

Utilizing DAW FL Studio as a Transformation of Traditional Music Learning to Digital Media

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ABSTRACT

This study examines the pedagogical role of Digital Audio Workstation (DAW) in traditional music learning among students of the Music, Dance, and Drama Education Study Program at the University of Palangka Raya. The research aims to analyze the functions of digital media, the role of DAW in the learning process, student interactions, creative exploration, and the integration of traditional music into digital environments. A qualitative case study approach was employed involving 21 students enrolled in the Central Kalimantan Traditional Music course. Data were collected through participatory observation, semi-structured interviews, documentation of student arrangement projects, FL Studio project files, audio recordings, and field notes. Data were analyzed using an interactive model and thematic analysis. The findings reveal that FL Studio functioned as a medium for musical exploration, production, and evaluation by enabling students to repeatedly revise and refine their musical arrangements. The learning process was characterized by active collaboration, peer assistance, lecturer guidance, and reflective practice, indicating the presence of scaffolding and collaborative knowledge construction. Students demonstrated creative exploration through experimentation with rhythm, melody, layering, and instrumentation while adapting traditional musical elements into digital formats. The integration of traditional instruments such as Panting Dayak, Rebana, and Gong Dayak into digital arrangements further demonstrated the potential of DAW-based learning to support cultural preservation and revitalization. The study concludes that DAW functions not only as a music production tool but also as a pedagogical environment that facilitates creativity, learner autonomy, collaborative learning, and cultural sustainability in higher education traditional music learning contexts.

KEYWORDS

Digital Audio
Workstation
Music Learning
Sosial Constructivism
Collaborative Learning

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INTRODUCTION

The development of digital technology has shifted the learning paradigm from a transmissive model toward constructive and participatory models, particularly in music education. The integration of digital technology enables the learning process to become more interactive, flexible, and practice-based. Music education in the digital era requires the integration of artistic and technological dimensions to remain relevant to contemporary educational demands. Digital technology not only supports technical learning processes but also facilitates creative exploration and independent learning experiences among students (Giri, 2023). This is consistent with research stating that the integration of technology in music arts learning contributes to the improvement of students' creativity and musical competence (Purbawati et al., 2024).

The utilization of digital media in music learning has also encouraged the emergence of various adaptive learning media innovations. Digital media no longer functions merely as a supplementary tool but has become a primary component in supporting effective, contextual,

and student-centered learning processes. In the context of culture-based learning, the use of digital media has been proven capable of enhancing learning effectiveness while simultaneously strengthening the relationship between learning materials and local cultural contexts (Puspita et al., 2025; Samosir et al., 2023). This development is particularly important in arts education, where learning outcomes are closely related to experience, reflection, and creative production.

However, traditional music learning in higher education is still largely dominated by imitation and repetition approaches that tend to limit students' opportunities for musical exploration. Although such approaches are effective in transmitting technical skills and cultural values, they often provide limited space for reflection, experimentation, and independent creativity (Han et al., 2022). This condition becomes increasingly problematic in the context of contemporary higher education, where students are expected to develop critical thinking, creative problem-solving, and artistic innovation.

In addition, the decreasing interest of younger generations in traditional music creates an urgent challenge for educators to design learning approaches that are both culturally relevant and technologically engaging. The influence of modernization and digital culture has shifted students' attention toward popular and globalized music practices, while local traditional music often receives less engagement and appreciation (Mantzou et al., 2023). In the context of traditional coastal music of Kalimantan, this issue becomes even more significant. Traditional music from coastal communities in Kalimantan contains distinctive rhythmic patterns, melodic structures, and cultural expressions that reflect local identity and collective memory. However, its transmission among younger generations faces serious challenges due to modernization, limited documentation, and reduced direct engagement with traditional artistic practices. Therefore, innovative learning media are needed not only to support musical learning but also to preserve and revitalize local cultural heritage.

Music technology-based digital media offers new possibilities as a more flexible space for musical exploration, representation, and cultural preservation. Digital-based learning media functions not only as a supporting tool but also as a transformative medium in music learning. The integration of digital music technology is capable of transforming music arts learning from a performative practice model into a creative production-based learning model (M. R. Maulana et al., 2025). Furthermore, the development of digital-based learning media in arts education has been proven capable of increasing learner engagement, motivation, and independent learning behavior (Darpindo & Yahya, 2024).

