THE EFFECTIVENESS OF ONLINE MUSIC THEORY MODULE IN IMPROVING LEARNING OUTCOMES AND SATISFACTION AMONG ADULT LEARNERS

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ABSTRACT

Adult learners who encounter difficulties in learning online music theory appear to do so owing to different training background, limited music experience, and drawbacks in foundational competencies. Additionally, the self-paced nature of online learning can reduce students' motivation to follow through with studying the material when it becomes abstract, theoretical, or hard to follow given the lack of timely assistance. By employing exploratory and mixed methods, this study seeks to explore the effects of an online music theory module on adult learners' educational outcome and satisfaction. Quantitative results were elicited from the pre-post Music Theory Knowledge Test (MTKT) as a measure of learning effectiveness. Meanwhile, the Learning Systems and Online Learning Environments (SLS-OLE) questionnaire was administered to assess student's satisfaction. After the intervention, the abovementioned data were supported by semi-structured interviews. Qualitative results complemented the quantitative results. The research found significant improvements to the knowledge and satisfaction level of adults regarding music theory in MI-driven, ASSURE-based teaching module. The findings indicate the importance of a coordinated multimodal approach to pedagogical design to engage adult learners and facilitate the construction of knowledge. Overall, these results are significant for building high-quality, learner-centred online music theory instruction and establishing adult online learning environments.

Keywords: Adult learners, ASSURE model, Instructional design, Multiple intelligences, Online music theory

1.0 INTRODUCTION

The growing interest in flexible, accessible course selection potentially explains the increasing number of adult learners pursuing online music theory classes (Ochoa-Daderska et al., 2023; Santiago et al., 2022). Nonetheless, adult learners with diverse learning styles and experiences present challenges to effective teaching. Others encounter obstacles via technology concerns, lack of resources, and the need to maintain self-motivation and discipline during online experiences (Memet, 2019; Mazlifah, 2024). Such challenges highlight the value of structured methods of instruction directly focused on learning. These strategies maximise student's participation, ease the cognitive burden, and retain motivation

in a digital learning environment. This will influence the learning outcome and satisfaction level of the students when learning music theory online. Teachers must undertake measures to leverage non-conventional learning. This perspective emphasises the essential role of music theory education in offering basic knowledge to provide a more holistic understanding of music. It demands a varied pedagogy to meet the unique needs of the students, particularly on online learning.

Recently, music theory education has been enhanced by the emergence of online courses within educational spaces. This calls for tailoring music theory teaching to pedagogically-oriented goals, technological developments, and educational reforms. Since these elements are vital to music education, students can gain in-depth knowledge of the subject matter. These factors should thus be prioritised by both musicians and teachers (News, 2024; Szucs & Shopie et al., 2023). This form of instruction is essential to music education, and seeks to address fundamental concepts of music theory, harmony, sight singing, and ear training. As part of these continual educational reform streams, music theory courses are being reshaped in response to new teaching contexts and dynamic societal settings (Jamaludin & Jinglong, 2024). In terms of pedagogical changes, the advancement of technology has become a dominant theme concerning the teaching and learning of music theory. The increasing use of information technology creates both opportunities and challenges for music education. Hence, technology integration into music theory instruction is a focal area of research (Huang & Shi, 2024).

Implemented by Howard Gardner in 1983, the Multiple Intelligence Theory (MI) proposes different types of intelligence (musical, linguistic, logical-mathematical, and kinaesthetic) that can meet the unique needs of adult learners. This theory presents intelligence as multiple, specialised forms of intelligence. Integrating these factors allows adult educators to consider how their teaching might be attuned to different learning styles. This improves the learning capacity in terms of the knowledge generated and the satisfaction gained from the process. Although the MI theory delineates the various learning preferences of adult learners, an instructional design framework is crucial for converting these intelligences into successful online learning experiences.

The ASSURE model involves analysing learners, stating objectives, selecting methods and media, utilising materials, requiring learner engagement, and evaluating and revising. It offers a systematic means of translating the concepts from MI to teaching and learning. The present study adopted this ASSURE model to guarantee an online music theory curriculum that is learner-centred, multimodal, pedagogically appropriate, technologically compatible, and purposefully planned to promote active learning, explicit learning developmental progress, and continuous growth.

