

Evaluation Model of Multi-dimensional Teaching Mode on Piano in Colleges and Universities based on Big Data

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Abstract: The multi-dimensional teaching mode on piano will focus on cultivating students' innovative spirit and practical ability, and emphasize the ability of students to explore independently and the ability to cooperate and communicate, which can further promote the process of reforming the teaching mode on piano. With the deepening of the curriculum reform in colleges and universities, the corresponding evaluation mechanism has attracted a lot of attention from educational experts and scholars. In order to adapt to the new trend of piano teaching, the existing evaluation mechanism needs to be reformed. Based on the characteristics of "Internet thinking", the paper deeply analyzes and discusses the advantages and disadvantages of piano teaching in colleges and universities through the investigation and analysis of the current situation of piano teaching in colleges and universities. Through the analysis of the existing problems, the paper proposes the basic ideas and methods of the application and implementation of big data in the piano teaching in colleges and universities.

Keywords: Multi-dimensional evaluation; Evaluation of the quality of piano teaching in colleges and universities; Application of big data

1. Introduction

For a long time, the research on the reform of piano teaching in colleges and universities has become a hot topic, which highlights the positive role of piano teaching in the training of social talents. With the arrival of the "Internet +" era represented by "Big Data", "Internet of Things", "Cloud Computing", etc., traditional piano teaching has encountered unprecedented opportunities and challenges. The cultivation and improvement of students' ability and level of playing piano is especially important for the major of music teaching in colleges and universities. In the piano teaching, a unique teaching evaluation mechanism suitable for the normal students of music education should be established. It is evaluated not only from the actual effect of the specified piano music played by the student, but also from the piano playing skills (improvised accompaniment, self-singing and other keyboard and sound performance techniques) necessary for the normal students. At the same time, it is necessary to introduce self-evaluation, other-evaluation and mutual-evaluation, which are included in the developmental evaluation, to strengthen the communication and discussion between teachers and students to promote teaching, and to absorb the formative evaluation point of view, to emphasize the evaluation of learning process and its staged results, and to construct a multi-dimensional piano

teaching evaluation system for the major of music education in colleges and universities from multiple dimensions. In addition, it also needs to combine the characteristics of Internet thinking and the objectives and specifications of the cultivation of the talents of the music education major in colleges and universities. It is also necessary to put forward the ideas and strategies of piano teaching in colleges and universities from the perspective of network thinking, including the establishment of open and shared piano education teaching concepts by teaching leaders, guiding the teaching objects to form a variety of collaborative piano Internet learning habits, constructing unique Internet piano classroom resources and teaching modes based on teaching content, and creating an experience platform for participating piano teaching scenes. In this way, the improvement of piano teaching can be continuously improved, and a composite and practical talent engaged in music education that truly meets the needs of social reality can be cultivated.

2. Establishment of Evaluation Model of Multi-dimensional Teaching Mode on Piano in Colleges and Universities Based on Big Data

The evaluation model of multi-dimensional teaching mode on piano in colleges and universities based on big

data is to help colleges and universities establish a scientific teaching quality evaluation system, which can cultivate more qualified talents to meet the development requirements of the new era. The establishment of a teaching quality evaluation system must rely on big data to ensure the science and effectiveness of the evaluation, and it is an inevitable trend to use big data technology to assess and analyze the quality of teaching. Therefore, the data mining platform for college teaching quality analysis first collects data and establishes a specific state database, and then conducts multi-dimensional data evaluation and multi-faceted data analysis, which can be used to guide the improvement of teaching evaluation.

2.1. Data preparation

The evaluation model of multi-dimensional teaching mode on piano in colleges and universities based on big data has the ability of data collection and integration, and can provide multiple types of data sources such as RDBMS, OLAP, Big Data, NOSQL, files, etc., and support queries based on multi-source and heterogeneous data as well as cross-database^[1]. It establishes basic state database through internal business interconnection system and external Internet data, including data collection, data validation, data retrieval, data reporting, data reuse and other basic functions, and finally implements the evaluation and analysis of teaching quality.