One form of technology that is highly relevant to music learning is the Digital Audio Workstation (DAW). A Digital Audio Workstation is software designed for recording, editing, arranging, mixing, and producing music in an integrated digital environment (Putra & Sepdwiko, 2024). The use of DAW enables students to perform sound exploration, music production, and direct evaluation of musical results within a single system (Chrisanto, 2021). Through real-time auditory feedback, students can revise rhythmic structures, melodic arrangements, dynamics, and instrumentation more effectively. This process supports reflective learning and strengthens students' practical competence in music arrangement. DAW-based learning has also been shown to enhance students' musical skills through a more practical, independent, and structured learning approach (M. A. Maulana et al., 2026).

This study is grounded in social constructivist learning theory, particularly the perspective of Lev Vygotsky, which emphasizes that knowledge is actively constructed through social interaction, learning experiences, reflection, and collaborative problem-solving. According to Tohari and Rahman (2024), two important concepts in Vygotsky's theory are the Zone of Proximal Development (ZPD) and scaffolding, where students can

achieve higher levels of understanding through guided interaction and support from lecturers or more knowledgeable peers. Learning is therefore not viewed as a passive transfer of information, but as an active process in which students construct meaning through engagement with their environment, social collaboration, and reflective practice (Tohari & Rahman, 2024).

This perspective is highly relevant to music learning, particularly in the use of Digital Audio Workstation (DAW), where students are encouraged to explore, revise, and reflect on their musical ideas independently while still receiving facilitative guidance from lecturers. Through DAW, students engage in repeated experimentation, immediate auditory evaluation, and collaborative problem-solving, which align closely with constructivist learning principles. As stated by Wibowo et al. (2025), technology-supported learning environments strengthen student-centered learning by providing opportunities for active participation, independent inquiry, and contextual understanding. In this context, technology functions not merely as a technical instrument but as a cognitive and creative learning space that supports artistic development, critical thinking, and meaningful musical engagement.

Previous have generally examined Digital Audio Workstations (DAWs) from the perspective of technical skill development, music production competence, and technology-assisted music learning effectiveness (Darpindo & Yahya, 2024; M. A. Maulana et al., 2026). These studies demonstrate that DAWs can improve musical skills and facilitate independent learning. However, limited attention has been given to how DAWs function as pedagogical environments that shape students' cognitive processes, social interactions, and creative meaning-making, particularly within the context of traditional music learning.

Furthermore, existing studies rarely investigate how digital technology mediates the preservation and reinterpretation of local musical traditions in higher education settings. In the context of traditional coastal music of Kalimantan, research remains scarce regarding how students negotiate cultural authenticity, technological adaptation, and collaborative learning processes while using DAWs. Consequently, there is still a lack of understanding concerning the pedagogical mechanisms through which digital media support creativity, cultural preservation, and knowledge construction in traditional music education.

Grounded in Vygotsky's social constructivist theory, this study addresses this gap by examining how students construct musical understanding through interaction with digital media, lecturers, and peers during DAW-based traditional music learning. The novelty of this study lies in conceptualizing the Digital Audio Workstation not merely as a music production technology but as a socio-constructivist pedagogical environment that facilitates creative exploration, collaborative learning, and the preservation of traditional music within higher education. Accordingly, this study aims to analyze the functions of digital media, the role of DAW in the learning process, and student interactions in learning traditional coastal music of Kalimantan among students of the Music, Dance, and Drama Education Study Program at University of Palangka Raya.

METHOD

This study employed a qualitative approach using a case study design to gain an in-depth understanding of the utilization of Digital Audio Workstations (DAWs) in traditional music learning. A qualitative approach was selected because it enables researchers to explore participants' experiences, perceptions, meanings, and interactions within a natural setting, thereby facilitating a comprehensive understanding of social and educational phenomena (Fadli, 2021). A case study design was considered appropriate because it allows researchers

to investigate a phenomenon comprehensively within its real-life context by considering contextual factors and utilizing multiple sources of evidence (Siregar & Murhayati, 2024).

