The Innovation Analysis of the Development of College Music Education under Big Data

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Abstract: *To improve the overall development of music teaching in colleges and universities, DEA model and Malmquist index model were used for data analysis. The reasons for the decline of music education technology in colleges and universities were discussed and analyzed. Taking music education in colleges and universities as the research object, the efficiency index of music education was clarified. In the music education of colleges and universities, the education of humanity and wisdom was very important. Furthermore, a music teaching cloud platform integrating Internet and Intranet network technology was designed. The results showed that only the total factor productivity in 2013 and 2014 had a growth, and the total factor productivity in other years had declined. Therefore, this method improves the efficiency of music education to some extent.*

Keywords: *Music education, DEA model, Malmquist exponential model*

1. Introduction

With the development of society, the integration of culture and the advancement of technology, the music education of schools has achieved remarkable results in recent years. However, music education is still the weak link in school education. Music education is an important part of aesthetic education and the most extensive implementation of school art education. Its educational function is very rich and extremely important [1]. The emergence of music education mode is the result of music education. In the course of historical development, with the progress of society and the development of music education, it has the characteristics of sociality, historicity and times [2].

Pitts pointed out that music education has a long history in defending its position in school curriculum, and practitioners and researchers are arguing about the creative, social and cognitive benefits of music in young people's lives [3]. De proposes to solve the challenge of creative support metaphor design, namely time stamping, and apply the ecological basic creative strategy to the formal education process. This serves as a way to increase the social interaction between musicians and laymen in everyday environments [4]. The impact of personalized music education programs based on information and communication technology (ICT) on the musical ability of primary school students was studied. Hernández-Bravo found that participants in average and high musical ability were significantly better at auditioning, vocal expression, instrumental expression, musical language, sports and dance, and ICT-based artistic and cultural capabilities than non-ICT-based capabilities. Those with low MA seem to benefit more from non-ICT-based programs [5]. Hayes has developed a teaching method project on computer music, with a special emphasis on providing a form of music education. This kind of education will produce creative practices that everyone can use, regardless of their musical ability and background. The findings suggest that discussions on how to continue to educate future generations to participate in computer music practice should not be limited at the university level. It may not be able to attract a familiar skill and word around new technologies. From the two aspects of sociology and economics, the connotation of educational efficiency can be improved by giving full play to the educational function and improving the input-output rate of music education and the allocation efficiency of educational resources. In music teaching, to optimize music teaching, many teachers introduce multimedia technology into the classroom, making it play an important role in music teaching. Students should use modern teaching methods to understand the meaning of musical works. In this way, music teaching is more vivid. As a result, students have a better understanding of music and mastering music knowledge [6].

To sum up, the current theoretical study of music education in colleges and universities is more than the method and technical level, but the study of educational efficiency is still rare. Therefore, based on

the current situation of music education in colleges and universities, the reform and innovation of the teaching system and educational concept of music education in colleges and universities are explored from the perspective of improving the efficiency of music education. From the perspective of theory and evidence, the key influencing factors of the efficiency and efficiency of music education in colleges and universities are discussed. The reform path of improving the efficiency of music education in colleges and universities is proposed.

2. Methodology

2.1 Construction of the index system for measuring the efficiency of music education

The essence of educational activities is the interactive process of knowledge dissemination and knowledge acquisition. The specific implementation of educational activities is always carried out under certain time and space conditions. The tangible and quantifiable input-output situation in the music education process is quantitatively analyzed. The direct output effect and efficiency of people's property and time investment in the implementation of music education is the focus of music education development research. Compared with the requirements of quantitative analysis, the input and output of music education in colleges and universities is also diverse. Its characteristics are different from material production and general economic production. The study of music education efficiency is to rationally allocate educational resources and maximize the educational efficiency of music education. Music education has become an effective part of the school's overall education system. This contributes to maximizing the efficiency and effectiveness of the school's overall education. Therefore, the DEA efficiency analysis method and model are introduced to analyze the efficiency of music education in colleges and universities.

At the national and regional levels, the indicators of educational resource input mainly refer to teacher input and funding. Output indicators mainly refer to scientific research results, training of students and transfer of results. At the university level, the input indicators mainly include four aspects: teacher input, material input, funding input and time investment. Output indicators mainly refer to scientific research results, training of students, science and technology awards, and transfer of results. From the above aspects of the education input and output system at different levels, the index system is basically the same whether it is research at the national, regional or school level.

