Research on Construction of Data Literacy Ability Evaluation Index System for Music Education Major

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Abstract: For the demand of big data era music education talents, the traditional teaching mode can not meet the social demand, in urgent need of multidisciplinary integration support the construction of music education professional, so in order to better implement data can assign music education professionals music literacy, need to build for music education professional data literacy ability evaluation index system.First of all, This study using literature research method, combing research situation at home and abroad, stick to the music education professional construction and data literacy education present situation, in view of the weak link, from the perspective of professional theory and practice teaching, results oriented drive as the goal, establish for music education professional data literacy ability evaluation index system, the data literacy ability into the music education professional training target, evaluation index, evaluation process, feedback and optimization of the closed loop. Finally, 7 first-level indicators and 25 second-level indicators are selected to form the evaluation index system, and suggestions are put forward to improve the data literacy ability database of music education majors, so as to provide effective guarantee for the improvement of data literacy of students majoring in music education and promote the high quality improvement of music education majors.

1. Introduction

China has more than 100 colleges and universities specializing in music education. Music education majors cultivate music educators who have certain basic theoretical literacy of Marxism and systematic basic professional knowledge, have good musical practice skills and teaching abilities, and are able to engage in teaching and scientific research in the fields of school music education and social music education. It requires music educators who have certain basic theoretical literacy of Marxism and systematic basic professional knowledge, have good practical skills and teaching ability of music, and can engage in teaching and scientific research in the fields of school music education and social music education. Music education is the key to support the development of Chinese students' core literacy.

In the era of big data, accelerating the reform and innovation of music education major construction, strengthening interdisciplinary integration, and integrating aesthetic paradigm with practical paradigm are the needs of the development of music education in Chinese colleges and universities. In the process of education, human development must be combined with the development of music art. Music education involves a large number of multi-source data such as music works, history, culture and teaching process. The management and application of these data plays an increasingly prominent role in the professional construction of music education, which helps to promote the reform and innovation of music education, realize the new development of music teaching, serve the major strategic needs of the country, implement the Party's educational policy and literary and artistic policy, and inherit and carry forward the excellent Chinese culture.

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2. Literature review

With the rapid development of the big data industry, data has become a market factor. Domestic and foreign scholars' research on music education and data literacy mainly focuses on music education, data literacy ability training and evaluation indicators of data literacy ability.

2.1 Current research status related to music education

The research on music education at home and abroad covers teaching methods, curriculum design, education policy, teacher training, student development and many other aspects. Foreign music education emphasizes individuation and creativity, such as the Mandattonville Music Curriculum Program in the United States, which is based on the spiral curriculum design of Bruner, focuses on the teaching of basic elements of music, and conducts stratified teaching according to students' age and cognitive level. Elizabeth Stephenson and Patti Schifter Caravello[1] mainly explored the conceptual integration of data literacy and information literacy in experimental courses, emphasizing the important role of data literacy in university libraries. The United States and other Western countries also have clear goals for music education, and classify students of different ages, emphasizing the joint efforts of school teachers and students. Germany pays attention to the level and clear goals when training music teachers, while China emphasizes the combination of theory and practice in teacher training. Music education is considered to play an important role in the overall development of students. Russian schools emphasize the cultivation of musical expression. Music education research is a multi-dimensional and interdisciplinary field, involving pedagogy, psychology, sociology and other disciplines.

2.2 Research status of data literacy ability cultivation

Tibor Koltay[2] believed that data literacy education is completed in activities related to data, and that researchers related to data need the cultivation of data literacy ability, which emphasizes the importance of data professional terms. Jori S. Beck and Diana Nunnaley[3]took teachers as the research object, the concept of data literacy is applied to teaching, the environmental factors affecting pre-service and in-service teaching data literacy are discussed, and finally to provide teachers with an integrated data literacy system from pre-service to in-service. Meng Xiangbao, Chang E [4] and Ye Lan [4] summarized the representative study of the definition of data literacy from the two perspectives of data management and data utilization. Cao Shujin, Liu Huiyun, and Wang Weijia[5] redefined the connotation of data literacy considering two aspects: data awareness and ethics.. Pay super[6] divided data literacy into three categories: basic data literacy, professional data literacy and data literacy and innovative data literacy. Wang Zhengqing and Zhang Liwen[7] studied the definition of teachers' data literacy by different organizations in the United States, concluded that teachers' data literacy includes three parts: data awareness, knowledge and ability. Zhang Wenliang and Liu Jingyi[8] constructed,the basic framework system of education suitable for China. Zhang Minghai and Zhou Yanhong[9] mainly studied the education problem of data literacy in colleges and universities, and makes a comprehensive and detailed design of the system of data literacy education in colleges and universities from three aspects of education team, teaching content and teaching platform.