Incorporating MI and ASSURE aids in establishing a more diverse and engaging educational environment to meet the diverse needs of adult learners and boost their satisfaction and learning outcomes. Although online music education is rapidly gaining ground, few studies have investigated the practical implementations of MI-based instructional design for adult learners in the area of (online) music theory. Recent studies on MI have concentrated on its incorporation into traditional educational settings, the motivation and academic performance of university students through MI-oriented tasks (Sholeh et al., 2025), and the relationship between MI and higher education learners' digital literacy (Tabussum et al., 2024). There is limited empirical data on the systematic implementation of MI into structured online pedagogical modules intended for adult learning environments. While the ASSURE model has been studied in other fields, little is known about its incorporation into the MI theory to develop a systematic, interactive, and multimodal music theory training. There is insufficient empirical research comparing learning outcomes and satisfaction levels when MI and ASSURE are combined within an online music theory framework. This study thus developed and evaluated an MI-informed, ASSURE-based online music theory module for adult learners, offering both theoretical insights and practical recommendations for future instructional design.

This study aimed to examine the influence of MI theory on learning and satisfaction in adult music theory education, specifically (1) the effect of MI-based education on students'

knowledge of music theory, and (2) how the learning satisfaction of online music theory is affected by the design and delivery of the learning module. The MI theory has been widely studied in diverse settings, but relevant literature is confined to its application in adult music theory education. Following a substantial body of existing research on MI, addressing learners' diverse intelligence types can enhance their educational experience by matching their individual learning preferences.

This study is guided by three primary research objectives:

1. Does the online music theory module improve the learning outcomes of adult learners?
2. Does the online music theory module improve the satisfaction of adult learners?
3. How does the design and delivery of the online music theory module influence adult learners' learning outcomes and satisfaction?

This research aimed to examine how the instruction of online music theory can be adapted to satisfy adult learners' needs in the online environment to create better learning outcomes and overall satisfaction.

2.0 LITERATURE REVIEW

Multiple Intelligence and Music

The theoretical implications of Howard Gardner's MI in education have been extensively studied. The resultant understanding can accommodate various learning styles, as well as improve students' engagement and results. Different experiences, learning styles, and motivational needs emerge from adult learners in education (Knowles et al, 2015; Merriam & Bierema, 2014). Empirical evidence that using MI approaches in music classes promote emotional and cognitive development has been substantiated. In examining the applications of MI theory in elementary-level music classes, Yesilkaya and Toreyin (2022), who reported that MI-based strategies help to foster students' creativity, self-esteem, and cooperation. The students are able to learn more in an interesting and effective manner. Zu (2024) also investigated the influence of MI theory in Chinese high school students. In sum, MI in music teaching is key to developing linguistic, visual-spatial, kinaesthetic, musical, interpersonal and intrapersonal intelligence.

Ni et al. (2024) proposed an innovative teaching model which uses the MI theory with music education. A fuzzy comprehensive evaluation was performed to measure teaching quality. Based on MI, their findings indicate the benefits of this practice on the improvement of students' musical performance and various types of intelligence. It is a successful MI-based method in music education. As stated by Xiong (2025), the MI theory enhances music classroom participation, accommodates individual learning requirements in a range of learning styles, and can be adjusted to suit modern education systems. These reports highlight the importance of embedding MI into music education and the effect of its incorporation on students' musical competences and cognitive and emotional development. Such an application for adult music theory learning can be adopted to personalise teaching while supporting cognitive and emotional development. Research on adult learners (specifically an MI-based module on online music theory) can promote learner interest for pedagogical outcomes. Despite ongoing theoretical concerns, key assessments underscore MI's ability to contribute to the pedagogical interventions in higher education.

ASSURE Model in Online Instructional Design

In online learning, instructors are required to plan and design media use and target content. One of the instructional approaches for teachers to effectively develop learning activities with integrated technology, according to Tangjitnusorn (2023), is the ASSURE model. Developed by Heinich et al. (1999), this framework is underpinned by six phases: analysing learners, stating objectives, selecting media and materials, utilising media and materials, requiring learner participation, as well as evaluating and revising. Studies have used the ASSURE method in educational instruction. Teachers faced difficulties in selecting appropriate media in Bengkulu, Indonesia, for the educational environment, specifically Islamic kindergartens aiming to enhance the learning of their students. Nevertheless, this model was well received both by instructors and students, thus demonstrating its effectiveness (Tangjitnusorn, 2023). Mine (2020) studied the effect of an ASSURE-oriented lesson on participants' perceptions, critical thinking skills, and academic performance. The lecture exerted a statistically significant positive effect on students' technological literacy skills. Educators design lessons based on the ASSURE paradigm to improve students' knowledge of technology. According to Tangjitnusorn (2023), the participants indicated that the selection of materials in ASSURE-driven online teaching with scenario-based learning meets the needs of the learners. A few individuals with internet and technology access also identified the importance of such instruction to mitigate learning difficulties. In conclusion, the current literature supports the ASSURE model as an evidence-based guideline in incorporating media and technology into online education. Thus, students are exposed to intentional, meaningful instruction.