The case examined in this study was the implementation of FL Studio as a Digital Audio Workstation in the Central Kalimantan Traditional Music course offered by the Music, Dance, and Drama Education Study Program at University of Palangka Raya. This case was selected purposively because it represents a learning context in which digital music technology is integrated into traditional music instruction. The bounded system of the case consisted of a specific group of students enrolled in the course, the learning activities conducted within the course, and the implementation period from September to November 2025. The study focused on understanding how students interacted with digital media, constructed musical understanding, and adapted traditional musical elements through DAW-based learning activities.

The participants consisted of 21 students enrolled in the Central Kalimantan Traditional Music course. Participants were selected through purposive sampling based on their active involvement in digital music learning activities and traditional music arrangement projects. To obtain richer and more detailed information, semi-structured interviews were conducted with selected participants who demonstrated varying levels of engagement and learning experiences throughout the course.

Data were collected through participatory observation, semi-structured interviews, and documentation. Participatory observation was conducted throughout the learning process to examine students' interactions with FL Studio, collaborative learning activities, problem-solving strategies, and creative exploration during traditional music arrangement tasks. Field notes were systematically recorded during each observation session. Semi-structured interviews were conducted using an interview guide developed from the research objectives and theoretical framework. The interviews explored students' experiences, perceptions, learning challenges, creative processes, interactions with peers and lecturers, and reflections on the use of DAW in traditional music learning. Documentation data consisted of students' arrangement projects, audio recordings, screenshots of FL Studio work sessions, learning portfolios, and other relevant learning artifacts that supported the interpretation of findings.

Data analysis employed an interactive model consisting of data reduction, data display, and conclusion drawing (Fadli, 2021). After the data were organized, thematic analysis was conducted to identify, categorize, and interpret recurring patterns across the dataset. The analysis involved several stages, including data familiarization, coding, theme development, theme review, and interpretation. Through this process, themes related to media functions, media roles, student interactions, creative exploration, and cultural adaptation were identified. To strengthen the analytical process, the interpretation of findings was guided by Vygotsky's social constructivist perspective, particularly the concepts of scaffolding and the Zone of Proximal Development (ZPD), in order to understand how students developed musical competencies through interactions with digital media, lecturers, and peers.

The trustworthiness of the data was established through source triangulation, technique triangulation, and member checking (Mekarisce, 2020). Source triangulation was conducted by comparing information obtained from different participants regarding similar learning experiences during DAW-based traditional music learning. Students' perceptions of musical exploration, creative processes, and the use of FL Studio were compared across interview participants and subsequently verified using supporting learning artifacts.

Technique triangulation was carried out by comparing findings obtained from participatory observations, semi-structured interviews, and documentation. Observation data concerning students' learning activities, collaborative interactions, and arrangement revision

processes were cross-checked with interview data and documentation in the form of students' arrangement outputs, FL Studio project files, audio recordings, and field notes. The consistency of findings across these different data sources was used to strengthen the credibility of the identified themes.

Member checking was conducted after the preliminary themes and interpretations had been developed. Summaries of interview results and initial interpretations were returned to selected participants to confirm whether the findings accurately represented their learning experiences. Participants were invited to provide clarification, correction, or additional explanations when necessary. Feedback obtained during this process was incorporated into the refinement of themes related to media functions, student interactions, creative exploration, and the adaptation of traditional music into digital environments.

RESULT AND DISCUSSION

Functions of Digital Media in Traditional Music Learning

The results of the study indicate that The findings indicate that FL Studio functioned as a medium for musical exploration, production, and evaluation in traditional music learning. Observation data showed that students repeatedly listened to and revised their arrangements throughout the learning process. Students frequently modified rhythmic structures, melodic patterns, instrument combinations, and dynamic levels after evaluating the playback results generated by the software. This iterative process was also evident in students' FL Studio project files, which showed multiple revisions before the final version was completed.

