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The Construction of Music Education Platform Under "Human-Computer Interaction" Mode

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Abstract

The present study centers on the utilization and advancement of "human-computer interaction" (HCI) within the realm of online education. This is achieved by providing a succinct overview of the human-computer interaction mode and the evolution of human-computer interaction technology. Based on the findings of the analysis, it is projected that the global digital music industry will experience a decline in total revenue during the period spanning from 2010 to 2020, followed by a subsequent increase. Specifically, it is anticipated that the total revenue of the global digital music industry will reach a value of US$21.5 billion in 2020, reflecting a year-on-year increase of 7.7%. The discourse pertains to the significance of the Human-Computer Interaction (HCI) model in the domain of music education. A novel collection of human-computer interaction (HCI) online music applications is suggested, and an assessment of current HCI online music instructional software is conducted. Subsequently, an examination of 'Little Leaf Music Education' is conducted utilizing Human-Computer Interaction (HCI) as a point of entry. The development of a Human-Computer Interaction (HCI) course rating scale was undertaken utilizing a participatory action research methodology. The study was conducted using a survey methodology, and it was found that 66.67% of the 12 participants who were surveyed had attended the sessions. The attendance rate of the four students who were not fully enrolled was equal to or greater than 60%. This indicates that the students did not exhibit resistance towards the HCI tool 'Little Leaf Music Education'. Further investigation into extracurricular employment demonstrated that the proportion of pupils who submitted their work offline under the HCI framework was as high as 90%. The pass rates for the assignment were recorded to be as high as 90%. Subsequently, a simulated assessment revealed that 75% of the students performed proficiently on the examinations. Furthermore, the surveys conducted on HCI classroom satisfaction and teacher satisfaction revealed that the collective satisfaction rate for both categories was 100%.The Human-Computer Interaction (HCI) model has expanded the potential for interactive music instruction and has successfully directed the advancement of students' imaginative and innovative abilities. This finding offers robust empirical evidence to inform and direct the future implementation and advancement of Human-Computer Interaction (HCI) in the context of online education.

Keywords: *Human-computer interaction" model, music education, curriculum and teaching objectives, teaching platform, multimedia teaching system.*

Introduction

The integration of internet technology with art has led to the emergence of a new teaching mode in traditional and social music education, known as the "human-computer interaction" mode. This mode is heavily influenced by the interplay between human, machine, and environment in the field of information science and technology. The enhancement and regulation of music education for students has been gradually implemented in the pursuit of a more comprehensive education model. The establishment of a rational and standardized education model has been shown to effectively facilitate the advancement of students' cognitive and perceptual abilities, as well as their physical and mental well-

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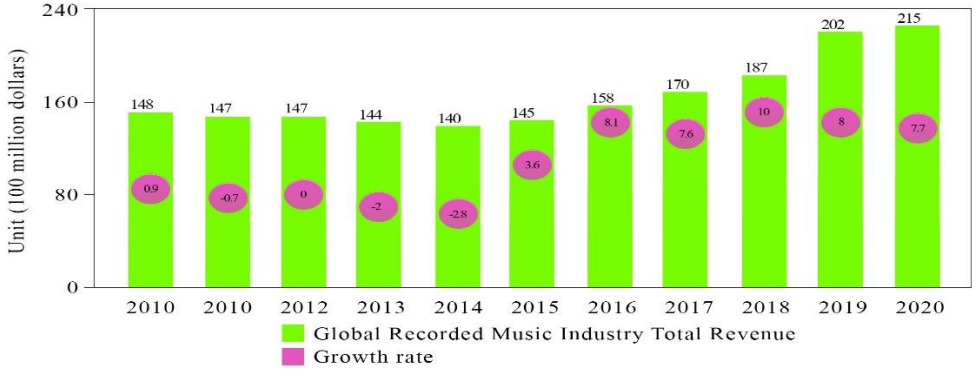
being [2]. It has the potential to facilitate positive development in their maturation trajectory.

The field of music education has experienced advantageous progressions due to the proliferation of the Internet, which has facilitated the establishment of a "human-computer interaction" paradigm for music education. In the context of designing music software for educational purposes, it is imperative that the software is engaging, user-friendly, and straightforward. It is recommended that an educational model based on the principles of human-computer interaction be developed, taking into account the psychological traits of students. This approach is necessary to effectively stimulate the perception and imagination of students.

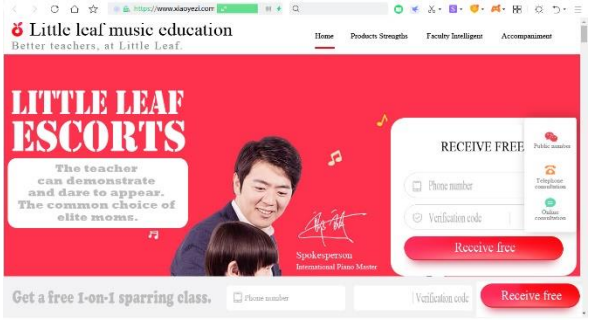
The domain of music education has witnessed an early onset of research and advancement in the field of Human-Computer Interaction (HCI) software. As a result, there exists a substantial collection of well-established HCI teaching models [3]. The magnitude of the global market is substantial. Based on data provided by IFPI [4], it can be observed that the overall revenue generated by the digital music industry worldwide between 2010 and 2020 exhibited a pattern of initial decline followed by subsequent growth. Over the course of the previous two years, there has been a consistent upward trend in the overall revenue generated by digital music on a global scale. As depicted in Figure 1, the digital music industry is projected to generate a total revenue of 21.5 billion USD in 2020, reflecting a 7.7% rise from the previous year.

