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# Influencing Factors and Modeling Methods of Vocal Music Teaching Quality Supported by Artificial Intelligence Technology

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## ABSTRACT

In order to explore the maturity of online concerts and the digital content of music resources, this article analyzes the role of artificial intelligence in music education, discusses the application of artificial intelligence in music education and the development trend of artificial intelligence in education, and studies the quality of vocal music teaching based on artificial intelligence technology. In this paper, ARM and SA algorithms, as well as internal and external probability algorithms, are combined for research and analysis. Through this study, the authors show that human intelligence skills have a certain impact on vocal music teaching, with an impact rate of 56.42%. It can be seen that artificial intelligence can directly optimize the level of music teachers and promote the improvement of teachers' teaching quality and efficiency. This article improves the effective understanding of artificial intelligence in music education and strengthens the scientific and rational application of artificial intelligence in education.

## KEYWORDS

Artificial Intelligence, Digital Content, Music Education, Vocal Music Teaching

In recent years, breakthroughs in artificial intelligence (AI) technology have brought intelligent, humanized electronic musical instruments to the music world. Not only can these instruments store a variety of instrumental tones, but they can also effectively program these tones so that they can be played in an orderly manner according to instructions. These features are not possible with traditional musical instruments. As a result, music educators have begun to introduce these intelligent electronic instruments into the music teaching classroom, instructing students to learn and use this new type of instrument. This development has made it possible for musical pieces that previously required the participation of several people to be performed by only one person. This situation provides a completely new teaching model for music education, in which students can create their own compositions in the classroom and compose them by collecting the sounds of various instruments and then perform them live.

This capability greatly facilitates students' ability to participate in music practice, further improving the quality of music teaching and achieving more desirable results. For example, in recent

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years many electronic musical instrument manufacturers have introduced various forms of intelligent pianos. Simply by activating a switch, a user enables the piano to automatically play a variety of techniques and instrumental tones according to a preset program. This new type of musical function replaces the traditional manual mode, and a series of intelligent and humanized music programming functions also replace the previous complex and cumbersome operation.

As these intelligent musical instruments have made great strides in music quality and programming, they have been widely introduced into music teaching in colleges and universities as well as primary and secondary schools for scenarios such as traditional group piano lessons and music theory teaching. AI is a new science and skill that simulates, develops, extends, and finally applies machines or software to different fields by studying human intellect.With the rapid expansion of interest in music by people in all walks of life, the demand for applied music has become more extensive and urgent. The diversity of music demands has given rise to a diversity of musical creation. The traditional method of composing music manually can produce excellent works, but it has limitations in meeting the greater demand and providing wider adaptability. If the automatic production of music works through computers can be realized to some extent, its practical value is self-evident. Sterne and Razlogova (2019) proposed a contextualized machine learning and aesthetic approach using LANDR, an online platform that provides automatic music mastery, and promoted its use of supervised machine learning called AI. Machine learning will increasingly become a component of sound and image processing, shaping the sound, appearance, and feel of our culture. Musical AI analyzes human music intellect through big data, simulates the processes of human seeing, listening, touching, feeling, thinking, and reasoning, composes its own neural network and algorithm generation, and finally applies it to human perception, cognition, and study and to the creation of music, and invents a new music teaching mode of "man–machine communication."

In music teaching, the scientific, objective, and quantitative evaluation of teaching results is of great benefit for improving students' level of musical skill, educators' own teaching strategies, and their level of teaching skill. However, it is difficult to make an objective, fair, and effective evaluation of the performance results if we rely only on the subjective consciousness of the evaluators. This is because even though subjective evaluation has various advantages, its requirements for the evaluators' quality are too high; evaluators' judgment is also affected by the evaluators' physical state and emotional fluctuations, and it is difficult to give accurate and quantitative indicators; thus there can be very little direct improvement of the skills of the evaluators. In theory, we can use temporal wavelet scattering feature extraction to extract the properties of sound signals, use support vector machines (SVMs) to classify them, and distinguish the types of makams. In the research of Kayis et al. (2021), the AI method for feature extraction using SVM and temporal wavelet scattering was studied on eight different types of makams. A music information retrieval system was created by using a graphics processing unit (GPU) accelerator for feature extraction.

In the process of music teaching, reasonable use of AI technology can enable students to better understand and create music. Applying multimedia to music classes can stimulate not only stimulate students' interest in learning, but also their enthusiasm for learning. At the same time, it can broaden their horizons. As the saying goes, "Interest is the best teacher." To have a genuine interest in learning something can improve learning efficiency. Using multimedia technology to cultivate students' interest has a positive effect. The specific images of music knowledge content will bring visual impact to students, thereby triggering their curiosity. Second, multimedia technology can also enrich classroom content, improve teaching quality, and achieve the goal of an efficient classroom. Finally, multimedia technology relieves the monotony of traditional music teaching models, making classroom content more intuitive and vivid. At the same time, it reduces the pressure on teachers to teach, and students learn more easily.

Through automatic language and language sense recognition skill. Robots, like music teachers at home, combine children's living habits, accompany their daily lives with particular pitches and rhythms, and gradually inject them into basic music theory teaching. Using music AI combined with

the internet, robots are like a huge music library. Traditionally, searching for music on the internet usually uses keywords. Most teachers and students are not familiar with this kind of electronic musical instrument, and more schools still adhere to the traditional teaching mode and have not introduced this kind of electronic keyboard musical instrument. Thus, the application of AI in music teaching is still in the experimental stage, but it is clear that AI has great potential and room for expansion in the field of music education.

