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Research on the Application of "Three-Wheel Cycle" Progressive Vocal Music Basic Training Mode under the Background of Digital Intelligence

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Abstract: Under the wave of digital intelligence technology, vocal music education has ushered in a new opportunity for reform. There are some disadvantages in traditional vocal music teaching, such as "separation between theory and practice" and "fragmentation of knowledge system", which need to be solved urgently through model innovation. This paper focuses on the reconstruction of teaching mode driven by digital intelligence technology, and puts forward a "three-wheel cycle" progressive vocal music course model. This model relies on the deep integration of online resource platform and offline training space, and builds a knowledge closed loop of "self-learning before class-intelligent interaction in class-accurate feedback after class" with the help of tools such as "vocalist" intelligent practice APP and learning pass. Through the first round of consolidating basic theory and core skills, the second round of deepening theoretical expansion and skill strengthening, and the third round of promoting project-based practice and independent inquiry, the problem of insufficient knowledge systematization of vocal music courses is systematically solved, and the traditional tendency of "emphasizing skills over theory" is promoted to provide a practical example for the digital and intelligent transformation of vocal music education.

Keywords: Number intelligence; Three rounds of circulation; Vocal music course; Mixed teaching; Model of instruction

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1. Introduction

At the moment when digital intelligence technology deeply reshapes the educational pattern, vocal music teaching is undergoing a profound transformation from the traditional "one-way teaching" mode to the innovative "intelligent collaboration" mode. There are some limitations in traditional vocal music teaching: there is no effective carrier for pre-class preparation, so it is difficult for students to grasp the foundation firmly; Interaction in class depends on teachers' personal experience, and the accuracy is insufficient. After-class training cannot get timely feedback, and skills improvement is limited.

However, the emergence of intelligent tools has broken the time and space barriers and created conditions for personalized teaching. The "three-wheel cycle" progressive curriculum model is characterized by "online + offline" mixed teaching. With the help of mathematical intelligence tools, the links before, during and after class are closely connected in series, and a complete teaching closed loop is constructed. This model not only adheres to the core characteristics of vocal

music teaching that emphasizes practice, but also improves the systematicness and efficiency of teaching by technical means, which opens up a new direction for the intelligent reform of vocal music courses.

2. The core framework of the "three-wheel cycle" progressive vocal music curriculum model

The "three-wheel cycle" progressive curriculum model is supported by digital intelligence tools, and a mixed teaching system of "online resource platform + offline training space" is constructed. The three stages are closely connected, forming a complete closed loop of "input-internalization-output".

2.1. Stage objectives and logical association

The first round focuses on "Introduction to Basic Cognition and Skills", aiming to help learners build a systematic theoretical framework of vocal music and master the basic norms of core skills such as breathing and vocalization. With the help of structured learning of online courses and intelligent vocal practice APP, abstract concepts such as "breath control" and "resonance position" are transformed into perceptual audio data and action guidance. The second round is devoted to "deepening the integration of theory and skills".

Through intelligent interaction and group training in class, the scattered knowledge points in the basic stage are connected in series to solve the problem of "knowing what it is but not knowing why", such as analyzing the resonance differences of different singing methods by combining acoustic principles. The third round takes "practical innovation and ability transformation" as the core, and guides learners to use digital intelligence tools to complete personalized works creation or performance through project-driven tasks, so as to realize the internalization and transfer of knowledge.

The three stages do not exist in isolation, but in a spiral cycle, the first round of learning provides the cognitive basis for the second round, the second round of deepening practice accumulates experience for the third round of innovative application, and the problems found in the third round guide the targeted reinforcement of the first two rounds in the opposite direction, forming a dynamic adjustment mechanism of "detection-feedback-optimization" [1].

2.2. The integration and application of digital intelligence tools

In the process of model construction, the choice and application of mathematical intelligence tools should conform to the characteristics of vocal music. Online resource platform integrates structured course video, music theory question bank and classic case base. Learners can preview and review according to the progress through platforms such as Learning Link, and the system automatically records the learning trajectory and generates weak point analysis. Professional APPs such as "Vocalist" and "Open Voice Practice" focus on skill training, and feedback data such as pitch deviation and breath stability in real time through audio analysis technology. For example, if there is "excessive tension of laryngeal muscles" during vocal practice, the app will simultaneously prompt relaxation methods and push targeted exercises [2].

The off-line training space is equipped with intelligent recording equipment and interactive teaching system. During the class, you can use tools such as Deepseek to instantly retrieve materials of acoustic principles to help explain. After class, you can show the training results from the media through video numbers and WeChat official account, forming a full chain record of "learning-practicing-exhibition". The integration of these tools is not a simple technical pile-up, but serves the teaching goal of "concretization of theory, digitization of skills, and immediacy of feedback", making digital intelligence truly a booster for ability training [3].

