

Research on the Talent Cultivation Model of Economic Statistics Major in Finance and Economics Universities under the Background of Big Data

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Abstract: *Cultivating students' professional competence in economic statistics and tapping into their potential for data analysis is a direction that statistical educators in universities are constantly exploring. This article fully recognizes the problems that exist in the training process of economic statistics major in Chinese universities of finance and economics, and proposes reform suggestions for the talent training of this major. It is necessary to optimize the curriculum system and score evaluation standards, cultivate backbone teachers, improve the teaching management system, strengthen the cultivation of teaching and internship bases, and allocate teaching resources well to promote new teaching concepts.*

Keywords: *Economic statistics major; Talent cultivation model; Finance and Economics universities; Big data*

1. Introduction

The talent cultivation mode of universities involves educational ideas, training objectives, training content, training methods, training processes, management and evaluation systems, and others. The main idea is "what kind of people to be cultivated" and "how to cultivate students"^[1]. Talent cultivation, as a fundamental function of universities, has always received widespread attention from academia and society. The reform of talent cultivation mode is an urgent requirement for the development of higher education. It is related to the improvement of talent cultivation quality, which directly affects the connotation and development of higher education.

The statistics major in China was also established in 1938, with a history of 66 years. Since 2013, the first-class discipline of statistics in Chinese universities has been divided into three majors: statistics, applied statistics, and economic statistics. The major of economic statistics focuses on economic data as its research object, including the collection, generation, and transmission of economic data. It uses statistical methods to analyze the complex economic systems and their inherent laws behind economic data, thereby serving economic and management decision-making. It is commonly offered in finance and economics universities. With the rapid development of the Internet, the Internet of Things, cloud computing, we have the opportunity to access massive data. The arrival of the big data era has put forward more practical requirements for China's statistics education, and the reform of talent cultivation mode has become a problem that current university education must face.

The characteristics of big data include a large amount of data, fast data growth rate, complex data types and structures, and low value density of data^[2]. Financial, commercial and other economic big data are widely used, and talent education in economic statistics major should adapt to the development of the times and meet the needs of social applications.

2. Problems encountered in the talent cultivation of economic statistics major in financial and economic universities

The economic statistics major aims to cultivate comprehensive talents in "economy + statistics". Students in this major are required to have an understanding of economic theories, as well as proficiency in relevant statistical tools and methods, and be able to apply the statistical methods to solve practical economic and social problems. Specifically, the talents we hope to cultivate have the following characteristics: (1) Being able to adapt to the needs of socialist market economy and information society

construction, with comprehensively development in morality, intelligence, physical fitness, and aesthetics, and are professional talents with good qualities in economic management, mathematics, and economic statistics. (2) Capable of mastering modern statistical techniques and quantitative analysis methods, possessing strong computer application abilities, and being a high-quality professional with the ability to discover and analyze problems. (3) They are high-quality professional talents with the ability of statistical investigation, data mining, market forecasting, and economic accounting. (4) They are high-quality professional talents with the ability to engage in quantitative analysis work in financial institutions, industrial and commercial enterprises, and government departments; (5) In the context of the big data era, they are professional talents with cloud data processing and analysis capabilities.

However, there are key issues in the education of economic statistics in Chinese universities.

2.1. The curriculum is not highly targeted and lacks background knowledge expansion

Since the discipline of statistics has been subdivided into three majors, many universities have not grasped the differences between the three majors very well, and there may be a lack of differences in the curriculum of talent cultivation. Especially in finance and economics universities, some may believe that economic statistics mainly focuses on applying statistical methods to economic data analysis, and does not require too much statistical theoretical foundation. Therefore, the curriculum does not require students to have a strong mathematical foundation. However, some universities may believe that economic statistics needs to focus more on the theoretical foundation of statistics, and therefore allocate a large amount of class time to learning theory, neglecting students' practical abilities. Some universities only focus on practical statistical skills and vigorously cultivate students' statistical software skills, while neglecting the statistical theoretical foundation and big data related courses required for statistical analysis software.

