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The Development of Online Lessons for Promoting Piano Playing Skills for Non-piano Playing Background Students

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Abstract

This study explores the process of developing online courses to improve the piano-playing skills of students with no piano-playing experience, designs and develops practical online piano courses for students and evaluates the effectiveness and practicality of the developed online courses in enhancing students' piano skills. This is research and development approach collecting data from 35 students. This study uses four tools: course plans and expert validation forms, interview and questionnaire forms, and pretest and post-test evaluations of piano performance skills. Data were analyzed by statistical and content analysis. The findings reveal that online piano lesson assessment step involves expert validation and trials to evaluate the online piano lesson design outcomes. The expert validation of the online piano lesson design and tools, including lesson plans, learning implementation observation sheets, and student response sheets. The expert assessment of the online piano lesson design encompasses the evaluation of several components, such as the correctness of the information provided on the rationale for developing online piano lessons, the theoretical foundations underlying the lessons, and the different learning components included (including learning steps, social systems, reaction principles, and support systems). The online piano lessons in the study were convenient, with an average learning implementation score of 4.20 out of a possible score of 5. Beginners have significantly improved their piano playing skills in various dimensions. These improvements were reflected in the mastery of basic playing skills and the flexible use of complex rhythms and chords. The course design emphasizes training in two-handed coordination, touch techniques, and rhythm. The successful development of the course has provided a flexible and efficient learning path for students with no prior piano playing background and has demonstrated the significant educational value and prospects for the promotion of online piano teaching in developing the skills of beginning piano students.

Keywords: Online Lesson Piano, Non-Piano background students, China

Introduction

The online lesson is defined as the use of the internet in some way to enhance the interaction between teacher and student through using the LMS or uploading text and PDFs online (Bates, 2014; Singh & Thurman, 2019). The digital age has introduced a new era of education, wherein online lesson platforms provide unparalleled opportunities to acquire knowledge and expertise in diverse fields. Within the domain of music instruction, this transition has created thrilling prospects for persons with an intense curiosity in acquiring piano-playing skills.

Today, piano education is actively developing worldwide (Wenjiao, 2021). Its development is a multifaceted creative process that aims to ensure effective teaching in modern conditions. It involves online formats using modern digital capabilities (Gibson, 2021). This research focuses on developing online lessons to promote piano playing skills among individuals without prior experience.

Creating a proficient online piano program for beginners entails various essential elements. They require a comprehensive comprehension of educational strategies specifically addressing adult learners lacking musical experience. These approaches incorporate systematic guidelines, engaging activities, and immediate feedback mechanisms to guarantee that learners can advance quickly while obtaining the necessary assistance. Current research primarily focuses on learners with basic knowledge or who can afford private instruction (Gieseking et al., 1972). However, there is a lack of specific research on developing structured, sequential online piano lessons designed for complete beginners (Bauer, 2014).

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Several online learning resources progress quickly, which may be challenging for beginners or require more interactive elements for optimal learning among novices (Creech & Hallam, 2011; Liu & Shao, 2022). The fast advancement and lack of interaction can lead to annoyance and disinterest among inexperienced learners, who need a more progressive and supportive form of teaching to develop confidence and fundamental skills. Furthermore, the lack of individualized feedback and adaptable learning routes intensifies novices' difficulties since they find it challenging to recognize and rectify their errors without appropriate supervision. In order to tackle these problems, it is crucial to build online piano lessons that include progressive learning phases, immediate feedback, and captivating multimedia components to establish a more supportive and efficient teaching experience.

Moreover, numerous researchers, such as Chau and Lee (2020), have studied the advancement of online piano lessons. These sessions offer students flexibility in terms of time and location, enhancing their motivation and consistency in practicing. A separate investigation conducted by Zhang et al. (2019) demonstrates that interactive technology, such as applications that provide immediate feedback, is more effective than traditional methods in enhancing novices' comprehension of fundamental procedures. Furthermore, a study by Jones (2021) asserts that using machine learning algorithms in online piano learning allows for tailored instruction, tailoring lesson materials to match each student's development and specific requirements. This approach ultimately leads to enhanced learning results. Although the advantages of interactive online piano instruction have been extensively studied, there is a lack of research on their implementation in beginner piano classes. Hence, this study aims to address this deficiency by creating an online piano instructional platform tailored for novices lacking prior experience in piano playing, using detailed instructions to facilitate the learning process for starting learners.

Research objectives

1. To explore the process of developing online courses to improve the piano-playing skills of students who have no previous piano-playing experience.

2. To design and develop practical online piano courses for students without piano performance experience.

3. To evaluate the effectiveness and practicality of the developed online courses in enhancing students' piano skills

Developing online music education lessons

Online learning has become popular across various educational domains, such as music, because of its flexibility and easy accessibility (Means et al., 2013). Barak et al. (2016) conducted a study demonstrating how online learning platforms offer diverse and comprehensive educational resources, enabling students to acquire knowledge autonomously and at their speed. Online learning in music education provides the opportunity to access qualified instructors and excellent instructional resources that may be lacking in local educational environments (Schlager & Fusco, 2003).

According to research by Jorgensen (2001), the use of video tutorials, interactive music software, and online discussion forums in online music education can help students improve their technical and musical abilities. According to Upitis et al. (2017), online music learning can enhance student motivation and engagement due to its personalized and interactive nature. Furthermore, online learning methods in music education facilitate collaboration among students from different geographical places, enhancing their learning experience (Ruthmann et al., 2010).

The development of online music lessons not only enables more adaptable and easily accessible learning but also enhances the quality of music education by using cutting-edge technology and adaptive learning methodologies. Technology in music education facilitates a more adaptable and personalized learning experience for students, enhancing their ability to acquire required musical skills more effectively and efficiently (Savage, 2005).

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Along with the advantages of accessibility and flexibility, the growth of online learning in music education also brings specific challenges that must be resolved. According to a study by Kruse et al. (2013), sustaining student engagement is a significant obstacle in online learning settings. For certain students, the absence of in-person connection can provide challenges in maintaining motivation and active participation in the learning process. Hence, developing online educational programs incorporating interactivity and enjoyment is crucial, such as high-quality videos, interactive quizzes, and dynamic discussion forums (Hrastinski, 2009). Thus, students can experience their instructors' and classmates' presence and assistance, even in a virtual learning setting.

Online piano learning strategies for beginners

Practical online piano lessons for beginners necessitate a structured and engaging approach to establish a strong foundation in piano playing proficiency. Means et al. (2013) conducted a study that found that online learning provides significant flexibility and accessibility, enabling students to learn at their speed and timetable. In the domain of piano, this implies that novices can utilize various educational materials, including video tutorials, interactive programs, and customizable audio recordings, to adjust to their requirements.

An efficient approach for novices in online piano learning is utilizing structured video sessions. Video lessons enable pupils to observe real-time demonstrations of piano playing methods and adhere to systematic directions. Upitis et al. (2017) conducted research that demonstrates how video tutorials can enhance students' comprehension of fundamental musical concepts and piano-playing methods by providing clear visual representation. Moreover, video tutorials allow students to review the course material repeatedly until they have achieved full proficiency, a particularly crucial aspect for novices who typically require additional time to grasp unfamiliar procedures.

Moreover, interactive piano applications can enhance student involvement and drive. Savage (2005) states that interactive applications have the potential to enhance students' motor and musical skills by providing them with opportunities for repetitive and diverse practice. Additionally, these applications typically provide instant feedback, enabling pupils to identify and rectify their errors promptly.

A comprehensive online piano instruction method for beginners should incorporate a component of customization. According to Bruner's (1966) constructivist learning theory, students acquire knowledge more efficiently when they can establish connections between new information and their existing experiences and knowledge. Online learning can utilize algorithms to analyze students' progress and customize learning materials according to their specific requirements. Allowing each student to study at a pace that aligns with their abilities is crucial to prevent them from experiencing feelings of being overwhelmed or losing enthusiasm.