Figure 1: 2010-2020 total revenue of the global digital music industry



Existing music education software can be categorized into various types based on their functionalities. These include music education software for fundamental knowledge, piano training software, software for listening and ear training, and song flash software, among others [5]. Currently, there exist various online music education platforms, including MOOC, EduSoho, and Adele Music, among others. The Little Leaf Music Education application has gained significant popularity within the online music Massive Open Online Course (MOOC) community, as illustrated in Figure 2.

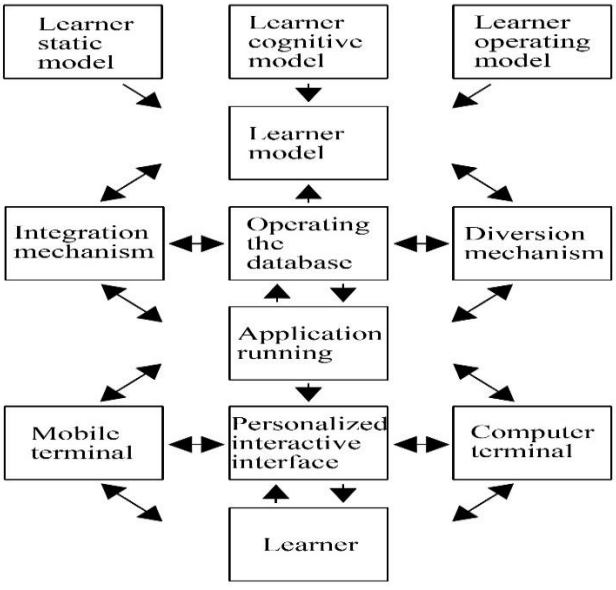
Figure 2: Registration page of Little leaf music education



Due to the impact of the COVID-19 pandemic, a majority of regions across the country are unable to conduct music courses in a conventional manner. As a result of this phenomenon, the popularity of web-based music courses is steadily increasing. As the user base expands, the limitations and monotony of web-based music education programs are becoming increasingly apparent. The issue of urgency is also pertinent to the realm of online education in the current stage.

The proposed solution to address the issues of monotony and inconsistency in online music courses is the implementation of the "Human-Computer Interaction" (HCI) management approach. The incorporation of 'human-computer interaction' technology into music education has the potential to enhance the effectiveness of pedagogy and scholarship within the field [6]. Moreover, it facilitates the dissemination of educational materials and enhances students' proficiency in comprehension. The implementation of music education can effectively facilitate the advancement of musical excellence and aesthetic appreciation. The development of cognitive and perceptual skills can be facilitated through its utilization by students. The human-computer interaction approach that prioritizes the student as the central focus is characterized by a diverse and adaptable nature. The level of interaction is highly substantial. The level of conveyed information is substantial, as indicated by the numerical value of 7. Efficient and timely communication is essential. The optimal utilization of the distinct cognitive abilities of both humans and machines in their interaction, as depicted in Figure 3, is imperative for effective human-computer interaction.

Figure 3: Learner-centered interactive system model



Initially, the static, cognitive, and operational modifications are constructed with consideration for the learner's viewpoint, in order to synchronize them with the modules provided to service students. The feedback provided by students is subsequently incorporated into the central database via an integration and transfer mechanism [8]. The central database conducts the initial analysis. The application runtime mechanism receives instructions through the integration mechanism, transfer mechanism, and operating system. The ultimate result is disseminated to both students and educators through the mobile module, computerized module, and personalization port. The present article commences with an exploration of "Little Leaf Music Education" and its utilization of online music education through the lens of "human-computer interaction."

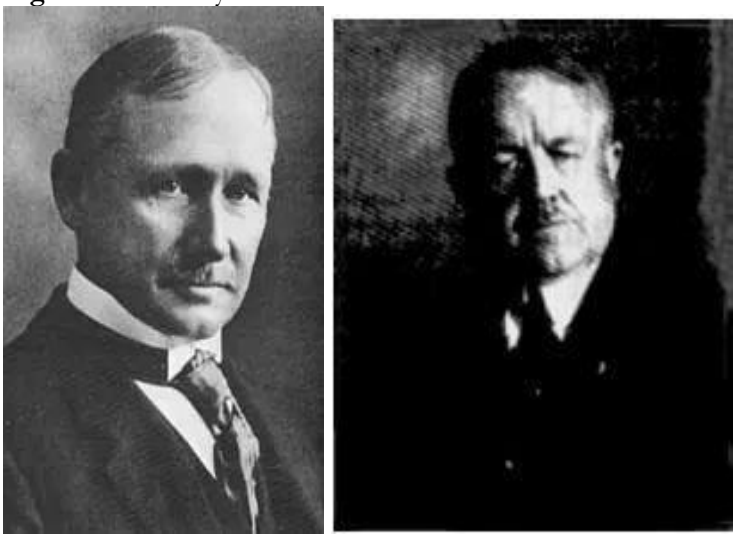
Research Background and Methods

The Context of Human-Computer Interaction

In a specific context, Human-Computer Interaction (HCI) pertains to the examination of the interaction between humans and computers, as well as the exchange of information facilitated by interaction technologies. HCI, as defined by reference [9], pertains specifically to the scientific and technological examination of the interaction between humans and computers, as well as the interaction that occurs between the two entities. The user interface serves as a communication medium between humans and computers, facilitating the exchange and transmission of information between the two parties. The term "human-computer interaction" pertains to the exchange of information between a human and a computer through a conversational language, with the objective of accomplishing a specific task, as documented in sources [10-12].

