Research on the Reconstruction of Vocal Music Singing Course Resources and Intelligent Teaching under the Digital Background

Hongzhuang Fan

Shandong University of Technology, Zibo, 255049, Shandong, China

2399565538@qq.com

Keywords: Digitization; Vocal Singing Course; Intelligent Teaching; Personalized Learning; Intelligent Interaction

Abstract: With the development of the digital age, vocal music teaching is facing new opportunities for change. This article focuses on exploring the intelligent teaching mode of vocal music singing course under the digital background. By constructing an intelligent teaching system, it expounds in detail the modules of data collection, analysis and evaluation, personalized learning planning and intelligent interaction. With the help of the module analysis table of intelligent teaching system of vocal music singing course, the relationship and function of each module are clearly presented. It is found that the intelligent teaching mode can break through the traditional teaching restrictions, accurately analyze and evaluate students' performance in pitch, rhythm and vocal skills according to the multi-dimensional data of students' singing, and tailor the personalized learning path for students. The application of intelligent interactive technology can effectively enhance students' learning experience. This intelligent teaching mode brings new vitality to the vocal music course, improves the teaching efficiency and quality, meets the individual differences of students, and provides innovative and practical ideas for the development of vocal music teaching.

1. Introduction

With the rapid development of information technology, the digital wave is sweeping the field of education in an unprecedented situation, profoundly changing the traditional teaching mode and curriculum resource structure [1]. Vocal singing course, as an important part of art education, is also facing the urgent need and brand-new opportunities of digital transformation [2].

From a macro perspective, digital technology has brought rich and diverse teaching resources to vocal music courses. In the past, vocal music teaching resources were mostly limited to teaching materials, records and teachers' personal experience [3]. Nowadays, the vast amount of audio and video materials and virtual singing environment simulation software on the Internet have greatly expanded the material boundary of vocal music teaching [4]. At present, there are still many problems to be solved urgently in the process of digitalization of vocal music singing courses. On the one hand, although the number of curriculum resources is huge, the quality is uneven and there is a lack of systematic and targeted integration [5]. Many network resources have not been strictly screened and arranged, and it is difficult to accurately match the syllabus and students' actual learning needs, which leads students to lose their way in the massive resources and increase the learning cost. On the other hand, the traditional vocal music teaching mode is relatively backward in the face of digital impact [6]. Some teachers are not proficient in the use of digital teaching tools and means, and still rely on the traditional oral teaching method, failing to give full play to the advantages of digital technology in personalized teaching and intelligent evaluation.

In this context, it is of great practical significance to reconstruct vocal music course resources and carry out intelligent teaching research. Through resource reconstruction, we can optimize the allocation of curriculum resources, build a scientific, reasonable, hierarchical and targeted teaching resource system, and provide students with high-quality and efficient learning materials. The introduction of intelligent teaching can make the teaching process intelligent and personalized with

  DOI: 10.25236/etmhs.2025.026

the help of advanced technologies such as artificial intelligence and big data, accurately meet the learning needs of different students, and improve the teaching effect and quality. The purpose of this study is to deeply analyze the opportunities and challenges faced by vocal music singing courses under the digital background, and to explore effective strategies for curriculum resource reconstruction and the implementation path of intelligent teaching.

2. Under the background of digital vocal music course theory

Digital education relies on modern information technology and takes digital resources as the core to reshape the educational ecology. It breaks the limitation of traditional education in time and space, and realizes the extensive sharing and efficient dissemination of educational resources. Its characteristics include the mass and diversity of resources, covering text, images, audio, video and other forms; Learning autonomy and flexibility, learners can choose learning content and time as needed [7]. In the course of vocal music singing, digital education theory guides teachers to carry out teaching with the help of online platforms and multimedia courseware, providing students with rich and diverse learning materials and broadening their musical horizons. At the same time, students are supported to use fragmented time to learn independently to meet personalized learning needs.

Vocal singing teaching aims at cultivating students to master scientific vocal methods and improve artistic expression. Its basic principle is based on the physiological structure and acoustic principle of human vocal organs, emphasizing the coordination of breath use, resonance adjustment and vocal cord vibration [8]. There are various teaching methods, such as demonstration teaching method, in which teachers demonstrate correct vocal skills and singing style through their own singing; Practice method, so that students can consolidate their vocal skills through repeated practice. The teaching goal is not only to let students learn to sing songs, but also to cultivate their musical perception, emotional expression and artistic creativity. This theory points out the direction for the reconstruction of vocal music course resources and intelligent teaching under the digital background, and ensures that teaching activities focus on improving students' singing level and artistic accomplishment.

Intelligent teaching theory integrates artificial intelligence technology and educational teaching principles to build an intelligent teaching system. Through the collection and analysis of students' learning data, it can understand students' learning situation, knowledge mastery and learning style. Based on this, it provides students with personalized learning path planning, real-time feedback and intelligent counseling. In vocal music teaching, intelligent teaching system can analyze students' vocalization problems with the help of voice recognition technology and give correct suggestions in time; According to students' learning progress and ability, push suitable practice tracks and learning resources. Intelligent teaching theory provides technical support for the innovation of vocal music teaching and promotes the transformation of teaching mode from traditional unification to modern personalization.