Online Music Theory Learning and Adult Learners

Teaching and learning music theory within online learning settings have unique challenges, particularly in the case of adult learners, for whom musical backgrounds, learning styles, and personal experiences will shape how abstract ideas of notation, rhythm, and harmonic structure are addressed. A comprehensive understanding of music theory would facilitate music development for adults, who would foster their musical intelligence, creativity, and flexibility in composition or improvisation (Yu, 2024). Despite its adaptability and availability, digital or online learning might render instructions less clear and interactive if not meticulously designed. These deficiencies highlight the importance of teaching methods in adult online music education, which contribute to theoretical learning and satisfaction. This research integrated the MI theory to accommodate different learners by offering music theory topics through visual, aural, kinaesthetic modes of expression. The ASSURE instructional design method also served to facilitate structured online instruction, in which explicit learning objectives, sequencing and alignment of instructional activities and media could be achieved. Following past works, multimodal pedagogical methods enhance comprehension and retention. A structured instructional design aids in establishing clarity and favourable learner impression in online education contexts. Both MI and ASSURE function as complementary frameworks, with the former emphasising learning diversity and the latter ensuring organisational consistency. This integration directly impacts the development of the online music theory module assessed in this research.

Instructional Effectiveness and Satisfaction in Online Learning

Learning effectiveness and student's satisfaction are common instructional quality indicators in online and blended learning environments. Learning effectiveness denotes the degree to which a process of instruction allows learners to meet the desired learning goals for knowledge acquisition and skills development. Conversely, student's satisfaction implies the extent to which learners view learning experience in relation to clarity of instruction, course structure, interaction, feedback, and perceived learning success. In online education, satisfaction is an important response to and assessment of the efficacy of instruction. Students' satisfaction depends on how well the lessons cater to meaningful learning.

The strong positive correlation between instructional efficacy and students' satisfaction indicates that perceived learning success results in satisfaction. The literature on digital and blended education contends that optimal instruction produces effective learning and learner perception. For example, Tong et al. (2022) showed a significant positive effect on academic performance and learner attitudes compared to traditional instruction. Cao et al. (2023) emphasised the benefits on academic success in blended academic environments. Similarly, Gortazar et al. (2024) revealed that the systematic design of online classes leads to a very high level of effectiveness. Hence, the structured pedagogical design plays an important role. Rexhepi (2024) demonstrated that the employment of digital tools in teaching music promotes the quality of teaching and learner perceptions. Martin and Bolliger (2022) found learner, instructor, course, and programme variables to be significant predictors for online learner satisfaction, demonstrating a direct correlation with instructional design. Clear format, social cues, and feedback may also enhance satisfaction in online learning (Yilmaz, 2023). Meanwhile, MI-based pedagogical practices can enhance satisfaction among varied learners (Oliwa, 2022). Collectively, these results support students' satisfaction as a predictor of pedagogical effectiveness. While many studies support the use of learner-centric and MI-driven instructional design, less research has been performed on their application in music theory education for adult learners.

Overall, the conceptual framework underpinning this study posits MI and the ASSURE model as complementary components on which effective online music theory instruction is built. The MI indicates the type of learning experiences provided, ensuring that activities cater to diverse learner strengths. Meanwhile, ASSURE guides how these learning experiences are organised, delivered, and supported through systematic instructional design. When combined, both MI and ASSURE result in a unified educational system contributing to cognitive (learning effectiveness) and affective (learner satisfaction) gains in learning. This study conceptualised students' satisfaction as an outcome of well-designed, practical learning experiences rooted in MI-based differentiation and ASSURE-based instructional sequencing.

Conceptual Framework

The interplay of adult learners' needs, the theoretical foundations of MI theory and the ASSURE instructional design model, the design and delivery of the online music theory module, and the expected learning outcomes was outlined in the conceptual research framework. Adult learners engage in the online music theory environment with diverse learning preferences, prior experiences, motivational levels, and technological challenges. The MI theory forms the pedagogical basis for designing multiple learning activities that address different learner strengths. Meanwhile, the ASSURE model provides a systematic instructional design structure to ensure that these activities are clearly planned, media-supported, learner-driven, and continuously evaluated.

The MI-informed and ASSURE-based online music theory module served as the primary instructional intervention in this framework. By providing structured, multimodal, interactive, and flexible learning experiences, the module design and delivery can influence learners' music theory knowledge and satisfaction. As posited by the framework, adult learners can achieve improved learning outcomes and higher satisfaction when online music theory instruction is designed to accommodate learners' diverse intelligences and delivered through a systematic instructional model.

