

EXPLORING CHALLENGES AND PRACTICES OF DIGITAL TECHNOLOGY INTEGRATION IN MUSIC EDUCATION: PRELIMINARY FINDINGS FROM A PILOT QUALITATIVE STUDY IN WEST COAST SABAH

Spawa, C. M. C.^{1*}

Simeon, J. C.²

Iggau, R.³

¹Academy of Arts and Creative Technology, Universiti Malaysia Sabah, Malaysia
(Email: claricespawa82@gmail.com)

²Academy of Arts and Creative Technology, Universiti Malaysia Sabah, Malaysia
(Email: jinkysoo@ums.edu.my)

³Academy of Arts and Creative Technology, Universiti Malaysia Sabah, Malaysia
(Email: resot@ums.edu.my)

*Correspondent Email: claricespawa82@gmail.com

Article history

Received date : 29-4-2026

Revised date : 30-4-2026

Accepted date : 10-7-2026

Published date : 12-7-2026

To cite this document:

Spawa, C. M. C., Simeon, J. C., & Iggau, R. (2026). Exploring challenges and practices of digital technology integration in music education: Preliminary findings from a pilot qualitative study in west coast Sabah. *Journal of Islamic, Social, Economics and Development (JISED)*, 11 (84), 461 – 469.

Abstract: *The integration of digital technology in education has increasingly influenced teaching and learning practices, including in the field of music education. However, the implementation of digital technology in music teaching continues to face various challenges, particularly within the context of secondary schools in Sabah. This exploratory pilot qualitative study aimed to obtain preliminary insights into the practices and challenges experienced by music teachers in integrating digital technology into music teaching and learning in West Coast Sabah. Data were collected through a semi-structured interview involving a secondary school music teacher and analysed using thematic analysis. Preliminary findings suggest that the use of digital technologies such as Canva, Wayground, music notation software, and multimedia applications may enhance student engagement, support understanding of musical concepts, and contribute to more interactive learning experiences. Initial findings also indicate that students appeared to demonstrate increased interest and motivation when digital elements were incorporated into classroom activities. Nevertheless, several challenges were identified, including limited internet accessibility, inadequate technological infrastructure, time constraints, and insufficient specialised training related to digital music technology. Despite these constraints, the participant demonstrated initiative in independently exploring digital applications to support teaching practices. As a preliminary investigation, the findings provide early insights into current digital pedagogical practices and highlight the importance of institutional support, continuous professional development, and improved digital infrastructure in strengthening digital technology integration within music education. Further studies involving a broader range of participants are recommended to obtain more comprehensive perspectives.*

Keywords: digital technology, music education, pilot study, preliminary findings, music teacher, digital pedagogy

Introduction

The immersion of digital technology has transformed education worldwide at an unprecedented pace and will keep on affecting teaching and learning in wide-ranging educational settings. However, with the realities of twenty-first century learning, digital integration becomes more critical to promoting high student engagement, more access to learning resources, and more interactive instructional experiences. Bond (2020) found that educational technology helps to create the learning dimensions of student engagement, namely, the behavioral, cognitive, and affective dimensions, especially in the context of technology-enhanced learning environments.

In the Malaysian educational environment, the emphasis on the implementation of digital technology has been fortified by national education policies designed to enhance digital literacy and educational innovation. Through the Malaysia Education Blueprint 2013–2025, it is shown that the integration of Information and Communication Technology (ICT) in teaching and learning is critical in order to equip students with appropriate digital competencies for a future that needs it. In line with this effort, investigations like Shah and Empungan (2021) and Mohd Razali and Abdullah (2022) have been found that Malaysian teachers are adopting digital tools in classroom delivery, but different figures of readiness and infrastructure are still the most important salient factor.

This also makes the integration of digital technology particularly relevant in the context of music education, given the creative, practical and interactive character of the subject. Learning music involves performance, listening, composition and music appreciation, and technology can support all of these aspects. With digital tools like music notation software, multimedia applications, and online learning platforms, teachers can visualize how to demonstrate musical concepts in ways that open up to the imagination. King and Prior (2021) highlighted that the use of digital technologies has supported student-centred learning in music education by enhancing student engagement, promoting collaboration, and raising conceptual understanding. Biasutti (2022) conducted a study on how technology integration within music education facilitates artistic creation as well as broadening pedagogical methods.

This factor notwithstanding, a forecast of the future of digital technology in education has to be set in the context of challenges a genuine digital transformation faces - factual and systemic. For the purpose of contextualisation, previous research identified obstacles such as inadequate infrastructure, unreliable internet connection, limited digital literacy acceptance, and insufficient or lack of professional development programmes as major impediments for effective technology use in school settings (Mohd Razali & Abdullah, 2022). Such obstacles may affect teachers' belief and preparedness to use digital methods successfully in classrooms.