3. Reconstruction of vocal music course resources under the background of digitalization

(1) Analysis of the current situation of curriculum resources

At present, there are many problems in the digitalization of vocal music course resources. Judging from the content of resources, there is a lag, and some textbooks and teaching materials have not been updated for many years, which is out of touch with the development of diverse musical styles and singing skills. The form of resources is relatively simple, and it is still mainly based on paper textbooks and traditional audio materials, which is difficult to meet the needs of students for diversified learning experiences. In terms of access, resources are scattered and lack of integration. Students need to search on multiple platforms, which consumes a lot of time and energy, and the quality of resources is mixed.

(2) The principle of resource reconstruction

Principle of pertinence: Course resources should closely focus on the teaching objectives of

vocal music singing and the actual needs of students. Teaching resources should be accurately allocated according to different learning stages, singing levels, and style preferences, to achieve adaptive supply and avoid blind accumulation.

Scientific principle: The content of resources should be accurate, in line with the scientific principles of vocal music singing, musical theoretical knowledge and artistic aesthetic standards, so as to ensure that students acquire correct knowledge and skills.

Systematic principle: A complete resource system should be constructed, covering the entire process from basic vocal training to advanced singing skills, from single track learning to music style research, ensuring that each part maintains a mutually related and progressive relationship.

Principle of openness: Teaching resources should be kept dynamically updated, and the content system should be improved by incorporating new singing methods, excellent works, and industry trends in a timely manner. At the same time, a mechanism for teachers and students to jointly participate in resource construction should be established to expand channels for resource acquisition.

(3) Content and strategy of resource reconstruction

This article presents the key contents of vocal music course resources in different learning stages in the form of Table 1. As can be seen from Table 1, content reconstruction pays attention to the progressiveness and pertinence of different stages. In addition to staged content, curriculum developers should also integrate all kinds of digital resources, so that students can fully understand the works.

Table 1: Key Resource Contents at Different Learning Stages of Vocal Performance Courses

Learning Stage	Key Resource Contents
Basic Introduction	Vocal Organs: Detailed explanation of the structure and function of vocal organs, accompanied by diagrams or animations
	Breathing Training: Instructional videos and practice audio for abdominal breathing and combined abdominal-thoracic breathing methods
	Sight-Singing and Ear Training: Simple musical pieces with both numbered musical notation and staff notation, accompanied by standard audio for practicing pitch and rhythm accuracy
	Error Correction: Common vocal errors such as air leakage and constriction, with video comparisons of correct and incorrect techniques, analysis of causes, and correction methods
Intermediate Advancement	Vocal Techniques: In-depth explanation of mixed voice and pharyngeal voice techniques, with demonstrations by singers and key practice points
	Song Analysis: Interpretation of classic songs from different styles, including melody, lyrics, and emotional expression, accompanied by performance versions
	Music History: Overview of the stylistic evolution during key periods of vocal music development to help students understand the creation background of songs
Advanced Refinement	Challenging Songs: Analysis of coloratura, high notes, and breath control in difficult songs, with expert commentary and explanations
	Cutting-edge methods: pay attention to cutting-edge singing methods and share research results and practical cases
	Stage Performance: Covering stage image, body language, and coordination with accompaniment, with analysis of excellent performance videos
	Professional Exchange: Compilation of interviews with singers and master class cases to broaden students' artistic horizons

Using multimedia technology to create an immersive learning environment, such as making 3D virtual vocal music classes, students can experience different singing scenes through virtual reality (VR) equipment. Curriculum developers can use animation to demonstrate the motion principle of vocal organs and visualize abstract knowledge; Develop interactive learning software, in which students can practice vocalization, and the software can feedback data such as pitch and rhythm in real time.

Course developers can establish a special platform for sharing vocal music course resources, gather high-quality resources, and set up a strict audit mechanism to ensure the quality of resources. Open source resources should be actively introduced to enrich the content of the resource library.

Teachers can encourage teachers and students to create resources together, form a good atmosphere for teaching and learning, and continuously promote the optimization and updating of curriculum resources.

4. Intelligent teaching of vocal music singing course under the digital background

Under the digital wave, the intelligent teaching of vocal music singing course injects new vitality into the traditional teaching mode, breaks through the time and space restrictions and realizes personalized teaching.

