

DESIGNING AND VALIDATING AN ONLINE MUSIC THEORY MODULE FOR ADULTS: INTEGRATING THE ASSURE MODEL AND THEORY OF MULTIPLE INTELLIGENCES

Joyce Low Xue Wen¹
Yumi Yoshioka^{2*}
Pravina Manoharan³

^{1,2,3} School of the Arts, Universiti Sains Malaysia, Penang, Malaysia

joycelow1992@student.usm.my*

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ABSTRACT

As one of the indicators to determine whether there has been a success in online learning, the rate of adult enrolment in the education of online music theory can assist in reflecting the intended outcome. Accordingly, Gardner's theory of multiple intelligences, which is also recognised as the MI theory, was incorporated with the ASSURE learning model in the present study, seeking to develop an instructional module tailored to the education of online music theory for adults. In particular, several challenges experienced by music teachers in Kuala Lumpur and Penang, Malaysia, were examined. To achieve the objective, a total of 10 experienced music teachers were invited to participate in the interviews, with relevant responses provided by the teachers assisting in the needs analysis. The results demonstrated that it was important to sustain adequate levels of engagement and evaluate how the adult learners actually understood the theory, as both were discovered to be the key challenges in an online learning context. Throughout the process, a 10-unit module was also established, which was consistent with the ABRSM Grade 1 to Grade 3 Music Theory Syllabus. Furthermore, three experts were invited to help validate the relevance, clarity, and applicability of the module, thereby validating that the instructional module was not only customised for adult learners but was also intelligence-based and structured. In the future, the module could be further catered to different learning preferences and requirements, especially in the context of the education of online music theory.

Keywords: Adult Learners, Online Education, Multiple Intelligences, Music Theory

INTRODUCTION

Contrary to conventional education, online learning can offer certain unique benefits, including higher degrees of cost-effectiveness, accessibility, and flexibility (Gomez et al., 2016; Pei & Wu, 2019; Gonzalaz-Baber, 2020; Lim et al., 2021). In terms of online music learning, online learners can be more self-directed in their respective learning journeys, as there will be virtual instrument learning and interactive lessons provided (Ng et al., 2021). Despite the benefits, there have been persistent barriers, especially technical challenges and insufficient practical activities (Fang et al., 2024), which have highlighted a need for various alternative approaches of instruction to fulfil the diverse learning needs of online learners. In a similar vein, Gardner's theory of multiple intelligences (MI theory) has acknowledged diverse learning requirements and preferences at the individual level. Nevertheless, the use of the MI theory to examine the journey of adult learners in the context of online music education remains scarce in the existing body of knowledge (Albenti, 2020). Comparatively, the ASSURE learning model has been widely employed by different scholars to investigate the mechanisms of incorporating technologies into the instructional processes to help enhance the learning interest, success, and motivation of adult learners (Heald, 2016).

The present study formulated an instructional module, which was specifically designed for adult learners who were aged between 21 and 25 years with at most one year of online learning experience. The teaching material was employed solely on an online platform, namely Zoom, in which all courses were conducted concurrently to help provide real-time explanation, engagement, and guided practice. Although there has been growing accessibility of the learning materials of online music theory, the current literature has been discovered to have a lack of organised lesson plans. As a result, the above limitations have restrained the capability of instructors to share relevant learning materials that have been specifically designed for adult learners and cater to different levels of cognitive abilities in the online learning environment. Accordingly, both the MI theory and ASSURE learning model were employed to develop an instructional module specialised for the education of online music theory for adult learners. Two key research questions (RQs) were developed in this study according to the challenges related to online teaching and learning identified based on the perspectives of music teachers:

- 1) What challenges do music teachers encounter when delivering courses on online music theory to adult learners?
- 2) How does the integration of the MI theory and ASSURE learning model in the developed and validated instructional model address the identified challenges and enhance adult learner engagement?