The emergence of Human-Computer Interaction (HCI) as a distinct field of study and technology occurred at the onset of the 20th century. The origins of HCI research through contemporary scientific methods can be traced back to the work of F.W. Taylor and Gilbreth. Their focus was on utilizing HCI to address the challenges associated with loading and unloading goods in industrial production and construction, as depicted in Figure 4.

Figure 4: F.W. Taylor and Gilbreth



The year 1946 marked the inception of the 'human-computer interaction' paradigm with the development of the world's first computer at the University of Pennsylvania. Subsequently, the advent of the mouse in 1964 ushered in the era of personal computing, leading to a surge in the number of users and hastening the advancement of interaction technology [15]. The inaugural technical conference on "human-computer interaction" was convened in the United States in May 1965 [16]. Martin's publication, The Design of Man-Computer Dialogues, was released in 1973 and served to raise industry awareness regarding the matter of human-computer interfaces [17,18]. The topic of discussion pertains to the design of dialogues between humans and computers. During the 1970s, novel research and application directions were introduced in the field of computer programs. These included the proposal of overlapping multi-window and object programming, which paved the way for contemporary computer operating systems [19]. The year 1989 marked the onset of the information age, which

consequently led to the emergence of research on 'human-computer interaction' [20].

Interactivity

The concept of "interactivity" primarily pertains to the user's ability to manipulate the virtual environment through an interactive interface, and subsequently receiving feedback from said environment. The predominant mode of immersive interactivity is characterized by visual and behavioral interaction.

The term "visual interaction" pertains to the manner in which the user engages with the visual elements displayed by an interactive device. The aforementioned statement implies that the interactive apparatus possesses the capability to track the user's bodily movements and alterations in visual perception, and subsequently exhibit fresh visual representations in immediate response to the interactive interface. The term "behavioural interaction" pertains to the actions exhibited by the user, including but not limited to the act of pressing buttons on an interactive device and modifications in bodily behaviour, as stated in reference [21]. Through engagement with the virtual environment generated by the interactive apparatus, users are able to manipulate objects. Throughout this period, the interactive apparatus acquires information regarding the interactive conduct and scrutinizes the information conveyed by the system, thereby facilitating the provision of feedback to the control device instantaneously. This process enables the user to have an authentic encounter of tactile interaction with objects within the interactive device [22].

Immersion

The utilization of interactive devices enables users to encounter a feeling of immersion and spatio-temporality within the "human-computer interaction" paradigm [23]. The sensation of "immersion" that users encounter is primarily attributed to the utilization of interactive devices that facilitate the incorporation of various perspectives within a virtual setting. According to scholarly literature, an optimal model for human-computer interaction involves utilizing the 3D modeling feature within an interactive system. This feature enables the processing of graphics, text, music, and other relevant information in a three-dimensional format, resulting in a diverse range of cross-perception functional experiences for the user [24]. Autonomy, as a concept, pertains to the ability of a user to interact with an interactive device or object within a 'human-computer interaction' mode environment. The system, in turn, provides the user with real-time feedback on the object based on the information available, as indicated by source [25]. In actuality, it is impossible for individuals to simultaneously occupy distinct temporal and spatial domains. However, interactive devices offer an immersive experience that enables users to appreciate the splendor of nature from within enclosed spaces or engage in conversations with beloved animals within designated settings. This technology creates a sense of three-dimensional interaction between individuals and their surroundings, simulating a lifelike experience. [26]

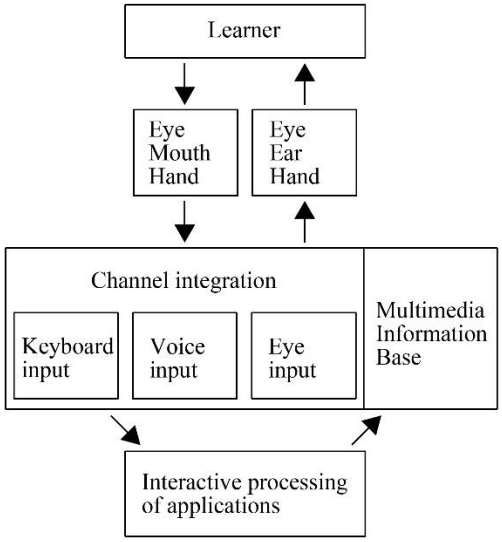
The Implementation Mode of "Human-Computer Interaction" Equipment in and Music Education

Multi-channel human-machine interaction interface

The primary pedagogical tools that can be efficaciously employed in the music classroom encompass multimedia, such as interactive whiteboards, and intelligent musical instruments, including intelligent pianos and intelligent drums [27]. Interactive whiteboards are frequently utilized in educational settings such as schools and universities, whereas smart musical instruments are predominantly employed in institutions focused on social education. The "human-computer interaction" model of music instruction prioritizes the examination of students' learning processes, learning materials, and methods for cultivating their potential. The model places emphasis on the student as the primary agent, engaging their sensory and cognitive faculties to encourage self-directed learning and foster creative thinking, as

depicted in Figure 5.