This research proposes a method based on the advanced RISC machines (ARM) processor and simulated annealing (SA) algorithm to address the challenge of evaluating the impact of music instruction and provide more specific and quantitative recommendations to assessors. This work is innovative as it incorporates numerous data analyses and simulation charts to provide justification in research on vocal music instruction. A vocal music teaching model that combines the ARM and SA algorithms was developed to offer direction for researching the elements influencing the caliber of vocal music instruction. The purpose of this essay is to reinforce the scientific and reasonable application of AI in education and to enhance the effective understanding of AI in music education.

## RELATED WORK

AI first appeared in the field of music education in the 1960s. At first, people applied intelligent skill to keyboard instruments and developed electronic keyboard instruments and electronic synthesizers, such as the electronic organ and the keyboard electronic synthesizer. This kind of musical instrument has some intelligent functions and can simulate the timbre of other musical instruments, store fixed melodies and rhythms, and operate simply and quickly. Aiming at the problem of automatic music generation in the field of computer music, this paper proposes a study method of modeling, analyzing, generating, and fusing the basic elements of music relations separately, which is based on the formalization of music rhythm itself. From a scientific point of view, there are many ways for people to acquire knowledge, and the speed of acceptance varies. In past teaching methods, students could only memorize knowledge by hearing, but in multimedia teaching, students can acquire knowledge more quickly and efficiently. In addition, the application of multimedia can also correct and adjust problems in the teaching course. In the past, teachers could only demonstrate and correct students face to face.

In the study, the application of AI to the field of education can indeed bring many benefits, but it will also bring many unprecedented challenges (Xue et al., 2021). Large technology companies such as Apple, Google, and Amazon are also strengthening their music service platforms. In addition, AI speakers such as Amazon Echo are increasingly popular, providing listeners with a new and accessible way to listen to music. Nam et al. (2018) conducted a study a computer's ability to distinguish between rock music and Bach's music on the basis of audio-based music classification and deep learning of labeling. Some real characters, such as those of symbolic logic, are used only to promote reasoning. Leibniz proposed that hieroglyphics, Chinese characters, and astronomical and chemical symbols are not real. Through internet research, Zhang (2020) collected 345 questionnaires using AI from experienced music creators in China. The validation of hypotheses identified the decisive factors influencing the acceptance of AI music by Chinese users. The innovation of this study was that it attempted to verify the applicability of UTAUT (Unified Theory of Acceptance and Use of Technology) in the Chinese context. The purpose of this study of AI was to contribute to a better learning environment for students by observing their learning activities. A distributed cognitive theory was proposed. According to this theory, distribution is the nature of cognition, which can occur not only in our mind, but also in the course of communication between people and tools. According to the distributed cognitive theory, cognition can occur in the transmission and transfer between internal representations (such as individual ideas) and external representations (such as information and knowledge represented by computer or paper). In order to overcome the shortcomings of traditional education, this paper constructed a system based on AI algorithms and oral spectrum algorithms.

In addition, in a study concerning practical needs, Qianjing and Lin (2021) proposed endpoint detection and judgment criteria based on spectral entropy information, established a mathematical model for knowledge forgetting, and obtained an intelligent memory algorithm to guide students in personalized learning. This theory is regarded as the beginning of connectionism. Later, as the pioneer of the man-made neural network school, they further mathematized the logic calculation of neural network and regarded neural network as a kind of high-level statistical regression. Wenzhou established the strategic position of applied talents in vocal music training in ERP (Enterprise Resource Planning). This established a practical platform for experimentation and practice for students majoring in vocal music training to improve their application abilities. The practical exploration of the cultivation mode of applied talents in the vocal music specialty was proposed. Ng et al. (2022) adopted a mixed research approach using learning satisfaction surveys, teacher observation, and semi-structured interviews. It was found that this strategy can effectively motivate students to learn music and improve their musical knowledge. The study provided evidence of an improvement in student satisfaction and knowledge acquisition during the production process of Shubailan's music through the implementation of an online flipped classroom approach, and provided suggestions for online music educators.

Since then, the era of theoretical study of man-made neuroscience has begun. A man-made neural network is a mathematical model imitating a biological neural network that can be used to simulate the structure and function of the human nervous system. A man-made neural network is an intelligent organization with its own knowledge and organization. It uses a large number of man-made neurons to calculate; each "neuron" represents a particular output function, and then a large number of "neurons" are connected to form a network.

## STUDY AND ANALYSIS OF AI SKILL AND VOCAL MUSIC TEACHING

### Study on ARM and SA Algorithms and Analysis of AI

The SA algorithm is a global optimization algorithm that searches on the basis of the principle of SA. It allows accepting a certain probability of inferior solutions during the search process by simulating the temperature change process during the annealing of metallic substances, gradually reduces the probability of accepting inferior solutions as the temperature decreases, and finally achieves the global optimal solution. The SA algorithm is characterized by avoiding falling into local optimal solutions; it is adaptive and applicable to nonlinear and nonconvex problems. It is widely used in optimization problems in various fields, such as engineering design, image processing, pattern recognition, etc., providing an effective method for solving complex problems. The SA algorithm has the advantages of global optimization, adaptivity, and speed.