2.2. Lack of systematicity and completeness in experimental and practical teaching

The era of big data requires specialized talents who can filter useful information from a large amount of data and determine statistical law. However, in the current training system of most financial and economic universities, it may still be limited to the previous perspective, such as overemphasizing sampling methods, or using only a small amount of data for students to practice in case studies or course exercises, and the use of software is not diverse enough. The role of laboratories has not yet been fully realized, and many are only used for student classes without being open to serving society. The cooperation between laboratories and social enterprises and institutions needs to be further expanded, resulting in lagging behind the pace of social development and digital transformation.

2.3. Insufficient ability of students to write data analysis reports

Students majoring in economic statistics not only need to be able to conduct empirical analysis of data, but also need to summarize statistical rules based on the results provided by statistical software and statistical method, obtain general conclusions, and present them in the form of data analysis reports. However, the reality may be that when designing lessons, there is a greater emphasis on introducing the principles of statistical analysis methods and interpreting software output results, with little training on how to further write analysis reports and policy recommendations from these outputs. Exploring the reasons for this is, on the one hand, because students majoring in economic statistics not only need to master the knowledge of economic statistics, but also need to master the background knowledge of the research object, which may even be knowledge of another major. On the other hand, because scientific research is a continuous and standardized work, and a brief introduction from one or several courses alone will not achieve results.

2.4. The revision of talent cultivation plan lacks suggestions from departments with actual talent needs

When revising the talent cultivation plans, many universities focus on discussions among teachers and learning from the practices of other universities, rather than listening to expert opinions from actual statistical departments. Some do hold several expert discussions when revising, but these expert opinions mostly come from various universities and lack practical guidance from special work departments, making it difficult to truly understand social needs^[3]. Production and education cannot be separated. Only by quickly understanding what kind of economic statistics professionals are needed in society can universities adjust their teaching plans in a timely manner to meet the needs. At the same time,

universities also need to design in advance what kind of economic statistics analysis talents can provide society, and strive to make students become important talents in this field as soon as they graduate.

3. Reform measures for the talent cultivate mode of economic statistics major

3.1. Optimize the professional curriculum system and performance evaluation standards

When reforming the curriculum system, the idea of "people-oriented" should be reflected, and a "2+2" training plan can be implemented, which lays the foundation for freshmen and sophomores, and starting from the third year, students should be classified into theoretical and applied talents according to their abilities and interests for classified training.

It's best to increase the number of basic math courses and change the content of computer courses to lay a solid foundation for the study of economic statistics. Considering the special requirements for mathematical foundations in the field of economic statistics, in order to provide students with a solid mathematical foundation in their subsequent studies, we suggest changing the commonly used "Calculus I/II" in finance and economics universities to "Advanced Mathematics I/II", and increasing the class hours from five to six hours per week.

To effectively improve the computer application and programming abilities of students majoring in economic statistics, a computer teaching reform plan has been proposed. In the first semester, reduce the time spent on explaining Office software in class, allow students to personally operate on the computer, and incorporate content on "VB programming". In the second semester, we will offer database languages, data structures, and SQL Server. Enable students to have a macro understanding of the current situation of database applications and develop database systems.

Special attention is paid to the systematic learning of statistical methods in curriculum reform. Taking the courses of Economic Statistics at Nanjing University of Finance and Economics as an example, we have changed the original mode of focusing on "Principles of Statistics" to focus on "Probability Theory and Mathematical Statistics" as the core basic course, and added a series of professional courses that extend mathematical statistics, such as "Time Series Analysis", "Statistical Predictive Decision", and "Sampling Survey". Provide sufficient time guarantee for the core basic courses, and the total class hours of Probability Theory and Mathematical Statistics reached 90 hours. In the reform, both addition and subtraction were used: for example, the 72-hour Input-output Analysis course was removed and placed in National Economic Statistics course, with only 7 hours. The teaching of professional courses has shifted from detailed and thorough teaching method to a precise and selective teaching method. By promoting online courses and minimizing in class learning hours without sacrificing teaching requirements, students can increase their independent learning and practice outside of class.