The scientific principles established by the indicators are followed. Combined with the research results of relevant literature and combined with the reality of music education, a comprehensive measurement system for music education efficiency was established. Considering the practical operability, this study decomposes the input indicators into four inputs: manpower, material resources, time and financial resources. To quantify the output indicators, the music education output indicators are selected in terms of quantity and quality.

2.2 DEA model

The most basic models of the DEA method are the CCR model (based on the scale return invariant assumption) and the BCC model (based on the variable returns of scale). The overall technical efficiency is calculated from the CCR model. The pure technical efficiency and scale efficiency are calculated by the BCC model. The product of the two is comprehensive technical efficiency.

The decision-making unit achieves both scale and pure technical efficiency, that is, the comprehensive technology is efficient and effective. The parameters are appropriately modified to obtain a second DEA model (BCC) for measuring pure technical efficiency.

When using the DEA method to measure production efficiency, there are two orientation-based measurement methods, including input-oriented and output-oriented. The input-oriented model is a mathematical programming problem that minimizes input while the output is constant. The output-oriented model is a mathematical programming problem that studies the maximization of output with constant input. In practice, the two models can be selected based on the controllability and manageability of the selected input and output indicators.

2.3 Malmquist index model

To comprehensively measure the efficiency of music education from a dynamic perspective, the

DEA method based on the Malmquist index is used to dynamically measure the change of total factor productivity. Two sources of change in total factor productivity (technical changes and efficiency changes) were analyzed.

3. Results and discussion

3.1 Analysis of calculation results of DEA model

Through calculation, the relative comprehensive technical efficiency, pure technical efficiency and scale efficiency between 2012-2017 calendar years are obtained. In addition to 2013, the comprehensive technical efficiency of other years is 1.000, which is an effective unit of DEA. Pure technical efficiency and scale efficiency are effectively achieved at the same time, and the scale returns remain unchanged. The comprehensive technical efficiency calculation results show that there is a low-efficiency transition in the early stage of the establishment of China Agricultural University art, and it has entered a stable development stage with high input-output efficiency.

In 2012, the pure technical efficiency of 2014-2017 reached 1.000. The Chinese Agricultural University art can also use the existing resources to maximize the output of art education, and the efficiency in the use of input factors has been maximized. At the same time, it shows that there is no redundancy in each input and output indicator. If the output remains the same, the input factor is no longer possible to reduce. In 2013, the overall technical efficiency was 0.930, which did not reach the DEA effective. If the economic interpretation of the model is simply applied, this result is generated because the scale does not match the input and output, and the scale needs to be reduced. The main feature of the diminishing returns of scale is that when the input elements are added simultaneously in the same proportion, the proportion of increase in output is less than the proportion of change in the input elements.

3.2 Analysis of calculation results of Malmquist index model

The growth rate of total factor productivity is often seen as an indicator of technological progress. Sources of total factor productivity in the economic sector include technological advancement, organizational innovation, specialization, and production innovation. For music education, technological advancement can be the innovation of educational concepts, the improvement of teaching organization model and the adoption of new teaching methods. The results show that, compared with the previous year, the growth rates of total factor productivity are - 56.6%, 41.4%, 47.0%, 36.3% and - 36.3% respectively. Only in 2013 and 2014, there was a positively large increase in total factor productivity, and in all other years, total factor productivity declined. The reason for the growth and regression of total factor productivity is the technological change in 2013 and 2014.

3.3 Structure design of network music teaching cloud platform

Figure 2 shows the functional structure of the network music teaching cloud platform. The platform is designed to integrate Internet and Intranet networking technologies. The B/S mode is adopted. The video server of the platform is mainly used to store teaching courses and music appreciation videos involved in music education. In addition, the network music teaching cloud platform also includes an application server, which is mainly used for storing intermediate data and running information of the platform operation. Users (including teachers, students, and other users) can use the personal computer to access the music teaching cloud platform through the Internet to conduct course learning or music appreciation.

4. Conclusion

Taking the efficiency and management of music education in colleges and universities as the research object, with the help of economic efficiency analysis, the DEA indicators and models for quantitative evaluation of music education efficiency are constructed. Taking the Agricultural University of China as an example, the efficiency evaluation of music education is carried out, and the root cause of the efficiency decline is analyzed. The teaching platform based on network information technology has opened new ideas and new ways for the improvement of music education efficiency in colleges and universities. The network music teaching cloud platform makes full use of the Internet and

mobile communication networks. It can be open to both PC and mobile terminals, and can accommodate different types of learners.

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