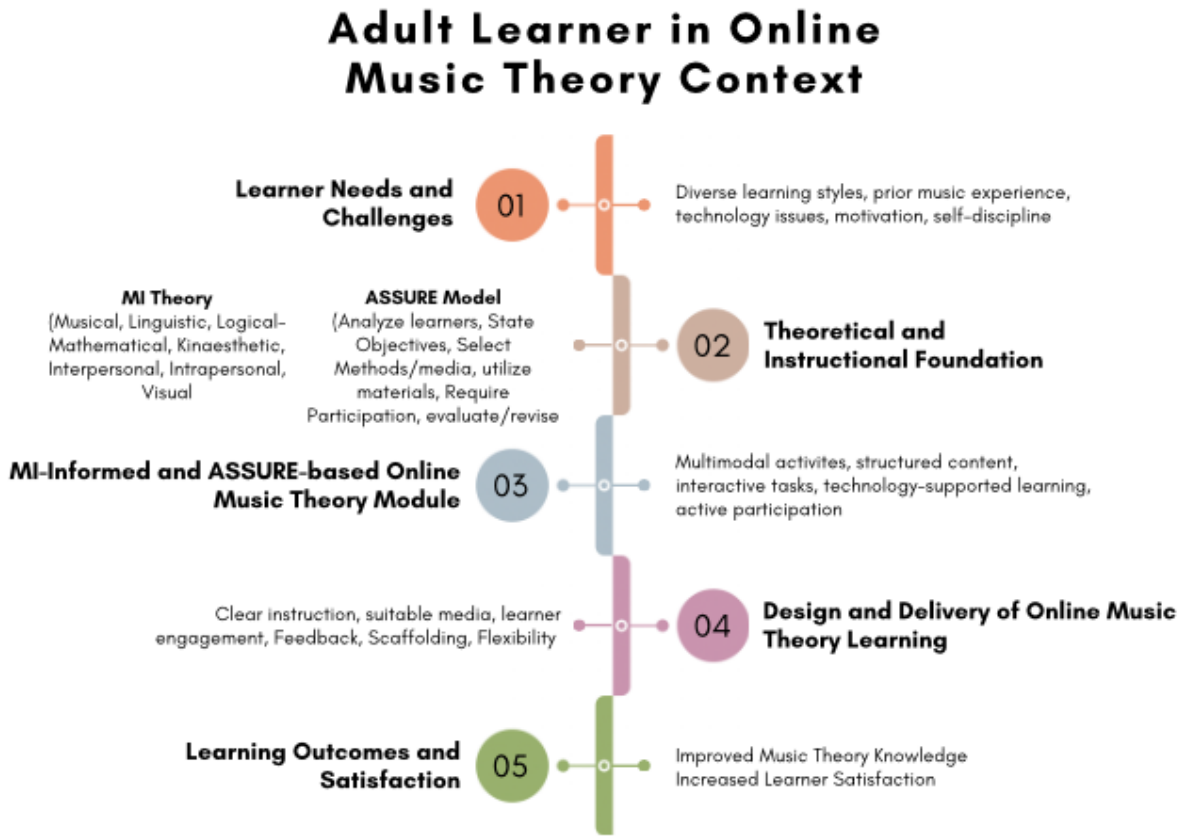


Fig. 1 *Illustrates the conceptual framework of the study*

3.0 METHODOLOGY

An explanatory mixed-method approach was used in this study, with MI and the ASSURE instructional model integrated for evaluating the effect of an online music theory course. Mixed methods were chosen to combine qualitative and quantitative data on learners' effectiveness and satisfaction, providing a comprehensive overview of students' learning effectiveness and satisfaction. Standalone quantitative results may fail to capture learners' experiences in an online learning environment. Hence, the quantitative phase was initially implemented, followed by the qualitative phase, to strengthen the statistical findings. The quantitative approach involved a pre-test and post-test measurement consisting of MTKT to examine learning effectiveness (research question 1) and the SLS-OLE questionnaire to assess student satisfaction (research question 2). Meanwhile, the qualitative approach included follow-up interviews with selected participants to capture the learning experience and deepen the understanding of the quantitative findings. Procedural or result-based factors were not stressed at this point. It was by combining the quantitative and qualitative findings that the qualitative information added depth to the quantitative findings and provided an integrated response to the research questions.

Participants

The participants involved were students between 21-28 years old. Participants who had zero to one year of experience in learning music were purposively sampled to establish a consistent baseline of music theory knowledge. Participants were recruited through announcements distributed via university communication platforms and social media channels. To ensure that participants met the inclusion criteria of being adult learners with minimal formal music learning experience, purposive sampling was employed. This mitigates

the impact of existing knowledge on participant performance. It also ensures that learning gains coincide with the design of the learning task. Each student could access a piano, electric piano, or tablet to comprehensively engage with the course content. To investigate the impact of the music theory module on novices, and how various online learning methods influence the satisfaction and progress of adult learners with limited musical experience, these individuals were selected. Notably, 63 students completed this 10-week training. They were randomly assigned to the control or experimental group with a digital randomisation tool to minimise selection bias and ensure balanced group distribution. After the 10-week module, 10 students from the experimental and control groups were randomly selected to participate in the semi-structured interviews (see Table 1).