The researchers created a teaching music keyboard. An ordinary ARM processor, USB interface circuit, and keyboard scanning circuit were embedded inside the keyboard. The ARM courser was responsible for receiving, coursing, and converting the key information of the keyboard and then sending the key information to the computer through the USB interface for further coursing. The voice was completely realized by the MIDI (Musical Instrument Digital Interface) device of the computer system. In this way, the system could record, course, and transmit the key information played by students on the teaching keyboard, and then the computer would produce the performance effect and record the performance result. Finally, the performance result evaluation module of the system would give the evaluation and suggestions for this performance result.

Intelligent music software can enlighten students' creation, enrich their imagination, and improve their creativity. In universities, intelligent music software can assist students in music creation and improve their skill level in intelligent software operation. Regardless of the subject of the music class, students can gain a more detailed and in-depth understanding of the content taught by the teacher through this music software and learn to master the characteristics and functions of various

music elements; Second, relying on this advanced music software, students can experience musical perception and truly feel the charm of various music elements; Finally, teachers can also use this music software to play with students and listen to students' performances to improve the effective understanding of each student's music learning. For example, in the music class, the teacher can play a question first and then ask the students to play an answer, or the teacher can play a piece of music first and then ask the students to repeat it or ask the students to improvise. The performance result evaluation module of the intelligent music software will provide an assessment of the user's performance based on various factors such as accuracy, timing, and expression. The system may also give advice on areas for improvement based on the user's performance, such as suggesting additional practice or focusing on specific techniques.

Teaching aids in music education, whether hardware or software, are becoming more and more intelligent and diversified, but at the same time, new requirements have emerged for modern music teachers, that is, the improvement of AI literacy. In this era of the rapid expansion of AI, the traditional music education mode can no longer meet the requirements of modern education, so modern music teachers should change their teaching concepts, actively learn and use intelligent music software, and improve their ability to operate intelligent software (Jarraya & Jarraya, 2019). Musical instruments and other related music materials or supplies need to be used in the schoolroom. Therefore, considering that the use environment is generally good and there is no strong interference, the matrix circuit can normally use a high-resistance circuit. Therefore, a corresponding model diagram is established to analyze, as shown in Figure 1, Figure 2 and Figure 3.

According to the normal operation mode of the matrix circuit, the related analysis shows that music AI + database + music teaching and application + social communication is a new music ecology, as shown in Figure 1.

Using AI teaching to develop models to inspire new ideas for AI teaching and learning applications for intelligent expansion of education, as shown in Figure 2.

In the era of artificial intelligence, the theoretical basis for teaching reform is expanding, prompting the need for technical education reform and driving continuous transformation and upgrading of teaching practices. Therefore, the corresponding model diagram is established to analyze, as shown in Figure 3.