Analysis of students' arrangement projects and audio recordings further demonstrated that the Digital Audio Workstation enabled students to experiment with different musical alternatives while maintaining the characteristics of Central Kalimantan traditional music. Most projects underwent approximately four to five revisions, indicating that students continuously evaluated and refined their musical ideas.

Interview data supported these findings. One participant explained: "I can immediately hear the results of my music arrangement directly with FL Studio. It makes things easier when something needs to be changed, added, or removed." (Informant 1, interview, 2026).

Similarly, observation notes revealed that students frequently replayed specific sections of their arrangements before determining the final musical structure. These findings suggest that FL Studio functioned not only as a technical production tool but also as a medium that facilitated continuous musical exploration, evaluation, and revision.



Figure 1. workshop FL Studio as DAW

The Role of Media in the Learning Process

The findings revealed that FL Studio played a significant role in creating a more interactive and student-centered learning environment. Observation data showed that students actively engaged in musical exploration rather than merely receiving information from lecturers. Students independently experimented with arrangement alternatives, adjusted musical structures, and evaluated their own work throughout the learning process.

Analysis of project files demonstrated that students developed individual learning strategies while working on their arrangements. The flexibility of digital media enabled students to revisit, revise, and improve their projects according to their own pace and learning preferences.

This finding was reflected in the following interview excerpt: “It is more exciting than learning traditional music manually. I am no longer afraid of making mistakes, so I can explore all my ideas.” (Informant 2, interview, 2026).

Creative Exploration Through DAW

Analysis A recurring pattern identified across observations, interviews, arrangement projects, and audio recordings was students’ engagement in creative exploration. Students frequently experimented with rhythmic variations, melodic developments, layering techniques, and instrument combinations while arranging traditional coastal music.

Analysis of FL Studio project files showed that students created several arrangement versions before selecting the final composition. Audio recordings revealed noticeable differences between early drafts and final outputs, indicating continuous experimentation and refinement throughout the learning process.



Figure 2. Students’ FL Studio Project

Observation data further showed that students often compared different arrangement possibilities by modifying tempo, texture, and instrumentation. This process enabled them to evaluate aesthetic suitability while preserving traditional musical characteristics.

One participant stated: “There are certain parts that I repeated to create the right arrangement. The good thing is that the arrangement can be heard immediately, so I know where the shortcomings are.” (Informant 3, interview, 2026). These findings indicate that FL Studio provided a creative environment that encouraged experimentation, reflection, and iterative musical development.

Student Interaction and Collaborative Learning

Observation data indicated that learning activities were characterized by intensive interaction among students. During arrangement projects, students frequently discussed the use of FL Studio features, exchanged musical ideas, and collaboratively solved technical problems encountered during music production.

Peer assistance was commonly observed, particularly when students experienced difficulties in editing audio tracks, arranging musical structures, or integrating traditional musical elements into digital formats. More experienced students often demonstrated specific software functions and provided guidance to classmates who were less familiar with the program.

Observation data also revealed that students who were more familiar with FL Studio frequently assisted peers in understanding software features, editing audio tracks, and developing arrangement structures. Lecturer feedback was likewise provided during revision activities, particularly when students encountered difficulties in adapting traditional musical elements into digital formats. These interactions indicate the presence of scaffolding, in which temporary support from lecturers and more knowledgeable peers enabled students to accomplish tasks that they initially could not perform independently. As students gained greater familiarity with the software and arrangement process, they became increasingly capable of revising, evaluating, and refining their projects without direct assistance, suggesting movement within the Zone of Proximal Development (ZPD).

Field notes documented multiple instances of collaborative problem-solving during arrangement tasks. Students frequently shared arrangement strategies, discussed revision alternatives, and exchanged feedback regarding the quality of their musical outputs.

The collaborative learning process was also evident during revision activities, where students evaluated each other's work and suggested improvements. These findings indicate that students' learning experiences were shaped not only through interaction with technology but also through social interaction and peer support.



Figure 3. Student Interaction with FL Studio

Integration of Traditional Music into Digital Media

The results of the study indicate that students adapted elements of traditional music into digital arrangements. Analysis of arrangement outputs, FL Studio project files, and audio recordings demonstrated the incorporation of traditional rhythmic patterns, melodic structures, and timbral characteristics into digitally produced compositions.