Table 1. Demographic Information of Interviewees

Group cluster	Interviewee's code	Age
Experimental group	B	23
	E	22
	Q	27
	R	27
	S	24
	T	28
	U	21
	V	22
	W	24
	Z	21
Control Group	C	21
	D	21
	F	21
	G	22
	H	23
	I	22
	K	25
	M	25
	N	21
	O	22

Research Instruments

Two instruments, SLS-OLE and MTKT, were employed to assess satisfaction and students' comprehension of key content in the music theories. The MTKT contains 30 questions on the ABRSM Grade 1-3 syllabus, entailing core music theory concepts (notation, rhythm, harmony, and melody). These tools were used before and after the participants engaged in the 10-week training to ascertain differences in satisfaction and outcomes. In addition to the quantitative results, semi-structured interviews were conducted (post-intervention) with the students to measure their learning experience, attitudes about instruction, teaching design, and factors affecting satisfaction and perceived learning effectiveness.

For content validity, the MTKT was developed following the ABRSM Grade 1–3 music theory syllabus and reviewed by music education experts. Notation, rhythm, harmony, and melody are the four major domains covered in this instrument. The SLS-OLE questionnaire was adapted from previously established online learning satisfaction instruments. Based on prior studies, this questionnaire demonstrated acceptable reliability. Both instruments underwent expert validation (pre-implementation) to ensure clarity, appropriateness, and alignment with the study objectives. To assess instrument reliability and suitability a pilot study was conducted before the main intervention. The Cronbach alpha values indicated acceptable internal consistency for the instruments.

Procedure

The experimental group participated in an online music theory module based on the MI theory. Essentially, the module utilised the ASSURE model of instruction, emphasising structured approach, suitable use of media, and learner engagement. The intervention lasted for 10 consecutive weeks, with the control group receiving conventional online instruction. The experimental group received MI-informed learning activities (multimodal exercises, interactive quizzes, collaborative tasks, listening activities, and technology-supported learning materials) integrated with the ASSURE instructional framework. Meanwhile, the control group followed a conventional lecture-based online learning approach. Each group completed one two-hour unit per week, amounting to 20 instructional hours following the established intervention durations in educational research (DeFouw et al., 2021).

Data Collection

The current data were gathered using various tools to measure the level of students' knowledge of music theory and satisfaction pre- and post-completion of the 10-week module. To assess student comprehension following the ABRSM Grade 1-3 syllabus, a pre- and post-test of music theory knowledge was conducted. These tests are crucial for comparing the students' knowledge gain during the course of the module. Pre-test and post-test assessments of SLS-OLE were also performed to assess online learning satisfaction levels pre- and post-module based on Gardner's MI framework.

Following the completion of the 10-week module, 10 students from both the control and experimental groups were randomly selected for attending semi-structured interviews. The interview participants were selected to gauge their perspectives on learners' experiences, satisfaction, and perceived learning effectiveness throughout the module. Empirical data were obtained using the semi-structured interview questions developed in line with expert opinions. These questions were used to gauge students' responses to the design and delivery of the online music theory module. They were also asked to reflect on their understanding and satisfaction with the module. These interviews were conducted online and visually using the Zoom platform.

Data analysis

Both quantitative and qualitative methods were used to analyse the effects of the 10-week music theory module on students' performance and satisfaction on the online learning process. Regarding the quantitative data, statistical examination was conducted on the pre-test and post-test scores for MTKT and SLS-OLE questionnaires. Pre-test and post-test results were compared to identify any significant changes in students' music theory knowledge and online learning satisfaction pre- and post-module completion. The current data were analysed with descriptive and inferential statistics, including paired sample t-tests and ANCOVA, to determine key variances between pre- and post-test scores while controlling for baseline differences. To ensure the appropriateness of the statistical procedures, assumption testing (normality and homogeneity of variances) was conducted prior to inferential analyses. Semi-structured interviews were conducted with 10 students from the control and experimental groups to yield qualitative data. The thematic analysis of interview responses was performed to highlight and organise the themes and trends associated with the design and delivery of the module, as well as the participants' comments regarding their understanding and satisfaction in online learning. In general, this mixed-method study facilitates the analysis of measurable results and students' subjective experiences with them. Ethical issues must be addressed post-data analysis to ensure that the research is conducted in compliance with established standards.

