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Designing Innovative Online Lessons to Foster Piano Playing Skills for Beginners with No Prior Experience

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Abstract

This research aims to design innovative online lessons for fostering piano playing skills in beginners with no prior experience. The study addresses the challenges and opportunities in teaching piano remotely, focusing on the key variables of lesson design, personalized feedback, and student engagement. A mixed-methods approach was employed, combining qualitative interviews with five piano teaching experts and quantitative analysis using data from 123 students who had no previous piano experience. The qualitative phase involved interviews to explore expert opinions on effective lesson components, which informed the development of the online lessons. In the quantitative phase, a questionnaire was administered to students to evaluate the effectiveness of the lessons. Data analysis was performed using SmartPLS to assess the relationships between the variables and test the proposed hypotheses. The findings show that all hypotheses were accepted, indicating that lesson design, feedback mechanisms, and engagement strategies significantly contribute to the success of online piano lessons for beginners. This research fills a gap in the literature by providing insights into designing effective online piano lessons tailored to beginners, a largely underexplored area. Its originality lies in the integration of expert feedback with empirical student data, offering practical recommendations for enhancing online music education for novice learners.

Keywords: Online Courses, Non-Piano Playing Background, Students, Skills, Development

Introduction

There have been profound and significant growths in the last few years in the domain of online education, not only at the elementary education level but also in advanced professional training. The entire shift towards online learning has significantly affected such skill-based fields as music education, where a more age-old, face-to-face model was conventional (Madleňák et al., 2021). These days, the adaptability, availability, and expandability of the online platform are making it even more popular among the educators and the learners. So, there has been an alternative method for learning and teaching piano skills (Kristoffersson, 2024). This is an attractive option for many, providing the ability to learn at their own pace, convenience in accessing lessons from anywhere, and revisiting content as needed. Online piano lessons are becoming a subject of growing interest in the research community as it applies to effectiveness, especially among beginners. Though the pace of online music education has taken off, there are considerable hurdles as it relates to lesson design, learner engagement, and developing foundational skills with or without a real setting in place (Arcila & Oliverio, 2021). This study will attempt to explore

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how online piano lessons can be designed to promote piano playing skills in beginners, considering both instructional design and learner interaction, and evaluate the effectiveness of these lessons from both expert and student perspectives.

Technological advancements have led to changes in the delivery and consumption of education. The impact of this is the development of online education and has increased availability for piano courses and instructional content in music education (Haspel & Burmester, 2021). These online platforms have opened the doors to students' learning lessons from renowned instructors and institutions around the globe, thus democratizing music education and offering more opportunities for learners who may not have had access to traditional piano teachers or schools (Bastepe-Gray et al., 2021). Although the Internet has expanded into learning, much is still not known about the design of lessons in piano learning with no prior experience in music. General studies on online learning in music education have dominated (Alfarizi et al., 2023), with few studies specifying best practices in teaching piano as a beginner-level instrument online. The paper attempts to bridge this gap by examining the essence of an online piano lesson's structure and its subsequent effects on learning experiences and learning outcomes. Additionally, the study emphasizes key variables, especially in regards to the effectiveness of online piano learning for novices. A leading variable here would be the nature of the lessons, or their design in general, in terms of sequence, pace, and content. The effectiveness of online piano lessons depends largely on whether the lesson is engaging, well-organised, and appropriately challenging for beginners (Li et al., 2022). Another critical variable that goes into determining a learning outcome involves personalized feedback, which is somewhat different from an in-person face-to-face scenario where teachers will give immediate tailored feedback. Instead, online courses face the disadvantage of not reproducing this effect of learning and teaching (Wang, 2022). The third variable is student engagement, which has been a factor to lead the learning process successfully in online environments (Hamdan et al., 2023). Engagement in this sense is defined as the extent to which learners interact with the content, participate in activities, and stay motivated throughout the learning journey (Prouska et al., 2022). The central aim of this study is to understand how such variables interact and contribute to the learning experience of novices in online piano lessons.

This study focuses on three key variables that influence the design and effectiveness of online piano lessons: lesson design, personalized feedback, and student engagement. The first variable, lesson design, is integral to the overall learning experience. In online education, lesson design is not merely about the content but also about how the material is structured and delivered in a digital format. Previous studies have stated that lessons need to be short, simple, and scaffolded in a way that makes the learning process more accessible to the students, particularly for novices (Jegerson & Ahmad, 2021). For instance, research works have shown that breaking down of complex tasks into smaller, easier-to-handle ones helps students step by step build their competencies without overwhelm (Dinku et al., 2024). In addition, online courses should use various learning materials like videos, tutorials, diagrams, and quizzes, which help meet the different learning styles and student engagement (Wei et al., 2021). The second variable, personalized feedback, is an essential component of any educational experience. In a face-to-face setting, the instructor provides instant and personalized feedback for each student to make adjustments and improvements in real time. However, in an online setting, providing feedback becomes difficult and requires much more effort. Some researches have shown the need to introduce automated feedback tools, like AI-based systems that analyze the students'

performance and give recommendations on how to improve (Selvaraj et al., 2021). Peer review and collaborative learning-where students engage in feedback among themselves through the online interface-was highlighted to be a technique that works very well to generate interaction and interest (Alshaikh et al., 2021) Giving of personalized feedback can be helpful in areas where students tend to start practice, which, particularly for novices, should have frequent directions as they perfect proper technique and then progress in such activities . This research will explore the effectiveness of providing feedback in online piano lessons and its impact on student learning. The third variable is student engagement, which describes the level of interaction and involvement students have with the content of the lesson. In any online learning environment, engagement is one of the main determinants of success because it directly affects motivation, retention, and overall learning outcomes (Babirye et al., 2024). An engaging student is one who is going to be consistent in learning, attending classes, and achieving their objectives (Chu et al., 2024). Interactive components of quizzes, assessment, and discussion have been proved to promote students' engagement since they actively involve the learner. Further, gamification, which is defined as the addition of game-like features such as points, badges, and leaderboards to encourage engagement with online materials, has been suggested to promote learning motivation in online environments(Qiu et al., 2021). This current research focuses on the extent to which engagement strategies in the online piano lesson, featuring interactive feedback, and gamified aspects support learning experiences and outcomes among students.