**Figure 1. Music Teaching and Application Communication Ecology**

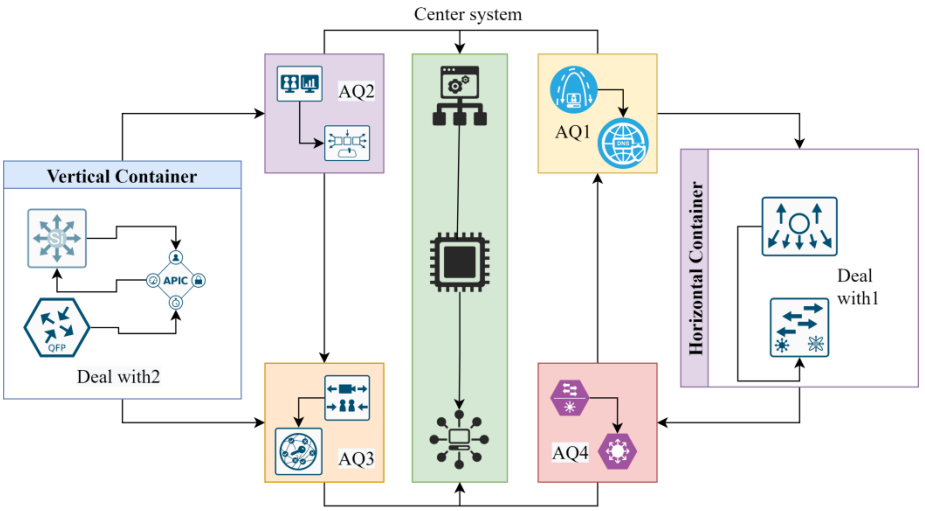


**Figure 2. Intelligent Extension of AI Teaching**

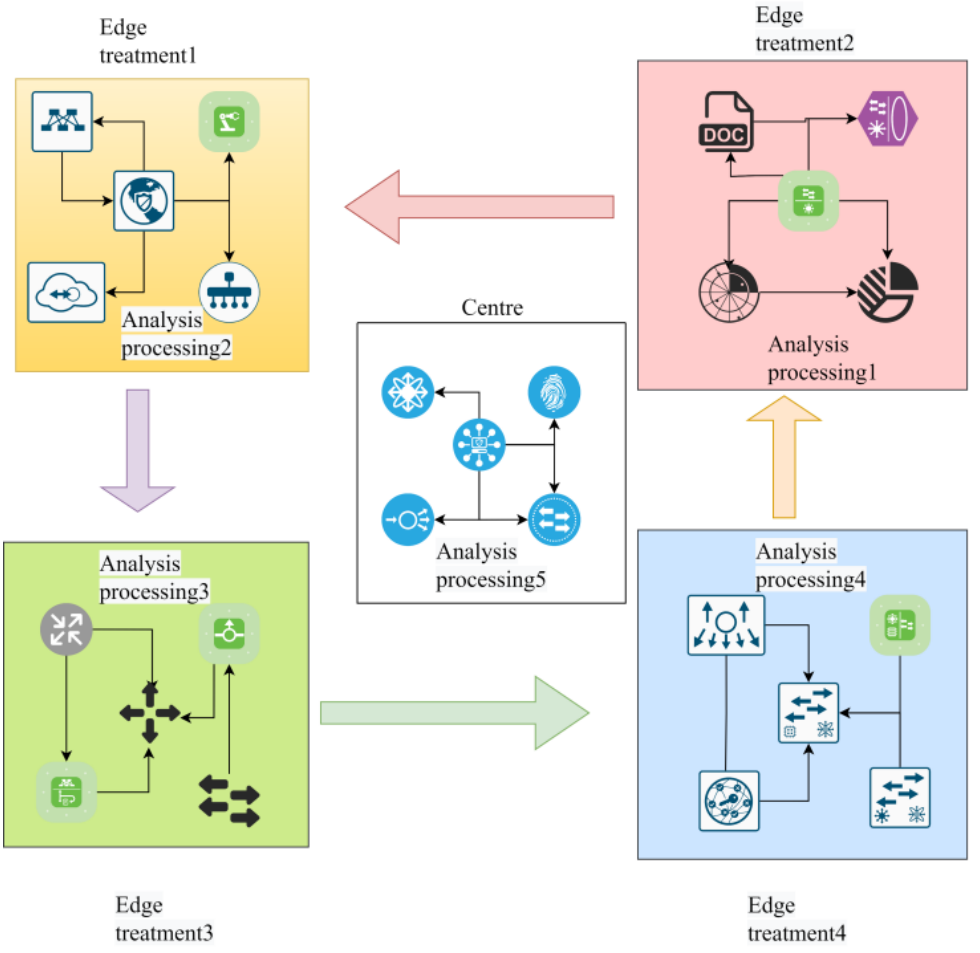
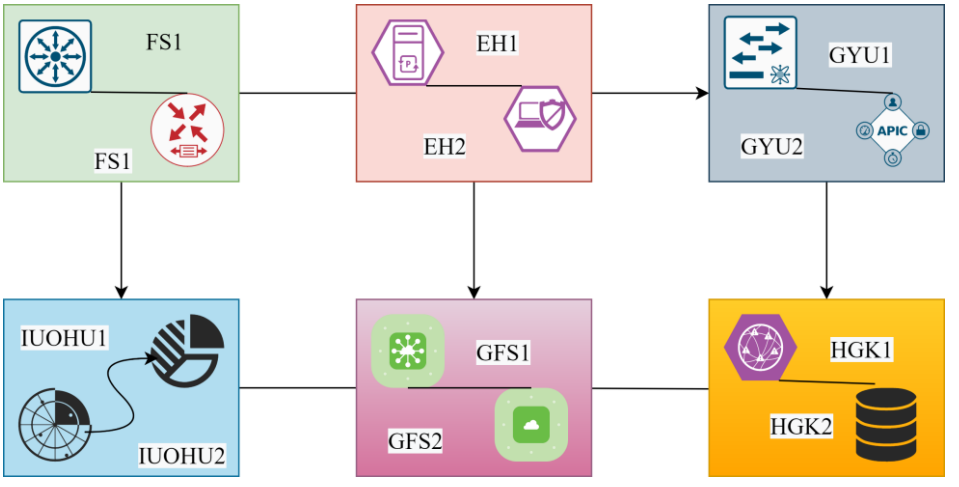



**Figure 3. Theoretical Model of Teaching Reform**



In the study, the SA algorithm was used to find the global optimal solution, and the convergence speed was high. The standard songs were divided into several key groups according to the music score, and each group is shown in formula (1).

$$f = \left[ \sum \left( \left| x - 1 \right| \left| \frac{T_{real} - T_{stl}}{T_{stl}} \right| \right) + \sum \left| \frac{T_{real}}{avg(T_{st})} \right| \right] \tag{1}$$

In which $x \in \{0,1\}$, $x = 1$ and mean that the whole result is correctly appraised by SA as shown in formula (2).

$$F = \min \sum f \tag{2}$$

When applying the SA algorithm to generate new solutions, the constraint conditions that should be met are shown in formula (3).

$$a_1 = \frac{\sum T_{sl}}{\sum T_{real}} \in (1,0) \tag{3}$$

In the study, for the sake of clarity and ease of interpretation, it is introduced as depicted in formula (4).

$$\mathrm{p} = \frac{\mathrm{T}_{\mathrm{real}}}{\mathrm{T}_{\mathrm{stl}}} \in (1,\delta) \tag{4}$$

Without losing generality, it is assumed that the $i$ key before the i-1 actual key has been judged. When the $\mathrm{p} \in (1,0)$ key is the primary key, it will enter the next round and wait for further evaluation. When the $p < 1 - \delta$ key is the key, it will be shown in formula (5), (6).

$$a \in (1,0) = \beta = \sum \frac{T_{real}}{T_{stl}} > 1 \tag{5}$$

$$a < 1 - \delta = \left\{ \beta = \sum \frac{\mathrm{T}_{\mathrm{real}}}{Tstl} < 1 \right. \tag{6}$$

The rapid development of AI technology not only affects society and people's lives and production modes, but also has a profound impact on the development of education. In the future, teaching will be AI driven, and the overall expansion model of teaching will be innovated and changed. AI technology will be widely used in the field of teaching. Schools and classrooms will be fully integrated with AI. The teaching mode of the new era will develop toward networking, digitalization, and personalization (Fu, 2020). Applied music teaching is ubiquitous in music education. It is formal, informal, and institutional. In a non-institutional environment, where teaching is targeted at different student groups, there are significant differences in their interests and motivations (Schmidt, 2021). The exponential expansion of AI will cover teaching, medical treatment, the economy, law, and human–computer relations. Teaching AI is a new field formed by the intersection of AI and *the science of education*. It makes the teaching environment flexible and personalized through AI technology. It is necessary

to use scientific and technological means to dynamically understand students' knowledge efficiency, knowledge progress, knowledge content, etc., to make teaching more convenient at different times and places, to pay attention to each student's knowledge status, and to promote teaching fairness. In the process of research, this paper establishes corresponding data tables for analysis and interpretation, such as Table 1, Table 2, and Table 3.