Several traditional instruments, including Panting Dayak, Rebana, and Gong Dayak, were integrated into students' arrangements and combined with modern instruments such as electric bass guitar. This integration created hybrid musical textures while maintaining the identity of the original musical traditions.

Observation data indicated that one of the primary challenges encountered by students was the limited availability of traditional instrument sounds within FL Studio's standard sound libraries. To address this limitation, students recorded traditional instruments directly and imported the recordings into FL Studio as audio samples. This challenge was reflected in the following interview statement: "It is sometimes difficult to adapt traditional instruments to FL Studio, as the sampling is unavailable. So there are some traditional instruments that I recorded myself." (Informant 4, interview, 2026).

Analysis of the completed arrangements showed that the use of recorded traditional instrument samples enabled students to preserve important sonic characteristics while adapting traditional music into a digital production environment. These findings demonstrate that digital technology served not only as a production tool but also as a medium for cultural adaptation and preservation.



Figure 4. Recording Traditional Instrument

Learning Experience and Confidence Development

The use of FL Studio had a positive impact on students' learning experiences. Across interviews, observations, and learning artifacts, students consistently reported increased motivation, engagement, and confidence in arranging traditional music.

Observation data showed that students became more active during learning activities and demonstrated greater independence in completing arrangement projects. As the learning process progressed, students displayed increased confidence when presenting their musical works and discussing their creative decisions.

Interview findings supported these observations. One participant explained: "I am very happy. I can be more confident in arranging Central Kalimantan traditional music on my own." (Informant 5, interview, 2026). Similarly, observation notes indicated that students

became more willing to revise, experiment, and present their work after gaining familiarity with the software. The opportunity to hear arrangement results immediately and revise them repeatedly reduced anxiety associated with making mistakes and encouraged greater participation in the creative process.

These findings suggest that DAW-based learning contributed not only to the development of technical competencies but also to increased confidence, motivation, and engagement in traditional music learning.



Figure 5. Student Learning Result

Media as a Cognitive and Creative Learning Environment

The findings of this study demonstrate that FL Studio functioned not merely as a technical production tool but also as a cognitive and creative learning environment. Evidence from students' arrangement projects, FL Studio project files, and audio recordings showed that students repeatedly revised rhythmic structures, melodic patterns, instrumentation, and dynamics before finalizing their musical works. Most projects underwent four to five revisions, indicating that learning occurred through continuous experimentation, evaluation, and reflection.

This iterative process reflects the principles of constructivist learning theory, which views knowledge as actively constructed through experience rather than passively received. The immediate auditory feedback provided by FL Studio enabled students to compare alternative musical ideas, identify weaknesses in their arrangements, and make informed musical decisions. Through this process, students became active participants in constructing musical understanding.

These findings support the argument of Zakiah et al. (2022), who state that digital music software facilitates conceptual understanding by transforming abstract musical ideas into audible and visual forms. Similarly, Saputra et al. (2024) found that DAW-based learning environments encourage creativity and musical experimentation. Therefore, FL Studio can be understood as a medium that bridges theoretical musical knowledge and practical creative application.

Scaffolding and the Zone of Proximal Development

An important finding of this study was the occurrence of collaborative learning processes during DAW-based traditional music learning. Observation data showed that students frequently discussed arrangement strategies, exchanged musical ideas, and assisted peers in solving technical problems related to FL Studio. More experienced students often guided classmates who were less familiar with the software, while lecturers provided feedback during revision activities.

These findings can be interpreted through Vygotsky's social constructivist theory, particularly the concepts of scaffolding and the Zone of Proximal Development (ZPD). The assistance provided by lecturers and more knowledgeable peers functioned as scaffolding that enabled students to complete tasks that they initially could not accomplish independently. As students became more familiar with FL Studio and the arrangement process, they gradually developed the ability to revise, evaluate, and refine their musical works without direct support.