Ethical Aspect

Ethical approval for this study was obtained from the relevant university ethics committee before data collection. Participants were briefed on the study aim, voluntary participation, data confidentiality, and their right to withdraw from the study at any point without penalty.

4.0 RESULTS

Research Question 1

Does the online music theory module improve the learning outcomes of adult learners?
Learning outcomes were assessed using MTKT. Initially, the pre-test showed similar scores in both groups based on the descriptive results. It was after the 10-week intervention that the experimental group showed greater improvement than the control group. For pre-test scores, the ANCOVA revealed a significant group effect on post-test performance. The MI-informed, ASSURE-based module also had students benefitting more from improvements in knowledge of music theory. The model explained a moderate proportion of the variance in the post-test scores, indicating that the instructional method makes a significant contribution to achievement beyond prior knowledge.

Table 2. Descriptive Analysis of MTKT in Pre-test and Post-test

	Group	N	Pre-test		Post-test	
			Mean	SD	Mean	SD
Learning Outcome (MTKT)	Experimental	32	14.16	4.27	22.44	4.78
	Control	31	14.45	4.06	19.32	4.20

Table 3. ANCOVA on Post-test Scores between Experimental and Control Groups in MTKT

Source	Type III Sum of Squares	Df	Mean Square	*F*	*p*	Partial Squared (η^2)
Corrected Model	337.35^a	2	168.70	9.62	.00	0.24
Intercept	1064.24	1	1064.24	60.70	.00	0.50
Group	164.90	1	164.90	9.40	.00	0.14
PRE_MTKT	184.57	1	184.57	10.53	.00	0.15
Error	1052.08	60	17.54			
Total	28921.00	63				
Corrected Total	1389.43	62				

a. R Squared = .24 (Adjusted R Squared = .22)

Research Question 2

Does the online music theory module improve the satisfaction of adult learners?
Students' satisfaction was quantitatively and qualitatively assessed using the SLS-OLE questionnaire and semi-structured interviews, respectively. Following the descriptive analysis, satisfaction levels were similar for both groups at pre-test. These groups reported increased satisfaction at post-test. However, the experimental group exhibited a greater improvement. The ANCOVA indicated a statistically significant group effect when baseline satisfaction was also adjusted, suggesting that participation in the MI-informed, ASSURE-based module promotes satisfaction. Pre-test satisfaction significantly predicted post-test satisfaction, explaining a large percentage of the variance.

Table 4 Descriptive Analysis of Online Learning Satisfaction in Pre-test and Post-test

	Group	N	Pre-test		Post-test	
Online Learning Satisfaction			Mean	SD	Mean	SD
	Experimental	32	2.48	.38	2.62	.39
	Control	31	2.34	.41	2.43	.40

Table 5 ANCOVA on Post-test Scores between Experimental and Control Groups in Online Learning Satisfaction

Source	Type III Sum of Squares	Df	Mean Square	*F*	*p*	Partial Eta Squared (η^2)
Corrected Model	9.31a	2	4.65	461.33	<0.001	.94
Intercept	.07	1	.07	6.74	0.01	.10
Group	.05	1	.05	4.90	0.03	.08
PRE_SCEQ	8.75	1	8.75	867.29	<0.001	.94
Error	.61	60	.01			
Total	413.02	63				
Corrected Total	9.91	62				

a. R Squared = 0.94 (Adjusted R Squared = 0.94)

Research Question 3

How does the design and delivery of the online music theory module influence adult learners' learning outcomes and satisfaction?

The sample students participated in semi-structured interviews post-test to share their perceptions of the online music theory learning experience. Three core themes emerged from the interview transcripts, which were thematically analysed. Theme 1 (Perception of Instructional Quality and Clarity) refers to students' views and assessments regarding the instructional structure and delivery of lessons, with students stating that the learning process is 'clear and easy to follow'. Theme 2 (Learning Engagement and Interaction) pertains to the experience of engagement and interaction among the students' peers in class. In this context, the participants described the class-based learning as 'engaging and interactive'. Theme 3 (Confidence in Learning) entails the students' confidence in learning music theory based on notation, rhythm and counting. One of the participants felt more confident to study 'reading and understanding rhythms'. These themes reflect students' perceptions regarding their educational experiences and their satisfaction with pedagogical methodology.

The current outcomes suggest a strong learning effectiveness-student satisfaction relationship. As students who achieved the highest enhancement of music theory knowledge experienced greater satisfaction, higher satisfaction is related to perceived levels of learning. Notably, the qualitative evidence reinforced this relationship based on perceived instructional clarity, learning engagement, and learning confidence. The following section details the quantitative and qualitative findings, revealing how the MI-based, ASSURE-guided instructional design supports students with their learning experiences and satisfaction.