LITERATURE REVIEW

Constraints in the context of online applied music learning among adult learners

When there was the outbreak of the coronavirus disease (COVID-19) pandemic, the benefits of online education, especially higher levels of cost-effectiveness, accessibility, and flexibility (Baber, 2020; Lim et al., 2021), were gradually recognised, which assisted in elevating the status of online education as a more feasible and effective alternative relative to traditional education (Lemay et al., 2021), including music education (Gonzalez-Gomez et al., 2016; Pei & Wu, 2019). In the context of online learning, learners can employ different virtual learning materials and tools embedded in the online learning platform, which can aid in fostering self-directed learning. Meanwhile, there have been a few drawbacks inherent in the online platform, which include inadequate physical interactions and communication, actual practice, and technical challenges (Ng et al., 2021; Rafiq et al., 2024). Moreover, despite the gradual proliferation of online music education, there have been insufficient instructional designs that

can specifically address the limitations encountered by adult learners in the context of applied online learning.

Education on online music theory and challenges related to feedback and assessment

In the contemporary landscape, the instruction on online music theory has been revealed to have distinct pedagogical challenges, particularly in guaranteeing sufficient clarity of explanations, sustained engagement of learning, and timely feedback (Gonzalez-Gomez et al., 2016; Pei & Wu, 2019; Ng et al., 2021). Although digital platforms can enable content delivery and basic assessment, they have also been frequently demonstrated to be unable to replicate the processes of interactive feedback that are common in the physical classrooms of music instruction. Owing to inadequate opportunities for guided practice, formative feedback, and diagnostic assessment in an online music lesson, the outcomes have been observed to be more passive learning experiences and an uneven level of understanding among learners. Thus, there should be a more systematic incorporation of interactive activities and feedback mechanisms in the education of online music theory, especially for adult learners with limited learning experience previously.

Differentiation framework (MI theory) as a design heuristic

In a recent investigation, Ni, Yang, and Liu (2024) observed the presence of considerable improvements in the musical performance of music learners, including the development of multiple intelligences (kinaesthetic, musical, and interpersonal) and a deeper engagement with learning materials, especially among disengaged or demotivated learners. Particularly, MI-integrated instructions in the courses on online music theory could offer a standardised framework for pedagogical approaches tailored to adult learners with different types of cognitive functioning (Gardner, 2011). Concurrently, MI-based instructions can help foster higher rates of learning participation and inclusivity, especially among learners with different backgrounds, which can aid in reinforcing the overall efficacy of learning (Yavich et al., 2020; McCall, 2024). On the contrary, there have been several systematic reviews and critiques, which have indicated gaps in the existing empirical evidence that supports the MI theory as a validated cognitive taxonomy, owing to methodological weaknesses and inconsistent measures of relevant learning outcomes (Ferrero et al., 2021). Therefore, despite the pedagogical value of the MI theory, there has been a gap in the existing literature to position the MI theory as a model for differentiation or instructional planning instead of just being an empirically validated cognitive framework, particularly in the contexts of online music theory education for adults.

Instructional design framework (ASSURE learning model) in the context of online music learning

When developing an online learning module, the current study applied the ASSURE learning model, which incorporates technological instruments, especially mobile applications and Web 2.0 platforms, in the process of teaching and learning within blended music learning environments (Irmis Engizli & Uludag, 2023). Specifically, the structured framework offered by the ASSURE learning model, which advocates the use of technologies in different learning activities, can help promote higher degrees of learner engagement and the development of problem-solving skills in the context of online learning (Heinrich et al., 1999). The framework consists of a total of six core components, including (1) analysing learners, (2) stating objectives, (3) selecting methods, (4) utilising media, (5) requiring learner participation, and (6) evaluating. Similarly, Irmis and Urudag (2023) revealed that when the above framework was employed for music lesson planning conducted during and after the COVID-19 pandemic, there was more systematic coherence in instruction and more proactive participation in learning activities. As such, the use of a structured framework, which includes the unique strengths of the MI theory and ASSURE learning model, can fulfil different learning preferences and requirements in more effective ways. Additionally, Irmis Engizli and Uludag (2023) demonstrated that the above integration contributed to higher learning engagement and a more positive perception of music education in the context of blended learning. Meanwhile, several challenges related to technology adoption, teacher training, and resource availability persist, which call for more investigations of the applicability of the above two frameworks for

improved learning outcomes, particularly among adult learners attending courses on online music theory.