Utilizing online educational platforms offering discussion forums and community assistance can be a successful approach. Hrastinski (2009) proposes that peer-to-peer social connection and support enhance engagement and motivation in online learning. Discussion boards facilitate the exchange of experiences, sharing tips, and providing mutual support among students, fostering a more collaborative and less isolating learning process. Effective online piano learning tactics for beginners should incorporate a methodical, engaging, tailored, and collaborative approach. Educators can establish a highly efficient and pleasurable learning atmosphere by integrating video tutorials, interactive applications, personalized features, and communal assistance. These strategies not only assist novices in developing a solid basis of piano proficiency but also enhance their drive and involvement in the educational journey (Means et al., 2013; Upitis et al., 2017; Savage, 2005; Bruner, 1966; Hrastinski, 2009).

The Thiagarajan development model

The Thiagarajan development model was established in 1974 to enhance exceptional education readiness. This learning preparation encompasses the creation of a well-structured learning plan to guarantee effective and purposeful preparation for special education during that period. In their study, Thiagarajan et al. (1974)

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concluded that training programs for teachers, particularly those in special education, need more instruction in constructing compelling learning experiences. While these programs offer broad skills, they fail to address the teaching of reading to children with dyslexia, specifically

In addition, Thiagarajan et al. (1974) propose creating learning designs that follow general steps derived from previous models, such as Twelker (1972). These steps include analysis, design, evaluation, and dissemination and are informed by practical experience in designing, developing, evaluating, and disseminating materials in special education.

Thiagarajan et al.'s (1974) model comprises four distinct stages, referred to as Four-D: definition, design, development, and dissemination. The 4D learning model, developed by Thiagarajan et al. (1974), comprehensively explains the operational processes involved in development. However, this model is primarily designed for the creation of learning aids. At the Design stage, one of the activities is choosing the format or template for the product being designed. In the final stage, packaging activities involve working with manufacturers that produce the developed product.

The Akker development model

The development model proposed by Van den Akker (1999) has a distinct emphasis compared to the design of professional practice development. This development methodology emphasizes the creation of restricted intervention examples. Its goal is not to design and implement a comprehensive intervention but to produce a prototype that fulfills creative needs. The process involves conducting a thorough and systematic initial investigation of the task components. This includes conducting a literature review, consulting with experts, analyzing samples, and studying current practices through case studies. The purpose is to identify and better understand the needs and problems of the intended users. 2) Thorough and current theoretical research; 3) Practical and effective empirical testing; 4) Documentation, analysis, and contemplation of processes and outcomes.

The research approach developed by Van den Akker (1999) is categorized as a descriptive research approach that prioritizes knowledge acquisition and gives less importance to practical application. The focus of the research is on making scientific contributions. Development research concurrently focuses on both practical and scientific contributions. Visscher-Voerman, Gustafson, and Plomp (1999) propose that the development research paradigm encompasses four distinct paradigms: the instrumental paradigm, the communicative paradigm, the pragmatic paradigm, and the artistic paradigm.

The Plomp development model

The Plomp (2013) model is a simplified version of the earlier model introduced by Plomp (1997). The Plomp approach primarily emphasizes development studies that focus on design principles and validation studies that try to build and validate theories. The 1997 Plomp model comprised five distinct stages: 1) preliminary inquiry, 2) design, 3) product realization, 4) testing, evaluation, and revision, and 5) implementation. In 2013, Plomp simplified the research process into three steps. The first step is preliminary research, which involves analyzing needs and context, reviewing the literature, and developing a conceptual or theoretical framework for the research. The second step is the development or prototyping phase, which includes an iterative design process with multiple research cycles. The most critical activity in this phase is formative evaluation, which aims to improve and strengthen the intervention. The third step is the assessment phase, which includes a semi-summative evaluation to determine if the solution or intervention meets predetermined specifications. This phase also generates recommendations for improving the intervention.

This research employed the Plomp model (2013) as the development model. The Plomp model was chosen for development because of its clear and systematic procedures, which align with the author's approach. By doing so, the online piano lessons are expected to encompass the necessary and representative components to ensure a comprehensive learning experience.

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Research design

A development research method using mixed methods technology is adopted in this study.

Phase I: Preliminary Research

1) Initial investigation into pedagogical approaches for novice piano learners

The activities undertaken at this stage encompass: 1) gathering data on the challenges faced by novice piano learners; 2) conducting a comprehensive theoretical analysis to inform the creation of online piano lessons; 3) researching to develop a model; 4) conducting a survey or preliminary investigation to determine the specific design requirements for online lessons as desired by students. At this stage, the activities focus on two main objectives: 1) establishing a logical basis for creating online piano lessons and 2) creating the necessary resources for producing online piano lessons.

2) Initial investigation regarding piano skills

The author explores the criteria and measuring model for piano playing skills to establish online piano classes or promote piano playing skills for individuals without a history in piano playing. The actions conducted during this stage encompass (1) the formulation of theories regarding piano playing proficiency and (2) the establishment of assessment standards for evaluating piano playing skills. In order to get valid, practical, and effective online piano lesson development results, it is necessary to gather data on the development process's validity, practicality, and effectiveness. The author devised a tool that encompasses validity, practicality, and effectiveness.

Phase II: Prototyping Phase

1) Design a sequence of learning steps

2) Social system

The social system discussed in the learning component encompasses two main aspects: a) defining the roles of teachers and students and b) designing activities that foster student engagement and motivation in the learning process. The components of a social system lack a formalized hierarchy.

3) Reaction principle

The reaction principle offers a comprehensive understanding of the interactions between teachers and students during the learning process. The principle of reaction is highly beneficial in assessing the efficacy of reactions performed by students.

4) Support system

The components of the support system consist of 1) lesson plans, 2) student worksheets, 3) learning implementation observation sheets, and 4) student response questionnaires.

Phase III: Assessment Phase

1. Validation: Request an expert assessment of the prototype design's authenticity. An expert validator's essential academic requirements include a PhD in piano music and music arts and practical experience working or conducting development research. We utilized content validation sheets and an online piano lesson design for this evaluation.

2. Field trial conducted in real-world conditions. The field trial activity aims to determine whether the online lesson model being developed satisfies the requirements of practicality and effectiveness.

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The participants in this study participate in evaluating the development testing results. The research subjects are nonpiano-significant students from the Music and Dance College of Guangdong Literary & Art Vocational College in China. Researchers randomly selected 35 students from 160 applicants to study their performance in piano music theory and auditory perception, basic performance skills, left and right-hand coordination and pedal use, rhythm, chord mastery, and their needs and effects on online courses during extracurricular timelines.

This study uses four tools: course plans and expert validation forms, interview and questionnaire forms, and pretest and post-test evaluations of piano performance skills.

Data analysis: Statistical analysis is done on the pretest, pretest, and post-test data of 35 students and survey questionnaires from students. Comparative analysis is conducted on differences in music theory, performance techniques, left and right-hand coordination, pedal usage, rhythm, and chord mastery through paired sample t-tests. T-test analysis: This study compares the performance differences of students before and after learning and analyzes students' progress in multiple dimensions, such as music theory, performance skills, left and right-hand coordination, pedal use, rhythm, and chord mastery for comparative analysis.

Pre - and post-test analysis: Researchers design pre-and post-tests to collect students' performance data before and after piano learning. Specifically, they analyze the improvement of students in the following dimensions: music theory and auditory perception, analyzing students' progress in basic music theory knowledge (e.g., note, beat, chord understanding), performance skills, evaluated students' ability improvement in touch control, finger flexibility, scale playing. Left and right-hand coordination and pedal usage: Examining students' improvements in left and right-hand synchronization and pedal usage. Rhythm and Chord Mastery: Analyzing students' progress in mastering complex rhythmic patterns and chord transitions.

