Research on the Construction of Data Science Curriculum Group of Art Major under the Background of New Liberal Arts

Rong Zhang
Baoshi Art College Jiangxi College of Engineering Xinyu, Jiangxi, China
**Corresponding Author*

Abstract:With the advent of the data era, data science curriculum group has become an important part of the new liberal arts construction process. Mastering the basic theoretical knowledge and practical operation skills of data science has become the core competitiveness of art majors. In the process of construction, the curriculum group of data science for art majors is faced with many difficulties, such as paying too much attention to the professional background of teachers, and the content system of data science is not perfect. Therefore, based on the overview of the connotation of the construction of data science curriculum group for Art Majors under the background of new liberal arts, specific measures are taken from three aspects of teaching methods, organizational mechanism and curriculum structure. Effectively promote the construction of data science curriculum group of art major, and cultivate high-quality data talents to meet the needs of social development.

Keywords: Personnel Training; New Liberal Arts; Data Science Curriculum Group; Curriculum Construction

1. Research Background

1.1 Literature Review

In the era of the Internet, data technology has an important impact on social development, and has become an important driving force of social and economic development. Data operation ability has become a necessary skill for modern talents, and universities gradually increase the research on data science. Through investigation, Yang Ruixian and Wan Jiaqi first understand the basic situation of UIUC's data science course, then make an analogy analysis of the course group from four aspects: teaching object, teaching method, course cooperation degree and course content. Finally, they put forward reform suggestions for the construction of data science course in Chinese universities, which are to strengthen the cultivation of data science students In addition, it is necessary to strengthen the research direction completeness and teachers' cooperation in teaching (Yang and Wan, 2020)[1]. In order to cultivate big data talents suitable for the development needs of the new era, Qin Xiongpai and others designed three curriculum groups for the computer curriculum system, focusing on the relevant teaching links of the introduction course of data science, including curriculum objectives, curriculum content setting, curriculum plan, examination methods and practical exercises, so as to provide new ideas for the improvement of the data science curriculum system (Tan et al., 2018)[2]. Chao lemen and others used empirical research and content analysis methods to explore the current situation and problems of the construction of data science curriculum group at home and abroad, and to obtain the successful experience of teaching purpose, teaching content, and experimental links. Finally, it is found that the discussion of data science talent cultivation at home and abroad focuses on the curriculum construction, while the content of curriculum design is ignored. Therefore, in view of the wide selection of teaching content, the lack of in-depth explanation of basic theory and the single teaching method, this paper puts forward some specific solutions such as the training objectives of data science course and the overall planning of data science course chain (Chao et al., 2017)[3]. Su Rina and Yang Qin used the methods of content analysis and literature research to sort out the data science curriculum projects at home and abroad from the aspects of discipline system, curriculum content and curriculum system, so as to provide help for the domestic data science curriculum (Su and Yang, 2019)[4]. Song Hui and others introduced cutting-edge science and technology such as big data and artificial intelligence into computer

teaching, and encouraged teachers to use intelligent technologies such as pictures, voice and software to continuously innovate and improve the knowledge system of data science course for computer majors in the process of teaching activities (Song et al., 2019)[5]. Zhou Lei and others put forward the keen vision of data and curriculum, analyzed the relationship between the professional ability of graduates and the needs of social development, and designed a data science talent training system in line with students' interests and social needs, so as to make the data science curriculum system develop by leaps (Zhou et al., 2020)[6]. Gui Sisi [7]and others analyzed the data science courses on MOOC platforms at home and abroad from the three dimensions of platform construction, organization mechanism and curriculum structure.In view of the dilemma of platform, organization and curriculum structure faced by the data science course, this paper puts forward corresponding countermeasures and suggestions to strengthen the cooperation with educational institutions, enrich the sources of data science courses, and build a systematic data science curriculum system, so as to continuously improve the MOOC curriculum system of data science.

1.2 Purposes of Research

With the continuous integration of information technology and social production and life, data has become an important strategic resource in various countries.Data science plays an important driving role in many disciplines, such as art major, information management major, ideological and political major and so on. Especially in the art major, it plays the most significant role, which is the key core competitiveness of art talent training. The school sets up a reasonable data science curriculum group, integrates the data science curriculum of art major into the talent training program of Arts major, and effectively promotes the job of talent training of art major in data science. In addition, the construction of data science curriculum group can provide direction for the establishment of talent training mechanism for art majors, and then provide an effective way for art professionals to master data processing ability. Therefore, under the background of new liberal arts, exploring the construction of data science curriculum group of art major has become the focus of this research.