Despite the growing interest in the integration of digital technology into education, musical pedagogy research investigating the influences associated with the incorporation of digital technologies into music teaching in the Malaysian secondary school education context, particularly Sabah, remains limited. Notably, there is no qualitative research that examines the nature of music teachers' actual classroom practices when experiencing digital pedagogy. As such, this exploratory pilot qualitative study was undertaken to gain an initial understanding of how secondary school music teachers in West Coast Sabah practice and face challenges while

integrating digital technology to their music teaching and learning. It is a preliminary study which will provide some insight that could be used as the foundation for future large-scale studies, as well as to develop better digital pedagogical practices of music education.

Literature Review

Digital Technology in Education

The advent of digital technology has been a major factor affecting current educational practices and the actual processes of teaching and learning in schools. The increasing presence of Information and Communication Technology (ICT) in education has become an imperative in the twenty-first century learning context with its role supporting student-centred pedagogy and an interactive classroom environment. Multimedia applications, online learning platforms, digital collaboration tools, and interactive software have opened many more doors by giving educators something to think about when deciding how they can diversify instructional strategies and improve their student's education experience. To address the increasing sophistication and complexity the Ministry of Education Malaysia (2013) identifies integration of digital technology as one of five priorities for the Malaysia Education Blueprint 2013–2025 to equip students with necessary technological competencies and higher-order thinking skills.

It has also been associated with better learner engagement, motivation, and participation in the learning process. As Bond (2020) explained, educational technology provides the active learning which interacts and takes place through cooperation where the child learns from his peer. In the same way, Koehler and Mishra (2009) stressed that to integrate technology, teachers must combine technological knowledge, pedagogical knowledge, and content knowledge to improve learning from the instruction. Digital technologies in contemporary classrooms are seen not only as tool for learning, but also as essential part of meaningful learning supporting teaching.

Digital Technology in Music Education

Digital technology has a significant relevance to music education as music itself is a practical and creative discipline. Technology can assist in music education activities in the form of listening, composing, performing, watching ensemble practice, music appreciation, and written notation. With music notation software, multimedia presentation platforms, audio editing applications, virtual instruments, and online learning environments, technology enables professors to plan more interactive and engaging lessons. In addition, digital tools help students to better visualize musical concepts and enjoy more commonly in classrooms.

Related work has shown the positive impacts of digital technology on the music teaching and learning processes. Digital technologies create opportunities to diversify instructional methods on creative tasks and encourage students not only to listen but also to produce sound (Biasutti, 2022). Music technology applications help enhance collaborative learning, facilitate the development of students' musical understanding, and guide students to a more student-centred pedagogical practice (King & Prior, 2021). YouTube videos, MIDI applications, music software, paperless learning/in-person learning platforms, etc. are considered supplemental teaching aids in helping students to get a better understanding of rhythm, melody, pitch, instrumental performance, etc.

In addition to this, differentiated learning processes enabled by digital technology means that music education can cater for students with different musical understanding and abilities in

learning. Digital applications can be utilized for extra reinforcement, repetition, and guided practice for students struggling in lessons. Through the use of technology, students can participate in webinars or online courses which allow them to learn without being physically present in a classroom setting and pretty much independently.

Challenges of Technology Integration in Music Education

Although the advantages of digital technology in education are increasing, teachers continue to face challenges and obstacles in integrating technology into their classroom teaching. A big challenge often cited while discussing educational research is the inadequacy of technical infrastructure and 'internet reach' for schools. Poor provision of digital infrastructure, unstable connectivity, shortage of digital devices and inadequate technical support may impact the effective use of digital technology by the teacher during teaching. These limitations are pronounced in specific school contexts with limited access to digital infrastructure.

In the context of music education, these issues may be compounded by the specific nature of music teaching, and the necessity for appropriate technological resources. They need software, audio equipment, digital instruments, multimedia applications, and music notation technologies for classroom activities. But all students might not have equal access to them at all schools because of funding available, the setup of multi-school campuses or school administrator priorities, to name a few variables.

Another challenge that is often cited in past research is teachers' preparedness and ability to use digital technology. Tondeur et al. (2020) noted that confidence of the instructors in technology and readiness of the instructing pedagogy affect the effectiveness of technology integration in classroom education. If teachers do not have adequate training or exposure in using digital tools, they may find it challenging to leverage technology capabilities in the actual teaching and learning process. Equally, Ertmer and Ottenbreit-Leftwich (2019) suggested teachers' formation and self-confidence to integrate technology in their classes and the professional support system have a major impact on their readiness to do so.