Reliability and validity testing: Data analysis also includes reliability and validity testing of questionnaire data. Cronbach's alpha reliability coefficient (0.632) is used to evaluate the scale's reliability, and the results showed that the scale's reliability is acceptable. The validity of the scale is verified through the KMO value (0.602) and Bartlett sphericity test ($p<0.01$).

Descriptive statistics: Data analysis also includes descriptive statistics for each item, providing data such as mean and standard deviation for each item. It facilitates understanding students' learning performance in different dimensions. This study analyzes the differences between students in different dimensions. It verifies whether students' abilities have significantly improved in various aspects after learning through the significance of p-values (usually $p<0.01$). The data shows that students' performance has significantly improved across all analysis dimensions, particularly regarding harmony perception, basic playing skills, and chord transitions.

Results

1. Music theory and auditory perception

The five experts agree that music theory and auditory perception are vital to piano beginners. Music theory helps students understand the structure and style of music, while auditory perception improves their performance expression and accuracy. The three experts agree that learning music theory and auditory perception should be carried out simultaneously with piano playing, and their understanding should be continuously deepened through practice to improve students' comprehensive music literacy.

1. Basic performance skills

The five experts unanimously agree that basic playing skills are decisive for beginners. Solid technique training improves accuracy and fluency and lays the foundation for playing more complex pieces in the

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future. With the right-hand shape, flexible fingering, and stable touch control, beginners can gradually master the core skills of piano playing and make lasting progress in the learning process.

2. Left right-hand coordination and pedal use

Summarizing the views of the five experts, left-right hand coordination and pedal use are the core skills that piano beginners must master during the learning process. After mastering the basic skills, students can synchronize their hands during performance and use the pedal appropriately through targeted coordination exercises, thereby enhancing the expressiveness and artistry of their music. Mastery of these skills will lay a solid foundation for beginners' piano learning.

3. Rhythm and chord mastery

The five experts agreed that rhythm and chord mastery are crucial for piano beginners. An accurate sense of rhythm can enhance performance fluency, while mastering chords can help students better understand and express a piece's harmonic structure. Through continuous rhythm practice and chord training, beginners can lay a solid foundation in piano learning, providing critical support for future performance progress.

Conclusion

Beginner piano lessons have specific attributes essential for building a solid foundation for students as they begin their musical journey. Here are some essential features:

1. Rhythm and coordination of the hands: In piano lessons, beginners need to focus on developing a sense of rhythm and coordination of the hands. This includes synchronizing the left and right hands and accurately grasping the rhythm.

2. Understanding and recognizing music notation: Beginners need to gradually learn how to recognize and understand the notes, chord symbols, and various symbols in the music notation. In particular, chords' connection and playing techniques are essential elements of initial learning.

3. Touch and finger flexibility training: Piano beginners must strengthen touch control, strength control, and finger flexibility. The flexibility of the five fingers of the right hand and the patterned training of the left-hand accompaniment are the keys to improving playing skills.

4. Continuity of practice and maintaining interest: In the early stages of learning, it is essential to maintain continuity of practice and sustain interest. Engaging repertoire and practical performance can enhance students' sense of participation and achievement and help them maintain long-term learning motivation.

5. Basic chords and accompaniment patterns: To ensure the stability of their performance, beginners need to master the left-hand accompaniment patterns and chord-connecting techniques in piano playing.

These features provide an essential basis for designing piano lessons, helping beginners lay a solid musical foundation to promote the optimal development of their skills.

The criteria used to evaluate students' skill in playing the piano

Evaluating a student's piano performance skills is crucial for measuring their progress and proficiency in several technical and musical aspects. It includes the following comprehensive assessment criteria:

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1. Rhythm control and coordination: Evaluate the student's mastery of rhythm during performance, especially their ability to control complex rhythmic patterns (such as dotted notes, syncopations, sixteenth notes, etc.) and the synchronization and coordination of the left and right hands.

2. Mastery of chords and accompaniment patterns: Assess the student's knowledge of chords, playing accuracy, and technique of connecting different chords, particularly the stability of the left-hand accompaniment patterns and the use of patterned accompaniment.

3. Touch stability and control: Assess the student's touch technique, including touch strength control, stability, and delicate touch expression, especially in slow playing.

4. Fingering flexibility and accuracy: Evaluate the student's fingering flexibility and accuracy during the performance, especially the coordination of the five fingers of the right hand and the ability to change fingering during scale exercises.

5. Musicality and expressiveness: Evaluate the student's overall performance of the music, including the understanding of musical phrases, the expression of emotions, and the use of musical expression techniques such as legato and continuity.

6. Mastery of complex techniques: Evaluate the accuracy and fluency of students using complex techniques in a specific piece of music, such as large jumps, scales, and compound rhythms. Together, these criteria form critical indicators of students' progress and proficiency in piano performance skills.

Designing Prototype Online Piano Lessons

The learning activities for each lesson are shown in Table 1.

Online learning course plan for piano beginners			
Step	Learning focus	Learning content	Time
Step1	1. Master basic touch-key techniques and become familiar with the location of the keyboard	Students will learn the basic touch techniques of the piano, master how to use their fingers to strike the keys correctly and perceive the weight and touch of the keyboard. In addition, students need to familiarize themselves with the keyboard's location, starting from the central C, and understand the order in which the notes are arranged. The course will help students master basic touch techniques through simple right-hand and left-hand exercises.	45mins
Step 2	Consolidate the basic scale playing of the left and right hands	The focus is on mastering the C major scale in both hands. Through repeated scale practice, students can improve the independence and flexibility of their fingers and learn to play the scale smoothly at different speeds. Playing the scale is a key step in improving the coordination of both hands and lays the foundation for a more complex repertoire.	45mins
Step 3	Recognize basic chords (I, IV, V)	Basic chords I, IV, and V are introduced. Students will learn to find these chords on the keyboard and master their basic fingering. Exercises to break down chords will strengthen finger strength and dexterity while helping students understand the function and role of chords in piano music.	45mins
Step 4	Practice the right-hand melody and left-	Students will learn how to play the right-hand melody and left-hand accompaniment in a simple	45mins

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	hand accompaniment in a simple piece	piece. Melody playing practice for the right hand will help students master the fluency of the melody line. In contrast, practicing the left-hand accompaniment pattern will help consolidate hand coordination. Through practical playing and singing of the piece, students can initially master the coordination of the two hands.	
Step 5	Basic rhythm and syncopation training	This course focuses on rhythm and syncopation training. Students will master basic rhythm patterns through various exercises, especially the technique of playing syncopated rhythms. The course will also include rhythm coordination exercises for the left and right hands to help students maintain a steady sense of rhythm when using both hands together.	45mins
Step 6	Introduce and practice secondary chords (IIm, IIIm)	The secondary dominant chords IIm and IIIm are introduced, and exercises help students consolidate the chord conversion technique and sing along with the songs. The course will explain in detail how to connect chords and guide students on smoothly connecting these secondary dominant chords in performance. This part of the study can enhance students' understanding of harmony and help them further expand the application of chords.	45mins
Step 7	Expand the right-hand melody with complex left-hand accompaniment patterns	Students will begin to learn more complex left-hand accompaniment patterns while expanding their right-hand melody playing. This training with complex accompaniment patterns can improve the coordination and independence of the left and right hands and enhance the musical expressiveness of their playing. The practice also includes transitions between multiple pitches.	45mins
Step 8	Strengthens hand-eye coordination and trains synchronization to complex rhythms	The focus is on further improving hand coordination and adding complex rhythmic synchronization training. Students will learn how to deal with complex rhythmic patterns, including syncopation and dotted rhythms. Based on this, students will sing and play in time with both hands and make subtle rhythmic adjustments during the performance.	45mins
Step 9	Master the techniques of dotted rhythms and compound rhythms.	Focus on dotted rhythms and compound rhythms. Students will learn how to master these complex rhythmic patterns and apply these techniques through practical music performance or playing and singing. This lesson focuses on improving students' sensitivity to rhythmic changes and teaching them how to achieve precise rhythmic control in performance.	45mins
Step 10	Play and sing a series of songs using a combination of the skills learned.	In the comprehensive review class, students will use all the skills they have learned before, including touch keys, scales, chords, and rhythms, to perform a complete piano repertoire and be able to sing along with the song using the mastered chord accompaniment patterns. This stage of learning helps students integrate what they have learned,	45mins

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		demonstrate their learning outcomes through practical performance, and lay a solid foundation for future piano learning.	