METHODOLOGY

Research Design

As human participants for the study interviews were recruited, the present study sought to obtain ethical approval from Universiti Sains Malaysia (USM). Concurrently, a design and development research (DDR) approach was employed to develop and validate an instructional module for adult learners in the education of online music theory, aiming to address the gap in the existing literature through a three-phase procedure:

1. Phase 1 (Needs Analysis): A quantitative assessment of needs, which involved semi-structured interviews with a total of 10 experienced music teachers, was performed to determine learning gaps.
2. Phase 2 (Design and Development): A 10-unit instructional module, which incorporated both the MI theory and the ASSURE learning model, was formulated.
3. Phase 3 (Validation): A total of three experts were invited to help review the content validity, pedagogical structure, and usability of the instructional module.

Sample and Population

In the current investigation, purposive sampling was employed to recruit participants for the semi-structured interviews. The participants were Malaysian music teachers, namely those from the Federal Territory of Kuala Lumpur and Pulau Pinang, with more than eight years of teaching experience in music theory for adult learners. Meanwhile, if teachers did not possess any experience in the instruction of music theory for adult learners or had less than eight years of teaching experience, they would be excluded from this study. In addition, a structured evaluation tool, which comprised criteria related to the practicality and relevance of the instructional module, namely content, effectiveness, pedagogical strategies, and potential areas of improvement, was appraised and validated by three experts specialised in music theory and pedagogy. Relevant feedback collected from the three experts was incorporated to help establish the content and design validity of the instructional module before implementation.

Data Collection

In the present study, the semi-structured interviews, which included a series of open-ended questions asked to participants, were conducted on the Zoom platform. On average, each interview lasted approximately 15 to 20 minutes. Before beginning each of the interviews, all participants were informed of their voluntary participation and the freedom to express honest opinions without the risk of receiving any undesired consequences. After completing all interviews, the instructional module was developed according to the preliminary results before being assessed and validated by experts in more holistic ways, which focused on determining whether the module was clear, relevant to the topic, and could be applied to other contexts. A summary of the structures of the interview guide, interview duration, delivery mode, workflow of the thematic analysis, and procedures of guaranteeing trustworthiness is presented in Appendix 1.

Data Analysis

Interview data of the present study were thematically analysed, with all experts' feedback also thematically categorised. Based on the emerging patterns, themes were identified and systematically organised according to the objectives of the current study. In particular, through a cross-case analysis, the similarities and differences of participants' perspectives were visualised, with any recurring themes also evaluated for more in-depth interpretations. Furthermore, this study conducted data triangulation to have a more detailed understanding of how the integration of the MI theory and ASSURE learning model could be more effectively leveraged to assist in improving the effectiveness of online music education for adult learners.

Theoretical Design

Table 1 demonstrates the relationship between the ASSURE model and the key elements of the online music theory module, wherein each ASSURE aspect is aligned with learning materials, MI dimensions, digital tools, and feedback sources. The MI theory, despite being widely used in educational settings, has often been criticised for its empirical validation as a cognitive taxonomy in the existing scholarly discourse. To address the above criticisms, the current study did not include the MI theory as a framework of static or independent intelligences, but rather, it was employed as a classification technique to help guide the development of different learning activities based on a framework for online music theory. Specifically, the theory could facilitate the process of instructional planning by promoting diverse modalities of engagement, whereas the ASSURE model could offer an organised approach for lesson design and implementation.

Table 1: ASSURE-Aligned Module Design, MI Dimensions, Online Tools, and Assessment Evidence

ASSURE Procedure	Module Unit/Lesson Element	MI Dimension	Online Tool	Assessment Evidence
Analysing Learners	Pre-course learner profiling	Intrapersonal and verbal-linguistic	Google Forms	Survey submission
Stating Objectives	Unit-level learning outcomes	Musical and logical-mathematical	Zoom and PowerPoint Slides Kahoot!,	Zoom poll results
Selecting Methods/Media	Interactive listening and practical tasks	Musical and auditory strategies	Mentimeter, and Quizzies	Quiz results
Utilising Media	Guided practice and demonstrations	Kinaesthetic and visual-spatial	Zoom (screen share and annotation)	Group task feedback
Requiring Participation	Breakout discussions and peer interactions	Interpersonal	Zoom breakout rooms	Shared video presentations
Evaluating	Formative reviews and feedback	Intrapersonal	Google Forms	Quiz scores and reflection submissions

RESULTS

A total of 10 participants who possessed eight to 20 years of teaching experience and had diverse educational backgrounds were interviewed. As depicted in Table 1, the analysis revealed eight basic themes, which were grouped into four organising themes.