In addition to technological skills, work overload and time restraints also affect teachers' use of digital technology in schools. Teachers are expected to balance administrative work, preparation for classroom lessons, co-curricular activities, assessment-related duties thus limiting the available time to prepare digital teaching materials. As a result, they may decide to stick to traditional teaching methods despite knowing how helpful integrating digital technology can be.

Research Gap

While there has been a rapid increase in research surrounding digital technology integration in education, music education research in the secondary school setting in Malaysia is still in its infancy. Many existing studies have sought to investigate technology integration in the classroom, but not necessarily reflective of music teachers' experiences. In addition, few qualitative studies have explored the experiences and practices of secondary school music teachers in Sabah about digital music pedagogy. Thus, this pilot qualitative study aims to explore the practices and issues of digital technology integration in music teaching and learning among West Coast Sabah music secondary school teachers. The findings gathered from the research intend to offer an initial glimpse that could enhance the ongoing evolvement of digital teaching practices in Malaysian music education.

Methodology

The present study used a qualitative research design to investigate the practices and challenges of digital technology integration in music teaching and learning between secondary school music teachers of West Coast Sabah. This study was qualitative in nature because qualitative studies are more personal and give the researcher a deeper understanding of the participants' experience, perceptions and practice in the natural setting. The study was conducted as an exploratory pilot study to garner initial information and to optimize the research instrument and procedures in advance of a main study. It is well known that pilot qualitative studies are used to test feasibility, to explore emerging issues and to gain preliminary insights into a phenomenon prior to primary data collection.

One purposively selected secondary school music teacher participated in the study. All participants were selected because of related teaching experience in music education, and active engagement in digital technology integration in the classroom context. Single participant (according to our view is totally fine in exploratory phase) is usable in a pilot qualitative study, due mainly to the fact that the main purpose is not generalisation, but searching first patterns, fine-tuning of interview protocol and highlighting core topics.

Data were collected via semi-structured face-to-face interviews with the participants at their schools. The interview protocol was designed in accordance with the objectives of the study and investigated the types of digital technologies used in music teaching, the forms of pedagogical practices involving digital tools, the perceived advantages of technology integration, challenges during implementation, and the supports needed to enact digital pedagogy. All interview sessions were audio-recorded (with the informed consent of the participants) in order to have accurate and complete data. This was then followed by the recording of the interviews, which were then transcribed, word-for-word, to maintain the realness of the responses and allow a more rigorous and structured analysis of the qualitative data.

Thematic analysis was conducted to explore the themes of the participants' experiences. Thematic analysis was chosen as it offers a rigorous process for structuring qualitative data into relevant thematic groups in line with the research goals. The analysis process included familiarisation with the data, initial coding, generating themes, and refinement of themes. These emerging themes were then interpreted against the literature regarding digital technology integration in education and music pedagogy.

A number of strategies were used to enhance the credibility and trustworthiness of the findings. The interview data were transcribed verbatim to preserve the integrity of participant responses. Second, the data was slowly and thoroughly read again and coded for similar themes to confirm consistency in theme development. Also, peer review of emerging topics was performed to enrich the interpretive reliability. While this study is based on a single participant, these procedures were put into place so that the results of the study represent a systematic and rigorous qualitative analysis process.

Ethical approval was upheld during the study. Informed consent was also obtained, and before data collection, the participant was informed about the goals of the study conducted through the use of audio and video phones. The data would be kept confidential; I assured the participant that their name and the name of their school would not be released and that the data would only be used for academic purposes.

Findings and Discussion

Emerging themes from thematic analysis are used to present the findings of this exploratory pilot study. Because this study had a single participant, the results are considered a pilot for, not the basis of, generalizable conclusions. This systematic review identified four core themes: (1) Digital Technology as an Interactive Teaching Tool, (2) Enhancement of Student Engagement and Motivation, (3) Challenges of Infrastructure and Accessibility, and (4) Need for Continuous Professional Development and Support.

Digital Technology as an Interactive Teaching Tool

The participant responded that they were increasingly incorporating different types of digital technology in music teaching activities such as Canva, Wayground, music notation software, multimedia presentations, YouTube and QR-code-based learning activities. These technologies were used in the context of instruction in music theory, rhythm, melody, ensemble performance, and music appreciation activities. The participant stated that digital applications were mainly to make it more interactive and visually potent.