Social structures

This online piano lesson is designed for novice students who have yet to gain prior experience or knowledge in piano playing. Student heterogeneity enables students to exhibit diverse features regarding their responses and interactions with the learning environment. This learning methodology is grounded in a constructivist approach, wherein students construct their knowledge through engaging in learning activities, individual practice, and taking quizzes. Researchers provide non-dominant interventions, allowing students greater freedom to express their thoughts and ideas during the learning process. Teacher intervention serves several functions in the learning process. Firstly, it assists students in comprehending the provided activities. Secondly, it directs them to acquire pertinent and reliable information. Thirdly, it guides them in constructing logical arguments or justifications. Fourthly, it fosters critical thinking skills. Fifthly, it offers reinforcement and motivation to cultivate a conducive learning environment. Lastly, it provides opportunities for individual participants to enhance their personal development.

Reaction principle

Table 2 summarizes the response principles for online piano lessons for beginners.

Step	Teachers' response	Students' response
Step 1	● Pay attention to the correctness of the student's finger position and hand shape, and correct mistakes promptly. ● Encourage students to touch the keys more often to develop a preliminary sense of touch for the keyboard.	● When first exposed to the piano, students may have difficulty controlling the strength of their fingers and need to get used to the keyboard. ● They may also feel unfamiliar with the keyboard layout and need to practice repeatedly to become familiar with the position of the notes.
Step 2	● Encourage students to maintain finger independence when practicing scales, especially the coordination between the left and right hands. ● Adjust the teaching pace in response to students' possible speed issues.	● Gradually adapt to the rules of the scale, but may feel that more than finger independence is needed, and it is more challenging to coordinate the left and right hands. ● Speed control and fluency need to be improved.
Step 3	● Focus on explaining chord fingerings to help students understand the structure and function of chords. ● Help students strengthen finger strength and flexibility through repeated practice.	● Initially grasp the I, IV, and V chords but may have difficulty switching between them. ● Please have a basic understanding of the musical function of chords, but need more practice to consolidate it.
Step 4	● Emphasizes the coordination of the hands to ensure that students can play both the melody and the accompaniment.	● 's stability. ● A preliminary experience plays simple tunes, but the coordination of the hands needs to be further improved.

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	● Students maintain the melody line's fluency and the accompaniment	
Step5	● Focus on training rhythm, especially the playing technique of syncopation. ● Observe the rhythmic stability of the student in the coordinated practice of both hands.	● Rhythm control has improved, but there is still instability when syncopating rhythms. ● The rhythmic coordination of both hands has improved, but further detailed practice is required.
Step 6	● Detailed explanation of the connecting technique of secondary chords to help students switch between chords smoothly. ● Encourage students to try more playing and singing exercises	● , try switching between chords ● , and improve their playing and singing ability. However, they still need to practice connecting chords.
Step 7	● Exercise the training with more complex accompaniment patterns to improve the independence and expressiveness of the student's hands. ● Strengthen the fluency of the melody line and the richness of the accompaniment.	● Significant improvement has been made in the coordination of the right-hand melody and the left-hand accompaniment, but they are not yet proficient in complex patterns. ● There is a particular understanding of multi-tone transitions, but further practice is needed.
Step 8	● Strengthen the teaching of complex rhythmic patterns to help students master syncopated and dotted rhythms. ● Ensure that students play with both hands in rhythm.	● Gradually become proficient at synchronizing complex rhythms, but may still need to be more stable when playing complicated rhythms. ● Improve the ability to coordinate both hands and become more sensitive to subtle changes in rhythm.
Step 9	● Through repeated practice, help students master the performance techniques of dotted and compound rhythms. ● Further, it consolidates students' understanding and application of complex rhythms.	● Mastering dotted and compound rhythms is becoming more mature, but control still needs to be improved in practical application. ● The ability to respond to changes in rhythm has improved, and the performance is more confident.
Step 10	● A comprehensive review helps students integrate their learned skills and demonstrate their learning outcomes. ● Students are encouraged to play independently and gradually develop their playing style.	● They can fluently play a repertoire series, demonstrating the comprehensive use of various skills. ● They are confident in singing and playing along and can continue learning in depth.

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Support system

Table 4: Support system

Component	Required conditions
Learning environment	1. Collaborative culture 2. Constructive culture
Learning source	1. Complete 2. Easy to access 3. Relevant
Learning material	1. Material content 2. Exercise
Teacher competency	1. Proficient in fostering student engagement in online piano learning through educational content design. 2. Capable of offering constructive feedback to pupils
Students attitude	1. Possess a strong inclination towards exploration and possess a healthy level of belief in oneself 2. Recognize the significance of learning for their personal growth
Evaluation	Evaluation instruments with explicit criteria for assessing learning outcomes

Assessment Phase

Once the design for the online piano lesson has been created, the following step is to evaluate the learning prototype. Evaluation is conducted in order to get an accurate model. The validation process consisted of two stages: expert validation and field trials.

Expert validation results

Table 4: Summary of expert IOC verification results for the online piano lesson design

NO.	Research Tool Average Score Conclusion	Average Score	Conclusion	
1	Interview form	0.900	very effective	
2	Lesson plan	0.926	very effective	
3	Checklist for Observation learning stages	0.939	very effective	
4	Questionnaire	0.933	very effective	
5	PretestPretest and post-test students' playing piano skill	0.911	very effective	

The expert validation results of the model design: All topic IOCs are more significant than 0.6, so all entries are qualified. After expert validation, the average value of all entries exceeds 0.90, indicating that all outlines of the model design have good content validity, which shows that the created components are very effective.

Trials

Field trial data is generated by observing the application of learning steps in groups of subjects and collecting student response surveys.

1. Results from the observed learning process (Figure 5)

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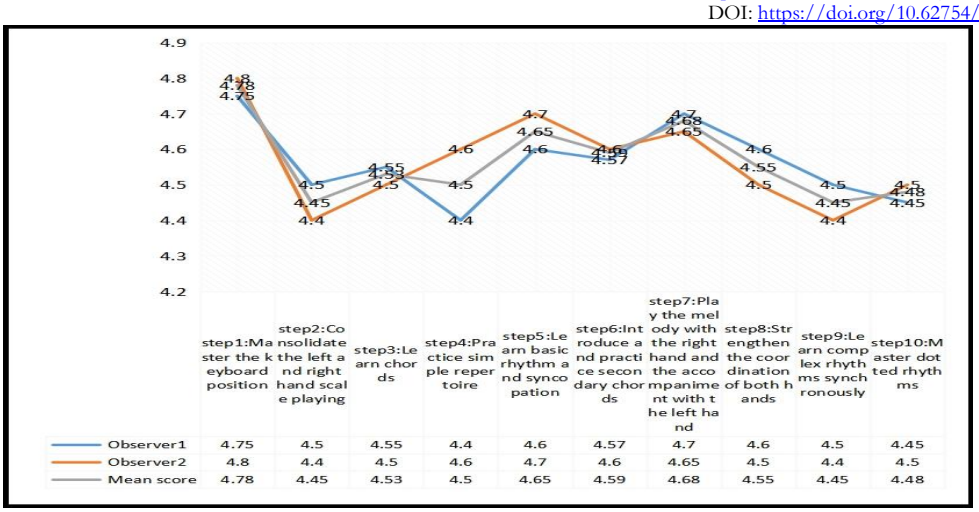

Figure 5: Findings from the observation of the learning process

Figure 5 shows the summary results of the two observers' learning implementation observations. The observers made first-hand observations during the learning process. Figure 5: Results of the observation of the learning process

The results obtained from monitoring the amount of learning step implementation in Figure 5 show that the overall average implementation of the learning process is in the upper range. This means that, based on the established criteria, it can be concluded that the model is practical. This shows that the students can effectively implement the learning process according to the prescribed procedures.