2.2. Multi-dimensional evaluation

The teaching quality evaluation is a national policy. In 2011, the "Opinions of the Ministry of Education on the evaluation of undergraduate teaching in general institutions of higher education" clearly required that universities should conduct institutional evaluations, and universities must attach great importance to them. However, if we want to improve the teaching quality, we can't do it by relying on external forces. Schools must also conduct self-evaluation, including more detailed university evaluation, professional evaluation, curriculum evaluation, and instructional evaluation. The big data analysis of the teaching quality data mining platform in colleges and universities supports the evaluation in universities required by the Ministry of Education. It also provides a multi-dimensional evaluation of the school's teaching quality through universities, majors, courses, etc., and supports the customization and configuration of evaluation indicators. The evaluation of each dimension includes self-evaluation, expert evaluation, evaluation results, problem correction, etc., and based on this, a cyclic evaluation mechanism is formed. The following is an example of a professional evaluation.

2.2.1. Professional self-evaluation

A specific indicator observation point was set up to allow self-evaluators to fill in the strengths and weaknesses and

self-evaluation of the indicator observation points, and upload supporting data and supporting materials for the relevant indicator observation points.

2.2.2. Rating by experts

Experts' ratings and suggestions must be limited so that the supporting data and supporting materials of the corresponding indicator observation points can be automatically correlated and self-evaluation reports can be automatically generated after the last departmental review.

2.2.3. Evaluation results

The scores of each major can be obtained intuitively. The top ranked majors should continue to be strengthened, while the lower ranked majors should be rectified according to the shortcomings in the evaluation and the experts' suggestions.

2.3. Multi-dimensional analysis

The "big" in big data is not the "large capacity" of its appearance, but the "big value" in analyzing data. In addition to descriptive statistical reporting of data, the key to demonstrating the value of data is the application of data in a variety of ways. Evaluating the quality of teaching, collecting and mining various data, and analyzing the results of evaluations can enable education managers to make more scientific and accurate decisions. Compared with traditional educational decision-making, big data has continuously improved the depth, breadth and fineness of teaching quality evaluation and analysis in colleges and universities. The analysis and mining platform of big data in the quality of teaching in colleges and universities also analyzes the evaluation results from different topics. Some common topics are presented below.

2.3.1. Leading cockpit

It includes sub-themes such as target orientation, teachers, students, courses, disciplines and specialties, and early warning of core indicators. School leaders can understand the teaching status of the school at a glance, and they can also conduct in-depth interpretation and analysis of these themes.

2.3.2. Analysis of teaching quality in classroom

The analysis of test scores, interactive data in the classroom, evaluation data and other indicators can be used to establish an excellent classroom model, timely and effective monitoring of teaching quality, stimulate teachers and students to solve classroom problems such as less interaction, and improve the quality of teaching in the training process.

2.3.3. Analysis of students' growth

Through the analysis of students' classroom behavior, their learning and living conditions, their psychological and family conditions, the school can grasp the students' psychology and serve the students better. Schools can also obtain abnormal behaviors of students through their portraits and behaviors, accurately analyze their safety, learning and living conditions, and provide early warning, early intervention and accurate help.

2.3.4. Professional comprehensive analysis

Professional analysis is divided into three levels. The first level is the professional evaluation at the level of the Ministry of Education, which focuses on the inspection of core professional indicators and the diagnosis of experts to meet the requirements of professional continuous operation. The second level is the Ministry of Education's detailed evaluation of the national universities to assess whether their level meets the required standards, which is the threshold for building a first-class major. The third level is the evaluation at the school level. Experts make the most detailed evaluation of the advantages of teaching, and the teaching quality reaches the international advanced level through continuous improvement of the mechanism.

