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A Study on the Current Situation and Construction Path of MOOC Resources in the Training of Master of Statistics

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Abstract: *The current situation and construction path of MOOCs in the training of master's degree in statistics are the hot spots of the current education reform. First of all, the problems faced by the training of master's degree in statistics include weak professional foundation and single teaching methods. Further quantitative analysis of the current situation of digital intelligence MOOC resources shows that although the resources of digital intelligence MOOCs at the undergraduate level are abundant, the number of courses at the graduate level is obviously insufficient, the course resources are scattered and lack systematization, and there is a lack of mature online degree programs in digital intelligence. In order to solve these problems, this paper proposes the construction path of digital intelligence MOOC in the master's degree training of statistics, including clarifying the training objectives and course positioning, optimizing the course structure and content, strengthening the integration and systematization of curriculum resources, promoting the development of online degree programs, and promoting the deep integration of industry, academia, research and application. The implementation of these measures aims to improve the quality of master's degree training in statistics and promote the reform of statistics teaching.*

Keywords: *statistics, Master's Degree Training, digital intelligence MOOCs, analysis of the current situation, Construction paths*

1. Introduction

With the rapid development of informatization, digitization and intelligence, statistics plays an important role in many fields such as natural sciences, social sciences, and engineering technology as a scientific method for processing and analyzing data. As a key stage in cultivating high-level statistical talents, the teaching quality and effect of the master's degree in statistics are directly related to students' future academic research and career development. However, there are still many problems in the current master's training of statistics, such as the weak professional foundation of interdisciplinary students, the single teaching method, and the insufficient practical application. MOOCs are considered to be one of the top 10 pedagogies that elevate education to an unprecedented level and are considered to be an excellent medium for promoting higher statistical education[1]. As an emerging teaching model, MOOCs are gradually becoming an important supplement to the field of higher education due to their flexibility, openness and abundant resources. Therefore, it is of great significance to explore the current situation and construction path of MOOCs in the training of master's degree in statistics, so as to promote the teaching reform of statistics and improve the quality of master's training in statistics.

2. Analysis of the Problems Existing in the Training of Master of Statistics

Master of statistics includes master of statistics and master of applied statistics. In order to meet the demand for data analysis talents in China's big data strategy, the Ministry of Education has expanded the enrollment scale of applied statistics majors. As of 2023, there are 188 colleges and universities in China that recruit applied statistics majors[2]. The expansion of talent scale brings challenges to the training of master of statistics. Firstly, there is no obvious difference between professional masters and academic masters in training objectives, curriculum, teaching methods and employment orientation. Although there are differences between the two types of master's programs, the Master of Applied Statistics only replaces some of the theoretical courses with practical or industry-related courses.[3]Students believe that there is

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no significant difference between the two training models.[4] Secondly, interdisciplinary graduate students are weaker than non-interdisciplinary graduate students in terms of professional foundation, the main reason may be that interdisciplinary graduate students have not undergone systematic professional learning, and they are indeed weaker than non-interdisciplinary graduate students in terms of professional basic knowledge and professional basic skills[5]. Third, the curriculum structure is incomplete. Postgraduate education is a higher level of higher education, to master the knowledge of the professional field, so the curriculum structure should be set up reasonably. In fact, this is not the case. Whether it is a two-year or three-year course, the course is generally studied in the first year. Taking the curriculum structure of master's degree of statistics and applied statistics in a university as an example, the basic courses, compulsory courses and elective courses account for about 56% of the total credits. The professional curriculum is relatively limited, which weakens students 'research on the knowledge of discipline and professional field.

3. Analysis of the current situation of digital intelligence class MOOC resources

In recent years, MOOC has developed rapidly on a global scale. According to relevant data, by the end of 2023, more than 100,000 courses have been launched on the global Mu class platform, with more than 500 million registered users and billions of students. Among them, China ranks among the top in the world in terms of the number of MOOC classes and the number of students, becoming an important force to promote the development of MOOC in the world. At the Education Change Summit held by the United Nations in September 2022, it was mentioned that lifelong learning capabilities, including digital skills, should be developed for all, digital skills should be integrated into student learning goals, curricula and planning, digital capacity-building should be strengthened, and digital skills gaps should be narrowed. Digital intelligence class MOOCs resources play a vital role in achieving this goal. At present, there is no clear definition of the scope of digital intelligence courses. Based on a large number of literature, this paper determines that statistics courses, artificial intelligence courses and big data courses are collectively referred to as digital intelligence courses. In order to quantitatively analyze the current situation of digital intelligence MOOC resources, this paper selects the main MOOC platforms at home and abroad to analyze the digital intelligence MOOC offered. The domestic MOOC platform mainly refers to the national higher education wisdom education platform (www.chinaooc.com.cn), and the foreign MOOC platform selects the three giants of the international MOOC industry: Coursera, edX and Udacity[6].