According to the observations, the highest scores were achieved in lesson 1 for acquiring the initial touch technique and familiarizing the keyboard positions, followed by lesson 7 for extending the right-hand melody with complex accompaniment figures for the left hand. This indicates that the observers noticed that the learning activities were efficient at this stage and that exemplary implementation was demonstrated in previous stages.

The analysis of the implementation of social systems and the principles of reaction and support systems is elucidated as follows:

（1） Social system

At each stage of the learning process, teachers promote communication and cooperation among students through carefully designed interactive activities, thereby enhancing students' sense of participation and positive learning experiences. Students can learn in a supportive environment that enhances socialization skills by guiding students to share their opinions in discussions, collaborative projects, and class interactions. This social system is designed to improve academic performance and enhance students' social skills and sense of collective responsibility by encouraging them to participate actively in learning activities.

（2） Reaction principle

Teachers actively provide students with immediate and constructive feedback to ensure that each student can clearly understand their performance in the learning process and make improvements promptly. Feedback takes various forms, including oral feedback, written comments, and individual tutoring, and is designed to help students reflect on their learning progress and motivate them to make further improvements. Through targeted feedback, students can identify the strengths and weaknesses in their learning to perform better in subsequent courses. In addition, teachers focus on positive incentives in their feedback to help students build confidence and improve their motivation to learn.

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（3）Support system

At each stage of learning, teachers provide students with clear activity instructions and guidelines to ensure that students can complete their learning tasks. These support systems cover learning resources, technical support, and personalized tutoring. Students can refer to these instructions at any time when faced with tasks of varying difficulty to avoid confusion due to a lack of understanding of the task requirements. In addition to the pre-set learning guides, teachers are also available to answer questions at any time through online platforms, discussion forums, and after-school tutoring to ensure that students receive adequate help during the learning process. This support system is essential in an online learning environment, helping students overcome distance and time limitations and ensuring continuity in their learning.

(4) Summary

Social systems, response principles, and support systems create a practical learning framework. By promoting interaction, providing timely feedback, and providing sound support, students can receive comprehensive help in the learning process. These measures not only improve student engagement and the learning experience but also ensure that they can get timely help when they encounter problems so that they can successfully complete course assignments. Through this comprehensive educational support system, students' academic and personal abilities are developed in a balanced way.

Enhancement of students' playing piano skill

To gather data on pupils' piano proficiency, a pretest and post-test were administered to the students. The pretest pretest was conducted in March 2024, whereas the post-test was conducted in June 2024. The pretest pretest and post-test results of the students' piano skills are displayed in Tables 6 and 7.

Table 6: Students' scores on each dimension before the test

Pretest Pretest score					
Evaluation content Evaluation result					
Student Student number	Music theory and aural perception	Basic performance technique	Coordination of right and left hands and use of pedals	Rhythm and chord mastery	total
1	2.67	1.00	1.33	1.50	1.63
2	1.33	1.33	1.00	1.83	1.38
3	3.00	1.00	1.00	1.50	1.63
4	1.67	1.00	1.33	1.17	1.29
5	2.67	1.00	1.67	1.17	1.63
6	1.67	1.33	2.00	1.33	1.58
7	2.67	1.33	1.67	1.67	1.83
8	2.00	1.33	2.00	2.00	1.83
9	2.00	1.00	2.33	1.33	1.67
10	2.33	1.00	2.00	1.67	1.75
11	2.00	1.00	1.33	1.83	1.54
12	2.00	1.33	1.67	1.33	1.58
13	1.67	1.33	1.33	1.67	1.50
14	1.33	1.00	1.33	1.83	1.38
15	2.67	1.00	1.00	2.00	1.67
16	2.00	1.00	1.33	1.67	1.50

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17	1.67	1.67	1.33	1.83	1.63
18	1.33	1.00	1.67	2.00	1.50
19	2.33	1.00	1.67	1.50	1.63
20	2.67	1.33	1.33	1.67	1.75
21	1.33	1.00	1.67	2.17	1.54
22	2.00	1.00	1.33	1.50	1.46
23	2.33	1.67	1.33	1.67	1.75
24	1.33	1.33	1.00	2.00	1.42
25	3.00	1.00	1.33	1.67	1.75
26	2.00	1.33	1.67	1.67	1.67
27	2.33	1.00	2.00	1.67	1.75
28	2.67	1.00	1.67	1.83	1.79
29	1.00	1.33	1.00	1.67	1.25
30	2.33	1.33	1.67	1.67	1.75
31	1.67	1.00	1.00	1.50	1.29
32	2.00	1.00	1.33	1.67	1.50
33	2.33	1.33	1.33	1.33	1.58
34	2.00	1.00	1.00	1.67	1.42
35	2.33	1.00	1.33	1.83	1.63
Average score	2.07	1.15	1.46	1.66	1.58

Table 7: Students' scores on each dimension after the test

Post-test score					
Evaluation content	Evaluation result				
Student Student number	Music theory and aural perception	Basic performance technique	Coordination of right and left hands and use of pedals	Rhythm and chord mastery	total
1	4.67	3.33	4.00	3.83	3.96
2	2.33	3.67	3.67	4.33	3.50
3	3.00	3.33	4.67	4.50	3.88
4	4.33	4.33	4.33	4.00	4.25
5	4.67	5.00	4.00	4.00	4.42
6	4.33	3.67	4.33	4.33	4.17
7	3.67	4.33	4.00	4.00	4.00
8	4.00	3.33	4.33	3.67	3.83
9	4.67	3.33	4.00	4.50	4.13
10	4.67	3.67	4.00	3.83	4.04
11	4.67	4.33	4.67	4.17	4.46
12	3.67	4.67	4.67	4.67	4.42
13	4.00	5.00	4.67	4.50	4.54
14	4.33	3.67	4.33	4.33	4.17
15	4.00	3.67	4.00	4.17	3.96

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16	4.33	3.67	4.67	4.50	4.29
17	3.67	4.33	4.33	4.33	4.17
18	4.00	3.67	3.00	4.17	3.71
19	3.67	4.33	4.00	3.83	3.96
20	3.67	4.33	4.00	4.50	4.13
21	4.33	4.00	4.33	4.33	4.25
22	4.33	4.33	4.33	4.33	4.33
23	4.33	4.67	4.67	4.50	4.54
24	4.00	3.67	3.33	4.00	3.75
25	3.67	4.33	3.67	4.50	4.04
26	3.33	4.33	4.33	4.17	4.04
27	3.33	4.33	3.67	4.33	3.92
28	3.67	4.67	3.67	4.00	4.00
29	4.33	4.33	4.00	3.83	4.13
30	4.67	4.00	4.00	3.50	4.04
31	4.33	5.00	3.67	4.67	4.42
32	4.67	4.33	4.67	3.50	4.29
33	4.33	4.67	4.33	4.33	4.42
34	4.00	4.67	3.67	4.33	4.17
35	3.67	4.00	3.67	4.33	3.92
Average score	4.05	4.14	4.10	4.20	4.12

Table 6 shows the average results of the student's initial and final piano ability assessments. The initial test results showed that the overall evaluation criteria did not reach 2 points. This is because the students participating in this trial activity were all novices with no previous piano-playing experience. The online piano learning activity, divided into 10 lessons, significantly improved the students' piano-playing skills. This is evident from the students' post-test results, which show that the overall evaluation criterion achieved an average score of 4.05 or above, with the best-scoring evaluation criterion being "coordination of the left and right hands and use of the pedals," which achieved an average score of 4.20. Descriptively, it can be said that the children's piano-playing skills have improved. Figure 3 below highlights the improvement in the student's piano-playing skills.