2.3 Research status of data literacy ability evaluation index system

Li Qing, Zhao Huanhuan[10]designed the evaluation index system including 4 first-level indexes, 10 second-level indexes and 26 three-level indexes, and used the Delphi method to calculate the index weight according to the score of each index, so as to improve the evaluation index system of teachers' data literacy ability. Lin Xiuqing, Yang Xianmin, and Li Yifei[11]built the evaluation index system of data literacy ability of primary and secondary school teachers. Deng Lijun and Yang Wenjian[12]took individuals as the object, fully considering the actual situation in China, the evaluation index system of individual data literacy ability including 12 indicators is constructed. Ge Mingxing, Wang Zhanjun and Lin Herong [13] used cluster analysis, principal component analysis and other techniques to make statistics on relevant word sets in Chinese journal databases, and built a scientific and feasible evaluation index system for data literacy level of engineering masters..Liu Aiqin, Wang Youlin, and

Shang Shan[14] adopted the factor analysis method to quantify the indicators in the data literacy ability evaluation system based on the MOOC platform. Li Hong[15] built the influencing factor model, and make a detailed analysis of the relationship between the three first-level indicators and eight second-level indicators. The correlation degree of indicators is sorted, and finally the data literacy index system is constructed according to the importance degree.

In summary, foreign countries have accumulated a lot of research results on music education and data literacy, most of which mainly focus on the single aspect of music education and data literacy, and integrate data literacy with music education , With the rapid development of technologies such as big data and AI, with the help of data development and utilization of enabling music education majors, the professional construction of enabling music education is closely linked to the current situation of domestic music education., Taking the cultivation of students'high-quality music literacy ability as the breakthrough point, stimulating the data thinking of music education professional teachers and students,from a macro perspective, the data literacy ability evaluation index system for music education majors from a systematic perspective, form a closed loop of data literacy objectives, evaluation index, evaluation process, feedback and optimization, To continuously optimize the data literacy ability evaluation index system, effectively improve the quality of music education major training, and then to provide scientific decision-making support for the construction of music education majors in China, to serve the improvement of national core music literacy.

3. Construction principle of data literacy ability evaluation index system

The evaluation index system of data literacy ability for music education specialty needs systematic and scientific quantitative indicators, and the selection of indicators and set the principles are the core and key of the whole system, directly affect the evaluation effect of data literacy ability evaluation ,index system construction principles need to comprehensively consider the new era of the educationreform, evaluation index system of basic principle and music education professional own specific requirements. To enhance the comprehensiveness, standardization and pertinence of the data literacy ability evaluation index system, the following principles should be followed when building the system:

3.1 The scientific orientation of the music education major

Around music education professional training goals and requirements, compared with musicology, pedagogy and data management professional have obvious focus, from the scientific perspective of index system macro architecture and planning, reflecting that in order to cultivate music teacher quality and music research ability, clear students and teachers’data literacy ability training link and tracking management mechanism, at the same time considering the evaluation system has scalability.

3.2 Standard requirements for ethics and business training

In the selection process of indicators, moral ethics is taken as a standard of evaluation. Break the traditional intellectual education light moral education, score quality education, strengthen the comprehensive quality education, through the evaluation of data literacy ability throughout and music education professional training process, so we need to pay attention to data ethics, including the use of data should follow the relevant laws and regulations and ethics, maintain data security, protect data privacy and other basic quality.

3.3 For the training objectives and requirements of music education major, and closely follow the requirements of social employers for the ability of graduates of this major

The evaluation index system constructed should be integrated with the professional training ideas and requirements formulated by the Ministry of Education, taking full account of the interdisciplinary characteristics of music education specialty involving pedagogy, psychology, musicology, data science and other disciplines. Therefore, in the selection of its indicators should focus on music education related data collection, data processing, data analysis, data governance, data service and other aspects of the ability improvement, Focusing on the data, servicing for music education

professional talent training,focusing on data applications such as music knowledge and skills, aesthetics, creativity, cultural understanding and emotional experience, focusing on data management and application services of music education professional training objectives, in line with the current education status and future development direction of the major.