3.1. Abundant Math and Intelligence Courses at Undergraduate Level, Insufficient Number of Graduate Courses

The number and application scale of MOOC in China have ranked first in the world. The rich and diverse MOOC resources not only provide more choices for learners, but also lay a foundation for micro-majors, nano-degrees, online degree programs and mixed teaching in schools. However, due to the nature of courses, audience and market demand, a large number of courses have repeated construction. As shown in Table 1, some basic courses such as probability theory, data structure, JAVA programming, Python programming, statistics, econometrics and so on are largely duplicated, while professional courses such as reliability analysis, non-parametric statistics, probability limit theory and measurement theory have no curriculum resources. At the same time, the resources of mathematics and intelligence courses are mainly undergraduate courses, and there are only a few professional courses suitable for graduate students, such as advanced econometrics, advanced operations research, stochastic process, natural language processing, etc. This can satisfy the basic study of interdisciplinary graduate students, but it cannot satisfy the study of graduate students who need to improve their professional level.

Table 1: MOOC courses for digital intelligence courses in China

Course name	Number of courses	Course name	Number of courses	Course name	Number of courses
Probability Theory	116	Computer Graphics	6	Intelligent Product Design	1
Data Structure	100	Introduction to Data Science	6	Introduction to Robotics	1
JAVA programming	49	Ordinary Differential Equations	5	Intelligent Robot System	1
Python Programming	35	Machine Learning (Postgraduate)	5	Introduction to Information Security	1

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Statistics	33	Mathematical Statistics (Postgraduate)	5	Set Theory and Graph Theory	1
Econometrics	29	Stochastic Processes	4	Quantum Information	1
Discrete Mathematics	28	Information Theory	4	Linguistic Statistical Analysis	1
Database system	26	Regression Analysis	3	Optimization Theory and Method	1
Operations Research	21	Biostatistics	3	Neural Network Theory and Application (Postgraduate)	1
Digital Image Processing	21	Advanced Econometrics (Postgraduate)	3	Natural Language Processing (Postgraduate)	1
Machine learning	18	Statistical Prediction and Decision-making	2	Modern optimization methods(Postgraduate)	1
Data Mining	18	Functional Analysis	2	Intermediate Operations Research (Postgraduate)	1
Fundamentals of Artificial Intelligence	18	Statistical Models	2	Advanced Operations Research(Postgraduate)	1
Complex Functions	14	Actuarial Science	2	Advanced Database System	1
Algorithm Design and Analysis	12	Introduction to Programming Languages	2	Reliability Analysis	0
Digital logic design	12	Data visualization (Postgraduate)	2	Non-parametric statistics	0
Calculation method	11	Stochastic Process (Postgraduate)	2	Probability Limit theory	0
Mathematical Statistics	9	Statistical Calculations and Software	1	Measurement Theory	0
Virtual Reality	9	Sample Survey	1	Advanced Data Structure and Algorithm Analysis	0
Data visualization	8	Attribute data analysis	1	Artificial intelligence chip and System	0
Medical Statistics (Postgraduate)	8	Cognitive Neuroscience	1	Introduction to Parallel and Distributed Computing	0
Multivariate statistical analysis	7	Ethics of Artificial Intelligence	1	Principles of Parallel Programming	0
Experimental design	7	Intelligent Vision	1	Quantum Computing	0
Artificial Intelligence (Postgraduate)	7	Information Collection	1	Parallel Algorithm	0
Time series analysis	6	Interaction Design	1	Intensive Learning	0

3.2. The resources of mathematics and intelligence courses are scattered and not systematized

Although the curriculum resources of mathematics and intelligence are rich, the construction is scattered and there is no overall planning. There is no corresponding curriculum resource recommendation and learning path planning for learners 'learning goals, and there is also a lack of online degree projects. MOOC platforms such as Coursera, FutureLearn, and Udacity design learning path planning services. The service automatically customizes a set of coherent learning paths covering multiple courses similar to professional education plans based on information such as career aspirations and learning drivers filled out by learners. For example, if a learner sets a career goal of Data Scientist on Coursera, the system will generate a learning path for them[7]. Learners 'learning experience on MOOC platform is no longer a series of scattered courses, but woven into a clear learning path. This shift is

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beneficial to enhance learners 'learning efficiency, optimize learning experience, and promote career progress.