There is an important body of literature on online education in music and skill-based learning. Most of the literature indicates that learning platforms online have been proven effective for many different subjects, yet little research focuses specifically on beginner piano lessons. For instance, studies by Ma & Ma, (2023) investigated how digital tools enhance the acquisition of musical skills. These studies have shown that, if used effectively, technology will help improve music education by opening access to educational materials, creating an asynchronous learning environment, and providing interaction skills (Brunello & Wruuck, 2021). Another study done by Liu & Bhengsri, (2024) was to show the benefits of online music education for a beginner: one can learn at his own pace and refer back to what has been learned. However, challenges are still there regarding the replication of personalized feedback and interactive experiences, which are a part of traditional face-to-face lessons. Earlier studies have highlighted that one of the main challenges in online music education is the problem of providing immediate and personalized feedback to the students. A study by Castro & Tumibay, (2021) concluded that the lack of real-time feedback in online environments is a significant barrier to effective learning, particularly for beginners who require constant guidance to correct mistakes and develop their skills. This finding underscores the need for innovative solutions, such as the use of AI-powered feedback systems or incorporating peer review, to provide timely feedback in online learning environments. Likewise, Jackson et al., (2022) in his study showed that student engagement is a critical predictor of success in online learning. However, studies also reveal that online learners, especially the beginners, face challenges in sustaining motivation and focus that have a negative impact on their learning outcomes. These findings show that lesson design and engagement strategies are crucial to making online piano lessons both effective and engaging for students.

Despite useful literature contributions of previous research to online learning and music education, this study still aims to fill gaps in the literature that are concerned with the current study. For one, most of what is available in literature about online music education has focused on more advanced learners or those with some prior musical knowledge (Cao, 2024). It was rare

to come across studies that specifically targeted the design and delivery of online piano lessons for beginners with no background in music. This research aims to bridge this gap and focuses its attention on the special challenges and instructional needs that absolute beginners possess. Most of the earlier studies emphasized either the technology of online learning or the pedagogical practice involved but didn't integrate the two, thus not making clear how the two elements combine to affect learning. This study sought to bridge that gap by ascertaining how lessons are designed in conjunction with types of feedback and engagement strategies would interact to shape students' experiences and success with online piano education. Additionally, the literature suggests a call for more research into the issue of how to best engage novices during online piano lessons. Although various studies have indicated that engagement is imperative for success in E-learning, the available evidence on how engagement can be enhanced in a skill-based performance-oriented discipline like music is relatively very sparse (Sivaji et al., 2020). This study contributes to the understanding of engagement in online piano education by studying the ways in which interactive content, personalized feedback, and gamified elements can influence student motivation and participation. This study addresses such gaps and contributes to the literature of online music education as well as offering practical insights in designing more effective and engaging online courses for beginner piano students.

The importance of this research is in its ability to enhance the manner in which piano lessons for new learners ought to be designed and delivered online. As online learning will continue to increase its demand, considering the aftermath of the COVID-19 pandemic, strategies to effectively teach people musical skills should be developed. This study contributes to the growing literature on online music education by focusing specifically on the needs of beginner piano students, a group that has been underrepresented in previous research. Through identifying key elements of effective online lesson design, including structure, feedback mechanisms, and engagement strategies, the research gives concrete recommendations for educators and instructional designers to enhance the online learning experience for the beginner piano student. In addition, the study's findings will help in informing future online music education platforms about the requirements that are necessary for such a diverse range of learners. Ultimately, this study may contribute positively to the easy accessibility and practicality of music education online as piano teaching might reach more learners across different ethnicities and regional locations.

Literature Review:

The development of online music education has greatly transformed the way people learn musical instruments, shifting from traditional face-to-face instruction to more accessible, digital platforms. Traditionally, music education relied heavily on personal, one-on-one instruction, with formal education institutions offering limited online resources (Castro & Tumibay, 2021). However, with the dawn of technology and internet, early 21st century, it has become possible for music teachers and the institutions to reach more people through online courses, instructional videos, and live streaming services. Online courses have numerous benefits for skill-based learning in terms of flexibility, accessibility, and reaching a heterogenous dispersed global audience (Valtonen et al., 2021). These developments in online teaching techniques have enabled learners to interact with the material at their own speed, making music education more personalized and inclusive, especially for learners who may not be able to receive in-person instruction.

Despite the benefits, learning musical instruments online is quite challenging, especially in terms of practical, hands-on skills. Theoretical knowledge can be communicated effectively through digital media, but the subtleties of music performance, such as finger positioning, dynamics, and expression, are hard to master without direct interaction with an instructor (Lu & Danpradit, 2022). In the case of online learners, especially beginners, immediate corrective feedback, which may occur during the practice sessions conducted by in-person teachers, might not be achieved. This results in slowing the learning process and leads to the creation of incorrect techniques (Bashir et al., 2021). Technological barriers can also be presented as poor internet connectivity or unavailability of relevant software, creating obstacles for learning, especially among students from low technological infrastructure areas (Xu et al., 2021). These challenges stress the necessity for instructional designs that overcome the shortcomings of digital learning environments.