There are many elements involved in music, the most important of which are rhythm, melody, and harmony. All the elements in the course of music are defined by these three elements or some of them. The study of music theory shows that rhythm has the strongest promoting effect on music, and rhythm is relatively independent. Combined with the new music recognition skill in music AI skill, this skill makes teaching communication interesting and can provide answers, scores, and knowledge suggestions at any time, with high efficiency and low cost. Varner (2020) emphasized the relationship between ordinary music and social and emotional learning. Social and emotional learning involves a range of social, emotional, behavioral, and personality abilities that are critical to success in school, the workplace, interpersonal relationships, communities, and life. An important question is how to ensure the stability, security, advancement, and usability of the knowledge platform, and how to ensure the accuracy, teaching rationality, continuity, and authority of music professional knowledge in the platform. Vasil (2019) integrated pop and informal music learning practices into the practices and perspectives of music teachers in high school music courses. This gave teachers a model for becoming more reform conscious, marking a shift in professional identity with the movement from a teacher-centered, autocratic mindset to a student-centered, democratic music teaching method. A knowledge-based system builds a knowledge base in a field by combining the knowledge of experts in many fields. This system uses symbols and rules and constraints to describe knowledge.

**Table 1. Data of AI Skill Types**

| Type | Data | Proportion |
|---|---|---|
| Neural network | 65.53 | 48.77% |
| Decision tree | 24.25 | 83.83% |
| Fuzzy algorithm | 47.26 | 35.74% |

**Table 2. Vocal Music Teaching Module Test and Analysis**

| Module | Frequency | Number of successes | Number of failures | Success rate |
|---|---|---|---|---|
| Systems management | 28 | 28 | 0 | 100% |
| Quality evaluation | 28 | 26 | 2 | 96% |
| Resource management | 28 | 28 | 0 | 100% |
| Enquire | 28 | 24 | 4 | 94% |

**Table 3 .Average Random Study of Vocal Order Matrix**

| Order | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| RT | 0.02 | 0.02 | 0.51 | 0.92 |
| GT | 0.00 | 0.009 | 0.49 | 0.87 |
| ET | 0.01 | 0.01 | 0.50 | 0.86 |

*Note.* Research on internal and external probability algorithms and music based on AI.

The probability value of generating formula $P(A \to \lambda)$ for context-free method $A \to \lambda$ is shown in formula (7).

$$\sum_{a} P(A \to \lambda) = 1 \tag{7}$$

The rules of probabilistic context-free grammar are shown in formula (8).

$$A \to \lambda P(A \to \lambda) \tag{8}$$

From rule $A \to \lambda$, the probability of the occurrence of $\omega$ % is the internal probability, and abbreviated $\alpha({}^{j}{}_{i}A)$ as shown in formula (9).

$$\alpha({}^{j}{}_{i}A) = P(A \to \omega_i), i = j \tag{9}$$

Starting from rule $A \to \lambda$, the context probability of generating $\omega_i$ is external probability, abbreviated as $\beta({}^{j}{}_{i}A)$, as shown in formulas (10) and (11).

$$\beta({}^{j}{}_{i}A) = 1, i = 1, j = n, A = S \tag{10}$$

$$\beta({}^{j}{}_{i}A) = 0, i = 1, j = n, A \neq S \tag{11}$$

$j$ is from 1 to $n$, and $i$ is from 1 to $n - j$, as shown in formula (12).

$$\mathrm{a}({}^{i+j}{}_{i}A) = \sum_{B,C \in V} P(A \to BC) a({}^{k}{}_{i}B) \tag{12}$$

Record the value of each internal probability in the calculation course. $({}^{j}{}_{i}A)$ is used to record the tree nodes corresponding to the corresponding $\delta({}^{j}{}_{i}A)$, as shown in formula (13).

$$P(S \to w_1 \ldots w_n) = a({}^{n}{}_{1}S) \tag{13}$$

Traverse the whole production from the starting node and trace back to the above calculation history table, and reuse the corresponding $\delta({}^{j}{}_{i}A)$ and $\Delta({}^{j}A)$, as shown in formula (14).

$$\beta({}^{j}{}_{i}A) = \sum_{B,C,h<i} \beta({}^{j}{}_{h}C) P(C \to AB) \tag{14}$$

Each statement of a CFG is assigned $P(A \to \lambda)$ probability initialization value, as shown in formula (15).

