use technology significantly impacts the effectiveness of digital learning. Interactive and

innovative materials, such as those provided by looping technology, can enhance student motivation and stimulate their creativity. According to students, looping makes the timbre of the music more dynamic and colorful. This is consistent with the growing role of timbre in contemporary popular music, which reflects trends in the music market today (Melzner & Raghubir, 2023; Kim & Askin, 2024; Morrison, 2024).

Development of musical skills is also a notable benefit. Electronic music looping supports a better understanding of musical structure and instrument techniques, and improves musical quality. This aligns with active learning theories, which emphasize the importance of direct interaction with materials to deepen understanding (Lombardi et al., 2021; Hailikari et al., 2022; Sliwka et al., 2024). With the help of looping, students can more easily internalize the structure and techniques needed to achieve higher skill levels. Innovation in learning is crucial to remain relevant with current technological advancements in music. This underscores the importance of innovation in education to keep teaching materials relevant and enhance teaching effectiveness (Asmayawati, 2024; Lan, 2024). The integration of scores with looping technology certainly provides a new learning experience that meets the needs of students in the digital age.

Table 2. Categorization of the challenges based on the questionnaire

Category of Challenges	Example Responses	Frequency
Synchronization and Tempo	- "The looping music does not sync with the performer." - "Must focus while playing, as missing even one beat can result in errors." - "Need to follow the click or set tempo."	7
Difficulty in Reading Scores	- "It is somewhat difficult to read the score if not familiar with it." - "Scores that have not been studied before are challenging."	4
Lack of Practice and Experience	- "Difficulty due to insufficient practice." - "Need to keep learning to better master the instructional materials."	4
Application and Technology	- "Difficulty using the application." - "Installation of the application is a challenge.	3
Creative and Conceptual Challenges	- "Excessive use of electronic looping can reduce interest in playing instruments manually." - "Need to balance so that electronic music does not undermine the essence of traditional scores."	2
No Challenges	- "So far, there are no challenges." - "No deficiencies." - "I don’t think there are any challenges."	11

Synchronization and Tempo is the most frequently mentioned challenge, with a frequency of 7. This issue includes discrepancies between the looping music and the performer, as well as the need for high concentration to follow the set tempo. Tempo mismatches or synchronization problems can disrupt the learning process and reduce the expected benefits of technological innovations in the instructional materials. Difficulty in Reading Scores appears with a frequency of 4. Some students experience challenges in reading scores, especially if they are not familiar with new material or scores. Understanding instructional materials, including scores, requires time and consistent practice (Main, S., & Slater, 2022; Zhou, 2023). This difficulty underscores the need for approaches that support comprehension of scores to ensure students can effectively utilize looping technology.

Lack of Practice and Experience is also noted with a frequency of 4. Students expressed difficulties arising from insufficient practice and experience with the instructional materials. Adequate practice and direct experience are crucial for mastering new skills and will result in a musical experience that correlates

with intelligence (Lippolis et al., 2022; Passarotto et al., 2022). Insufficient practice time can slow down the learning process and affect the effectiveness of technology use. Furthermore, Application and Technology present a challenge with a frequency of 3. Difficulties in using applications and the technology installation process were also reported. Educational technology development theories suggest that technical issues and implementation difficulties can hinder the use of technology in education (Vinnervik, 2022; Abedi., 2024). Resolving technical issues and acquiring knowledge about application use could be solutions to this challenge.

Creative and Conceptual Challenges were identified with a frequency of 2. Some students feel that the use of electronic looping can diminish interest in playing instruments manually and undermine the essence of traditional scores. Balancing technology and traditional methods is crucial to maintain the artistic integrity of the orchestra itself (Ma & Chen, 2024; Palazzolo, 2024). No Challenges was reported with the highest frequency of 11, indicating that some students did not experience significant issues with the use of this technology. This suggests that for some students, the integration of technology can proceed smoothly without major problems

CONCLUSION

The results of this study indicate that the use of score-based teaching materials integrated with electronic music looping technology is effective in improving students' understanding and skills in orchestral learning. Data from questionnaires and interviews showed that 86% of respondents considered the score design clear and easy to follow, and most students felt the benefits of integrating looping technology in facilitating synchronization during practice, although there were still technical challenges related to synchronization and tempo. The use of Ableton Live technology and electronic music looping not only motivated students but also provided wider opportunities for creative exploration. Around 85% of students showed greater interest in repertoires that used looping compared to classical repertoires, indicating that looping-based repertoires are more relevant to modern music skills. Qualitatively, the integration of looping technology in orchestral teaching materials provides several important benefits, including increasing practice efficiency, expanding student creativity, and supporting the development of musical skills that are in accordance with the demands of the contemporary music industry. The looping feature allows students to practice repeatedly on certain parts, thereby increasing in-depth mastery of skills. In addition, the flexibility of electronic musical instruments encourages students to express their creativity and experiment with new musical ideas, which ultimately strengthens their critical and innovative thinking skills. However, this study also shows challenges, especially in terms of technical issues such as synchronization and students' lack of experience in using the technology. Therefore, further development is needed in technical aspects, including additional training and the development of clearer instructional guides so that students can maximize the benefits of this technology-based learning. The implications of this study are quite broad, especially in supporting 21st-century learning that emphasizes creativity, critical thinking skills, and mastery of technology. The success of this approach shows its potential to be adapted in other music education contexts, both in ensemble practice and individual music training. In addition, this approach also opens up opportunities to develop innovative learning models through collaboration with professional musicians and educators, which can bridge the classical orchestral tradition with modern music production techniques. Further research can be conducted to evaluate the long-term impact of the use of looping technology on improving students' musical skills and engagement in learning. This study can also be expanded by examining the application of this method to various music genres and different learning environments. With a more comprehensive approach, the use of technology-based orchestral teaching materials can be an alternative effective, innovative, and relevant learning media to create a more interactive, enjoyable learning atmosphere that suits the needs of students in this digital era.

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