The curriculum should emphasize differentiation, which teach students in accordance with their aptitude, and carry out stratified teaching based on individual needs. Provide different "menus" for different students and conduct differentiated teaching according to the situation. For students who want to pursue graduate studies, the courses arranged focus on theoretical foundations, methodological principles, and subject research. In elective courses, "Intermediate Microeconomics", "Intermediate Macroeconomics", and "Special Research in Economic Mathematics" are offered; For students who directly enter the job market after graduation, the arranged courses focus on the practicality of professional knowledge and skills, and emphasize the cultivation of knowledge transfer ability in teaching. In order to improve employment levels, bilingual courses can be offered.

The design of the course should focus on practice, allowing students to transition from "learning" to "knowing how to use". Statistics involves a large amount of data processing and analysis, so the design of all professional courses emphasizes computer operation and internship. For employment industries where student is relatively concentrated, elective courses are offered, such as Modern Business Statistics, Modern Financial Statistics, and Modern Industrial Statistics, which not only clarifies the internship content in the teaching plan, but also requires students to engage in practical exercises outside of class. Based on the employment tendencies of students majoring in economic statistics, design application course modules in classroom teaching, with practical activities as prescribed content, so that students have the opportunity to experience the entire process from collecting data, organizing data, analyzing data, and writing statistical analysis reports. There are no mandatory regulations on the statistical analysis software used in the course, allowing students to have full access to various software and laying a foundation for their statistical expertise in different software environments in the future.

We also need to improve performance evaluation standards. To assess students' true talents and practical learning, the course assessment methods must be adjusted accordingly. The course assessment should run through the entire semester, and the proportion of daily performance should be increased. The assessment of daily performance focuses on classroom answers, group presentations, homework assignments, group discussions, experimental reports, papers, etc. For each assessment, the teacher provides specific scoring rules. Through various daily performance assessment stages, cultivate students' ability to independently analyze and solve problems, comprehensively expand and apply their knowledge, and collaborate with teams.

3.2. Explore talent growth paths, attach importance to the training of backbone teachers, and improve teaching management systems

Teaching staff is an important support for talent cultivation. The major of economic statistics needs to always adhere to an open policy and build a high-level, complementary learning resources and reasonable age structure teaching team. Fully consider academic expertise, age factors, and source factors, and plan to introduce outstanding personnel to enrich the teaching staff. At the same time, we increase efforts to introduce outstanding overseas talents with international backgrounds, hire foreign experts and scholars, while understanding the forefront of foreign disciplines and majors, enrich the teaching content of our professional curriculum system, and provide space for practical teaching while driving the extension of discipline direction. Every year, there is a planned arrangement for backbone teachers to visit or study abroad, learning advanced teaching concepts and frontier professional knowledge from famous universities. And encourage and support teachers to actively participate in international and domestic academic conferences. In order to promote the growth of young backbone teachers, they are responsible for some parts of the national and provincial science fund projects undertaken by this discipline. By boldly utilizing the talents of young teachers, inviting old teachers to help new teachers, and providing appropriate support, backbone teachers can quickly grow into academic leaders in the field of statistics.

Teacher job training and process control should be organically integration. Teaching quality is the soul of talent cultivation, and a sound teaching quality assurance system needs to be achieved through strict teaching management systems. Every teacher who undertakes the teaching task of economic statistics courses should undergo strict pre-job and job training, and create conditions for teachers to learn new teaching methods and means through backbone teacher training, conference exchanges, company training, and other channels. On the one hand, the teacher firmly establishes a clear sense of job responsibility, and on the other hand, fully possesses the ideological quality and professional level to undertake professional course teaching.

In order to control the quality of the teaching process, each college and department in the university establish a dedicated teaching supervision group, composed of experienced professors, responsible for planning the teaching system and curriculum system, regularly conducting discussions of teaching plans and course content, and comprehensively guiding professional construction and development. The department head is responsible for daily teaching management and regularly checks the implementation of teaching tasks. Establish a constraint mechanism to allow professors and PhDs with first-class academic level to teach undergraduate students.