3.4 Comprehensive and scientific index selection for evaluation and implementation

Data literacy ability evaluation index system required to truly support the whole process of music education professional training, in the music education professional music knowledge and practical skills in the whole process of data of teachers and students, choose index is not easy too much, should choose each field can reflect the improvement of music literacy ability level of music education professional students, avoid too redundant.

4. Status of data literacy in music education

4.1 Music education major discovery is diversified

Today's society is constantly developing in the direction of economic globalization, information network and cultural diversification. In the era of big data, the diversification of music education concept, educational mode, educational methods and educational content has been realized, making music education develop in the direction of diversification. The diversification of music education major refers to the introduction of different ethnic groups, different regions and different types of music teaching content into music teaching classroom, enhance the diversity of music teaching content, expand the classroom capacity, stimulate students 'interest in learning, mobilize students' enthusiasm and initiative in learning, so that students can develop in an all-round way. These diversified-related data management and application need to be further strengthened and optimized.

4.2 Application of information Technology in music appreciation

In recent years, multimedia information technology has been widely used in education and teaching work. Music education as the basic education in quality education work, in the learning time, learning space, teachers and students can not limited by time and space for teaching communication, teachers can combine students 'music appreciation ability, from the network platform to find excellent music repertoire audio data and video data, break the teaching time, teaching space for music teaching bondage, enable students to hear in teaching classroom excellent music performance, expand music classroom knowledge content, rich teaching content, cultivate students' music appreciation ability, improve students' aesthetic level. Teachers and students lack the management awareness of various communication process data in the process of learning and communication.

To sum up, the music education profession is diversified,, strengthen the comprehensive music literacy training of teachers and students, the process involves music knowledge, communication, music diversified data, in order to effectively serve the formation of music teachers literacy, improve music education ability, an urgent need to build music education professional data literacy ability evaluation index system, stimulate the teachers and students in the teaching process of data thinking ability, promote the data can assign music education professional talent training.

5. Construction of the evaluation index system of data literacy ability of music education major

The training of college students in China mainly adopts the way of combining theory with practice, taking professional theoretical courses as the guidance, strengthening theoretical knowledge with practice, and connecting theory and sublimate theory. For the education of data literacy for students majoring in music education, theoretical course design and practical teaching should also be conducted according to the actual needs, while the final teaching results should be emphasized, and the result-oriented drive should be aimed to construct the evaluation index system of data literacy ability.

Our country has more than 100 universities opened music education professional, mainly concentrated in the arts colleges and comprehensive universities, through the music education

professional training in colleges and universities analysis and classification, extract keywords, and the main factors as a level index, and under the level index for the corresponding secondary index, common evaluation index system.

5.1 Selection and setting of first-level indicators

The first-level index in the evaluation index system is the key part of the whole system, so the selection of indicators needs to be able to comprehensively reflect the data literacy ability of music education students majoring in colleges and universities. Through the analysis of the curriculum design in the training plan of music education majors in Shanghai Conservatory of Music, Central Conservatory of Music, Wuhan Conservatory of Music, East China Normal University and Nanjing Normal University,, and on the basis of the research on the evaluation index system of data literacy ability by scholars at home and abroad in domestic universities, the current situation of data literacy training for college students is integrated ,choose the following seven level indicators:

From the perspective of the ideology of students majoring in big data in universities, consciousness is the basic work of data literacy education, and at the same time, it can guide individual behavior. Only by realizing the value of data can we promote the construction of data literacy. The awareness mentioned here includes being able to recognize the importance of data in the current environment, and to think of using data to solve problems when encountered, so the "data awareness" is selected as the first level index. From the perspective of the connotation of data literacy, having a certain understanding of data, knowing the relevant concepts of data and some data tools are the basis for improving the ability of data literacy, so "data knowledge" is selected as the second first-level index. Data collection is the premise for the next data processing, and plays an important role in the evaluation index system of data literacy ability. In order to make effective use of data, we should first collect data and find useful data from many information,therefore, "data collection" is selected as the third first-level index. How to store effective data after obtaining it is the key to data processing, and it is also an indispensable part of data literacy education,therefore, "data storage" is taken as the fourth level index. In the study of the current university data courses, found that data analysis methods and data analysis software teaching gradually increasing, it can be seen that data analysis processing ability has become a part of the construction of data literacy education, at the same time the students demand for data processing and analysis ability is relatively high, so will "data processing and analysis" as the fifth level index. In addition ,in the era of big data with data to view has been recognized by the public, especially college students in the classroom display, achievement communication or competition need to use the data for the argument, which requires the students to have certain data expression ability, to display data in the form of charts, tables, graphics and so on ,and plain language to share with others, so the "data expression and communication" as the sixth level index. Finally in the use of data should follow the relevant laws and regulations and ethics, maintain data security, protect data privacy, which is the big data management and application of students the most basic quality, so select "data ethics" as the seventh level index. Evaluation index selection need to conform to the university curriculum design, make the evaluation index system more scientific rationality, the precision according to the results of the relevant course.

5.2 Selection and setting of secondary indicators

The second-level index in the evaluation index system is extended vertically on the basis of the first-level index, which is the refinement of the first-level index. The selection of first-level indicators pays attention to its comprehensive characteristics, while the selection of second-level indicators pays more attention to its degree of detail. First, the second-level indicators are preliminarily determined according to the meaning of the first-level indicators, and then screened by the current status and characteristics of data literacy education for students majoring in big data management and application. Finally, a total of 25 second-level indicators are selected. The specific content and meaning of the indicators are shown in Table 1:

Table 1 Content of the evaluation index system

Level 1 indicators	Secondary indicators	Indicator meaning
Data awareness	Data sensitivity	It refers to the ability to observe and identify the data, and the ability to accurately obtain useful information from the data.
	Data value awareness	Refers to the ability to realize the value and benefits of data in the current context.
	Data utilization awareness	The ability to think of using data to solve problems when you encounter a problem.
Data knowledge	Basic knowledge of data	Refers to the ability to master a series of basic knowledge, such as data definitions and related concepts.
	Data tool knowledge	The ability to know what data analysis tools software, data visualization tools, data crawl tools are, and know their use
data collection	Data discovery	The ability to accurately identify useful data from a wide range of information, or to find the most qualified data source based on its own research content.
	data retrieval	The ability to correctly retrieve information, based on the required data source.
	Use of the data acquisition tool	The ability to master the use of data acquisition tools and to use these data acquisition tools to collect the required data.
	data screening	It refers to the ability to select the data from the collected data sources and extract the data useful to itself.
data storage	data protection	Refers to the ability to choose the best way to store data to effectively protect the accuracy and value of data, which is conducive to reuse.
	Use of the data storage system	Refers to the ability to master the use method of the data storage system, and to accurately store the data into the system.
	Application of database	It refers to the ability to master the operation process of the relevant database and can use it accurately.
Data processing and analysis	Data audit	Refrefers to the ability to initially process data and remove invalid or incorrect data.
	Data organization management	Refers to the ability to organize and manage data effectively and accurately
	Use of the data analysis tools	The ability to master the use of data analysis tools and be able to use these data analysis tools to analyze and process data and meet the required requirements.
	Master of data analysis methods	It refers to the ability to use mathematics, statistics and other knowledge to analyze the data reasonably and achieve the best results.
Data expression and communication	data presentation	The ability to present the data results in the appropriate form.
	Use of the data visualization tools	The ability to master the use of a data visualization tool and to use the tool to display the data in the form of charts and so on.
	Data sharing	It refers to the ability to share your own data results with others under reasonable and legal conditions.
	data description	Refers to the ability to interpret and describe all data and data outcomes.
	Report writing	Refers to the ability to write data results into work reports in a more professional language.
Data ethics	laws and regulations	Refers to the ability to always follow the requirements of laws and regulations in the process of data utilization.
	Data specification	The ability to regulate the use of data throughout the use of the data.
	Data security privacy	It refers to the ability to always ensure data security and privacy leakage in the process of using data.
	academic morality	It refers to the ability to abide by academic ethics, not steal others 'achievements, respect others' data, use marked sources, etc.