3.3. Lack of mature digital intelligence online degree programs

Digital intelligence online degree programs include statistics, data science, artificial intelligence and other related online degree programs. Coursera, edX and Udacity, the three giants of the international MOOC industry, offer a large number of online degree programs, including bachelor's and master's degree programs in computer and information science, machine learning and data science, and applied data analytics. Coursera's Master of Applied Data Science program, for example, offers 27 courses and three integrated practices, and learners are expected to complete 34 credits. It can be seen from Table 1 that, except for a few elective courses, China already has most of the core curriculum resources of intelligence. China already has the resource base to carry out most intellectual bachelor's degree programs, but it cannot support the development of graduate professional degree programs.

4. The construction path of mathematical intelligence courses in the training of master's degree in statistics

4.1. Clarify the training objectives and curriculum orientation, and lay a solid foundation

On the one hand, refine the training objectives. The training goal of master of statistics discipline should clearly distinguish academic master and professional master. Academic masters should focus on theoretical research and mastery of scientific methodology, and cultivate talents with a profound theoretical foundation in statistics and independent scientific research capabilities; while professional masters should pay more attention to practical application and industry integration, and cultivate talents who can use statistical knowledge to solve practical problems. Applied talents. Second, precise course positioning. On the basis of clear training objectives, the number of intellectual classes should be accurately positioned. On the other hand, ensure that the curriculum can not only meet the in-depth needs of academic research, covering the cutting-edge theory, methodology and research methods of statistics; on the other hand, it should also meet the breadth requirements of practical application, including practical skills such as data analysis technology, machine learning algorithm, big data analysis platform application, etc.

4.2. Optimize the curriculum structure and content and construct a complete system

In view of the incomplete curriculum structure, we should increase the proportion of mathematics and intelligence courses in master's training programs. Especially for advanced courses at graduate level, such as advanced statistics, machine learning algorithms, big data analysis, data visualization, etc., to meet the deep needs of graduate students for professional knowledge. Interdisciplinary graduate students are relatively weak in professional foundation, so interdisciplinary courses should be set up, such as mathematics foundation, computer science foundation, economics principle, etc., to provide systematic professional basic knowledge supplement for interdisciplinary graduate students. According to market demand and industry dynamics, constantly update the content of digital intelligence class. Introducing the latest research results, technical methods and application cases to ensure the timeliness and practicality of the course. At the same time, teachers are encouraged to jointly develop curriculum content with enterprises, research institutions and other cooperative units to realize the deep integration of production, learning and research.

4.3. Strengthen the integration and systematization of curriculum resources to improve learning efficiency

First of all, build a unified Mu class platform. Through the construction of a unified Mu course platform or alliance, the sharing and mutual recognition of digital intelligence course resources can be realized. The platform should provide rich curriculum resources, personalized learning path planning, online communication and interaction, etc. to provide learners with convenient and efficient learning experience. Second, personalized course resources are recommended. Based on learners 'career aspirations, learning drivers and other information, personalized curriculum resource recommendation and learning path planning services are provided[8]. Intelligent algorithms analyze learners 'learning behavior and interest preferences, recommend course resources and learning paths that meet their needs,

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and improve learning efficiency and learning experience. Finally, curriculum systematization construction. Strengthen the systematic construction of mathematics and intelligence courses. According to the logical relationship between courses and learning order, a complete curriculum system and learning path are constructed. At the same time, attention should be paid to the connection and complementarity between courses to ensure that learners can systematically master mathematical knowledge and skills.