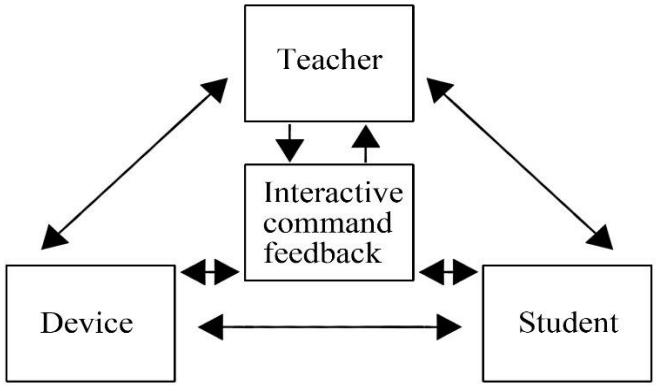
Figure 5: Multi-channel human-machine interaction interface



Teacher-machine-student interaction

The integration of "human-computer interaction" technology with the subject of music education has resulted in a novel teaching approach known as the "human-computer interaction" mode of music education [28]. During the implementation of the curriculum, educators generate guidelines for interactive devices or establish pedagogical scenarios via the interactive device system, thereby extending the conventional "teacher-student" instructional paradigm to a "teacher-machine" model. The interactive device system can be utilized by the teacher to generate instructional materials or to establish teaching scenarios, as depicted in Figure 6.

Figure 6: Teacher-machine-student interaction

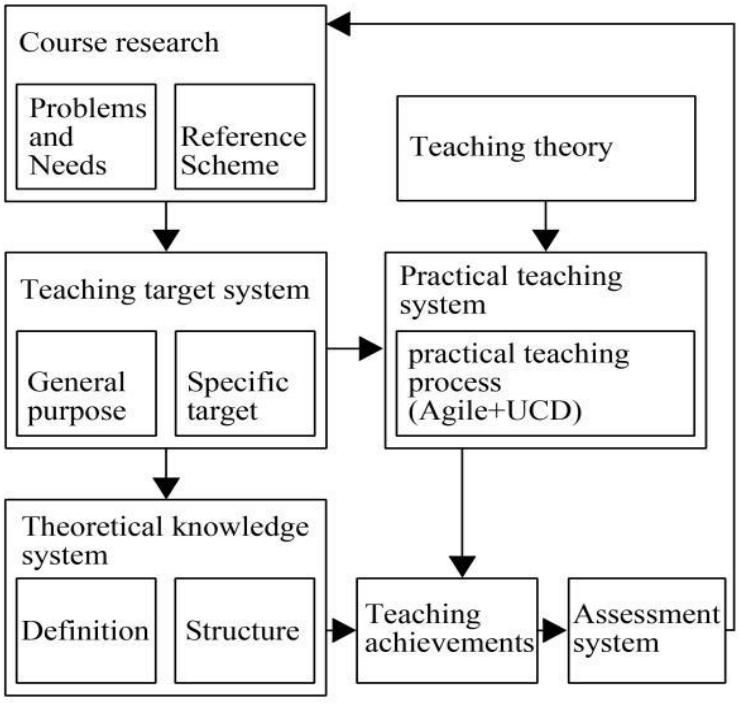


Human-computer interaction course system

Conversely, the pedagogical process centers on the concepts and perspectives of the learners. The incorporation of interactive and customized educational materials. Educators facilitate and direct the educational pursuits of pupils, allowing for the expression of their self-directed learning endeavors and fostering their imaginative capacities. The primary objective is to facilitate the constructive growth and

holistic enhancement of the students' caliber. A comprehensive design for the HCI course has been put forth, as depicted in Figure 7.

Figure 7: Human-computer interaction course system



Sampling survey Method

The selection of students from various online music education software is done randomly, without any form of grouping, categorization, or queuing. The key characteristics of the sampling process include the principle of equal probability, complete independence of sample units, and absence of correlation or exclusion among them. The fundamental underpinning of various sampling techniques is the practice of simple random sampling. Typically, this methodology is employed solely in cases where the overall variance among the units is minimal and the quantity of units is limited [29].

A sample survey of students was conducted to evaluate the efficacy of online music education software available on the "Little Leaf Music Education" internet teaching platform. Solicit feedback from students regarding the efficacy of online music education with regards to its management, instructional quality, and convenience. Comprehend the extant forms of online music education management and their limitations [30].

Participative Action Research

In contemporary times, Participatory Action Research (PAR) has emerged as the predominant methodology utilized in research pertaining to development communication. The fundamental idea underlying this approach is to recognize issues, analyze impediments, explore remedies, and attain resolutions through the enablement of individuals within the community and the aggregation of the collective wisdom of all stakeholders. Conversely, participatory action research remains a relatively new approach within the natural sciences due to its focus on research subjects that primarily involve objective laws [31, 32].