2. Overview of Related Concepts of Data Science Curriculum Group for Art Majors

2.1 Connotation of Data Science Curriculum Group for art Major

Data science course group of art major is an emerging discipline in the era of big data. From the perspective of knowledge system, the research on the construction of data science curriculum group for art majors is mainly based on machine learning and data visualization, which explores a knowledge system of data preprocessing, data calculation and data management for art majors. In terms of personnel training, the interdisciplinary application of statistics, programming, domain knowledge and other related disciplines is an important way to train software engineers, which is represented by drew Conway's Wien diagram (see Figure 1). In short, the data science course group of art major is a technical course to extract key knowledge from data, including data acquisition, information, knowledge, insight and wisdom(see Figure 2).

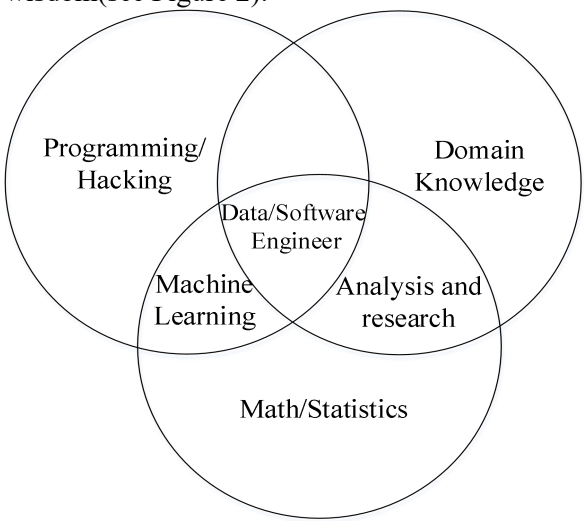

Figure 1. Drew Conway's Wien Map of Data Science

When designing the course content of data science, colleges and universities should design the course content that can meet the development needs of students of different majors and the needs of talents in different fields of society according to the teaching objectives of data science for art majors. For this reason, colleges and universities should set up courses in mathematics, statistics, computer and other fields, which are closely combined with the content of data science of art major, and set up basic courses, professional optional courses and comprehensive practice courses (see Table 1).

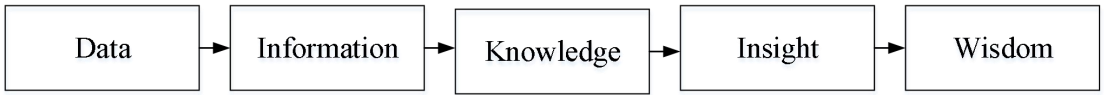

Figure 2. Knowledge Transformation of Data Science

Table 1. Curriculum Framework of Data Science for Art Majors

Key concept areas of data science course for art majors					Other disciplines
Course subjects	Fundamentals of Mathematics	Basis of calculation	Data knowledge and technology	Statistical basis	
Basic courses	Data logic	Computer principle and Application	Database technology and data mining	statistics	"Humanities courses" "Interdisciplinary optional courses"
Professional optional courses	"linear algebra" "mathematical modeling" "optimization algorithm" ...	"data structure" "computer network" "machine learning" "artificial intelligence"	"Data acquisition technology" "Big data analysis" "Advanced database" "data warehouse"	"Probability theory and mathematical statistics" "Application of multivariate statistical analysis"	
Comprehensive experiment course	"Application experiment of mathematical modeling" "Big data analysis and visualization comprehensive training" "Parallel programming training of big data technology"				

2.2 The Relationship between Data Science Curriculum Group and Art Major

On the one hand, the curriculum group of data science can innovate the ideas of curriculum construction of art major. Art major is a highly artistic discipline. The school not only requires art majors to have a deep understanding of the basic knowledge of art, but also requires students to have a unique understanding of reliefs, round sculptures and portraits, and pay attention to cultivating students' unique way of thinking. Therefore, the integration of data science curriculum group is helpful for art majors to break through the unified way of thinking in traditional professional teaching. So that colleges and universities to cultivate art professionals more targeted. On the other hand, promote the cultivation of art professionals. As an important place for personnel training, colleges and universities have successfully broken the disciplinary barriers by establishing interdisciplinary teaching and research groups and actively carrying out interdisciplinary reform of data science. Interdisciplinary learning can not only broaden the cognitive scope of art majors, but also improve the comprehensive quality of Art Majors in all aspects, laying a good foundation for colleges and universities to cultivate high-quality interdisciplinary talents.