The respondent also pointed out that digital technology amplifies the presentation of musical concepts, especially with the use of multimedia elements (audio, video, graphics and interactive quizzes). Digital tools were regarded as an aid to simplify the teaching of music and to enhance students' understanding of abstract musical concepts.

These results corroborate previous research studies which suggested that interactive pedagogical practices, often enabled by digital technology, were reported to be an important avenue for student-centred learning in music education (Biasutti, 2022; King & Prior, 2021).

Enhancement of Student Engagement and Motivation

Another important point was the beneficial effect of digital technology on student engagement and motivation. The participant also said that students showed heightened enthusiasm, engagement, and in class interest when music lessons incorporated digital components. Use of interactive platforms and use of multimedia resources make them have fun and in-turn force students to participate actively in the classroom.

The participant further explained that students were more motivated towards gamified learning approaches, and preferred colourful, attractive, and interactive learning materials compared to conventional teaching approaches. Digital learning in their learning camp also encouraged students to carry out more confidently in classroom presentation and music-related tasks.

This finding reflects the existing literature that demonstrates how educational technology increases student motivation and engagement by providing an interactive learning environment and incorporating multimedia components along with real-world applications (Bond, 2020).

Challenges of Infrastructure and Accessibility

On the other hand, despite the adaptive advantages of the digital technology integration, the participant stated that many challenges were related to infrastructure and access. Main problems identified included lack of internet access, inadequate technology infrastructure, less availability of digital devices, and reliance on personal devices and internet hot-spot. Such disruptions occurred especially in cases of planned digital learning activities when internet access was unstable or the required facilities were limited, one participant explained.

The study participant also mentioned that some digital applications and music software required subscriptions that could not be fully utilized in teaching because of the financial burden. Specific barriers included the absence of special digital facilities like digital whiteboards, appropriate equipment for the music classes, and structures in classrooms to accommodate technology use.

Such results are in accordance with earlier studies showing that technical infrastructure and technological resources continue to present major barriers to the achievements that would be obtained from successfully integrating digital technologies in schools (Tondeur et al. 2020).

Need for Continuous Professional Development and Support

Moreover, the study suggested that professional development is a factor which needs to be taken into consideration to enrich teacher's digital competency. Another participant stated that we need more workshops, PLCs and digital music tech related training. Although to some extent the participant was taking initiative through engaging with online tutorials and largely self-exploration of new digital applications, more formal support through the institution would still be considered as needed.

The respondent also reiterated the need for localized music software by education stakeholders, improved technology infrastructure, and greater institutional support for music educators. Such forms of support were considered necessary for teachers in order for them to feel more prepared and empowered in utilizing technology / digital media more seamlessly in their overall teaching practice.

The results are consistent with earlier studies that argue that teachers' preparedness and confidence and the professional support systems to which they are connected are critical to successful technology integration (Ertmer & Ottenbreit-Leftwich, 2019).

Conclusion

This was an exploratory pilot study to gain preliminary insights into the practices and challenges faced by West Coast Sabah secondary school music teachers with integrating digital technology in their music teaching and learning. The results suggest that digital technology use is a supplementary means of supporting maths pedagogy for music education, specifically engagement, comprehension of musical concepts, and possibly interactive learning.

Initial findings indicate that these tools, including multimedia applications, music notation software, and platforms for online learning, can positively influence or assist music teaching, providing more engaging and student-centered instructional practices. However, the study also recognised a series of barriers/limitations which may prevent successful implementation including limited internet access, deficient technology infrastructure, time availability, and lack of professional training opportunities.

Despite significant barriers, the participant showed a commendable autonomy in researching and implementing digital applications to support teaching practices. It shows how important teacher adaptability and self-directed learning are in face of the technological limitations observed in classrooms.

Due to the small patient population, a potential pilot study may be anticipated and the findings should be interpreted with caution. Nevertheless, this study offers preliminary insight that may

serve as a guide for future large-scale studies involving a wider population of Malaysian music teachers. Future investigations should continue to assess state and school contexts for more widespread digital technology integration within music education, and should also examine the relationships between institutional support, professional development, and teachers' use of technology in the classroom.

In summary, this study contributes to the emerging literature on digital pedagogy in music education by identifying initial strategies and obstacles with which teachers engage to teach for digital transformation in the Malaysian secondary school context.

Acknowledgement

The author would like to express sincere appreciation to the participant involved in this pilot study for the valuable cooperation and insights throughout the interview process. Appreciation is also extended to Universiti Malaysia Sabah, particularly *Akademi Seni dan Teknologi Kreatif*, for the academic support and guidance provided in the completion of this study.

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