Table 2: Thematic Analysis of Music Teachers' Challenges and Strategies in the Education of Online Music Theory for Adult Learners

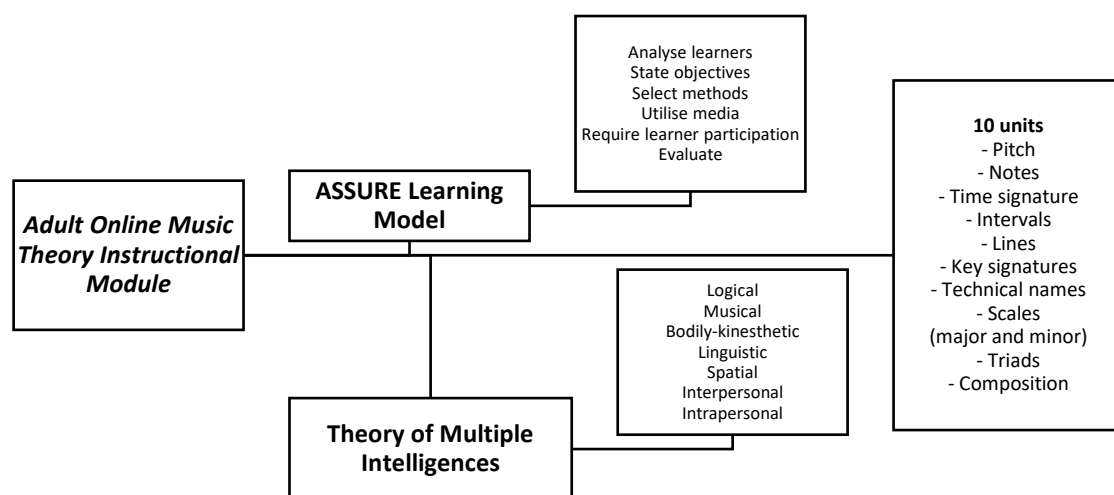
Organising Theme	Basic Theme	Quotation
Challenges in Teaching Adult Learners	Difficulty in gauging understanding without in-person interactions	<i>"It is hard to gauge students' understanding without face-to-face interaction."</i>
	Difficulty in maintaining engagement and focus	<i>"Students get bored easily and prefer practical learning more than theoretical lessons."</i>
	Inconsistent attendance and lack of time	<i>"Adult students often struggle with consistency in attendance due to work commitments."</i>
Feedback and Engagement	Importance of real-time feedback for engagement	<i>"Feedback is crucial to ensure students understand. I use WhatsApp and annotation tools for instant feedback."</i>
	Verbal and written feedback methods	<i>"Students receive feedback through written comments and video calls, which helps them improve."</i>
Learner Engagement	Promoting engagement through interaction and quizzes	<i>"I encourage engagement by calling students to answer questions and using quizzes during class."</i>
Tools and Activities	Supplementary resources to improve comprehension	<i>"I use additional materials beyond the syllabus, like e-books and YouTube videos."</i>
	Use of multimedia to enhance engagement	<i>"Using interactive slides, pre-recorded videos, and music examples to enhance the lessons."</i>

When teaching adult learners using online platforms, it was revealed that there were several challenges, which included the difficulty in determining whether the learners actually understood the lessons when there was no in-person interaction. Moreover, certain learners might be, within a short period, disinterested and might prefer practical learning sessions. There would also be inconsistent attendance and insufficient time, all of which could be owing to the demands from work and family commitments among adult learners, further distracting them from constantly concentrating on and committing to online learning sessions. Additionally, based on the responses collected from the interviewed music teachers, it was discovered that offering real-time feedback and employing verbal and written feedback were important to have a deeper engagement and understanding among adult learners. Concurrently, to boost higher levels of learner engagement, music teachers highlighted that certain quizzes could be arranged, which could provide adult learners with prompt feedback to maintain their motivation, focus, and engagement in learning. In addition, learner feedback and teacher perspectives indicated that the use of supplementary multimedia resources, such as pre-recorded videos, interactive slides, and music excerpts, could offer clearer explanations regarding theoretical concepts and contribute to a more engaging learning experience, as intended by the design of the instructional module.