3. Analysis of Relevant Data in the Evaluation of Teaching Quality

Static evaluation data mainly come from the evaluation of teachers' quality, teaching content, teaching attitude, teaching methods and teaching effect by experts, peers and students. In addition, social evaluation should also include the evaluation of professional skills and quality of students by employers and society after graduation. The dynamic evaluation data refers to the timely data extracted from the information system, which has the characteristics of development, objectivity and dynamics^[2]. For example, the education management system can provide relevant data, such as teachers' teaching tasks, teaching contents, teaching methods, and digital teaching resources, etc., and can also extract student's grades, course selection and other data. The science and research management system can provide scientific and research results, publications, monographs and other data that reflect the professional qualities of teachers. The student management system can collect data such as the student's rewards and punishments, the awards of the competition, etc. The human resources management system can provide information such as the teacher's personal basic information, professional skills, training and rewards. The library system can record students' self-study after class, as well as the data of teachers and students' borrowing. The campus monitoring system can record the behavioral data of teachers and students, which can more accurately evaluate the overall quality of teachers and students. The social network platform records the online

activity data of teachers and students, online activities such as microblog and Moments. Employment management system can provide students' employment data after graduation, including unit, post, salary, career development and other data.

In addition, according to the different evaluation criteria of teaching quality and the different process of information construction in different universities, the data sources of the big data platform for teaching quality evaluation are also different.

4. The Application of Big Data Analysis in Teaching Quality Evaluation

4.1. Data acquisition

Data acquisition is based on the needs of teaching quality evaluation. Static data are collected directly from the network questionnaire; dynamic data are mainly from the school business systems. For example, the content related to educational administration is from education administration management system, and the data related to scientific results is from science and research management system, etc. These data are well structured. But some network data, such as user's network log, network search record and reading preference record, which are unstructured, need to be crawled through the network and stored in the database.

4.2. Data filtering

In order to improve the validity of the data, it is necessary to perform data filtering on the collected raw data before applying the data. It mainly eliminates "junk data" in the original data, including duplicate data, abnormal data, irregular data and missing data. For example, the comparison method is used to remove the filtered data, the data model filtering and analysis method is used to remove the abnormal data, and the simple judgment method is used to filter out irregular data such as line breaks, tabs, spaces, etc. which do not have actual data characteristics and affect data statistics, and machine learning interpolation methods and manual intervention methods are utilized to process missing data.

4.3. Data pre-processing

Data pre-processing refers to the process of data integration, data conversion and data reduction after data filtering. Data integration and data conversion can integrate data from multiple data sources into a database and output them in a specified format through existing tools. However, in the process of integration, redundant data need to be removed, so as to facilitate data analysis later. Data reduction is to reduce the amount of data by data reduction.

4.4. Data analysis

After data acquisition, data filtering and data pre-processing, a “healthy” database is formed. This database is equivalent to a small “data cloud processing platform”, and users can adopt different analysis methods according to different analysis needs. In addition to the traditional SQL-like language to achieve traditional multi-dimensional statistical analysis of teaching quality, the implementation of teaching quality evaluation should also use data mining algorithms to analyze the data in depth.

5. Conclusion

Through the analysis of multi-dimensional teaching quality and the analysis of multi-dimensional results in the analysis platform of teaching quality in colleges and universities, the establishment of scientific teaching quality evaluation system can not only meet the requirements of the Ministry of Education’s teaching quality evaluation, but also conduct self-evaluation in advance to identify problems, solve problems and improve the quality of teaching.

In order to improve the authenticity, effectiveness and timeliness of teaching quality evaluation, the research on the evaluation and prediction of teaching quality in colleges and universities based on big data platform should be implemented. This paper collects the data that affects the evaluation and prediction of teaching quality, and

conducts data filtering, data pre-processing and data analysis, and then uses the obtained data as the basis and uses the mathematical evaluation model to achieve comprehensive evaluation and prediction of teaching quality. The research shows that the application of big data platform can achieve objective and dynamic evaluation and accurate prediction of teaching quality.

The application of big data platform is the main direction of the development of information quality in colleges and universities, and is also the inevitable trend of the evaluation and prediction of teaching quality in colleges and universities under the background of “Internet +”. The big data platform can achieve “speak with facts and speak with data”, which can truly realize the objectivity, accuracy, timeliness and dynamics of evaluation and prediction of teaching quality, and can provide a basis for the evaluation, supervision and management of teaching quality in colleges and universities.

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