(1) The composition of intelligent teaching system

Intelligent teaching system is like a well-built teaching building, supported by several key parts. Among them, the data acquisition module is the cornerstone of the building. Through various sensors arranged in the teaching environment, it can capture the multi-dimensional data of students' voices, expressions, body movements and so on in real time. The analysis and evaluation module, like a keen tutor, uses deep learning algorithm to analyze the collected data and gives quantitative evaluation from the aspects of pitch, rhythm, vocal skills and emotional expression. This article explains in detail with the help of Table 2:

Table 2: Analysis of Intelligent Teaching System Modules for Vocal Performance Courses

Module Name	Functional Description	Data Sources	Output Results	Role in Teaching
Data Collection Module	Collects data on students' singing voices, facial expressions, body movements, etc.	Sensors such as microphones and cameras	Raw data files	Provides comprehensive materials for analysis and evaluation
Analysis and Evaluation Module	Assesses pitch accuracy, rhythm, vocal techniques, emotional expression, etc., based on deep learning algorithms	Raw data from the Data Collection Module	Quantitative evaluation reports highlighting strengths and weaknesses	Helps students understand their own level and provides a basis for teachers to adjust teaching methods
Personalized Learning Planning Module	Customizes exclusive learning paths and content based on evaluation results	Evaluation reports from the Analysis and Evaluation Module	Personalized learning plans, including practice songs, key technique training points, etc.	Meets individual differences among students and improves learning efficiency
Intelligent Interaction Module	Enables real-time human-machine interaction, providing feedback and guidance	Data from the interaction process between students and the system	Real-time voice or text feedback, demonstration audio and video	Corrects students' errors in a timely manner and enhances learning engagement

(2) Planning of personalized learning path

Relying on the evaluation of intelligent teaching system, the learning path can be tailored for each student. For students with poor intonation but strong sense of rhythm, the system gives priority to the intensive training course of intonation. For students with weak vocal skills, targeted vocal training videos are provided, with step-by-step guidance from breathing control to resonance adjustment. With the progress of students' learning, the system continuously tracks and evaluates, and dynamically adjusts the learning path to ensure that it always meets the current level and needs of students.

(3) Improve the intelligent interactive experience

Intelligent teaching pays attention to interactive experience. When the students sing, the intelligent system gives feedback in real time, just like a teacher who goes hand in hand. If the students make mistakes in pronunciation, the system will immediately give a prompt and show the demonstration audio and animation demonstration of correct pronunciation. Students can also interact with the virtual vocal music tutor and ask questions such as how to deal with a difficult phrase. The virtual tutor gives professional answers and suggestions based on database knowledge

and algorithms. This kind of intelligent interaction not only solves students' doubts, but also makes the learning process interesting and fresh, which greatly enhances students' willingness to learn actively.

5. Conclusions

With the rapid development of digital technology, this article studies the intelligent teaching of vocal music singing course under the digital background, which has far-reaching significance. Intelligent teaching system has brought comprehensive and profound changes to vocal music teaching because of its multi-module cooperative operation.

From the system structure, the data acquisition module comprehensively collects multi-dimensional data of students' singing, and the analysis and evaluation module accurately analyzes students' singing level with the help of deep learning algorithm, which provide a solid foundation for subsequent personalized learning planning and intelligent interaction. Through Table 1, the functions and connections of each module are clear at a glance, which strongly supports the scientific and systematic nature of intelligent teaching. Personalized learning path planning customizes the exclusive scheme according to the individual differences of students, pushes specific training courses and exercises for different problems such as intonation and vocal skills, and dynamically adjusts with students' learning, thus effectively meeting the unique learning needs of each student. Intelligent interactive experience greatly enhances students' initiative and interest in learning. Real-time feedback interacts with virtual tutors to solve students' doubts in the learning process in time and create an immersive learning atmosphere.

To sum up, the intelligent teaching of vocal music singing course under the digital background breaks through the limitation of traditional teaching time and space and mode, and injects new vitality into vocal music teaching. It can not only improve the quality of teaching, promote the individualized development of students, but also be an important direction for the development of vocal music teaching in the future.

References

[1] Hu Qili. The Application of Red Songs in the Vocal Music Teaching of Colleges and Universities under the Concept of Curriculum Ideological and Political Education [J]. Journal of Shanxi University of Finance and Economics, 2022, 44(S2): 221-223.

[2] Hou Yunchen. Design of a Digital Music Recording System Based on Power Spectrum Estimation Value [J]. Modern Electronics Technique, 2020, 43(10): 63-65.

[3] Gao Jie. Research on the Importance of Offering Vocal Performance Courses in the Musical Specialty of Normal Universities [J]. Sichuan Theatre, 2023, (05): 119-121.

[4] Zhai Aijing. The Reform Strategy of Vocal Music Teaching in Normal Higher Vocational Colleges [J]. Education Theory and Practice, 2024, 44(3): 61-64.

[5] Zhuang Tingting. Innovative Thinking on the Teaching System of Opera Performance Courses in Colleges and Universities from the Perspective of New Liberal Arts [J]. Sichuan Theatre, 2023(3): 120-122.

[6] Zhang Xiaoyan. Analysis on the Construction of the Nationalized Characteristic Curriculum System for the Vocal Performance Major [J]. Sichuan Theatre, 2020, (04): 177-179 + 184.

[7] Shen Xue. The Application of Digital Music Teaching Method in Erhu Teaching [J]. Journal of Shanxi University of Finance and Economics, 2021, 43(S1): 132-134.

[8] Mu Jianyun. Research on the Theory and Method of Music Auditory Training in Colleges and Universities Based on Digital Technology [J]. Light Alloy Fabrication Technology, 2020, 48(08): 74-75.