From the viewpoints of music teachers, there were two profound challenges, which were sustaining learner engagement and evaluating learners' degrees of understanding, suggesting that there was a vital need to employ different resources, tools, and activities based on the specific types of intelligences (visual, auditory, and kinaesthetic), learning preferences,

and cognitive strengths. Accordingly, an instructional module was developed in the present study, on top of incorporating the MI theory and ASSURE learning model, thus emphasising the importance of catering to different types of intelligences to achieve the objective of facilitating a higher level of understanding. Moreover, the use of the ASSURE learning model could be attributed to its structured and systematic approach to the course design. Apart from addressing the challenges pertaining to learner engagement and understanding, the integration of both the MI theory and ASSURE learning model could allow the modification of the course content to more effectively cater to different learning styles. As illustrated in Flowchart 1, a total of 10 units were incorporated into the instructional module, aiming to provide a structured and well-organised methodology for music teachers to inculcate adult learners with the key principles of fundamental music theory in the settings of online education. Specifically, pitch, notes, time signature, intervals, lines, key signatures, technical names, scales, triads, and composition were the key elements of the ABRSM syllabus for the development of a more solid foundation in music theory.

Flowchart 1: The Instructional Module on Teaching Music Theory for Adult Learners Online through the Integration of the MI Theory and ASSURE Learning Model



In this study, the proposed activities in the instructional module accommodated different learning preferences. For instance, there were colour-coded notations, diagrams, and interactive visual slides for visual learners, music examples and recorded lessons for auditory learners, rhythm clapping and virtual piano play activities for kinaesthetic learners (prefer physical engagement with the learning materials), rhythm math activities for logical-mathematical learners, gamified quiz platforms (such as Kahoot!) with audio clip examples for identifying melodic directions and intervals for learners with musical intelligence, and group discussions for learners with interpersonal intelligence. Concurrently, a total of three experts in music theory and piano pedagogy were invited to help review the effectiveness of the developed instructional module and its alignment with educational standards based on their feedback on its strengths and areas of improvement. Overall, the instructional module was reported to possess a robust structure and alignment with educational standards for adult learners in the education of online music theory, hence demonstrating its capacity to effectively cater to diverse learning needs, with areas of improvement suggested to further enhance its effectiveness.

Table 3: Key Feedback from Experts

Organising Theme	Basic Theme	Quotation
Module Comprehension and Clarity	Clarity with learning objectives	<i>“Objectives have to be clearer—don’t start with ‘by the end of the lesson ...”</i>
	Appropriateness of language in lesson plans	<i>“Change the objectives—don’t let it sound like you are going to do ‘play by ear’.”</i> <i>“The methods in your lesson plans need to be clearer—imagine someone else reading it and will be conducting the lessons.”</i>
Content and Instructional design	Lesson plan structure and clarity	<i>“Content is intensive and will depend largely on the execution of the teacher.”</i>
	Inclusion of auditory intelligence	<i>“You might want to gear the teaching approach to a more listening skills approach. There is also a possibility to include aural intelligence, although it is not by Gardner.”</i>
Engagement	Learner engagement	<i>“I would say the majority will be engaged enough, as there is usage of various apps and software to enhance the learning. Week 10’s lesson would be the most engaging as it provides a possibility to use TikTok and sound.”</i>
Suggestions for Improvement	More detailed lesson plans	<i>“It may need to be slightly made ‘easier’ should it be used widely by other teachers ...”</i>
		<i>“To introduce very basic creative activity in every lesson ...”</i>