The effectiveness of online music education depends on the instructional design models and learning theories that underpin the design of online lessons. One model commonly used is ADDIE, which involves a systematic approach to designing educational programs so that the lessons are in harmony with the objectives of learning and the needs of the students (Marisa et al., 2024). Adding that it can apply well to the structure of delivering online music lessons with ADDIE for easier development, the breakdown of a complex task of musical technique into smaller chunks will be allowed, and so does the inclusion of learning theories in the skills being acquired: behaviourism and constructivism. Behaviorism is being used in training to design structured practice exercises that are well-reinforced so that one can continue with the repetition for perfect mastery by Gunnars, (2021) while constructivism, on active learning and knowing, promotes ideas of student-centered learning online with online lessons, based on constructing through exploration and then practice for that understanding of the music.

Even though research exists in terms of general effectiveness, much of the existing literature has gaps when it comes to online lessons designed for piano players with no experience. A large body of studies focused on technology and its application in music education fail to account for complete beginners with no background in music, which poses specific challenges in their learning process (Yuchen & Yoong, 2022). The lack of focused research on the pedagogical strategies required for teaching piano to such learners means that there is a need to develop instructional frameworks that are attuned to cognitive, emotional, and technical challenges confronting beginners. Most of the currently available frameworks and models of online music education are developed with middle or advanced-level learners in mind, leaving the gap of not knowing how lessons can be prepared that are simultaneously accessible and effective for beginners.

The gap in research related to beginners learning piano online is especially important when considering the rise of self-directed learning and the desire for more personalized educational experiences. For beginners with no prior experience, online piano lessons often rely on pre-recorded videos or step-by-step instructions, but without the support of a teacher, it can be difficult for learners to stay motivated or troubleshoot issues independently (Rui, 2023). Personalized feedback is one of the critical components of effective learning and is usually absent, making it difficult for beginners to progress or even feel confident about their abilities. Moreover, the design of online piano lessons seems to be oriented toward one-size-fits-all approaches, neglecting the fact that people have different ages, learning paces, or experience with music theory (Garris & Fleck, 2022). The online lessons need, therefore, a great deal of research

to explain how the sessions can be altered according to an absolute beginner's needs so that he gets guided and encouraged accordingly for his further musical growth.

This gap requires reconsideration of methods and technologies used in teaching and a more complex understanding of cognitive and psychological dimensions of learning a musical instrument. Studies on the novice learner have shown that learning can be significantly improved if instructional designs involved scaffolding, problem-solving, and self-reflection (Yao, 2023). Such strategies can be incorporated into online piano lessons to encourage more meaningful engagement and a greater sense of accomplishment. For example, providing interactive exercises where students can practice new skills in different contexts or giving personalized feedback through automated systems or peer review could help bridge the gap between the consumption of passive content and active learning (Hendriarto et al., 2021). Only when these challenges are addressed and online lessons are adjusted to meet the needs of the novice can online music education finally serve the needs of the beginner piano player in a meaningful way to develop their skills.

Methodology

Adopting a mixed-methods approach for the current research, it tested the efficacy of innovative online piano lessons that facilitate piano playing abilities among novice players with no past experience. Using this method gave the researcher not only in-depth access to expert's views on the online piano lessons but also empirically validated knowledge on the same through the aid of quantitative data analysis. The study was carried out in China, a country with rapidly growing interest in online education, but especially in music, where few studies have looked into the specific problems and strategies associated with teaching the piano to complete beginners.

The qualitative phase was achieved by conducting in-depth interviews with piano teaching experts in China. For this, experts with long, varied backgrounds that spanned traditional teaching and online platforms were selected; this ensured an in-depth grasp of the challenges in teaching beginner students and those that the Internet presents. With a semi-structured interview, themes related to the place of technology in music education can be explored very flexibly-including, as examples, difficulties inherent in teaching new students who one cannot meet and greet with directly, and which elements make a good online course in piano lessons. The interview protocol was developed to ask specific questions regarding lesson pacing, use of multimedia tools when teaching, methods used in providing an online setting of giving feedback, and online strategies for keeping the student engaged. The interview data were transcribed and analyzed using thematic analysis techniques, through which the researcher was able to establish the key concepts and patterns of online lesson design with beginning pianists. From these, a set of propositions concerning effective strategies for online piano instruction of novices could be constructed by the researcher in constructing the development process of the quantitative phase of the study.

In order to measure the efficacy of these online lessons, the evaluation used formative and summative assessment tools. The formative assessments were all conducted during the course so that students could be monitored in terms of their progress, and immediate action taken if needed. For example, small quizzes, exercises, and tasks focusing on specific skills, like identifying musical notes, can be performed such as doing the scales, etc., and executing simple melodies. Formative assessment would adjust teaching techniques and lesson content in a continuous flow so that students could never become overwhelmed by knowledge they hadn't mastered yet. Summative assessments are administered towards the end of each course to evaluate the overall

progress made by the student in playing the piano. This included more in-depth checks on the development of skills in rhythm accuracy, finger positioning, and musicality. The summative tests were conducted to capture the cumulative effect of the online lessons and to assess whether the students had developed the competencies necessary for playing basic piano pieces. Aside from the formal tests, observation forms were used in gathering real-time feedback on the implementation of the lesson. These observation forms were specifically designed to document the students' response to this online learning setting and the level of engagement, motivation, and barriers encountered in those lessons. Feedback was also elicited on the general structure of the lessons, clarity of instruction material, and efficacy of the online system. Qualitative analysis of data collected from the observation forms showed common themes and issues that affect the learning experiences of students. The feedback provided in this form was very helpful in identifying the areas where online lessons could be improved, for example, interactivity of lesson materials, the frequency of giving feedback, and how to make the platform more accessible to students who have limited technical know-how.