5.0 DISCUSSION

The MTKT quantitatively measured key differences in post-test scores for experimental and control groups, with a moderate effect size (partial η^2 = .15). Beyond previous baseline skills in learning, the MI-informed, ASSURE-based module has a large, positive impact on adult learners' music theory knowledge. The comparison of the pre-test scores of both groups suggests that the group performs better after the intervention. This may also contribute to the conceptual understanding and retention of theoretical knowledge, which extends beyond improvement in prior knowledge. Essentially, MI-enabled tasks may increase effective learning progress through varied 'entry points' to information about learners' skills and

preferences and measurable performance improvements in quasi-experimental settings (Gebremeskel T. et al., 2024).

These results align with earlier works on adult online learning. Significant associations were identified between educational design parameters (systems or instructional support) and learning outcomes, as well as between educational programmes and learner requirements (Abuhassna H. et al., 2024; Yuebo L. et al., 2024). From an instructional design perspective, the findings denote how structured design paradigms allow learning theories to be incorporated into cohesive online media applications through deliberate media selection, sequencing, and learner engagement for optimal learning outcomes (Lu et al., 2022; Yuebo L. et al., 2024). The MTKT finding depicts how combining MI-supported activity design (content differentiation) with ASSURE-guided planning and delivery (systematic implementation) would enhance adult learners' knowledge of music theory in online teaching.

Qualitative data were collected from interviews held after the intervention and included to complement the quantitative data. Members of the experimental group were more confident in reading musical notation, grasping rhythmic structures, and applying music theory within practical lessons. These improvements were associated with pedagogical methods involving visual aids, kinaesthetic exercises, guided auditory engagement, interactive digital learning media, which support learning through multiple sensory and cognitive modalities (Shearer, 2018; Gebremeskel et al., 2024). The instructional design followed the ASSURE model structure to determine the order of learning objectives, activities, and opportunities.

From the students' perspective, the lessons were developed appropriately, comprehensible, and logically sequenced (Eliana et al., 2024; Abuhasaana et al., 2024). This minimises cognitive overload and provides conceptual understanding when learning online. In addition, MI-based methodologies enhance cognitive processing through participation in learning. Systematic instructional design models improve the clarity and consistency of online instruction for adult learners (Shearer, 2020; Yuebo et al., 2024).

The integration of MI-informed activities with the ASSURE instructional framework established a more structured, learner-driven online music environment. Throughout the intervention, multimodal learning activities and systematic instructional planning jointly supported adult learners' understanding, satisfaction, and engagement. These findings align with previous studies, which underscored the need for instructional structure, learner diversity, and active participation in online learning (Gardner, 2020; Smaldino et al., 2020).

In terms of online learning satisfaction, students from the experimental and control groups were at the same pre-test level of satisfaction. The post-test measurements, however, showed a significant difference in student satisfaction for the experimental group. Notwithstanding the small effect size (partial $\eta^2 = .08$), the ANCOVA results suggest that the MI-informed, ASSURE-based module significantly contributes to student satisfaction when the mean difference during the baseline adjustment is also considered. Simple changes in instructional design significantly impact learner responses to online learning satisfaction when instruction is designed in a well-organised and learner-driven way. Empirically, satisfaction in online learning environments is mainly derived from clarity of instruction, organisation of learning materials, and fulfilment of learner needs, rather than the content itself (Martin & Bolliger, 2018; Kuo et al., 2014). Systematic instructional design schemes (ASSURE) lead to enhanced learner satisfaction, as they contribute to coherence, pace and perceived teacher presence in online courses (Smaldino et al., 2020; Iriani et al., 2023). The MI supports specific and interesting learning activities aligned with participants' preferred modes of engagement (Qutab et al., 2024), resulting in positive educational experiences. Overall, instructional design and delivery may significantly determine adult learners' satisfaction in online learning environments.

The qualitative findings confirmed this interpretation: there are significant differences in learners' experiences between the experimental and control groups. The experimental group had a higher score, indicating greater satisfaction as the course is clearly structured, collaboration is promoted, and instructions are personalised. Notably, many participants

disclosed their enjoyment for quizzes, visual descriptions, and flexible approaches to pedagogy. These features render the process less 'monotonous' and 'more exciting'. Consistent with previous studies, interactive and multimodal learning activities enhance students' satisfaction with and quality of online education. Such is the case when instruction aligns with student preferences and provides diverse access to content (Martin & Bolliger, 2018; Kuo et al., 2014). Yet, students in the control group described a passive learning opportunity shaped by restricted interaction, limited opportunities for active involvement, and increased reliance on lecture-oriented teaching. Prior studies also showed that restricted contact or reduced user participation in online environments adversely impact students' satisfaction and reported engagement, even when the topics are sufficiently covered (Baber, 2020; Dixson, 2015). Instructional design features (not content delivery alone) facilitate interaction, inclusiveness, and learner autonomy, thus affecting students' satisfaction on online music theory education than content dissemination.