The experiment was conducted for 10 weeks, from March to June 2024. Throughout the study, two skilled experts verified changes in pre- and post-course tests. Statistical analysis and collation of the survey results were done using SPSS 26.0 statistical software and tools such as Excel and Word. The 35 survey samples were compared for within-group differences in music theory and aural perception, basic performance skills, left-right hand coordination and pedal use, and rhythmic chord mastery. Paired sample t-tests were used to achieve this, depending on the nature of the variable.

1. Comparison of the differences between music theory and auditory perception

Table 8: Comparison of the differences between music theory and auditory perception before and after learning (M±SD)

Statement	Before learning	After learning	*t*	*p*
1. Whether students have basic music theory knowledge, such as a basic understanding of notes, beats, and chords.	1.94±0.87	3.77±0.77	3.345	0.002

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2. How is the student's aural sensitivity to harmony, and can they distinguish between major and minor keys and their scales?	2.14±0.85	4.34±0.73	6.672	0.000
3. Can the student recognize and apply common music symbols (slurs and dotted notes) to the performance?	2.11±0.9	4.03±0.86	3.916	0.000
Music theory and auditory perception	2.07±0.52	4.05±0.51	-9.468	0.000

注：*p<0.05,**p<0.01.

Statement 1: Do students have a basic theoretical knowledge of music, such as understanding musical notes, beats, and chords? The difference between students' pre- and post-learning is statistically significant (p=0.002<0.01), and students' understanding of this area has improved significantly after learning. Statement 2: How is students' aural sensitivity to harmony, and can they distinguish between major and minor keys and their scales? The difference between the pre-and post-learning results is statistically significant (p=0.000<0.01), and the students' sensitivity has improved significantly after learning. Statement 3: Can students identify and apply common music symbols (slurs and dotted notes) to actual performance? The difference between the there-and post-learning results is statistically significant (p=0.000<0.01), and the student's identification ability has improved significantly after learning. The average score of the top 35 students in the music theory and auditory perception dimension before the experiment was 2.07±0.52 points, and after the experiment, it was 4.05±0.51 points. This dimension improved significantly after the experiment and reached a relatively high level

Comparison of the differences in basic playing skills before and after learning.

Table 9 Comparison of the differences in students' basic performance skills before and after learning (M±SD)

Statement	Before learning	After learning	*t*	*p*
4. When playing, does the student have the essential ability to control the keys, and what is the stability and strength of the touch?	1.11±0.32	4.06±0.94	6.014	0.000
5. How flexible are the five fingers of the student's right hand, and can they move independently and play the melody correctly?	1.23±0.55	4.23±0.77	7.125	0.000
6. Can the student accurately play the C major scale and maintain smooth finger movement?	1.11±0.32	4.14±0.81	5.868	0.000
Basic playing techniques	1.15±0.2	4.14±0.5	-13.115	0.000

According to the results of the comparison of the differences in the basic playing skills of students before and after learning, statement 4: When playing, does the student have the essential ability to control the touch of the keys, and what is the stability and strength of the touch? The difference between the students before and after learning is statistically significant (p=0.000<0.01), and the student's essential ability in this area has improved significantly after learning. Statement 5: How flexible are the five fingers of the student's right hand, and can they move independently and play the melody correctly? The difference between before and after learning is statistically significant (p=0.000<0.01), and the students' flexibility has improved significantly. Statement 6: Can students play the C major scale accurately and maintain smooth finger movement? The difference between before and after learning is statistically significant (p=0.000<0.01), and the students' playing skills have improved significantly after learning. The average score of the 35 students in the basic performance skills total dimension before the experiment was 1.15±0.2 points, and after the experiment, it was 4.14±0.5 points. This dimension improved significantly after the experiment and reached a relatively high level.

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Comparison of the differences in the coordination of the left and right hands and pedal use before and after learning

Table 10: Comparison of differences in left-right hand coordination and pedal use before and after training (M±SD)

Statement	Before learning	After learning	*t*	*p*
7. How are the left and right hands synchronized and coordinated during the performance, and can they be operated simultaneously?	1.51±0.61	4.23±0.81	6.676	0.000
8. Does the student master the primary use of the pedal, and can it be coordinated with the performance?	1.49±0.61	4.23±0.77	7.694	0.000
9. Can the student recognize and play basic chords correctly, and is the chord transition smooth?	1.37±0.49	3.86±0.91	3.093	0.004
Coordination of the left and right hands and use of the pedal	1.46±0.34	4.1±0.42	-12.868	0.000

According to the results of the comparison of the differences in the coordination of the left and right hands and the use of the pedal before and after learning, statement 7: How is the synchronization and coordination of the left and right hands during the performance, and can they be operated at the same time? The difference before and after learning has significant statistical significance ($p=0.000<0.01$), and the coordination of the left and right hands of the students has improved significantly after learning. Statement 8: Do students master the primary use of the pedal, and can they coordinate it with the performance? The difference between the results before and after learning is statistically significant ($p=0.000<0.01$), and the students' pedal coordination has improved significantly after learning. Statement 9: Do students master the primary use of the pedal, and can it be coordinated with the performance? The difference between the results before and after learning is statistically significant ($p=0.004<0.01$), and the students' chord changes have improved significantly after learning. The average score for left-right hand coordination and pedal use before the experiment was 1.46±0.34 for the top 35 students, and after the experiment, it was 4.1±0.42. This dimension improved significantly after the experiment and is at a reasonable level.

Results of the comparison of the differences in students' rhythmic and chord mastery before and after learning

Table 11 Comparison of the differences in students' rhythmic and chord mastery before and after learning (M±SD)

Statement	Before learning	After learning	*t*	*p*
10. The student can maintain a steady rhythm, especially mastering complex rhythmic patterns such as dotted notes and syncopation.	1.37±0.49	3.8±0.96	3.515	0.001
11. Can the student play simple pieces such as "Fishing Light Song" or "Dove"?	1.77±0.65	4.49±0.61	8.097	0.000
12. Whether the student's phrasing is coherent and fluid when playing melodies.	1.77±0.77	4.2±0.9	4.028	0.000
13. Whether the student can maintain the clarity and stability of the notes when playing slowly.	1.94±0.87	4.31±0.8	4.428	0.000
14. The student can master the rhythmic combination of eighth and sixteenth notes.	1.71±0.46	4.23±0.88	7.52	0.000
15. The student can master the smooth playing of compound chord connections such as I-VIm-IIm-V.	1.37±0.49	4.14±0.91	6.026	0.000

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Rhythm and chord mastery	1.66±0.24	4.2±0.31	-15.008	0.000

According to comparing the differences in students' rhythm and chord mastery before and after learning, item 10: Can students maintain a stable rhythm, especially mastering complex rhythmic patterns such as dotted notes and syncopations? The difference between students' performance before and after learning is statistically significant (p=0.001<0.01), and students' mastery of this aspect has improved significantly after learning. Item 11: Can students play simple songs such as "Fishing Light Song" or "Dove"? The difference between the students before and after learning is statistically significant (p=0.000<0.01), and the students have significantly improved in this area after learning. Item 12: Do the students' phrases show coherence and fluency when playing melodies? The difference between the students before and after learning is statistically significant (p=0.000<0.01), and the students have significantly improved in this area after learning. Question 13: Can students maintain the clarity and stability of notes when playing at a slow tempo? The difference between before and after learning has a significant statistical significance (p=0.000<0.01), and students have significantly improved playing at a slow tempo after learning. Question 14: Can students master the rhythmic combination of eighth and sixteenth notes? The difference between before and after learning is statistically significant (p=0.000<0.01), and students have significantly improved in rhythmic combinations after learning. Question 15: Can students master the smooth playing of compound chord connections such as I-VIm-IIm-V? The difference between before and after learning is statistically significant (p=0.000<0.01), and there is a significant improvement in students' mastery of compound chord connections after learning. The average score of the top 35 students in the rhythm and chord mastery experiment before the experiment was 1.66±0.24 points; after the experiment, it was 4.2±0.31 points. After the experiment, there was a significant improvement in this dimension, which is relatively good.