With qualitative exploration complete, the study was followed by a quantitative phase of data collection wherein a structured questionnaire was used with 123 respondents in China. The participants recruited were from diversified backgrounds and places to ensure a representative sample across the population for all beginner piano learners. The questionnaire was set in line with the different aspects of the online learning experience, including their levels of engagement, and the progression of their piano playing skills. Questions were formulated based on the insights gained from the expert interviews and the literature on online music education. The survey was conducted through an electronic distribution and responses would be gathered over two weeks for a suitable amount of time in case students would engage with the online lessons. Analysis of data were done using SMARTPLS (Partial Least Squares Structural Equation Modeling), a statistical method that works best in analyzing complex relationships between variables. With SMARTPLS, the researcher was able to test the relationships between variables such as ease of learning, student engagement, and skill development that may be contributing to the success of the online lessons for beginners.

Findings

Qualitative Findings

This study aimed to explore the qualitative analysis of how design and delivery issues in distance learning take place for piano teaching experts with students who do not have any background knowledge of playing the piano. To be able to explore a detailed analysis of the challenges and strategies encountered with teaching piano in a digital environment, five semi-structured interviews with experienced instructors were conducted. These interviews were intended to gain insight into such crucial areas as instructional design, feedback mechanisms, and learner engagement. Instructional design is the core principle behind the implementation of effective online piano education, and it relies on a couple of important feedback mechanisms to get learners engaged and focused on what they need to do to meet their objectives. Thematic analysis was conducted across interview data to generate propositions for better online piano lessons in teaching beginners more effectively. This approach not only provided valuable expert input but also helped contextualize the quantitative findings by highlighting the underlying instructional principles that contribute to successful learning outcomes.

From qualitative findings of this study, several core components that have added value to online

piano lessons for beginners may be drawn, considering the perspectives of expert interviewees. Indeed, experts strongly emphasized that one aspect of successful online piano lessons is clarity in lesson structure. According to Respondent 1, a music educator with over 15 years of teaching experience, "The first lesson should focus on building a solid foundation, introducing students to basic concepts like note reading and hand positioning in a way that they can easily digest." This reflects the importance of starting with clear, accessible content that doesn't overwhelm beginners. Respondent 3, a learning designer, mentioned that even modular lesson design will help a student learn to gradually build their skills. "Lessons need to be fragmented into smaller digestible parts to master easily," he said. "Each lesson leads naturally into the next step." The concept will be based upon constructivist theory of learning by which a well-orchestrated scaffolding and progressive acquisititon of skill leads to good cognition. They also suggest as the next indispensable component: Interactional feedback loops. Respondent 2, piano teacher with an extensive experience online, explained how "without real-time, person-to-person feedback, students commonly lose motivation or move forward." Here, it speaks to the reason why real-time feedback is indispensable in online settings, where practice is done absent the instructor that would otherwise correct the student right away. To overcome this challenge, Respondent 4 proposed the use of interactive tools such as video analysis or AI-powered feedback systems that can give instant corrective feedback. The need for continuous feedback aligns with the principles of behaviorism, which stresses the role of reinforcement in learning (Gunnars, 2021). This feedback is much more important in online lessons where physical presence is absent, and it ensures that learners are on the right track and motivated to continue practicing.

Apart from feedback, experts cited learner engagement strategies as the importance of online lessons. Respondent 5, an experienced teacher, said, "Engagement is key; without engagement, even the best lessons can feel like a chore." They underlined the importance of creating interactive, gamified content that lets students be an active participant in their learning journey. Such strategies, such as quizzes, tracking of progress, and rewards, were considered crucial for keeping beginners motivated and experiencing a sense of accomplishment. This is based on self-determination theory, which states that the more learners experience autonomy, competence, and relatedness, the more they will engage in and persist with tasks (Shahid & Paul, 2021). Thus, incorporating features that enable students to monitor their progress, receive rewards, and challenge themselves in an entertaining manner can be a great strategy for promoting engagement in online piano lessons. The experts also emphasized the need for a balanced approach to theoretical and practical learning in online lessons. The respondent 3 contended, "It's not enough to teach students how to play the notes; they need to understand the underlying musical theory, even at the most basic level." It means that in the curriculum, music theory has to be added so that a student gets the complete knowledge about music. A practical skill in the piano, which can be attained by understanding something theoretically, will be time signature, scales, and key signature. However, the theory of all these skills needs to be balanced with hand practice so as not to have students overwhelmed with theory without its application. As the theory of cognitive load stipulates, Sweller, 1988, learners' cognitive load needs to be well controlled in order not to over-extend them; especially beginners need this approach as they are still unable to form mental images for complicated musical concepts.

Another theme that emerged from the interviews was the importance of flexibility in lesson design. Respondent 1 emphasized, "Online learning should provide flexibility to accommodate different learning paces and preferences." This flexibility can be achieved by offering modular

lessons that students can revisit as needed, and by allowing for asynchronous learning where students can complete lessons at their own convenience. Respondent 2 elaborated further that certain students would need more time for the simple basics, and at the same time, some of them may acquire it quickly; therefore, online lesson platform has to allow these differences. That is why such flexibility leads into individualized instruction, which had been proved effective in enhancing students' learning performance, especially with beginners (Ding & Huang, 2022). Online piano courses may be more appealing to beginners who have different needs, by having lessons designed with options for self-paced learning. Lastly, they emphasized that it is important to have a good and encouraging environment despite the absence of face-to-face interaction. Respondent 4 noted, "Online platforms must integrate social learning elements, like peer support or instructor check-ins, to help students feel connected." Social learning theory (Chuang, 2021) suggests that learning is a social process, even in online environments, and the inclusion of collaborative features such as peer discussion forums, live feedback sessions, or virtual recitals can help foster a sense of community among students. Respondent 5 echoed this, saying, "Even though we're teaching remotely, students need to feel they're part of a learning community to stay motivated." These insights reinforce the need for online platforms to go beyond just delivering instructional content and to incorporate elements that create a sense of belonging and support for beginners, ensuring that they do not feel isolated in their learning journey.