2.3 Promote the Cross Integration of Art Major and Science and Engineering, and Promote the Cultivation of Students' Data Application Ability

The construction of data science course promotes the cross integration of art major and science and engineering major, and effectively improves students' innovative thinking ability. Under the background of new liberal arts, colleges and universities integrate data science curriculum group with art education, art research and other courses, and set up a modular talent training system for art majors, so as to form modular combination courses to meet the learning needs of students of different majors. The integration of data technology fully reflects the development status of multi-disciplinary integration, and the construction of data science curriculum group is of great significance to promote the cross integration of fine arts and science and engineering, and cultivate students' data application ability. One is to improve data thinking ability. The construction of data science curriculum group mainly focuses on the assumption, analysis and conclusion of data. Because data thinking ability and innovation ability are the core ability of students to solve problems. Colleges and universities take this as the teaching goal, and require students to have strong data integration ability and logical thinking ability. This has laid a solid foundation for the cultivation of students' data thinking ability. Second, improve the ability to solve problems. Under the background of new liberal arts, education informatization has become the

main development direction in the field of education. Data processing technology has become the ability that students must master, especially the liberal arts students like art major. Colleges and universities set up special computer practical training and data processing courses for liberal arts majors to improve the ability of art students to use data to solve problems.

3. Difficulties in the Construction of Data Science Curriculum Group for Art Majors under the Background of New Liberal Arts

3.1 Too Much Emphasis on Teachers' Professional Background

At present, in the process of teaching design, the content of data science course of art major is mainly determined by the major of teachers, not based on the needs of art professionals, which is contrary to the needs of social development. At present, statistics and machine learning are the professional fields of the teachers who carry out the data science course of art major in Colleges and universities; in the teaching process, the teachers who are majoring in statistics focus on the basic theoretical knowledge of statistics, and are used to using statistical thinking to solve problems; Teachers of machine learning major take machine learning related courses as the key teaching of the data science course Content. In the process of the construction of data science curriculum group in Colleges and universities, there is a problem that the focus of the curriculum is determined by the major of the teachers. which will lead to the design of curriculum content is not in line with the actual learning needs of students.

3.2 The course Teaching Mode is Lack of Innovation

One is the lack of diversity in teaching forms. Under the background of new liberal arts, there are some problems in the teaching form of data science course of art major, such as traditional and old, lack of diversity. Although some learning video, PPT and other material resources are introduced into the classroom teaching process, teachers still can not change the status quo of students' inattention and fragmented learning time, and it is difficult to stimulate students' learning initiative through the current single form of multimedia teaching. Second, the teaching methods are backward and lack of interaction. Under the background of new liberal arts, most liberal arts courses, including art major, are still in the stage of one-way teaching mode dominated by teachers, and lack of teacher-student interaction links, such as online learning progress management, online testing and online and offline interaction. The one-way dissemination of teaching content makes teachers unable to give timely feedback and evaluation on students' learning effect.

3.3 The Design of Curriculum System Lacks Systematicness

Under the background of new liberal arts, the teaching design of data science course for art majors is highly modular, and the course content is seriously fragmented. The main reason is the lack of systematic course knowledge system. On the one hand, the design of curriculum content is lack of systematicness. At present, when colleges and universities at home and abroad carry out data science related courses for art majors, students are required to master the basic knowledge of statistics and computer and form the ability of data processing. However, due to the lack of systematization of the data science curriculum system in Colleges and universities, teachers can not design systematic teaching content, and it is difficult to teach the data science curriculum to art majors in a more scientific way. On the other hand, textbooks and cases are lack of systematicness. At present, the education of data science course for art majors is still in its infancy. The school only carries out relevant teaching activities according to the professional needs of the school and students' ability. The content of data science course for art majors is lack of systematic teaching materials and practical cases. Most of the books and courses on Data Science in the market focus on technical operation and practical cases, and lack of systematic explanation of basic knowledge, which makes art students difficult for art majors to learn data science course without theoretical knowledge base. For example, the current domestic learning platform on the art professional data science original curriculum resources are relatively scarce, and there are similar content courses between the platforms, which is not conducive to the development and construction of our art professional data science curriculum. At the same time, there are some related teaching materials of data science course. Although they have relatively complete

theoretical knowledge, there is a lack of step-by-step practical case operation guidance content in the teaching materials, which is not in line with the requirements of computer teaching, which also increases the difficulty of the construction of data science course group for art majors.

4. Construction Strategy of Data Science Curriculum Group for Art Major under the Background of New Liberal Arts

4.1 Teaching Method Level: Strengthen the Communication and Cooperation between Domestic and Foreign Teaching Platforms, and Innovate Teaching Methods