Several limitations should be considered during outcome interpretation, despite the positive findings yielded. First, the intervention was conducted with a relatively small sample of adult learners demonstrating limited prior musical experience. This may restrict the outcome generalisability to learners with different musical backgrounds or age groups. Second, the intervention duration was limited to 10 weeks. This duration is insufficient for determining the long-term retention of music theory knowledge and sustained satisfaction levels. While the MI-informed activities appeared beneficial, it proved challenging to isolate the instructional components that significantly contributed to the observed improvements. Multiple pedagogical and technological elements were simultaneously integrated into the module. Learner motivation, instructional interaction, and familiarity with online learning may also have influenced the outcomes beyond the intervention design itself.

The experimental group demonstrated improved learning outcomes and satisfaction, but the effect size for satisfaction remained relatively small. Hence, the factors influencing adult learners' satisfaction in online learning may go beyond instructional design to include personal motivation, technological readiness, time management, and external learning conditions. Further studies may examine additional learner-related variables and investigate the long-term effectiveness of MI-informed online music theory instruction across broader educational contexts.

Implications of the Study

The current results align with the existing research on online music theory instruction, which emphasised the influence of method of teaching on learning outcome and learners' satisfaction. Specifically, the MI-informed teaching directs students through various cognitive routes to musical concepts (Taj, Sheikh & Khan, 2025). Empirical studies have reported that such modes of learning yield better learning results. Thus, adult students demonstrate a clear increase in knowledge and satisfaction through MI-oriented, activity-based learning of music theory.

The learning outcomes and satisfaction of adult learners in the online music theory module are largely based on the nature of the instruction. Notably, MI-informed approach facilitates students to comprehensively understand the content, as students are able to interact with content through diverse activities tailored to their cognitive preferences (Gardner, 2020; Al-Abdallat & Al-Omari, 2023). The ASSURE model results in the cohesive alignment of objectives, instructional strategies, media, and assessment, thus minimising confusion and enhancing learning progression (Mohammed, 2020; Eliana et al., 2024). For adult learners, structure and flexibility are beneficial. The quality of learning is higher when it is well structured, easier to understand, and well-connected (Kahu & Nelson, 2018; Bolliger & Halupa, 2018). Consistent with previous works, satisfaction also relates to organisation, pace and meaningful engagement, transcending the boundaries of digital technologies (Grey & DiLoreto, 2016; Rapanta et al., 2020).

Following research on instructional design for online classes, lesson planning enhances understanding and satisfaction. Martin et al. (2020) revealed that students achieve

better learning outcomes in online courses when objectives, activities, and instructional media are aligned. Based on the current results, learners demonstrating more positive gains in learning feel more satisfied. The study thus presents a systematic instructional framework that supports cognitive outcomes and learner perceptions of online music theory education.

The MI-informed learning activities, combined with the ASSURE instructional framework, may support adult learners' understanding and satisfaction in online music education. Multimodal activities, structured instructional sequencing, and learner-centred engagement jointly provide a practical framework for designing online music instruction that meets different student needs while maintaining instructional clarity and coherence.

Limitations and Future Research

This study is not without its limitations, despite the positive outcomes yielded. First, the learning outcomes were derived over a short intervention period. They may not reflect long-term information retention or generalisability beyond the instructional module. Second, initial attitudes had a strong impact on satisfaction. Further research could consider long-term interventions to assess persistent effects, explore MI-informed, ASSURE-based design across different music disciplines and learner demographics, and analyse how certain intelligence types inform learning outcomes in adult online education.

6.0 CONCLUSION

This research examined the effectiveness of an online music theory module, designed using the MI theory and ASSURE framework, for adult learners. It sought to determine whether this teaching approach would enhance learning results and student satisfaction in an online learning environment.

Students in the MI-informed and ASSURE-driven activities improved their level of music theory knowledge more than those in the control group. Participants also expressed more satisfaction. Based on the qualitative data, satisfaction was strongly linked to perceived teaching effectiveness, with students highlighting clearer explanations, engaging activities, as well as enhanced note-reading, rhythm, and fundamental theory. Students from the control group had less active learning experience and, hence, lower satisfaction.

Overall, an online music theory module for adult learners should be supported with MI-informed learning experiences in a contextual ASSURE-based framework. Adopting such an approach may help establish a conducive learning environment and positive learner perceptions in adult and lifelong music learning contexts, without over-generalising beyond the study setting.

CO-AUTHOR CONTRIBUTION

The authors report no conflict of interest.

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DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

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