3. The first cycle: the foundation of basic theory and core skills

The core of the first cycle is to build a "theory-skill" double-base framework, and realize "standardized cognition and

accurate introduction" with the help of mathematical intelligence tools, laying a solid foundation for subsequent learning.

3.1. The systematic design of online autonomous learning

Colleges and universities can build modular online courses based on learning platforms, and disassemble the basic theory of vocal music into sub-modules, such as the basis of music theory, the principle of vocalization and auditory training. Each module includes micro-videos, graphic handouts and interactive exercises. For example, in the module of "Vocalization Principle", the linkage between vocal cord vibration and resonance cavity is demonstrated by animation, and with the "vocal cord relaxation exercise" of "Vocal Musician" APP, learners can verify the vocal cord state during abdominal breathing through the APP immediately after watching the video, and the system will automatically compare the standard waveform, mark the problems such as "insufficient breath support" and push the corrected video.

In order to avoid fragmentation of autonomous learning, the platform can set up "learning path navigation" and recommend personalized learning order according to the initial test results of learners. If the test shows "poor pitch recognition", give priority to the "hearing training" module and the "pitch correction game" of the APP, and enhance learning interest through gamification design. The progress and data of online learning are synchronized to the teacher's side, and teachers can grasp the common problems such as "most learners have a vague understanding of the concept of' mixed voice singing'" through the background, so as to find the key points for teaching in class [4].

3.2. Introduction to the precision of offline training

Offline training focuses on the standardized training of core skills, and realizes "immediate feedback and immediate correction" with the help of intelligent recording equipment and interactive system. For example, in the "breathing training", after the learner completes a slow breathing practice, the system will automatically generate an analysis report on the duration and smoothness of breathing, and the teacher will explain the "relationship between diaphragm force and breath stability" in combination with the report, and retrieve relevant anatomical data for auxiliary explanation through Deepseek.

When practicing in groups, learners use APP to record each other's vocal exercises, and after uploading to the platform, they can get the "skill radar map" generated by AI, which can visually display the scores of dimensions such as pitch, rhythm and breath. The group can discuss about "how to improve breath stability", and the teacher will focus on the common shortcomings in the radar map. This mode of "data feedback + targeted guidance" can effectively avoid the ambiguity of "evaluation by feeling" in traditional teaching, and let beginners quickly master the skill specification [5].

4. The second cycle: the deep expansion of theory and the strengthening of skills

The second cycle aims to break the bottleneck of "theory suspension and skill machinery", promote "knowing what it is and knowing why it is" by means of digital intelligence, and realize the deep support of theory to skills.

4.1. The deepening design of intelligent interaction in class

In-class teaching can adopt the mode of "problem-driven + tool-assisted" and explore questions around the setting of "how theory guides skill optimization". For example, in the teaching of "resonance control", first let learners try to sing the same phrase with different resonance cavities and record the comparison with recording equipment; Then, the spectrogram is extracted by audio analysis software to show the frequency difference between "head cavity resonance" and "chest resonance", and the "overtone characteristics corresponding to different resonances" is explained by combining the acoustic research data queried by Deepseek.

In the interactive session, the offline teaching system can be used to carry out the activity of "skills breakthrough": the system randomly plays audio clips of different singing methods, and learners need to judge the use of the resonant cavity through the "spectrum analysis" function of APP, and explain the basis in the group. Teachers view the analysis results

of each group in real time through the background, and explain the typical mistakes such as "confusing the resonance between nasopharyngeal cavity and oral cavity" in a targeted way, combining with the demonstration videos in the online resource library, so that theoretical knowledge can be naturally integrated into the skill analysis process [6].

4.2. Scenario training of offline skill integration

In order to strengthen the comprehensive application of skills, offline training can design "situational tasks", such as "choosing a suitable singing method for a melody and explaining the reasons". Learners need to use the "Musician" APP to simulate the effects of different singing methods in combination with the theory of "applicable scenes of different singing methods" in online courses, and upload them to the platform after recording, with a text explanation of "selection basis". Other learners can leave messages on the platform for discussion, while teachers will comment from two aspects: "theoretical application" and "skill performance", and the comment data will be automatically incorporated into personal learning files.

This kind of training breaks the split state of "theory is only emphasized in theory class and skill is only practiced in skill class", and the two are closely bound by mathematical intelligence tools, so that learners can gradually form the thinking habit of "guiding practice with theory and feeding back understanding from practice". For example, when learners compare "the resonance difference between Bel Canto and folk singing", they will naturally review the resonance cavity theory learned in the first round and realize the active transfer of knowledge [7].