The present investigation involves the active involvement of scholars in the realm of online piano

instruction, utilizing the Internet-based educational platform known as "Lobular Music Education". As per the objectives established by the researchers [33].

Results and Discussion

Analysis of Music Education Experience Under the "Human-Computer Interaction" Model

The software "Little Leaf Music Education" that employs Human-Computer Interaction (HCI) has been chosen for the survey on the satisfaction levels of both teachers and students. The ratings provided by teachers constituted 60% of the total ratings, while the remaining 40% were contributed by students. The survey encompassed various aspects of student performance, including attendance, classroom summary assignments, and exam scores. Additionally, it gauged student satisfaction with the course schedule and the quality of the teacher's instruction. The former was evaluated by the instructor, whereas the latter was appraised by the pupils. Table 1 displays the precise scoring percentages and criteria for the complete ten-point scale.

Table 1: HCI System Curriculum Assessment criteria

Raters	Course	Content	Proportion (%)
Teachers	Attend class	Attendance	10
	Theoretical knowledge	After-class assignments	20
	Examination	Take an exam	30
Students	Course System	Course System Satisfaction	20
	Quality of teaching	Teacher satisfaction	20

Attendance

The present study has collected data from Tables 2 and 3, which pertain to a sample of 12 students who have utilized the "Little Leaf Music Education" software for online music education. The student population encompasses individuals between the ages of 5 and 14. The pianos in question are within the age range of one to five years. Approximately 41.6% of the student population possesses a piano age of one year. Approximately 16.7% of the student population falls within the age range of 4 to 5 years old, which is commonly associated with piano instruction.

Table 2: The number of students attending classes through the app in one month in 2021

Name	**Piano Age**	**Age**	**June**														
			6	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Student 1	2	7															
Student 2	1	9															
Student 3	1	8															
Student 4	1	10															
Student 5	1	14															
Student 6	3	12															
Student 7	3	13															
Student 8	5	9															
Student 9	2	5	2							2							2
Student10	3	10															
Student11	1	11															

Student12	4	10

Note: Yellow highlight part denotes class space. If there is a 2 in the yellow box, it means that there are two lessons at a time.

Table 3: The number of students attending classes through the app in one month in 2021

Name	Piano Age	Age	June													
			21	22	23	24	25	26	27	28	29	30	1	2	3	4	5
Student 1	2	7															
Student 2	1	9															
Student 3	1	8															
Student 4	1	10						2									
Student 5	1	14															
Student 6	3	12															
Student 7	3	13															
Student 8	5	9															
Student 9	2	5							2							2	
Student10	3	10															
Student11	1	11															
Student12	4	10															

Note: Yellow highlight part denotes class space. If there is a 2 in the yellow box, it means that there are two lessons at a time.

The calculation of attendance is contingent upon a minimum of eight lessons per month, with maximum credit being granted for attendance that surpasses or meets the aforementioned threshold. In the event that a student attends less than 8 lessons, they will receive a percentage of points calculated by dividing the number of lessons attended by 8 and then multiplying the result by 10. Based on the statistical data, it can be inferred that merely four pupils failed to complete eight sessions and consequently, were not granted the maximum score. All of the remaining eight individuals were awarded full marks for their attendance. Five individuals exhibited attendance of more than eight lessons. Out of the 12 individuals who were surveyed, a complete attendance rate of 66.67% was documented. Furthermore, all four pupils who did not achieve a complete attendance rate were above 60%. This finding indicates that students are receptive to online music education courses that utilize HCI.

After-class assignments

The HCI System Curriculum Assessment criteria were utilized to evaluate and classify each student's work into one of three grades: excellent (blue), average (green), and poor (red). Table 4 and Table 5 present the statistical data. The color blue is indicative of a score ranging from 7 to 10, while the color green signifies a score within the range of 4 to 6. On the other hand, the color red is representative of a score that falls between 1 and 3.

Table 4: HCI online music homework response statistics

Name	Piano Age	Age	After-class assignments （June）													
			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Student 1	2	7		7							8						
Student 2	1	9				8				6					4		
Student 3	1	8				7			4			4			3		
Student 4	1	10				4			6				4				5
Student 5	1	14				3		4					3	5			
Student 6	3	12				5		6		8	6				6		
Student 7	3	13		8			6						8				
Student 8	5	9		6	8		6	9	6		10	8	6		8	6	10
Student 9	2	5		9							6						

Student10	3	10				6	8					6	9			
Student11	1	11			5				5				3			
Student12	4	10		8	9				10				10			

Note: Judged on three levels excellent blue, average green, poor red

Table 5: HCI online music homework response statistics

Name	Piano Age	Age	After-class assignments（June）													
			21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**1**	**2**	**3**	**4**	**5**
Student 1	2	7	6							5							9
Student 2	1	9					6								3	6	
Student 3	1	8	7			6			5			5			3	5	
Student 4	1	10				6			7								
Student 5	1	14			5		6					7		5			
Student 6	3	12	9			6	8		7			7		6	7		
Student 7	3	13					7			7			6				7
Student 8	5	9	7		8		7		10	10	8		6	6	7		
Student 9	2	5	6							7							6
Student10	3	10			6	8					6	7					7
Student11	1	11					5					6				7	
Student12	4	10		8				5				8				9	

Note: Judged on three levels excellent blue, average green, poor red

The study conducted on students enrolled in the "Little Leaf Music Education" program, specifically those aged 4-5 and learning to play the piano, revealed a notable degree of competence in fulfilling their post-school assignments. HCI exhibits a high rate of guaranteed uploads, with 45.10% of the managed work demonstrating excellence. The aforementioned data suggests that the provision of HCI course support is conducive to the advancement of online music instruction.