$$\sum_{a} P(A \to \lambda) = 1 \tag{15}$$

By using this probabilistic grammar, the musical rhythm with sample rhythm style was generated, which partially solves the difficulty of music examination. Through the music score and performance, it can be seen that the rhythm is regular and conforms to people's aesthetic habits. The realization of the prototype system provides a new idea for a computer to automatically generate musical elements. This study enhances the understanding of the importance of maintaining proper singing posture to sustain interest in learning. Through the digital skill video recording function, all kinds of standing postures and states of singing students in the course can be recorded throughout the whole course and then broadcast to students in the form of multimedia broadcast for their own appreciation, so that they can discover the problems existing in their own singing (Fu, 2020). Harrison and Pearce (2020) validated this conclusion by developing a computational model that forecasts chord consistency using these three characteristics. They published this model in the open-source R package incon, along with the 15 other computational models assessed in this study. We hope that this program can promote further research in psychology and musicology. The deductive musical cognitive paradigm provides an anti-representational framework for understanding the material and cultural environment of musical activities. Hayes (2019) discussed the improvisation of live electronic music as a demonstration model to demonstrate the importance of participatory, relational, emergent, and expressive musical activities and processes. It is important to unify the teaching system of undergraduate music education, and it is imperative to inject AI skill into music education in the new era, which complement each other. Music AI will provide a new multi-latitude teaching practice platform for undergraduate music education.

## ANALYSIS OF INFLUENCING FACTORS OF VOCAL MUSIC TEACHING QUALITY

### Analysis and Study on the Impact of Teaching Quality

There are many factors that affect the quality of teaching in colleges and universities, but the main factors that affect the quality of classroom teaching are as follows. First, the number of students in classes is large, and the teachers are limited. In a large number of courses, teachers have to face a class of 200 or even more than 300 people, and interactive teaching is almost impossible. Second, cramming teaching has become a habit. The most common practice is that teachers are still used for indoctrination in most of the courses with small numbers and conditions for communication. Finally, students' subjective status is ignored, which is not conducive to timely control of teaching content. These three factors are directly related to the learning effect of students.

To change this situation, we must carry out reforms in the education and teaching concepts, teaching methods, and teaching management, guided by modern education ideas. The extent to which a teacher can effectively take on a leading role in classroom teaching primarily depends on their mastery of the foundational knowledge and fundamental theoretical skills of the subject they are teaching, as well as their understanding and grasp of the students' actual circumstances. They should be able to skillfully and accurately apply this knowledge, ensuring simplicity, depth, complexity, and ease. During lesson preparation, teachers should emphasize key points, disperse difficult concepts, and optimize the content. Pei Wen Zhong and Wang Zhigang (2021) designed and developed a computer-assisted, instructional technology-based digital music curriculum teaching system. This system facilitates easy digitized processing of recorded sound and presents it on the computer in the form of sound waves. It enables intuitive audio editing and comprehensively stores specific training states in a database, providing more information for teaching and training. Figures 4, 5, and 6 analyze the factors affecting teaching.

In Figure 6, it can be seen that teaching factors will have an impact on the curriculum, and the impact rate is as high as 40.53%. Teachers should be able to communicate emotionally with students,