This finding suggests that learning did not occur solely through interaction with technology but also through social interaction. The DAW served as a collaborative learning space where knowledge was co-constructed through dialogue, feedback, and shared problem-solving. This result supports Tohari & Rahman (2024), who argue that learning becomes more effective when students receive appropriate support within their Zone of Proximal Development before gradually achieving independent performance. This finding supports previous studies by Darpindo & Yahya (2024), who found that DAW integration increases learner autonomy and participation in music learning. Likewise, M. A. Maulana et al. (2026), emphasize that digital learning environments encourage self-regulated learning behaviors, allowing students to develop responsibility for their own progress. In this sense, technology becomes not only a tool of instruction but also an instrument for pedagogical transformation.

Moreover, this student-centered approach reduces the fear of making mistakes, which often becomes a barrier in creative disciplines. Because revisions can be made repeatedly without permanent consequences, students feel psychologically safer to explore musical possibilities. Learning environments that tolerate mistakes have been shown to positively influence students' creative engagement and confidence, as psychological safety enables students to take creative risk without the fear of permanent failure (Han et al., 2022). This contributes significantly to confidence-building and supports a more inclusive and exploratory learning environment.

Pedagogical Transformation toward Student-Centered Learning

The findings revealed that the integration of FL Studio contributed to a shift from lecturer-centered instruction toward a more student-centered learning approach. Observation data showed that students actively explored musical ideas, developed arrangement strategies, and evaluated their own work throughout the learning process. Rather than functioning solely as recipients of information, students became active agents in constructing musical knowledge.

This finding contrasts with conventional traditional music instruction, where lecturers often dominate learning activities through demonstrations and direct explanations, while students primarily function as recipients of knowledge. Such approaches have been reported to limit student engagement and weaken the connection between theoretical understanding and practical musicianship (Wiggins, 2016). In the present study, however, students were directly involved in experimenting, evaluating, and revising their musical arrangements, indicating a more active and participatory learning process.

This transformation was particularly evident in students' ability to determine their own creative pathways and learning strategies. The flexibility of FL Studio enabled students to learn according to their individual pace, revisit musical materials, and revise their work repeatedly. Such conditions encouraged greater learner autonomy and responsibility for learning outcomes.

From a social constructivist perspective, the lecturer's role shifted from a transmitter of knowledge to a facilitator who guided reflection and supported students' creative development. This finding is consistent with Wibowo et al. (2025), who emphasize that technology-supported learning environments strengthen student-centered learning by encouraging active participation and independent inquiry. Likewise, Darpindo & Yahya (2024), found that DAW integration promotes learner autonomy and engagement in music learning. The opportunity to revise arrangements repeatedly also reduced students' fear of making mistakes. As a result, students became more willing to explore alternative musical ideas and take creative risks, creating a learning environment that was more inclusive and exploratory.

Digital Adaptation as a Strategy for Cultural Preservation

Another important finding concerns the adaptation of Central Kalimantan traditional music into digital production environments. Analysis of students' arrangement outputs demonstrated that traditional musical elements, including rhythmic patterns, melodic structures, and timbral characteristics, were successfully integrated into FL Studio arrangements. Students incorporated traditional instruments such as Panting Dayak, Rebana, and Gong Dayak while combining them with modern instruments such as electric bass guitar.

These findings indicate that digital technology can function as a medium for cultural continuity rather than cultural replacement. Instead of abandoning traditional musical practices, students used digital technology to reinterpret and reproduce local musical traditions within contemporary learning environments.

A significant challenge identified in this study was the limited availability of traditional instrument sounds in FL Studio's default sound libraries. To overcome this limitation, students recorded traditional instruments directly and imported them into the software as audio samples. This strategy enabled students to preserve important sonic characteristics while adapting traditional music into a digital format.

This finding supports Mantzou et al. (2023), who argue that digital technology can increase the accessibility and sustainability of traditional cultural practices. Similarly, Saputra et al. (2024) explain that digitalization provides opportunities for traditional music preservation by expanding modes of documentation, production, and dissemination. Therefore, the use of DAW can be viewed as a practical strategy for revitalizing traditional music within higher education contexts.