In the context of assessing one's level of proficiency, a mock proficiency examination is a simulated test that aims to replicate the format and content of an actual proficiency examination.

The evaluation of the efficacy of online music education in the domain of HCI encompasses not only the regular appraisal of day-to-day performance and timely submission of assignments, but also the administration of simulated assessments and formal music examinations. The trajectory of daily performance and post-class assignments in music education involves a deliberate approach, whereby students engage in extensive practice of a musical piece prior to performing it, with the aim of attaining a desired level of proficiency. This presents a challenge in demonstrating the efficacy of online music instruction at HCI. The utilization of mock exams can effectively demonstrate the complete advantages of Human-Computer Interaction (HCI) in the context of online music instruction. The composite score is determined by aggregating the individual scores of Basic, Exercises, Polyphony, Music, Music Theory, and Listening. Among these, 35% pertain to fundamental skills, 25% are related to music theory, and the remaining 10% constitute other categories. The aforementioned formula, which is measured on a ten-point scale, comprises of various components including basic technique, music theory, exercises, polyphony, music, and listening. These components are weighted differently, with basic technique and music theory carrying the highest weightage of 35% and 25% respectively, while exercises, polyphony, music, and listening carry a weightage of 10% each. Table 6 displays the precise numerical values.

The data pertaining to online music teaching practice exams is derived from the field of Human-

Computer Interaction (HCI). Seventy-five percent of the total is represented by the 12 individuals who achieved and surpassed the passing score by six points. A quarter of the total scores were classified as distinction, with three of them exceeding the 9 mark. The administered mock examinations serve as empirical proof that the utilization of the Human-Computer Interaction (HCI) system in online music instruction is more favorable for facilitating at-home learning for students who experience unforeseen circumstances, as well as for providing music education to students in their homes for instructors.

Table 6: HCI online music daily mock test scores

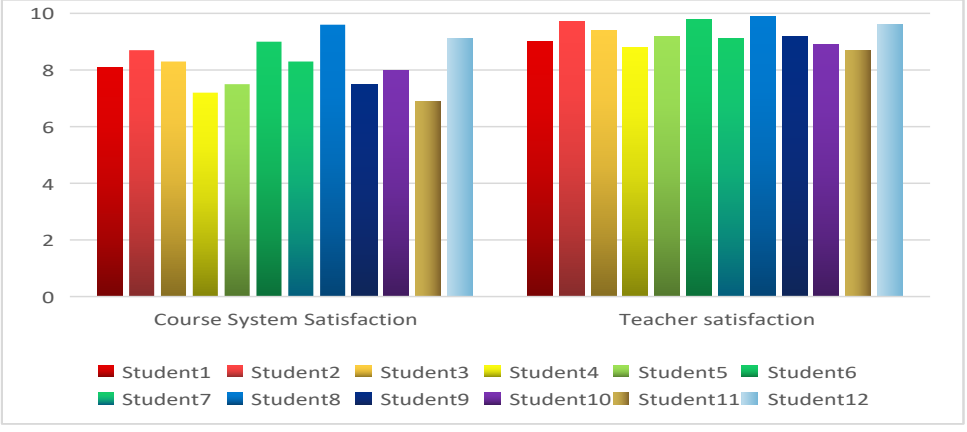
Name	Piano Age	Age	Examination results （simulation）
Student 1	2	7	5.5
Student 2	1	9	6.5
Student 3	1	8	7.0
Student 4	1	10	6.5
Student 5	1	14	5.5
Student 6	3	12	9.5
Student 7	3	13	9.0
Student 8	5	9	9.5
Student 9	2	5	7.0
Student10	3	10	8.5
Student11	1	11	4.5
Student12	4	10	8.5

Note: Ten points out of ten

Students' Attitudes Towards HCI Online Music Teaching Courses and Teachers

The student satisfaction statistics encompassed evaluations of both teachers and HCI courses. On a scale of ten points, a rating of 8-10 is considered excellent, while a rating of 5-7 is deemed fair, and a rating of 1-4 is considered poor. According to the survey results, the satisfaction rate for the Course System was 66.67% rated as excellent, 33.33% rated as fair, and 0% rated as poor. The Teacher satisfaction survey's outstanding 100% rate serves as an indirect indication that teachers are able to effectively communicate with their students through the HCI system. The utilization of teaching methods that have been approved by students can foster a closer relationship between teachers and students. Moreover, this enhances the effectiveness of the pedagogical process. The data presented in Figure 8 illustrates the aforementioned point.