Quantitative Findings

Table 1 and Figure 1 shows the reliability and validity of the constructs of the study based on outer loadings, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). The construct of interactivity was found to be reliable since Cronbach's alpha is 0.833, CR is 0.889, and AVE is 0.666. Item loadings range from 0.799 to 0.829. Similarly, online lesson design showed high reliability, with Cronbach's alpha at 0.890, CR at 0.924, and an AVE of 0.752, supported by item loadings between 0.842 and 0.881. Piano playing skill development also reached robust reliability, with Cronbach's alpha at 0.875, CR at 0.907, and an AVE of 0.662, and item loadings ranging from 0.790 to 0.832. Internal consistency was high; the Cronbach's alpha came out at 0.824, CR is 0.895, and an AVE is 0.739 with an item loading range of 0.851-0.871. This establishes that all of the constructs will be reliable as well as valid above the threshold requirements, meaning the measurement model is appropriate and strong to carry on any further analysis.

Variables	Items	Outer Loading	Cronbach Alpha	CR	AVE
Interactivity (I)	I1	0.829	0.833	0.889	0.666
	I2	0.799			
	I3	0.808			
	I4	0.827			
Online Lesson Design (OLD)	OLD1	0.842	0.890	0.924	0.752
	OLD2	0.873			
	OLD3	0.873			
	OLD4	0.881			
Piano Playing Skill Development (PPSD)	PPSD1	0.801	0.875	0.907	0.662

	PPSD2	0.815			
	PPSD3	0.790			
	PPSD4	0.829			
	PPSD5	0.832			
Student Engagement (E)	SE1	0.851	0.824	0.895	0.739
	SE2	0.871			
	SE3	0.857			

Table 1: Constructs reliability and validity

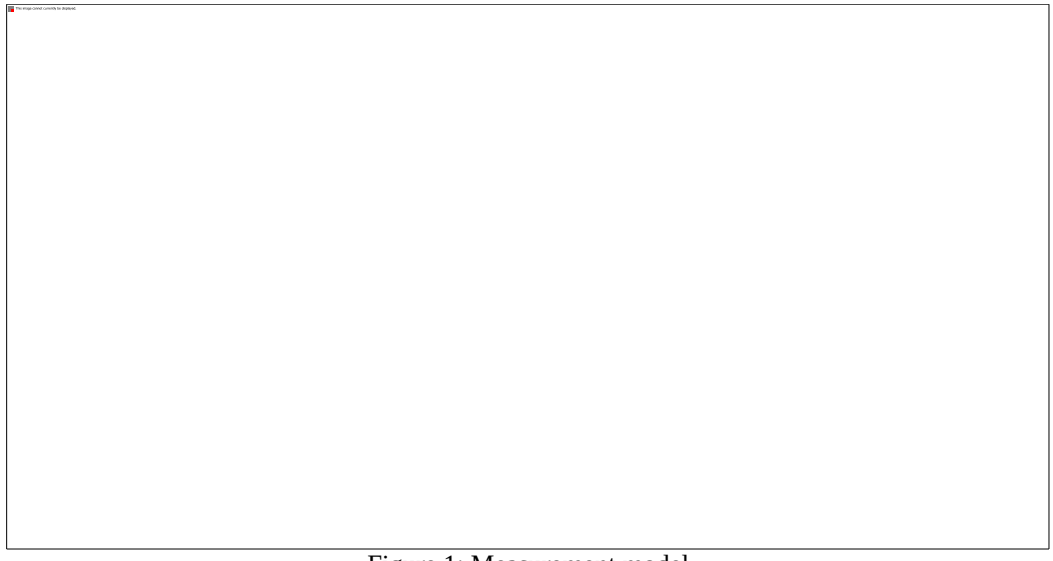

Figure 1: Measurement model

Table 2 discriminant validity through comparison of the square roots of AVE with the inter-concept correlations. All the diagonal values, being square roots of AVE values, are larger than the inter-concept correlations and therefore validate that all concepts are distinct from each other. For instance, interactivity is more highly associated with its AVE value (0.881) than it is with its correlations to online lesson design (0.542), piano playing skill development (0.591), and student engagement (0.447). Similarly, the AVE value of online lesson design is more significant at 0.881 than it is for its correlations with interactivity (0.622), piano playing skill development (0.567), and student engagement (0.447). These results confirm the discriminant validity, thus showing that each construct measures a unique dimension within the study.

	I	**OLD**	**PPSD**	**SE**
Interactivity				
Online Lesson Design	0.881			
Piano Playing Skill Development	0.542	0.622		
Student Engagement	0.591	0.567	0.447	

Table 2: discriminate validity

Table 3 and Figure 2 depicts the path coefficients, t-values, p-values, and significance levels of the structural model, showing how the constructs interrelate with each other. The results indicated that interactivity has a strong influence on the development of piano playing skill with $\beta = 0.396$, $t = 13.602$, and $p = 0.001$. Similarly, online lesson design has an important positive influence on the piano playing skill developed. The respective path coefficient value is 0.441, with a t-value of 3.612, and the respective p-value 0.000. Both of the paths, therefore, appear to be significant statistically, indicating interactive and well-designed online lessons play an important role in developing piano skills for beginners. These findings underscore the importance of including engaging and thoughtfully structured elements in online piano education to foster effective skill acquisition.