Figure 4 .Influence Diagram of Teaching Factor Data

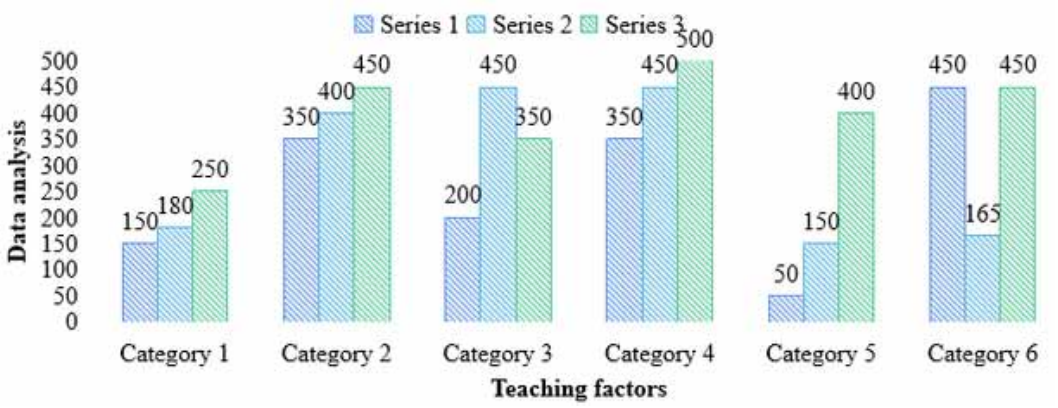



Figure 5. Analysis of the Impact of Teaching Quality

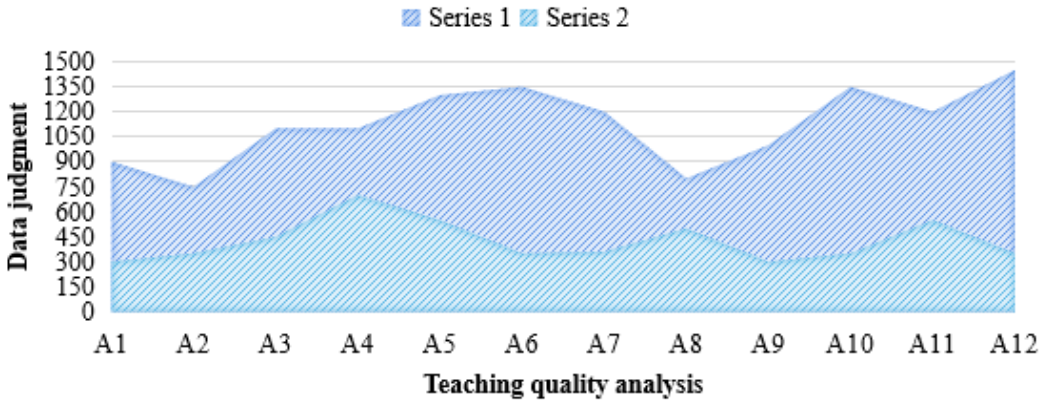
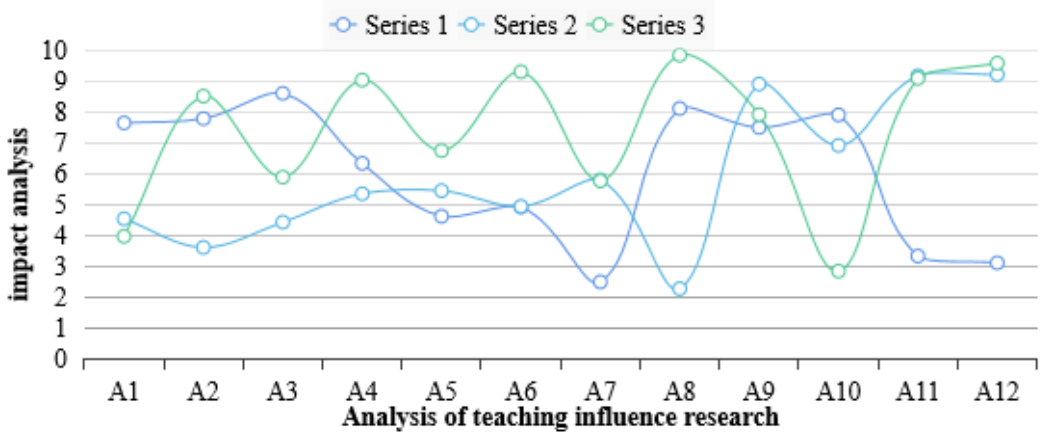



Figure 6. Analysis and Study on Influencing Factors of Teaching



attract students' attention, and guide them to think positively. In order to effectively control the schoolroom, stabilize the schoolroom order, and enliven the schoolroom atmosphere, we should properly deal with the unexpected events in the schoolroom. Teachers should be able to effectively control the teaching time. The time needed for each element of class, such as review, questioning, cutting into the topic, expansion, development, thought enlightenment, student practice, etc., should be estimated in advance and reasonably allocated so that the classroom teaching can be carried out rhythmically. The quality and appeal of vocal music teachers also play a role in the teaching effect. Ovcharenko et al. (2020) paid special attention to forming the technical culture of future music teachers through the application of innovative technologies in vocal music training in higher art and art teacher education institutions. The technical culture of teachers is considered a professional and personal phenomenon based on values and technological worldviews, ways of thinking, skills to apply technical knowledge, skills formed and implemented in creative art and teaching activities, and the ability to creatively use teaching tools. Mingming (2021) combined the specific situation of vocal music teaching in colleges and universities, understanding some specific problems in vocal music teaching, and proposing specific ways to promote the reform of vocal music teaching in colleges and universities in the context of internet plus, hoping to help vocal music teachers in colleges and universities have a more objective understanding of the significance of teaching and learning in the process of vocal music teaching. Second, in terms of knowledge and ability foundation, the more students have knowledge, the broader their knowledge, and vice versa.

## Influence of Music Teaching Quality Based on AI

The benefits of AI are seen mostly in three areas, and it has numerous applications in the field of music education. First, the appeal of teaching music has increased thanks to AI technologies. Second, the issue of music accompaniment is resolved by the use of intelligent musical instruments. Last, the bar for creating music is lowered via AI music education. In the traditional vocal music teaching course, teachers' guidance is the main way to help students master correct vocal skills, but in this course, the initiative of students' independent exploration is also limited, so the choice of sound particularations is limited. The sound particularations that students can access are mainly taught by teachers on their own initiative, and there is an obvious relationship between teachers' knowledge level and the sound particularations they reserve. Schiller et al. (2018) used a visual analogue scale to self-assess their own voice. VLI(Vocal Load Index) and self-evaluation data were correlated using Spearman correlations. The voice load parameters and noise SPL(Sound Pressure Level) in professional environments were significantly higher than those in nonprofessional environments. Vocal music, as a singing art, must go through a long period of hard vocal music special training before it can skillfully use singing skills and properly express thoughts and feelings. After reaching a certain level, it can consciously master the corresponding singing skills.

Redman et al. (2022) assessed the speech and hearing status of speech teachers before and after class and linked these assessments to speech and noise dosimetry during class. As we all know, human language is not only a unique communication tool for human beings, but also an important carrier of cultural transmission. As vocal music is an art that combines literature with music, it has a close relationship with literary language. Therefore, one must read the lyrics carefully before singing a good song. By reading the lyrics carefully, with the effective help of literary language, we can master the rich feelings of vocal music works. Language itself has the function of expressing emotions, and it can pour out every emotion in people's hearts. Teacher's perspective is one of the important factors that affect the further optimization and expansion of vocal music teaching quality. In the traditional schoolroom, the teacher-centered teaching concept has a significant negative impact on the expansion of students' thinking. While traditional teaching methods may address certain challenges in vocal music instruction, they also come with noticeable drawbacks. These include creating a significant gap between teachers and students and hindering the integration of contemporary elements to enhance the quality of vocal music teaching. With the continuous combination the of internet and music education,

the content of the online classroom will be more abundant, and excellent music resources will be more concentrated together. Because the natural language recognition function of AI can instantly recognize and convert languages of those of various countries, the future online music classroom can conduct instant and barrier-free knowledge and communication with foreign music teachers or scholars, and language and distance are no longer obstacles to knowledge. In the study, the corresponding data graphs are established for further analysis, as shown in Figure 7, Figure 8, and Figure 9.