5. The third cycle: project-based practice and independent exploration and innovation

The third cycle aims at "application promotes internalization", and promotes the transformation from "theory-skill" to "ability-accomplishment" through project practice and achievement display, which embodies the ultimate value of digital intelligent teaching.

5.1. Independent inquiry design of project practice

Colleges and universities can design projects and tasks such as "individual works creation" and "small vocal performance" to encourage learners to combine the previous two rounds of theory and skills accumulation and choose their own themes and forms. For example, when creating "Vocal Music Fragments on Campus Life Theme", learners need to use the musical form knowledge learned in online courses to conceive melodies, polish the singing details repeatedly through the "Musician" APP, inquire about "Emotional Expression Skills of Campus Theme Works" with the help of Deepseek, and record the "Theory Application Log" during the creation process and upload it to the platform to form a process file.

During the implementation of the project, the platform provides a "collaborative space" and supports the division of labor among groups, some people are responsible for melody creation, while others focus on singing performance. By sharing documents in real time to synchronize progress, teachers can track the completion quality of each link through background data, and timely push related resources such as "harmony configuration" and "emotional processing". This kind of independent inquiry is not completely laissez-faire, but through the "invisible guidance" of mathematical intelligence tools, so that learners can deepen their understanding of knowledge in solving practical problems [8].

5.2. The results of the display and feedback of the whole chain closed loop

The results of the project can be displayed from media such as video number and WeChat official account, forming a complete closed loop of "creation-display-evaluation". After the learners upload their works, the platform will automatically count the data such as broadcast volume and interactive comments, and generate an "achievement analysis report" combining teacher evaluation and peer evaluation, pointing out the advantages and disadvantages of the dimensions such as "theoretical application innovation" and "skill performance stability".

For example, a learner's work is well received because of the high degree of agreement between emotional expression and melody style, and the report will be related to the theoretical knowledge point of "singing and emotional matching" in

the second round of circulation, suggesting that he can further explore "emotional processing skills of works with different styles"; If the work has the problem of "unstable rhythm", the "rhythm training" module of the first cycle and the "beat correction exercise" of APP will be automatically pushed to realize the precise connection of "achievement feedback-problem location-resource push".

6. The construction of digital intelligence guarantee mechanism

6.1. Resource dynamic updating mechanism

Online course resources need to establish a "quarterly update" system, combine the development of vocal music discipline and learners' feedback, and supplement the contents of "research on new singing methods" and "progress of intelligent vocal practice technology"; The training libraries of apps such as "Musician" need to update the practice tracks and evaluation criteria regularly to keep pace with industry practice. Colleges and universities can unite vocal music teachers and technicians to form a resource renewal team to ensure the professionalism and timeliness of the content.

6.2. Teachers' mathematical literacy cultivation mechanism

Through "special training + practical discussion", teachers' ability to apply mathematical intelligence is improved. The training contents include learning the data analysis function of general platforms and the teaching application of audio processing software, etc. At the same time, regular "cases sharing sessions on mathematical intelligence teaching" are held to exchange practical experience such as "how to explain resonance principle with spectrum diagram", so as to promote teachers' transformation from "knowledge imparting" to "technology integration guide" [9].

6.3. Multi-evaluation system construction

The evaluation needs to break through the limitation of "single skill assessment", and construct a multi-dimensional evaluation model combining online learning data, such as module completion rate and APP practice score, offline training performance such as skill radar chart and group discussion contribution and project achievements, such as work innovation and theoretical application depth. The evaluation results are presented in the form of "ability growth curve", which allows learners to intuitively see the progress track of dimensions such as "mastery of music theory" and "skill proficiency" [10].

7. Conclusion

Under the background of digital intelligence, the "three-wheel cycle" progressive vocal music course model is designed with the spiral design of "foundation-deepening integration-innovative application", which integrates digital intelligence tools into the whole teaching process. It solves the problems of fragmentation of traditional teaching theory and lagging skill feedback, and also retains the essence of vocal music education's artistic perception and emotional expression. The core of this model is to integrate "online + offline" and "data + experience" and build a closed loop of "learning-practice-application-evaluation" to help learners improve their theory and skills. In the future, the development of digital intelligence technology can explore new scenes such as "meta-cosmic training space", but we should stick to the initial intention of "technology serving education", so that vocal music education can not only keep pace with the times in digital intelligence, but also keep the core of art education and cultivate compound talents with theoretical depth, skill precision and artistic temperature.

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