Implication for Traditional Music Learning

Another The findings indicate that DAW-based learning contributes not only to the development of technical musical competencies but also to creativity, collaborative learning, learner autonomy, and cultural preservation. Students demonstrated increased motivation, confidence, and engagement throughout the learning process while simultaneously developing the ability to adapt traditional musical elements into digital environments. These findings suggest that digital technology can function as a pedagogical medium that supports both musical learning and cultural sustainability.

From a theoretical perspective, this study extends the application of Vygotsky's social constructivist framework in technology-supported music education. According to Vygotsky, learning is fundamentally a social process in which knowledge is constructed through interaction with more knowledgeable others and mediated by cultural tools. Two central concepts in this framework are scaffolding and the Zone of Proximal Development (ZPD), which describe how learners can achieve higher levels of understanding through temporary guidance and collaborative support (Tohari & Rahman, 2024; Vygotsky, 1978). In this study, FL Studio functioned as a mediating cultural tool that enabled students to explore, evaluate, and reconstruct musical ideas through interaction with lecturers, peers, and digital representations of traditional music. The observed processes of peer assistance, collaborative problem-solving, lecturer guidance, and repeated revision activities demonstrate how learning occurred through social interaction and mediated experiences. The scaffolding provided by lecturers and more knowledgeable peers enabled students to gradually develop independent musical competencies, illustrating the operation of the ZPD within a digital learning environment. Consequently, the DAW functioned not only as a technological tool but also as a social and cognitive space that facilitated knowledge construction through interaction, reflection, and collaborative learning.

The findings also have important implications for traditional music education. Students' integration of Panting Dayak, Rebana, and Gong Dayak into digital arrangements demonstrates that technology can support the preservation and revitalization of local musical traditions. Rather than replacing traditional musical practices, DAW-based learning enabled students to reinterpret and reproduce traditional musical elements in forms that are more accessible and relevant to contemporary learners. This finding supports previous studies showing that digital technology can strengthen the sustainability of traditional music by expanding opportunities for documentation, creative production, and dissemination (Saputra et al., 2024).

Practically, the results suggest that DAW-based learning can serve as an innovative instructional model for higher education music programs. By combining digital technology with local cultural content, music learning can become more interactive, student-centered, and culturally responsive. Unlike previous studies that primarily focused on the effectiveness of DAWs in developing music production skills, this study demonstrates how DAWs function as pedagogical environments that facilitate scaffolding, collaborative learning, creative exploration, and the preservation of traditional music within higher education contexts. Through the integration of social interaction, reflective practice, and digital music production, DAW-based learning creates opportunities for students to actively construct musical knowledge while engaging with local cultural heritage. Therefore, this study contributes to the growing discourse on technology-supported music education by highlighting the pedagogical role of DAWs in supporting both educational innovation and cultural sustainability.

CONCLUSIONS

This study demonstrates that the Digital Audio Workstation (DAW), particularly FL Studio, functions not only as a technical tool for music production but also as a pedagogical environment that supports musical exploration, reflection, collaboration, and knowledge construction in traditional music learning. The findings reveal that students actively engaged in repeated experimentation, evaluation, and revision processes, enabling them to develop musical understanding through direct experience and creative practice.

The study further shows that DAW-based learning facilitates social interaction through peer collaboration, lecturer guidance, and collaborative problem-solving. These learning processes reflect the principles of Vygotsky's social constructivist theory, particularly scaffolding and the Zone of Proximal Development (ZPD), where students gradually develop independent competencies through support from more knowledgeable peers and lecturers.

In addition, the integration of traditional musical elements, including Panting Dayak, Rebana, and Gong Dayak, into digital arrangements demonstrates the potential of DAW-based learning to support the preservation and revitalization of local musical traditions. The use of digital recording and sampling techniques enabled students to maintain important cultural characteristics while adapting traditional music to contemporary technological contexts.

The novelty of this study lies in demonstrating that DAWs function not merely as music production tools but as pedagogical environments that facilitate scaffolding, collaborative learning, creative exploration, and cultural preservation within higher education traditional music learning. Therefore, DAW-based learning offers a promising approach for developing innovative, student-centered, and culturally responsive music education in the digital era.

Future research may explore the implementation of DAW-based learning in different musical traditions and educational settings, as well as examine its long-term impact on students' musical competencies and cultural engagement.

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