Analysis of the results of the questionnaire

A total of 35 students participated in educational endeavors. After participating in the learning activity, students were administered an online answer questionnaire through the WeChat program. In summary, the outcomes of the students' feedback are displayed in Table 6

Table12 Descriptive Statistics

	N	Min	Max	Mean	Std. Dev
1. Whether students have basic music theory knowledge, such as a basic understanding of notes, beats, and chords.	35	2	5	3.77	0.77
2. How is the student's aural sensitivity to harmony, and can they distinguish between major and minor keys and their scales?	35	3	5	4.34	0.73
3. Can the student recognize and apply common music symbols (slurs and dotted notes) to the performance?	35	2	5	4.03	0.86
4. When playing, does the student have the essential ability to control the keys, and what is the stability and strength of the touch?	35	2	5	4.06	0.94
5. How flexible are the five fingers of the student's right hand, and can they move independently and play the melody correctly?	35	3	5	4.23	0.77
6. Can the student accurately play the C major scale and maintain smooth finger movement?	35	2	5	4.14	0.81
7. How can the left and right hands synchronize and coordinate during the	35	3	5	4.23	0.81

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performance, and can they be operated simultaneously?					
8. Does the student master the primary use of the pedal, and can it be coordinated with the performance?	35	3	5	4.23	0.77
9. Can the student recognize and play basic chords correctly, and is the chord transition smooth?	35	2	5	3.86	0.91
10. The student can maintain a steady rhythm, especially mastering complex rhythmic patterns such as dotted notes and syncopation.	35	2	5	3.80	0.96
11. Whether the student can play simple pieces such as "Fishing Light Song" or "Dove."	35	3	5	4.49	0.61
12. Whether the student's phrasing is coherent and fluid when playing melodies.	35	2	5	4.20	0.90
13. Whether the student can maintain the clarity and stability of the notes when playing slowly.	35	3	5	4.31	0.80
14. The student can master the rhythmic combination of eighth and sixteenth notes.	35	2	5	4.23	0.88
15. The student can master the smooth playing of compound chord connections such as I-VIm-IIm-V.	35	2	5	4.14	0.91

Reliability test

The Cronbach α reliability coefficient reflects the degree of confidence in the measurement results of the scale. The value of this coefficient is between 0 and 1. A coefficient value >0.6 indicates that the scale's reliability can be accepted; a coefficient value between 0.6 and 0.8 indicates that the scale's reliability is good; a coefficient value greater than 0.8 means the scale's reliability is excellent. The results show that the overall reliability coefficient for the 15 items is 0.632, which is greater than 0.6, indicating that the reliability of the scale measurement results can be used for further statistics.

Reliability Statistics

Cronbach's Alpha	N of Items
0.632	15

Validity test:

The KMO test judges the validity of the measurement results of the scale, and the process of validity testing is usually carried out using exploratory factor analysis. A KMO value greater than 0.6 indicates that the scale's validity is acceptable; a KMO value between 0.7 and 0.8 indicates high scale accuracy. When the KMO value is more significant than 0.9, the measurement accuracy of the scale is very high. According to the validity test results, the KMO test value is 0.602, and the significance of the Bartlett sphericity test is 0.000, which is less than 0.01, indicating that the accuracy of the measurement scale is acceptable.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.602
Bartlett's Test of Sphericity	Approx. Chi-Square	129.431
	df	105

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Conclusion

Students showed significant improvement in music theory and aural perception. The survey results showed that students' basic understanding of notes, beats, and chords, aural sensitivity to harmonies, and ability to recognize and apply common music symbols all improved significantly. For example, students' average scores in music theory and aural perception improved significantly, from 2.07 to 4.04.

Improvements in basic playing skills were also significant. Students' touch control, right-hand dexterity, and C major scale playing skills improved significantly. Their average score improved from 1.15 before the study to 4.14 after, significantly enhancing their basic playing skills.

Students also made significant progress in coordinating their left and right hands and using the pedals. The synchronization of the left and right hands and the ability to use the pedals improved significantly after the study, reflecting a qualitative leap in students' overall performance.

In terms of rhythm and chord mastery, students' mastery of complex rhythmic patterns (such as dotted notes and syncopations) and chord connections has improved significantly. The student's rhythm and chord mastery improved from 1.66 points to 4.2 points, indicating that after the study, they performed more fluently in complex rhythmic patterns and chord changes.

Overall, students' performance in all dimensions has improved significantly, indicating that this teaching has positively promoted the development of students' music skills.

Discussion

Online piano lessons consisting of twelve steps have the capability to enhance the piano-playing skills of beginner students

The finding that online piano lessons following the ten-step program can enhance the piano playing skills of novice students aligns with prior studies that emphasize the efficacy of technology-driven music education. Yang and Ho (2020) conducted a study demonstrating that using digital music learning platforms can enhance student involvement and motivation in learning musical instruments, such as the piano. The study revealed that implementing a systematic and hierarchical approach to online music education enhances students' comprehension and proficiency in fundamental abilities, surpassing traditional teaching approaches. Moreover, a study conducted by Lan and Sie (2018) discovered that online music learning with specific guidance allowed students to have the freedom to choose when and where they study, which significantly assisted beginner students in organizing their study timetables based on their requirements. These two studies corroborate the discovery that a methodical teaching process framework facilitates the acquisition of fundamental piano skills and offers a distinct structure for novice students to monitor their advancement and maintain motivation over the learning journey. In addition, a study by Rickard et al. (2017) highlighted that using technology to enhance music learning can have a considerable positive impact on students' cognitive and motor abilities. Hence, the findings of this research not only showcase an enhancement in piano proficiency through virtual instruction but also emphasize the significance of a methodical approach and the utilization of technology in modern music pedagogy.

Conversely, a study by Bernard et al. (2017) demonstrates that integrating online music learning with in-person sessions can yield highly favorable outcomes. The study found that students engaged in the blended learning model had more significant skill advancements than those who exclusively utilized either strategy. This suggests that while ten-step online piano lessons are efficacious, integrating them with in-person tuition can enhance learning and guarantee that students reap the benefits of both methodologies. In addition, a study conducted by Hu and Ritzhaupt (2020) demonstrates that using interactive learning technology, such as programs that offer immediate feedback and visual aids, can enhance student

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engagement and comprehension even more. The results of this study provide evidence that combining different methods and utilizing cutting-edge technology can play a crucial role in optimizing the effectiveness of online music education.