By focusing on the need to personalise instructional strategies for adult learners in the settings of online learning, a structured learning module, which was integrated with the MI theory and ASSURE learning model, was validated to be able provide adult learners with a more effective, engaging, and inclusive online learning experience in the education of music theory. One of the main points highlighted by the experts was the level of comprehension and clarity of the instructional module. Specifically, one of the experts clarified the requirement to establish higher clarity with the learning objectives, namely, more specific and measurable. The goal was to help learners understand what to expect and achieve, which could promote more effective processes of goal setting and assessment. The experts also recommended structuring the language used in lesson plans and incorporating more creative and practical activities, as the above approaches could offer learners the opportunities to apply their knowledge in more innovative ways, such as creating their respective melodies and creatively applying acquired theoretical knowledge in short composition tasks. Furthermore, according to the experts, there was a vital need to consider the educational content and instructional design, in which clearer methods could be employed in each of the lesson plans, such as offering detailed steps and explanations in each of the activities and personalising teaching methods based on learners’

unique requirements, preferences, and paces. The above could be achieved by adjusting the structure and enhancing the clarity of each of the lesson plans, which could assist in guaranteeing higher degrees of consistency and ease of implementation.

A relevant theme was uncovered according to the experts' feedback, which was the inclusion of auditory intelligence. Although auditory intelligence has not been explicitly identified in Howard Gardner's original MI theory, auditory-based learning activities were incorporated in the present study to align with the listening-focused nature of music theory instruction. Additionally, when concentrating on the aspect of sustaining adult learners' motivation and engagement in online music learning lessons, technologies could be leveraged more effectively, as the technologies could assist in catering to different learning requirements, preferences, and interests. In particular, interactive tools, such as social media, could, in more effective ways, engage and stimulate learners, hence offering more dynamic and engaging learning experiences. In a similar vein, the experts suggested developing several detailed lesson plans, teaching procedures, and creative learning activities, as the above could offer learners more explicit instructions and help them engage more in practical learning journeys, thereby contributing to a deeper understanding and more practical experiences. There was another benefit, which was the capability to increase the applicability of lesson plans to other learning contexts.

DISCUSSION

After interviewing the music teachers, it was revealed that there were inadequate physical interactions and engagement in the context of online music learning. As such, teachers experienced more challenges in offering personalised feedback when delivering lessons on music theory online for adult learners. The above challenges have also been discussed in the existing literature on online music education, which has demonstrated the limitations of the online learning environment in sustaining sufficient focus and interactions among learners (Baber, 2020; Liu et al., 2024). The main reason for the above scenario was that in the context of online learning, learners would tend to be less motivated and concentrate less, which could lead to less effective learning outcomes. To address the above challenges, especially in sustaining learning engagement, an instructional module was developed by incorporating the MI theory and ASSURE learning model. According to the MI theory by Gardner (1989), it was suggested that online lessons should consider different types of intelligences, as it could help meet different learning styles, needs, and preferences, such as rhythmic mathematical activities that could benefit logical-mathematical learners more compared to learners having more talent in musical intelligence. Thus, it was implied that employing the appropriate teaching methods could aid learners in more effectively attaining the objectives of learning activities. In a similar vein, according to Harirudin (2023), the MI theory emphasises developing a more inclusive and engaging learning environment, aiming to facilitate learning success based on the unique strengths of learners and the use of different multimedia tools and resources, including pre-recorded videos, scanned music scores, and audio clips, thereby fostering in-person learning and accommodating different learning styles (Ng et al., 2021). Moreover, with the inclusion of the ASSURE learning model in systematic ways into the instructional module proposed in the present study, the model could assist in guaranteeing that different learning tools and resources could be more effectively aligned with the learning objectives and personalisation of the online lessons based on unique learning preferences and requirements. As a result, a more structured and flexible framework could be established, which could, in more effective ways, organize and deliver the module content.

The current instructional module could be regarded as more relevant to online music education, as music teachers could leverage the module when developing and preparing lesson plans in more efficient ways. The module could be considered a more structured framework, which could help enable music teachers to more flexibly include important learning activities catered to learners. In addition, the module could resolve certain key challenges experienced