The evaluation index system of data literacy ability constructed in this paper is mainly aimed at students majoring in music education. Its main application scenarios are divided into two kinds: one is to grasp students' data literacy ability and promote the reform and adjustment of data literacy education in colleges and universities. Can be the data literacy ability evaluation index system as students before and after the survey statistics, the test results as the initial data, before admission every semester test again, establish students 'data literacy ability level achievement summary table, master the change of the data, finally according to the students' training plan adjustment teaching plan, to achieve the effect of "according to their aptitude". Second, it is used for students' self-evaluation. All students can enter the system through the official website of the school for self-testing at any time. According to the results, they can clearly grasp the current situation of their own data literacy ability so as to check the gaps and adjust their self-learning plans. The system will organize the test results and students independent test scores, provide students with data literacy ability database, at the same time the evaluation index system through grading form, show the final comprehensive score and index of the score, can not only to grasp the overall data literacy ability level, and can accurately catch the problem project, thus targeted adjustment training plan.

6. Conclusion

On the basis of comprehensively combing the research achievements of domestic and foreign scholars in the construction of music education major, data literacy and evaluation index system, bu analyzing and summarizing the training plan of music education in China,combined with the current demand analysis of the data literacy ability evaluation index system of universities in China, aiming at a results-oriented drive, closely to the training program of music education in colleges and universities, finally, 7 first-level indicators and 25 second-level indicators were selected, a data literacy ability evaluation index system for big data management and application major is constructed, and to describe the meaning of each indicator, form a closed loop of data literacy ability training objectives, evaluation indicators, evaluation process, feedback and optimization, finally, the objects and scenarios of the evaluation index system are pointed out. But the evaluation index is still difficult to understand, more complex problems, under the background with the rapid development of Internet technology at the same time, in the later study of the different grade of music education students, detailed index system, enhancing its pertinence, and select representative professional students index test, constantly adjust the content of the index system, to cultivate high quality music education professionals to provide effective support.

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References

[1] Elizabeth Stephenson,Patti Schifter Caravello. Incorporating data literacy into undergraduate information literacy programs in the social sciences[J]. Reference Services Review,2007,35(4).

[2] Tibor Koltay. Data literacy: in search of a name and identity[J]. Journal of Documentation, 2015,71(2).

[3] Jori S. Beck,Diana Nunnaley. A continuum of data literacy for teaching[J]. Studies in Educational Evaluation, 2020.

[4] Meng Xiangbao, Chang E, Ye LAN. Data research on literacy: origin, Status and outlook [J]. Journal of China, 2016,42 (02): 109-126.

[5] Cao Shujin, Liu Huiyun, Wang Weijia. From information literacy to data literacy [J]. Library and

Information Research, 2017,10 (01): 19-24.

[6] Fu Chao. Research on Data Literacy Classification in China in the Era of Big Data [J]. Library Theory and Practice, 2020 (02): 68-74..

[7] Wang Zhengqing, Zhang Liwen. The Foundation and Path of Developing Teacher Data Literacy in the United States in the Era of Big Data [J]. Education and Culture Forum, 2018,10 (03): 137.

[8] Huang Luhua, Lin Yan. Data Literacy Education in the context of Big Data [J]. Digital Library Forum, 2016 (05): 19-26.

[9] Zhang Wenliang, Liu Jingyi. Discussion on the framework of data literacy Education system of University libraries in China [J]. Work in university Library, 2017,37 (04): 80-84.

[10] Zhang Minghai, Zhou Yanhong. Target positioning and system construction of data literacy education in the Era of Big Data [J]. Library, 2016 (10): 84-88.

[11] Li Qing, Zhao Huanhuan. Research on the evaluation index system of teachers' data literacy [J]. Research on Audio-visual Education, 2018,39 (10): 104-110.

[12] Lin Xiuqing, Yang Xianmin, Li Yifei. Construction of the evaluation index system of data literacy for primary and secondary school teachers [J]. Distance Education in China, 2020 (02): 49-56.

[13] Deng Lijun, Yang Wenjian. Research progress of individual data literacy evaluation system and the connotation of related indicators [J]. Library and Information Work, 2017, 61 (03): 140-147.

[14] Ge Mingxing, Wang Zhanjun, Lin Zhirong. Construction and application of the Data Literacy Evaluation Index for the Master of Engineering [J]. Research on Higher Engineering Education, 2020 (03): 189-194.

[15] Liu Aiqin, Wang Youlin, and Shang Shan. System study on data literacy ability evaluation in the MOOC environment [J]. Digital Library Forum, 2018 (01): 68-72.