Path	**Path Coefficient (β)**	**t-value**	**p-value**	**Significance**
Interactivity → Piano Playing Skill Development	0.396	13.602	0.001	Significant
Online Lesson Design → Piano Playing Skill Development	0.441	3.612	0.000	Significant

Table 3: Path coefficient

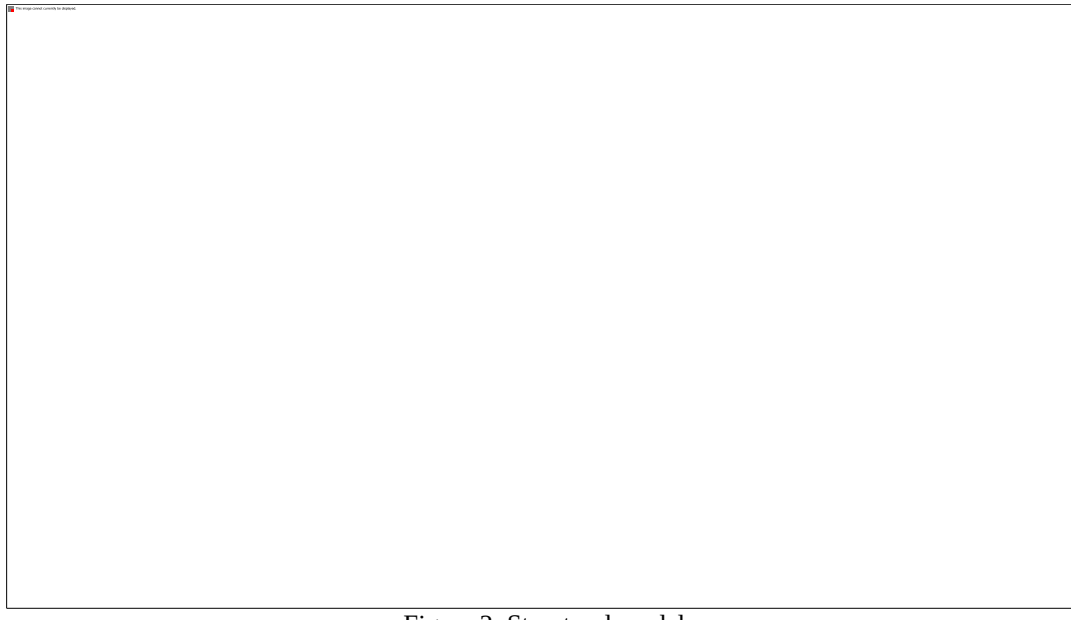

Figure 2: Structural model

Table 4 summarizes the mediation analyses. It details the indirect impacts of interactivity and online lesson design on student skill development through engagement. Here, it reveals that the relation between interactivity and piano playing skill development is fully mediated by the engagement of the students, whose path coefficient, $\beta = 0.094$, t-value = 6.216, p-value = 0.001. Student engagement acts as a mediator between the online lesson design and piano playing skill development. Its path coefficient is 0.141 with a t-value of 5.120 and p-value of 0.000. This confirms that the intermediary role played by student engagement in amplifying the impact of interactive and well-structured lesson designs is critical to the acquisition of piano playing skills

for beginners in online piano education. This underscores the importance of fostering engagement as a central strategy in designing effective online learning experiences.

Path	Path Coefficient (β)	t-value	p-value	Significance
Interactivity → Student Engagement → Piano Playing Skill Development	0.094	6.216	0.001	Significant
Online Lesson Design → Student Engagement → Piano Playing Skill Development	0.141	5.120	0.000	Significant

Table 4: Mediation analysis

Discussion

This study's findings present significant insights into the design and implementation of online piano lessons for beginners who have no experience at all. The qualitative phase was useful to input from experts in piano teaching, while the quantitative analysis validated the findings by testing the proposed hypotheses and exploring the relationships among them with a larger sample. One major conclusion drawn from this study is that clarity in lessons and systematic progression in piano online courses, which agrees with much of the literature that discusses instructional design in online education. Online learning environments, especially when dealing with skills-based subjects like music, have to be straightforward in guiding students in easy steps to avoid confusion and frustration and build fundamental skills before complex ideas can be introduced (Sharif et al., 2021). The expert answers stressed the fragmentation of lessons into manageable units, which also the quantitative data suggested, indicating that students exposed to a linearly structured curriculum perform better than their counterparts. This is similar to the view held by research on online education that scaffolding is necessary for learning, where the new knowledge constructed upon the previous is incrementally possible (Harsch et al., 2021). In addition to the clarity in the structure of the lessons, mechanisms of feedback came out as the core aspect of enabling learning within the online piano environment. The qualitative and quantitative findings emphasized that timely and specific feedback was the only way students could improve engagement and progress. The experts during the qualitative phase argued that if students do not get immediate feedback, they will be repeating mistakes repeatedly, which is a sure path to frustration and decreased motivation. This is consistent with the behaviorist learning theory, in which reinforcement and corrective feedback have been established to be essential components in the modification of desired behavior (Firmansyah & Saepuloh, 2022). For the quantitative phase, analysis revealed that students exposed to frequent feedback demonstrated significant improvement, especially those who were interacting with the AI-powered tools for feedback or video assessments. This is supported by studies, which emphasize that feedback is the most important component in distance learning environments, especially when the presence of the instructor is not face-to-face or in real time, which limits the learning process (Dahabiyeh, 2021). In this regard, online piano courses must include proper mechanisms for giving feedback so that students can see their progress and correct mistakes quickly.