3.3. Cultivating high-quality teaching bases

The old talent cultivation model needs to be reformed, and the goal of talent cultivation in economic statistics has been determined to comprehensively improve the comprehensive quality of students. Starting from the aspects of students' humanities and social science literacy, natural science literacy, adaptability, innovation ability, and sustainable development ability, the quality standards for talent cultivation need to be revised, and a talent training approach that solidifies professional foundation, expands knowledge scope, teaches according to individual needs, and classifies training should be established. Teachers majoring in economic statistics engage in both scientific research and teaching, naturally integrating the spirit of exploring science and the latest achievements of projects into their teaching work. Through these teachers' guidance on students' papers, more students will participate in some of the research projects, greatly improving the quality and academic level of students' papers.

Introduce an undergraduate mentor system, and innovate the undergraduate thesis guidance system. Select professors and PhDs with high professional ethics and outstanding teaching and research achievements as academic mentors for students, providing communication and guidance in terms of

ideology, learning, life, sentiment, interests, and interpersonal communication. In order to fully leverage the guiding role of teachers in the process of student development, enable teachers to better tailor their teaching to students, and help students grow comprehensively, a mentor is provided for each undergraduate student. Undergraduate supervisors are mainly composed of young and middle-aged teachers who are responsible for their work and have strong teaching and research abilities, as well as senior professors. Introduce a graduate teaching assistant system, implementing a teaching method that combines teaching and tutoring, effectively improving teaching effectiveness. In response to the common situation where graduates are busy searching for jobs during the stage of writing their graduation thesis, which affects the quality of their papers, the Economic Statistics major can determine the thesis supervisor in advance for students after they advance from sophomore to junior year. Through the initial selection of graduation thesis topics, students can enter the process of writing papers as early as possible, thus forming a "three in one" continuous scientific research process of graduation thesis, academic year thesis, and literature review under the guidance of mentors, effectively ensuring the quality of papers.

The curriculum system requires systematic content, inheriting the reasonable parts of the old curriculum system and absorbing fresh knowledge according to the needs of talent cultivation. Experts review the teaching outline of each course, and coordinate which courses are responsible for explaining the principles and which courses only focus on application, so that the knowledge points in the curriculum system are not repeated or missed. The effectiveness of the curriculum system will inevitably be achieved through courses, and each course has a dedicated person responsible for formulating its construction plan, and organizing a course construction team for important courses. In addition, we need master modern information technology, build a web-based resource platform for this major, fully utilize the school's "online teaching" space, and through the transmission mechanism of teacher-student interaction, ultimately enable students to improve their research and innovation abilities, practical skills, and other aspects.

We can offer subject introduction courses to introduce the role, characteristics, employment prospects, research directions, strengths, and achievements of our major, enhance students' professional pride, consolidating professional thinking, and establishing confidence in learning the major well. Fully embodying the principle of "people-oriented", starting from the third grade, students will be trained according to their abilities and interests, and classified according to their theoretical and applied abilities.

Adopting the approach of "going out and inviting in", further strengthening the connection with existing teaching practice bases, and allowing students to participate in practical activities to the best of their ability in their spare time. At the same time, teachers are encouraged to involve students in various applied research projects and strengthen the integration of industry, academia, and research in talent cultivation.

Through the collaboration between universities, government, and enterprise, the theoretical teaching and practical work can be organically combined, and a talent training program for economic statistics can be formulated according to the needs of the industry, which can effectively improve students' statistical abilities. When revising talent training programs, it is also necessary to delve into relevant industries and enterprises, listen to the suggestions and opinions of relevant experts on talent training programs, and focus on improving students' practical entrepreneurial abilities. Collaborate on various aspects of basic courses to enhance the applicability of training methods and cultivate students' social service abilities.

3.4. Planning and allocate teaching resources, promoting new teaching concepts and methods

On the basis of the original resource platform for the curriculum system of economic statistics, we build a shared resource system with practical teaching as the main line from both vertical and horizontal aspects. Horizontally, we have planned to design several main courses into a web-based teaching resource library to facilitate teacher teaching and student learning; Vertically, we provide data, tools, and methods to cultivate students' practical abilities. By introducing the research projects of teachers and the hot topics recommended by teachers, a two-way selection method is adopted to involve some students in various levels and types of research projects of teachers, ultimately improving the communication channels between teachers and students, and realizing the teaching model of "teacher led, student centered, and interactive teaching and learning".