4.4. Promote the development of online degree programs and broaden learning channels

Draw lessons from the successful experience of the international MOOC platform and promote the development of digital intelligence online degree programs. By integrating high-quality curriculum resources and constructing a complete curriculum system and learning evaluation system, it provides all-round learning support for learners from undergraduate to graduate students. Especially for professional masters, a series of online degree programs can be developed that are closely integrated with industry needs, such as master of data science, master of artificial intelligence, etc. At the same time, promote the certification and credit mutual recognition of digital intelligence online degree programs[9]. Cooperate with well-known universities, research institutions and enterprises at home and abroad to jointly develop certification standards and credit mutual recognition mechanisms for online degree programs[10]. Improve social recognition and application value of online degree programs through accreditation and credit mutual recognition.

4.5. Promote the deep integration of production, learning and research, and enhance the application value

Encourage enterprises, research institutions and other cooperative units to jointly develop digital intelligence courses with universities. By introducing the actual needs of enterprises and technical application cases, the course content is closer to the actual application scenarios and industry needs. At the same time, through school-enterprise cooperation to develop courses, promote the deep integration and collaborative innovation of production, learning and application. Establish practice training bases with well-known enterprises, research institutions and other cooperative units to provide practical opportunities and internship positions for learners. Through practical training, learners can deeply understand industry needs and technology application scenarios, and improve practical ability and comprehensive quality. Encourage learners to participate in innovative entrepreneurial activities. By providing innovative entrepreneurship guidance, financial support, entrepreneurship incubation and other services, learners 'enthusiasm for innovation and entrepreneurship and practical ability are stimulated. At the same time, through innovation and entrepreneurship activities, promote the transformation and application of the achievements of digital intelligence classes, and enhance the social influence and application value of digital intelligence classes.

5. Conclusions

The current situation of MOOC courses in the training of master's degrees in statistics and its construction path are of great significance to promote the reform of statistics teaching and improve the quality of master's degree training in statistics. Facing the current problems in the training of master's degrees in statistics, such as weak professional foundation, single teaching methods, and insufficient practical application, we should make full use of the advantages of MOOC resources, clarify training goals and curriculum positioning, optimize curriculum structure and content, strengthen the integration and systematization of curriculum resources, and promote online degree programs.And promote the in-depth integration of industry, university and research. Through the implementation of these measures, it can provide more high-quality, efficient and practical learning resources and learning paths for masters in statistics, and help them in their future academic research and professional development. At the same time, we should continue to explore and innovate the construction and application model of Mu curriculum resources to meet the development of the times and the needs of society. I believe that in the near future, Mu courses in the training of master's degrees in statistics will play a more important role and contribute more to the cultivation of high-level statistical talents.

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References

[1] MEET R K，KALA D. Trends and Future Prospects in MOOC Researches: A Systematic Literature Review 2013-2020[J]. Contemporary educational technology, 2021, 13(3): ep312.
[2] Xu Jianfeng. Analysis on the consistency between the master's program in applied statistics and the employment needs of Internet enterprises[D].Central China Normal University, 2022. DOI:10.27159/d.cnki.ghzsu.2022.001924.
[3] Li Gang, Wang Taorui. Comparative analysis of talent training programs for master's degree students in applied statistics in China and the United States[J]. Education Modernization, 2019, 6(85): 17-20. DOI:10.16541/j.cnki.2095-8420.2019.85.008.
[4] Zhu Zhichuan, Jiang Ben, Wang Dehui. Investigation and Analysis of Master's Degree Training in Applied Statistics for Big Data [J]. Journal of Jilin Provincial College of Education, 2024, 40 (08): 136-141.
[5] Song Junlong, Li Hongyan. The Role of MOOCs in the Training of Master's Degree Students in Characteristic Majors in Local Colleges and Universities [J]. Education and Teaching Forum, 2018, (06): 162-163.
[6] Yin Zhengjie. Research on the construction of MOOC course for graduate education[J].China Management Informatization, 2016, 19(13):240-242.
[7] Han Song, Meng Shengwang. Research on the Current Situation and Development Countermeasures of MOOC in China from the Perspective of Curriculum System [J]. University Education, 2024, (20): 17-22.
[8] Wang Li. A preliminary study on graduate education reform from the perspective of "MOOC"[J]. Asia-Pacific Education,2015,(05):46.DOI:10.16550/j.cnki.2095-9214.2015.05.039.
[9] Zhu Haibin. Research on the strategy of introducing MOOC in full-time professional master's teaching[D]. Bohai University,2017.
[10] LIU Anran. A comparative study of MOOCs in Chinese and American universities: A case study of "Chinese University MOOC" and Coursera[J]. Higher Education Exploration,2021,(09):88-94.