Under the background of new liberal arts, in order to further improve the teaching effect of data science course for art majors, colleges and universities should start from the following two aspects. On the one hand, establish cooperation with foreign curriculum teaching platform. Domestic colleges and universities should actively establish cooperation with foreign teaching platforms of data science for art majors, and learn excellent teaching cases of data science. Colleges and universities should also encourage active communication between educational institutions, so that both sides can produce more high-quality educational resources under the condition of long-term good cooperation, so as to constantly enrich the teaching resources of the data science curriculum group of art major. On the other hand, we should innovate the teaching methods of data science. University teachers use mixed teaching methods to carry out the teaching practice of data science course for art majors, such as questioning method, discussion method and other teaching methods, so as to effectively improve students' interest in learning data science course. One is to establish the connection between new and old knowledge. University teachers should combine the basic content of data science course with new knowledge of art major to carry out teaching activities. In the process of teaching new knowledge, teachers can use questioning teaching method to stimulate students' thinking and guide students to gradually master the relationship between new knowledge and old knowledge. Teachers can also play the video materials related to the content of data science course for art majors to make students aware of the contact point between basic knowledge of art major and new knowledge of data science from multiple perspectives, so as to fully stimulate the interest of Art Majors in data science course. The second is to innovate the teaching form. College teachers should cultivate students' reading ability and data integration ability through various teaching methods, such as intensive reading of literature and special lectures. Under the guidance of a variety of teaching methods, students constantly break through the inherent way of thinking, and then build a new knowledge framework, and gradually form innovative thinking and innovative ability.

4.2 Organization Mechanism Level: Expand the Channel of Data science Curriculum Resources, Improve the Practicality of the Curriculum

Enrich the data science curriculum resources and ensure the quality of the curriculum. On the one hand, joint teaching with enterprises. Under the background of new liberal arts, in order to ensure the quality of data science course and the integrity of the theoretical system of art major, university teachers should closely connect with the development needs of the talent market and carry out targeted teaching activities. At the same time, university teachers should also combine the data science related courses with enterprises to carry out teaching activities, so that students can participate in the actual project operation process of enterprises, and let students quickly master the content of art professional data science courses by practicing and learning. On the other hand, the United Nations universities and industry institutions at home and abroad to teach together. When carrying out the data science course for art majors, domestic universities should strengthen cooperation with well-known universities at home and abroad, and constantly enrich the access channels of data course resources by combining online course learning with offline lectures, so that most learners can get high-quality course learning resources. Colleges and universities should strengthen cooperation with data science related industry institutions, regularly invite industry technical personnel to the school to carry out exchange meetings, share the experience of learning data science courses with students, and fully mobilize students' learning enthusiasm. Colleges and universities can also set up training classes, hire enterprise data technology training

personnel, and provide students with career oriented courses on data science, so as to fully connect the talent training of art professional data science with the market demand.

4.3 Curriculum Structure: Improve the Data Science Curriculum System, Clear the Direction of Curriculum Research

Data science curriculum system mainly includes three stages of learning content, which are primary, intermediate and advanced data science curriculum content. In order to make the curriculum system more perfect, universities and relevant educational institutions should start with the curriculum system and curriculum research direction to further improve the curriculum system of data science for art major. From the perspective of curriculum system. One is to set up a curriculum system in line with the actual development situation in China. Data science courses play different roles under the influence of different regional systems, cultures and other factors. Chinese universities can learn from foreign experience in the construction of data science courses, and establish a data science course system with Chinese characteristics for art majors according to the learning habits and needs of Chinese learners. For example, on the basis of routine and special data science courses in foreign countries, China should add domestic in class mode and independent mode, organically combine domestic and foreign teaching modes, and form a data science curriculum system consistent with the talent training objectives of domestic data science courses. Second, improve the content of intermediate data science course. Intermediate course is the key to the transition from low-level course to high-level course. In order to smoothly upgrade the data science course of art major from low-level course to high-level course, teachers should take intermediate course as the key teaching content. Teachers should also increase the breadth and depth of data science courses for intermediate art majors, and increase the proportion of intermediate courses, so as to constantly enrich the content of intermediate data science courses. From the perspective of curriculum research direction. First, at the university level, colleges and universities should determine the main learning mode of data science course for art majors, take learning video as the main presentation form of data science course resources for art majors, and integrate it into the case inquiry link, so that students can learn with specific cases. Second, at the teacher level, teachers should give timely learning feedback based on students' inquiry results, so that students can quickly improve their learning effect in continuous reflection and summary. In addition, teachers should also lead students to pay close attention to the frontier information of the information industry, deeply study the domestic market information post talent demand and specific talent requirements, and clarify the research direction of data science course for art majors according to the current industry development trend, so as to provide the correct goal for the cultivation of professional data science research talents.

5. Conclusion

With the rapid development of information technology, data has increasingly become an important strategic resource of the country. Effective organization and utilization of data plays an important role in promoting national economic development and social progress. In the context of new liberal arts, data science has become an important subject in the field of big data, and data science has also become the key content of new liberal arts talents training. The cross integration of art major and science and engineering, constantly enrich the construction of data science course of Art Major Based on new liberal arts, effectively improve the data science thinking and operation ability of art major students, and cultivate high-quality big data talents.

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