Figure 8: Statistical chart of student satisfaction with the classroom and teacher satisfaction



Advantages and disadvantages of music education under "Human-computer

interaction" mode

The integration of Human-Computer Interaction (HCI) devices in online classroom instruction has the potential to enhance the resources available for teacher preparation, augment the content of teaching courses, and optimize teaching effectiveness. Moreover, it has the potential to enhance the caliber of education, proficiently incentivize pupils to acquire knowledge, and augment the process of knowledge acquisition. The model of "human-computer interaction" presents a novel pedagogical approach for students of traditional music education. However, it is not a comprehensive substitute for conventional teaching methodologies during the actual teaching and learning process. This is apparent in section 3.2.2 pertaining to after-class assignments, wherein daily tasks are turned in. Approximately 90% of the students who were not scheduled for classes on the following day were able to allocate adequate time to complete and turn in their musical assignments, leading to favorable grades for their post-class tasks. A minority of the students, specifically less than 10%, exhibited difficulties with their coursework during the subsequent class session. The aforementioned issues were not apparent in the academic output of students who did not receive classroom instruction. This implies that the academic submissions of students who did not receive classroom instruction on the following day were potentially subject to revision. The online music model in the domain of Human-Computer Interaction (HCI) is still facing certain issues. In order to mitigate the limitations of the Human-Computer Interaction (HCI) model in the realm of music education, an analysis has been conducted and the data has been synthesized within the framework of the HCI experience questionnaire as it pertains to music education.

Optimising Music Education Pathways

Expanding the Quality Education Pathway

5.1.1 Expand the quality education path

The utilization of "human-computer interaction" technology serves a multifaceted complementary function in the selection of teaching resources by educators, the educational content and activities of students, and offers an effective approach towards providing students with quality music education. The evaluation of course management in HCI online Education, specifically in the context of Little Leaf Music Education, reveals that students have acknowledged the expansion of online music education through HCI. As per the survey results, all students have expressed their agreement with the management of the HCI course. A majority of the students, specifically 66.67%, conveyed a sense of distinct acknowledgement. This provides conclusive evidence that the utilization of Human-Computer Interaction (HCI) technology in online music education serves to broaden the scope of high-quality educational opportunities.

Alleviate the Tedium of Traditional Music Learning

To effectively incorporate 'human-computer interaction' technology into music education, educators ought to steer clear of exclusively technology-based music education activities. The utilization of Human-Computer Interaction (HCI) technology in music classroom instruction presents novel avenues for educators to access pedagogical resources and for learners to acquire knowledge. Furthermore, this approach diminishes the feeling of monotony experienced by students in the music classroom. Furthermore, the capacity of the students to generate and conceptualize musical material will be significantly improved. The implementation of interactive teaching methods that resemble game mechanics is expected to mitigate the monotony associated with traditional learning approaches. Additionally, this approach is anticipated to foster collaboration among students and promote a sense of competition that can serve as a catalyst for academic achievement.As per the survey findings, all

participants acknowledged the educational qualifications and pedagogical approach of the instructors in the domain of HCI online music instruction. The mean score obtained by the 12 participants was 9 on a scale of 10. This finding provides evidence that online music instruction in the field of Human-Computer Interaction (HCI) is well-received by students, and has the potential to mitigate the tedium associated with conventional music education.

Shortcomings of Music Education in the "Human-Computer Interaction" Mode

An effective interactive course employs interactive devices that offer visually engaging learning materials. This approach can mitigate the apprehension associated with acquiring novel knowledge, alleviate the tedium of the learning process, and foster a greater sense of engagement in the learning experience. Nonetheless, through targeted teaching observations, practice activities, questionnaire analyses, and interviews with educators on the frontlines, it was determined that there exist certain pragmatic obstacles that necessitate resolution within the context of music education activities utilizing the "human-computer interaction" mode.

Students' Over-Reliance on Interactive Devices

During the course of observing music classrooms and student learning, it was discovered that the utilization of interactive devices with rich visual content facilitated a swift immersion of students into the learning environment. During the interactive gaming sessions, the students became deeply engaged in the gameplay and appeared to disregard their academic knowledge acquired in the classroom. The outcome of this phenomenon is a decrease in students' motivation due to a subsequent decline in their performance on knowledge assessment sessions. The results of the homework survey indicate that the majority of piano students who have been playing for 1-2 years are assigned homework at an intermediate level ranging from 4-6, comprising a significant proportion of 80%. Following admonishment from their educators, their performance temporarily improves before returning to its previous level. Furthermore, the assigned homework appears to be at a proficiency level of only 3. It is necessary to make adjustments to the entertainment teaching links in HCI in response to students who have been encouraged to engage with interactive devices.

Lack of Appropriate Use

The interactive device terminal system offers a plethora of educational resources. Nonetheless, this may result in instructors disregarding the pedagogical recommendations outlined in the course outline and making arbitrary decisions regarding instructional materials, ultimately resulting in straying from the intended learning outcomes. In the pedagogical process, educators who overly depend on, or inadequately employ a systematic approach to utilizing, interactive teaching tools are prone to developing a singular mode of instruction. Despite the allure of visually stimulating classroom instruction, a singular teaching approach has the potential to constrain the advancement of students' cognitive, creative, and perceptual proficiencies.

Research Limitations and Recommendations for the Future

It Is Difficult to Obtain Data on Music Education

Numerous renowned companies specializing in data analysis can be found globally. Some of the companies that are involved in market research include Gesellschaft für Konsumforschung (GFK), BLOOMBERG PROFESSIONAL(R), McKinsey American, IMS Health, Synovate, Ipsos, and Nielsen. Nevertheless, a limited number of enterprises incorporate music education statistics as a research topic. Obtaining access to data pertaining to the music industry has become increasingly challenging.