According to the data analysis in Chapter 4, online piano lessons have a significant effect on improving the playing ability of beginners. In particular, students have made significant progress after the course regarding coordination between the left and right hands, basic playing techniques, and mastery of rhythmic chords. Whether it is finger dexterity, touch control, or mastery of complex rhythms, students have significantly improved their abilities (Guo Bin, data analysis in Chapter 4). These results show that online piano lessons are an effective way to help beginners improve their skills, especially for students who need access to face-to-face teaching opportunities.

The piano course's design and learning process were the most compelling implementation aspects.

The finding that the piano introduction and fingering technique stages were the most successful phases in implementation aligns with earlier studies that highlight the significance of the beginning stages in music learning. Research conducted by McPherson and Renwick (2011) demonstrates that possessing a fundamental comprehension of musical instruments and employing proper fingering techniques is vital for advancing musical abilities. It was discovered that students who achieved mastery of these fundamental strategies exhibited faster development in the more intricate components of the game. Furthermore, a study by Duke and Simmons (2006) emphasized the importance of a proficient introduction to the musical instrument and fundamental techniques, such as fingering, to establish a solid groundwork for musical performance skills. It was observed that pupils who got a well-executed introduction showed better levels of self-assurance and perseverance in their practice.

Conversely, Jorgensen's (2009) research indicates that for specific students, particularly those without prior musical experience, acquiring and becoming proficient in fundamental methods like fingering might pose a significant obstacle. Jorgensen discovered that in the absence of appropriate instruction and ongoing evaluation, students may acquire detrimental playing behaviors that are challenging to rectify in the future. Nevertheless, Zhukov's (2014) study demonstrates that employing a methodical and engaging strategy in instructing these fundamental principles can effectively address these difficulties. Zhukov discovered that incorporating multimedia and interactive exercises into teaching methods greatly enhanced the efficacy of instructing students in fingering skills and instrument recognition. This ultimately led to improved student achievement in music education.

Through monitoring the learning process, the data analysis shows that lesson 7, which expands the right-hand melody and the left-hand complex accompaniment patterns, is the most effective stage, followed closely by lesson 1 when students demonstrate a high learning effect as they master basic touch techniques and familiarize themselves with keyboard positions. This shows that mastering basic skills and expanding training in complex accompaniment patterns are crucial to improving students' comprehensive performance ability during the learning process. In addition, training in coordination between the two hands is also a critical stage in learning, helping students achieve a qualitative leap in overall performance.

Online piano lessons help build students' confidence and long-term interest in learning.

The findings of this study suggest that online piano lessons primarily enhance the skills of playing the piano with both hands and maintaining coherence in playing. This is backed by several studies demonstrating the efficient use of technology in improving musical instrument playing abilities. A study by Schwellnus et al. (2012) highlighted the benefits of incorporating technology into music education, specifically through video lessons and interactive applications. This approach can enhance students' comprehension and proficiency in playing musical instruments with both hands. A study revealed that pupils who received instruction via online platforms showed notable enhancements in manual dexterity compared to those taught using conventional techniques.

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Moreover, Mishra's (2014) study demonstrates that music learning technologies that rely on visual cues, such as applications that display musical notation and demonstrate playing skills, effectively enhance the skill of maintaining coherence while playing. Mishra observes that students who utilize this technology demonstrate a heightened comprehension of musical composition and exhibit the ability to perform musical pieces without encountering issues of coherence. However, Pitts et al. (2017) found that while online learning is helpful in certain areas, some children may need help maintaining coherence and hand coordination without direct teacher supervision. They highlight the significance of real-time live engagement and immediate feedback in assisting students in rectifying technological problems.

Data analysis shows that online piano courses help students build confidence and stimulate their long-term interest in piano learning through systematic course design and feedback mechanisms. In particular, students' sense of accomplishment is greatly enhanced by receiving immediate feedback and personalized guidance to improve their skills after completing the course. In addition, by providing practical performance opportunities, students can comprehensively apply the skills they have learned, enhancing their enthusiasm for piano learning and their ability to be self-driven.

Conclusion

The research was conducted to examine the development of online piano lessons, which consisted of three distinct phases: preliminary investigation, design phase, and assessment phase. The preliminary inquiry involved examining the available online piano lessons, analyzing the features of online piano lessons designed for beginners, and establishing the criteria for evaluating students' piano playing abilities. The findings from the preliminary inquiry are used to develop online piano tutorials encompassing instructional procedures, responsive principles, social systems, and support systems.

The online piano lesson assessment step involves expert validation and trials to evaluate the online piano lesson design outcomes. The expert validation of the online piano lesson design and tools, including lesson plans, learning implementation observation sheets, and student response sheets, was conducted by two validators. The average validity score obtained from a range of 1-4 was above 3.3, indicating that the design and tools meet the criteria well. Legitimate. The expert assessment of the online piano lesson design encompasses the evaluation of several components, such as the correctness of the information provided on the rationale for developing online piano lessons, the theoretical foundations underlying the lessons, and the different learning components included (including learning steps, social systems, reaction principles, and support systems).

The online piano lesson design, deemed valid by experts, is subsequently tested on groups of students to acquire a practical and efficient model. The online piano lessons in the study were convenient, with an average learning implementation score of 4.20 out of a possible score of 5. The effectiveness of the online piano lesson design was assessed based on the observations of two observers during the lesson's implementation. Regarding effectiveness, the online piano lessons have successfully met the effectiveness criteria. This is evident from the favorable reactions received from students who have participated in the classes and the improvement in their piano playing skills.

The online piano course consists of 10 lessons with different learning stages. These stages are as follows: 1. master the initial touch technique and familiarize them with the keyboard position; 2. consolidate the essential scale performance of the left and right hands; 3. recognize basic chords (I, IV, V); 4. practice the right-hand melody and left-hand accompaniment in simple pieces; 5. practice primary rhythms and syncopations; 6. Introduce and practice secondary dominant chords (VIm, IIIm); 7. expand right-hand melodies and left-hand accompaniment patterns; 8. strengthen coordination between the two hands and synchronize training with complex rhythms; 9. master syncopated rhythms and compound rhythm techniques; 10. play and sing a series of songs using the techniques learned.

Through the online piano course developed in this study, beginners have significantly improved their piano playing skills in various dimensions. These improvements were reflected in the mastery of basic playing skills and the flexible use of complex rhythms and chords. The course design emphasizes training in two-

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handed coordination, touch techniques, and rhythm, which strongly supports students' continued learning. The successful development of the course has provided a flexible and efficient learning path for students with no prior piano playing background and has demonstrated the significant educational value and prospects for the promotion of online piano teaching in developing the skills of beginning piano students.

Recommendation

Recommendation for policy

Incorporate online piano learning programs into the school music curriculum as an extracurricular choice to enhance the availability of music instruction.

1. Ensure sufficient availability of modern gadgets, such as laptops and tablets, and reliable internet connections in schools to facilitate online piano learning.

2. Arrange specialized training sessions for music educators on the optimal utilization of online piano learning platforms and pertinent pedagogical methods.

Recommendation for Teachers

1. Implement the teaching steps in online piano lessons, with particular focus on the initial stage of becoming comfortable with the piano and mastering fingering methods. These steps have been demonstrated to effectively enhance pupil proficiency.

2. Regularly evaluate student development and offer constructive feedback to enhance their skills, particularly in playing with both hands and preserving game coherence.

3. Motivate students to engage in autonomous practice at home utilizing the advice offered in the online learning platform and provide supplementary resources that students can utilize to enhance their practice.

Recommendation for students

1. Utilize all the available features and resources on the online piano learning platform to enhance comprehension and proficiency in playing the piano.

2. Dedicate sufficient time each day to practice, with particular emphasis on mastering fingering techniques and playing with both hands to expedite the progress of piano playing abilities.

3. Adhere diligently to the directions and guidelines provided by the teacher, and do not hesitate to seek clarification or ask questions regarding any ambiguous or challenging aspects.

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