The issue of student engagement with online learning emerged as another big theme both through the qualitative interviews and in the quantitative analysis. Respondent 2, an instructor teaching

the piano online for several years, noted that for students to continue to be interested in learning there needs to be some form of interactivity present in lessons. This is in line with research from the larger field of online learning, where gamification, tracking of progress, and interactive activities have been found to improve engagement and retention (Perpetuo & Pestana, 2023). Qualitative insights revealed that engagement in online lessons was not only about content delivery but also creating an experience that captivated students, making learning both enjoyable and motivating. The quantitative findings supported this, showing that students who engaged with interactive, gamified content were more likely to report high levels of satisfaction and motivation. These students also demonstrated better learning outcomes, reinforcing the importance of interactive content in maintaining learner interest. It has been shown to improve motivation and effort in learning through gamification, including features like point systems, leaderboards, and achievements (Autsadee et al., 2023). The online piano lessons are an affirmation that such balance will emerge between theoretical learning and application because there is a positive relationship between engagement and the learning outcomes in this study. Respondent 3 highlighted the importance of not only teaching students how to play the notes but also giving them a deeper understanding of the music theory that underpins the pieces they are learning. This finding resonates with the notion that a holistic approach to music education, which integrates both theoretical knowledge and practical application, is essential for fostering well-rounded musicianship (X. Liu & Shao, 2024). Especially in the online setting, where the students cannot be exposed to the spontaneous interaction which occurs during a face-to-face setting, a holistic learning experience that encompasses technical and conceptual playing of an instrument is particularly essential. The quantitative results confirmed this view: those who perceived the lessons as theoretical-practical were better in terms of learning satisfaction and skill improvement. This would mean, then, that beginners, especially online learners, have to find an integration of both technical and theoretical knowledge as part of a better approach towards understanding the music they are reading as well as creating a deep interest in playing the piano for motivation.

Flexibility in learning was another critical point mentioned both in the interviews and the extensive data collected. Experts in the qualitative phase emphasized the need to design lessons that were adaptive of different learners' learning pace and preference. Respondent 4 noted that some students would require more time to master the fundamental concepts, while others would progress more rapidly, which underlines the importance of having a flexible learning environment that allows students to progress at their own pace (Al-Rahmi et al., 2021). This is further supported by the quantitative results where students who were allowed to learn at their own pace reported greater satisfaction and better learning outcomes. Revisit and practice in the comfort of a student's own pace with minimal time taken on lessons enable consolidation of their knowledge and then they can present themselves to the new material confidently. This advantage in online learning, therefore, helps students attain experience that might not be obtained within the strict structures of conventional classes (Brooks et al., 2021). This is also indicated by research done in adult education, which stipulates that if learners can learn in their own comfort and have full control over the process, they stand a better chance of succeeding in learning (Bastepe-Gray et al., 2021). In the case of learning piano, because the acquisition process is so divergent from individual to individual, flexibility in an online lesson is absolutely important for students. The social aspect of the learning process notwithstanding the lack of actual face-to-face interaction, it was another factor where expert commentary and quantitative outputs agreed. For instance, according to Respondent 5, "It also has to establish a supportive or encouraging

environment which is very conducive to learning; even in this online setting. The experts recommended that the features of peer support, live check-ins, and collaborative opportunities be integrated into the system to create a sense of community among learners. This view is consistent with social learning theory, which holds that learning is inherently a social process and is significantly enhanced by interaction with others (Yarberry & Sims, 2021). The quantitative analysis shows that students experiencing peer interaction or perceived social support of instructors were most motivated and possessed a greater feeling of belonging during the learning process. This discovery is consistent with the literature review on online learning, which explains that the people who are committed to learning belong to a certain community (Guo et al., 2021). In the context of online piano learning, the sense of community can be very important for beginners who feel isolated or disconnected from the learning process without regular instructor feedback or peer interaction. In conclusion, the findings of this study point out several critical factors that contribute to the success of online piano lessons for beginners with no prior experience. These insights from expert interviews and the results of student surveys point out that clear lesson structures, interactive feedback, student engagement, balance between theory and practice, flexibility, and social support are all crucial factors. If these aspects are integrated into the design of online piano courses, it could enhance learning outcomes and provide a more engaging and supportive learning environment for beginners. This research also supports the importance of instructional design in online education, especially in skill-based subjects such as music, where feedback and engagement are crucial for the success of the students. The findings contribute to the growing body of research on online music education and offer valuable insights for instructors and course designers seeking to improve the effectiveness of online piano instruction.

Conclusion

Therefore, this study would provide valuable insight into the design and implementation of online piano lessons for beginners. Combining qualitative expert interviews and quantitative data analysis, the research identified key instructional components that may significantly influence learning outcomes, including clear lesson structure, personalized feedback, student engagement strategies, and a balance between theory and practice. In doing so, this study underscores the need for an all-rounded flexible and interactive environment for online learning that develops skill as well as motivation. Such a research has been a major contribution to knowledge in online music education, hence offering practical recommendations on how best to improve effectiveness in online piano instruction for novices and advanced design of skills-based online courses.