We need to change the outdated teaching methods that were filled with lectures in the past, fully introduce self-directed learning, research-based learning, and cooperative learning, and fully mobilize students' learning enthusiasm. We need to use modern educational technology to change traditional

teaching methods, promote online courses, innovate teaching content and curriculum system, and supplement them by vivid, delicate, and rich multimedia methods, fundamentally changing the dull teaching mode of economic statistics, and mobilizing students' enthusiasm, initiative, and creativity in learning.

We need to establish a long-term mechanism with the goal of reforming practical teaching methods and means, and improve students' comprehensive quality. Implementing the PBL (Problem Based Learning) teaching model can stimulate students' interest and enthusiasm for learning [4]. The PBL teaching model breaks the boundaries between disciplines, based on practical problems, student-centered, teacher guided, and student self-directed learning. This model is conducive to cultivating students' innovation ability, improving their practical ability, and exploring the creative potential of teachers themselves. Carrying out case teaching methods can improve students' problem-solving abilities. Case teaching method is a comprehensive and practical training method. By analyzing and explaining typical cases, it can deepen the understanding and recognition of basic theoretical knowledge, and also exercise the ability to think independently, analyze and solve problems. Opening laboratories can guide students to use the experimental manual correctly. We will focus on "actual problem scenarios", "economic statistics simulation experiments", and "social practice activities" to study how to provide a good platform with statistical and economic professional characteristics to transform students' theoretical knowledge into practical abilities. Organize teachers to write corresponding experimental manuals based on the curriculum, guiding students to learn independently and cultivating their learning abilities.

The teaching method can be combined online and offline, using online teaching platforms such as Xuexitong, Yuketang etc. Teachers place course knowledge on the platform, assign tasks for early learning, and only provide guidance on the difficult points and key points of learning in the classroom. Classroom time is mainly used for discussion and practical operations. In terms of teaching methods, multimedia and other means can be used, and the dual teacher teaching method is also a recommended teaching method. Firstly, it changes the traditional one person teaching method, allowing students to have more freshness. Secondly, two teachers can use their respective expertise in the classroom to make the classroom content more efficient.

In the teaching process of economic statistics, a portion of knowledge can be left for students to self-study, improve their self-learning ability, connect theoretical knowledge with practical operations, improve their hands-on ability, and gradually enable students to move from "learning" to "knowing", and from "knowing" to "using".

4. Conclusions

Starting from the training objectives of undergraduate talents in economic statistics major in financial and economic universities, and combined with the needs of statistical talents in the era of big data, this paper explores the reform of talent training models from the following aspects. (1) Optimize the professional curriculum system, emphasize differentiation in teaching, and implement differentiated teaching according to individual needs. Emphasize practice in teaching, allowing students to transition from "learning" to "knowing how to use", and improve performance evaluation standards. (2) Pay attention to the cultivation of backbone teachers and improve the teaching management system. Strive to build a high-level academic platform. Organic integration of job training and process control. (3) Cultivate high-quality teaching bases. Establish an academic mentor system, introduce an undergraduate mentor system, and innovate the undergraduate thesis guidance system. Establish a new curriculum system for the major of economic statistics. The curriculum system requires systematization of content, refinement of curriculum, modernization of means, and the establishment of subject introduction courses, integrating the latest achievements of the discipline into the curriculum content. Strengthen external exchanges and cooperation, and widely carry out practical application teaching. Enhance university-government-enterprise cooperation. By collaborating with the government and enterprises, we will develop a talent training program for applied statistics professionals tailored to the needs of the industry. (4) Overall planning and allocation of teaching resources, promoting new teaching concepts and methods. Reform teaching methods, build a high-level innovative teaching team, and build a shared resource system centered on practical teaching courses.

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