It can be seen from Figure 8 that AI skills have a certain impact on vocal music teaching, with an impact of 56.42%. In Figure 9, we can see that AI skills have a strong influence on vocal music teaching. With the continuous improvement of AI skills and the demand for online courses under the current epidemic situation, a large number of intelligent music software has flooded into the market, including music teaching software, music creation software, and music appreciation software. In music education, AI is useful in the following ways: first, it can raise the caliber of music educators. In

**Figure 7 Analysis of Vocal Music Factors**


**Figure 8 Analysis of Vocal Music Quality Factors**

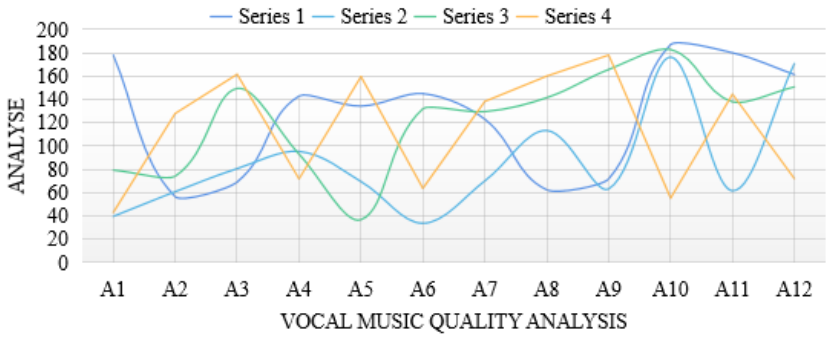
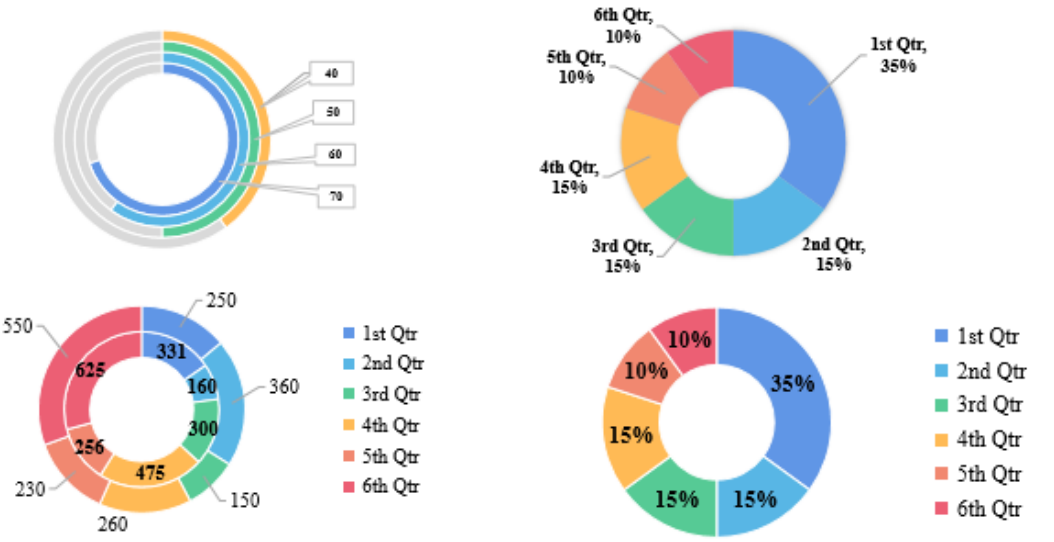


**Figure 9 The Influence of AI on Vocal Music Teaching**




addition to increasing teachers' productivity and taking over some low-skill jobs, AI can give educators new options for growth and development. Second, by using big data analysis to better understand students' learning and needs, AI can assist teachers in providing more effective and high-quality instruction. Finally, with intelligent aids and individualized learning recommendations, AI can help students learn more effectively by improving their comprehension and mastery of music abilities as well as by piquing their interest in and retention of the material. In conclusion, AI has a significant positive influence on both teachers and students while opening up new avenues for music instruction.

## DATA AVAILABILITY

The figures used to support the findings of this study are included in the article.

## CONCLUSION

This paper analyzes the role of AI in music education and discusses the application of AI in music education and its development trend in the field of education. In this paper, the ARM algorithm, the SA algorithm, and the internal and external probability algorithm are combined for research and analysis. Through the research of this paper, we can see that people's intelligent skills have a certain influence on vocal music teaching. With the continuous development of AI, it has been widely disseminated and popularized in the field of music education. It realizes the organic integration and interaction between music and science and technology and promotes the development of music education in China to a great extent. Therefore, music educators in China must innovate their ideas and improve their effective understanding of AI in music education. They should strengthen the scientific and rational application of AI in music education, keep up with the development trend of AI in music education, and actively promote the healthy and stable development of music education in China. However, under the conditions of information technology, there are still some shortcomings in the combination of music teaching and information technology in this article. One is that the sample of the study is not universal enough, and the scope may be expanded in the future. Second, this study

focuses on verifying the influencing factors of innovation diffusion of AI in the field of education. In the future, comparative analysis of the factors affecting the adoption and diffusion of AI technology in other fields can be considered, and more potential influencing factor variables can be involved.

## CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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