Implications

The practical implications are significant to the educators and designers of instructions teaching online music because the research draws attention to an important point for lesson designs with clear, well-structured outlines that take down complex tasks into manageable steps and make learning processes less intimidating to beginners. In practice, this means that online piano courses should have well-defined learning objectives for each lesson and ensure that the objectives are progressively built on. Additionally, integration of interactive and engaging elements like gamification, quizzes, and interactive feedback mechanisms can improve the motivation and retention of students. For the piano teacher, the research recommended that individualized, immediate feedback is necessary for student growth and retention across remote learning as students may have less opportunity for face-to-face interaction. Educators can use these AI-

infused resources or video evaluation for corrective and personalized input so that the learner feels supported throughout the musical process. The importance of flexible, self-paced learning also has powerful practical effects. This study underlines that online learning tools should be flexible enough to provide the opportunity to learn at a student's pace and review when necessary. It is beneficial in catering to a variety of learning styles and ensures that beginners will not be pushed ahead without mastery of basic skills. This would also enable them to balance other responsibilities, especially useful for adult learners or those with limited time. This research indicates that providing learners with different learning pathways within the same course, for instance, beginner, intermediate, and advanced levels, is very vital as it would motivate the learner to learn step by step. This learning flexibility accompanied by one's ability to study from any instructional material at whatever time they want would make students possible to adjust according to their personal timetables and learning requirements.

This research will contribute towards the theoretical understanding of how learning occurs within the context of online music education instructional design. The benefits of such research lie in the application of ADDIE models in creating online piano courses for beginners. By using a systematic approach to lesson design, educators can address the varied needs of students and ensure that lessons are not only informative but also engaging and practical. The findings suggest that elements of behaviorism, especially feedback and reinforcement, can be effective in the facilitation of skill acquisition in online environments. Thus, the study was conducted in strict accordance with the principles of the learning theory of the behaviorist learning theory, insisting on the provision of reinforcement by immediate feedback when mistakes are committed and guiding students toward mastery. The research further supports constructivist learning theories in that it emphasized active learning, and the learner's role in constructing knowledge is important. More profoundly, the role of student engagement in the research would indicate that there is a good chance that courses on piano available online, provided they encourage more interaction, exploration, and solving of problems can lead to effective and meaningful learning experiences. Interactive content, such as quizzes or peer discussions, could be used within the constructivist perspective, since learners should participate actively in the learning process. The research also supports the integration of social learning elements, such as peer interaction and community-building features, into online piano courses. This social dimension, which can be facilitated through online forums or live check-ins, provides learners with a sense of belonging and encourages collaboration, further reinforcing the constructivist idea that knowledge is socially constructed through interaction and shared experience.

The implications of the study would extend to future research in online music education, particularly in the area of learning analytics and personalized instruction. Data-driven insights, such as tracking student progress and performance through online platforms, offer a potential for the creation of adaptive learning systems tailored to individual needs. This may include the use of machine learning algorithms to identify patterns in student behavior and provide personalized recommendations for improvement. In addition, this research opens up the possibility of studying the long-term effectiveness of online music education for beginners, including how sustained engagement and retention can be achieved. Further research could compare how the effects of online piano lessons differ when varied according to demographic factors, including older adults or those with prior experience in playing. In summary, the practical and theoretical implications are relevant enough to contribute towards a deeper understanding of how online piano education may be optimized toward different needs of learners, in addition to advancing the theoretical

foundations of instructional design in the online learning context.

Limitations and Future Research Directions

Although the study produced very valuable information, there are some limitations identified, which can impact the generalization and application of the findings. One of the primary limitations lies in the size of the qualitative phase sample that comprised only five expert interviews. Although this sample size was sufficient to probe the views of experts, it may not reflect the diversity of teaching practices or challenges that all piano instructors face, especially those with different levels of experience with online education. Furthermore, the sample size of 123 students is acceptable for quantitative studies but may not allow the full manifestation of the differences among beginner piano learners, perhaps by age or cultural background and exposure to music. These are some factors which could limit generalizability for even larger populations of piano learners with lower external validity for the study. Future studies can then increase the number of samples including a diverse sample of students and experts. Differences in learning based on age, learning style, or prior musical knowledge may be examined as variation factors. This is another limitation that the present study has since student participants were solicited through self-report data which is vulnerable to response bias. Although the use of validated questionnaires ensured the reliability of the responses, the subjective nature of self-reporting means that students' perceptions of their learning experiences, motivation, and satisfaction may not always reflect their actual progress or performance. The study did not directly measure the actual skills or competencies students gained over the course of the online lessons. Future research could incorporate more objective assessments of skill acquisition, such as performance-based evaluations or pre- and post-tests of specific piano-playing techniques, to provide a clearer picture of the relationship between the instructional design elements and actual learning outcomes. Additionally, integrating learning analytics, such as tracking students' interaction with lesson content or monitoring their practice habits, could offer more precise insights into how instructional elements influence student progress. Future research directions would be to further explore the long-term effectiveness of online piano lessons for beginners, especially student retention, motivation, and ability to maintain skill over time. The current study was mainly designed to look at short-term learning outcomes; however, future studies could determine how students remain engaged with lessons and continue developing their skills long after the course is completed. Longitudinal studies might also be useful to understand whether the initial design of online piano courses impacts long-term musical growth and whether benefits in terms of structured feedback, interactive content, and self-paced learning persist over the duration of lessons. Further research could then also consider the role of technological innovation such as AR or VR for the online piano learning experience. These emerging technologies could provide for even more immersive and interactive learning environments that could increase student engagement and skill development even further. Lastly, the research could examine how various types of online communities and social learning platforms could be effective for supporting beginner piano learners since social interaction and peer feedback were deemed important in this study but were not investigated further. Investigating how collaborative learning, peer support, and instructor-student interaction contribute to the student's musical development in virtual spaces would bring better exposure to the social aspects of online music education.

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