Access to Data is Limited by Time

The availability of market data pertaining to the music industry is constrained by temporal limitations. Frequently, data pertaining to the preceding year is made available in the subsequent year. Periodic data release at intervals of 2 to 3 years may be deemed necessary. Access to current market data in the music industry is highly valuable.

The HCI model has certain limitations that should be taken into consideration.

The model of "human-computer interaction" serves as an additional instructional aid and is not intended to supplant conventional pedagogical tools. The overreliance of students on interactive devices may result in a dearth of communication between educators and learners, thereby potentially engendering a perceived emotional or psychological gap between the two parties. Insufficient teacher-student communication in a music classroom may impede the cognitive skill development of students and diminish their inclination towards music education. In instances where challenging concepts arise, it is imperative for the instructor to provide elucidation, direction, and illustration, as these pedagogical approaches cannot be supplanted by the "human-computer interaction" modality of instruction.

Recommendations for the Investigation

The efficacy of utilizing interactive devices as auxiliary music teaching tools is contingent upon the real-time updating speed of the terminal system's teaching resources during instruction. It is imperative to assess whether this speed aligns with the pace at which teachers require teaching resources, and whether the level of interaction between students and the interactive device satisfies the targeted objectives of the teaching activities. Within the context of music education, utilizing the "human-computer interaction" mode, the implementation of three-dimensional and diverse interactive teaching and learning methods, specifically the "teacher-computer-student" model, can facilitate a comprehensive understanding of the dynamic between teacher-led and student-led instruction. This approach enables teachers to effectively navigate the complex relationship between themselves and their students. The correlation between pedagogical approaches that are teacher-led versus student-led, as well as the efficacy of interactive devices for instructional purposes, remain topics that require further examination and enhancement.

Conclusion

This study utilizes the Human-Computer Interaction (HCI) framework and focuses on analyzing the "Little Leaf Music Education" application as a case study. This study investigates the influence of Human-Computer Interaction (HCI) on students enrolled in online music courses. The present study provides a summary of the beneficial impacts of the Human-Computer Interaction (HCI) model on students' music learning. Additionally, the study highlights the strengths and limitations of the implementation of music education within this particular educational framework. A novel collection of online music applications pertaining to Human-Computer Interaction (HCI) is suggested and subsequently evaluated in comparison to the pre-existing HCI online music instruction software, "Little Leaf Music Education".

The investigation commences by elucidating the constituents of the system and the extent of application linked with Human-Computer Interaction (HCI) systems. The study of HCI's "Little Music Education" was conducted through the utilization of the participatory action research approach, resulting in the development of an HCI curriculum evaluation framework. This served to establish the research direction and furnish empirical evidence for the study.

The survey methodology was employed to gather data on student engagement in online Human-Computer Interaction (HCI) courses from the perspective of the students. The study involved the acquisition of

monthly course volumes, which were subsequently utilized to analyze the motivation levels of students towards attending classes. The study revealed that a majority of 66.67% out of the twelve participants who were surveyed exhibited complete attendance. Among the subset of students who were not fully enrolled, the attendance rate exceeded 60%. This finding indicates that students do not exhibit resistance towards the Human-Computer Interaction (HCI) system known as "Little Leaf Music Education".

An investigation was carried out on the extracurricular activities of the students after school hours. The research revealed that the success rate of after-school assignments was 90%. Over 80% of the entire surveyed population submitted their work on the following day. The Human-Computer Interaction (HCI) system exhibited a notable rate of assignment submissions among students. A subsequent assessment of the quality of assignments revealed a noteworthy submission rate of 90% for assignments submitted offline. The rate of assignment submission during the second course was a mere 10%. The quality of the work submitted for the second course was observed to be significantly inferior to that of the offline work submitted. The study revealed that offline submissions exhibited a higher degree of perfection owing to the ample time available for preparation and the provision of repeated recording opportunities. Additionally, the level of proficiency demonstrated in the assignments did not correspond to the students' strengths. The execution of online assignments in a live setting serves as a means of assessing the students' academic proficiency.

The study employed participatory action research to collect data on the perceptions of students regarding the caliber of instruction in the HCI music curriculum and the educators within the HCI framework. According to the data, a majority of 66.67% of the participants expressed a high level of satisfaction with the HCI music programme. One-third of the participants expressed contentment with the HCI music curriculum. The level of satisfaction expressed by the participants was at a maximum of 100%. The level of satisfaction regarding the quality of teaching provided by teachers under the HCI system was reported to be 100%.

To summarize, the Human-Computer Interaction (HCI) model of music education represents the most effective approach to implementing the concept of "teaching for understanding". The HCI terminal system offers visual narratives and gamified learning experiences to facilitate comprehension and engagement among students during instructional sessions. Furthermore, the HCI model enhances the potential for experiential music pedagogy, proficiently directs the cultivation of students' imaginative and innovative faculties, and centers on the interplay between educators and learners throughout the instructional trajectory. This study offers insights into institutional concepts and fundamental information that can be utilized in the future implementation of Human-Computer Interaction (HCI) in the context of music education that focuses on skill development and progression.

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