by music teachers in online lessons, especially that there were lower degrees of learning engagement, yet with more technological disruptions for learners. The proposed instructional module, which incorporated different media tools and resources and interactive activities, such as discussions, quizzes, and collaborative activities for real-world applications, also accounted for different learning styles, requirements, and preferences. As a result, music teachers could more effectively adapt the existing teaching environment to unique learning requirements and preferences, as the module was validated by experts in relevant fields, which could sustain learner motivation, attention, and opportunities for higher engagement and interaction. Moreover, the current study highlighted the importance of developing a framework that could help provide more organised instructions and adaptable strategies based on the specific types of intelligence. Accordingly, by combining the MI theory and the ASSURE learning model within the same framework, a learner-oriented instructional module, which was grounded in the context of online music theory education, could offer more inclusive, flexible, and engaging learning experiences for adult learners. The module was also specifically established based on the results of a needs analysis, which concentrated on adult learners' cognitive and practical requirements that music teachers frequently perceived to be difficult to fulfil, particularly in the setting of online teaching and learning. Moreover, according to the interview results and the expert review, the instructional module concentrated on design quality, pedagogical alignment, and effectiveness for the online instruction on music theory for adult learners. Therefore, the expected instructional value and expert-validated potential of the instructional module, especially concerning engagement-enhancing strategies and feedback mechanisms, were justified. Nonetheless, learner-centred outcomes, such as improvements in music theory knowledge, engagement, or motivation, were not specifically assessed, wherein future research could be specifically conducted on the effectiveness of the above outcomes.

CONCLUSION

A qualitative approach was employed to explore key challenges encountered by music teachers in delivering online music lessons for adult learners. The goal was achieved by proposing an instructional module that incorporated the MI theory and the ASSURE learning model. Accordingly, the results demonstrated that the proposed module could help support learner engagement, and music teachers could sustain learning engagement more effectively by using diverse multimedia resources and interactive activities. Additionally, as the proposed module provided a more structured framework, it could assist in resolving the above challenges and aligning instructional strategies with different learning needs and preferences. The module could also help improve the delivery of online music theory lessons for adult learners, emphasising the importance of having a more structured and intelligence-based approach, especially in establishing a more engaging and interactive online learning setting for adult learners with unique learning styles, requirements, and preferences. As a result, more inclusive and effective instructional practices could be established for the education of music theory. Nevertheless, only a small sample size was used in this study, and the music teachers who participated in the interviews were from specific states in Malaysia. Thus, the generalisability of the study outcomes might be limited. The results were also limited by the absence of learner outcome measures and the reliance on teacher self-report and expert judgement. As such, future scholars can expand the current scope by including participants from different age cohorts and geographical locations, which can improve the applicability, effectiveness, and implications of the instructional module developed in the present study. In future investigations, the effects of MI-based modules on learner engagement and performance in music theory courses can also be explored, which may help provide alternative perspectives on how the module can be applied and adapted to different contexts of education.

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APPENDIX

A1. Interview Guide Structure

The interview guide consisted of approximately five core questions, designed to explore music teachers' perspectives on teaching music theory to adult learners in an online environment. It was organized around the following key themes: challenges in teaching adult learners, feedback and engagement practices, learner engagement, and the use of online tools and activities. The main prompts addressed the following areas:

1. What challenges do you commonly encounter when teaching music theory to adult learners in an online environment?
2. How would you describe the learning needs and characteristics of adult learners in online music theory classes?
3. How do you typically provide feedback to adult learners in online music theory lessons?
4. What strategies do you use to maintain learner engagement and participation during online music theory instruction?
5. What types of digital tools, multimedia resources, or activities do you find more effective when teaching music theory online to adults?

Follow-up questions were used where necessary to clarify or expand participants' responses.

A2. Interview Duration and Delivery Mode

All interviews were conducted online via the ZOOM platform to accommodate participants' schedules and geographical locations. Each interview lasted approximately 15 to 20 minutes.

A3. Thematic Analysis Workflow

The thematic analysis approach was used to analyze the interview transcripts, following a systematic stepwise procedure adapted from Braun and Clarke. The process involved:

1. Familiarization with the data through repeated reading of transcripts
2. Generation of initial codes
3. Identification of preliminary themes
4. Review and refinement of themes
5. Definition and naming of final themes for reporting.

A4 Trustworthiness Procedures

Several strategies were employed to enhance the trustworthiness of the qualitative findings. Member checking was conducted by sharing summary interpretations with participants for verification of accuracy. Triangulation was achieved by comparing interview findings with expert validation feedback and the instructional module design documentation.