

Exploration and Construction of the Experimental Teaching System for the Economic Statistics Major from the Perspective of "Application-Oriented Undergraduate"

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Abstract: Against the background of "application-oriented undergraduate education", the major of Economic Statistics has such problems as emphasizing knowledge over ability, difficulty in synergizing knowledge, skills and ability, students' inflexible application of statistical methods, and weak social adaptability. Following the idea of "adhering to disciplinary standards, strengthening practical teaching, and highlighting ability cultivation", this study focuses on constructing a "four-stage and three-level" experimental practice teaching system for this major. Relying on discipline competitions, it integrates the "special competition-practical course" mode and the school-enterprise "project-cooperation" mode, innovates the teaching system, and aims to realize the progressive improvement of students' "knowledge-skills-ability". This system can solve the above-mentioned problems, help optimize the curriculum setup and evaluation system, enrich teaching forms, improve the training chain from cognition to innovation, and break the bottleneck in the cultivation of application-oriented talents.

Keywords: "Application-Oriented Undergraduate"; Economic Statistics Major; Experimental Teaching System

1. Introduction

Application-oriented undergraduate talents are different from academic talents. They focus more on cultivating technical application capabilities to enhance students' adaptability to positions. They are also different from skilled talents in higher vocational colleges, as they lay more emphasis on the systematicness and integrity of knowledge, as well as the ability to apply knowledge and innovation capabilities. They emphasize comprehensive training to

develop the technical application skills required to meet the needs of industry and enterprise positions.

At present, the research of scholars at home and abroad on the experimental practice teaching system is mainly reflected in the following three aspects:

First, research on the mode of experimental practice teaching system from the perspective of "application-oriented undergraduates". Zhou&Tan proposed a talent training model of "ideological and political guidance, integration of science (industry) and education, and parallel development of competitions and innovation", constructed a four-level experimental curriculum system, and promoted the reform of experimental practice teaching through a "five-in-one" approach [1]. Yang & Wu implemented the reform of innovative talent training for the Information Countermeasure Technology major at Southwest University of Science and Technology, accelerated the construction of a four-dimensional experimental teaching system, and explored the experimental teaching model of "one main line, three levels, and five platforms" [2]. Wang et al. developed "four-stage" experimental teaching resources for internet technology and multi-method experimental teaching methods supported by these resources and experimental platforms. They summarized the positive impact of experimental curriculum reform on cultivating students' innovative and practical abilities and on the development of teaching staff [3]. Wang et al. proposed an experimental process design scheme that involves hierarchical design of experimental tasks and integration of Hattie's feedback model, with the goal of knowledge transfer. They introduced the implementation process of this scheme using a graph experiment as an example and finally explained its practical effects [4]. Wang et al. proposed to explore aspects such as

experimental teaching content and teaching models, aiming to build a high-level application-oriented talent training system [5]. Second, research on the concepts of experimental practice teaching. Fu et al. verified the reform and practice of hybrid experimental teaching based on the CDIO concept, concluding that experimental teaching should be reformed from four aspects: overall experimental design, experimental database construction, teaching activities, and teaching evaluation. The results of students' experimental operation assessments and formative evaluations showed that both experimental scores and final summative scores significantly improved, indicating that this experimental teaching reform promoted students' understanding of theoretical knowledge [6]. Cheng&Xu introduced the outcome-based education concept centered on cultivating application-oriented talents, and carried out corresponding teaching reforms and practices by carefully designing hierarchical experimental projects, improving experimental teaching models and methods, and optimizing the experimental performance evaluation system. It showed that students' learning initiative and their ability to analyze and solve problems were effectively enhanced, and the experimental teaching effect was good [7]. Wang et al. constructed corresponding experimental and practical teaching systems based on the concept of "visible learning" and the OBE teaching concept, respectively [4].

Third, research on the experimental practice teaching system of economic statistics. Sun et al. analyzed the current situation and existing problems of economic statistics practice teaching, and proposed an application-oriented and innovative talent training system based on discipline competitions [8]. Liu et al. pointed out that for the economic statistics major, there are still problems in the current teaching process, such as backward infrastructure, a single teaching model, and unscientific class hour arrangements. To address these issues, the economic statistics major must study and build a set of practice teaching systems, and carry out reforms and practices in aspects such as class hour arrangements, infrastructure construction, and the introduction of professional teachers, in order to cultivate more excellent talents for social development [9]. Li showed that the economic statistics major is a highly application-oriented and comprehensive major, requiring

students to have a solid theoretical foundation and strong practical abilities [10].

In summary, scholars have conducted extensive research on experimental and practical teaching systems. However, against the new backdrop of artificial intelligence and the integration of ideological and political education, further specific research is still needed on the experimental teaching system of the Economic Statistics major from the perspective of "application-oriented undergraduates". Therefore, this paper aims to further enrich the research on experimental teaching systems, focusing on the construction mode of experimental practice and the incentive mechanism for experimental innovation in the Economic Statistics major.

2. Main Difficulties in the Reform of Constructing the Experimental Practice Teaching System for the Economic Statistics Major

The main difficulties in the reform of constructing the experimental practice teaching system for the Economic Statistics major are reflected in the following three aspects:

2.1 Reconstructing the Experimental Teaching Curriculum System and Optimizing the Experimental Teaching Curriculum Evaluation System

The knowledge in experimental courses is scattered, and students' experimental ability is insufficient. It is a difficulty in the reform to solve the problems of narrow professional scope and single knowledge structure in the talent training of the Economic Statistics major, transform talent training from a single discipline - oriented type to a multi - disciplinary integrated type, and realize the high - quality and diversified experimental teaching content. In addition, due to the different academic backgrounds of students, their degree of "absorption and internalization" of the learned knowledge varies. When facing complex practical social problems, they cannot flexibly apply various methods and have slow social adaptability. Solving these problems is also a difficulty in the reform.

2.2 Creating an Atmosphere for Discipline Competition and Constructing an Incentive Mechanism for Experimental Innovation

The simple case - teaching mode mainly relies on students to complete tasks independently,

with few actual combat opportunities for team cooperation, and students' enthusiasm for participation is generally not high. It is another difficulty in the reform to enrich the forms of practical teaching, improve the talent training system that enables students to upgrade from cognitive ability to innovative ability, and through discipline competitions, let participants go through a series of links such as research, topic selection, preparation for the competition, and participating in the competition, so as to cultivate students' five abilities of "learning, practice, innovation, communication, and cooperation", and improve the innovative talent training system with experimental innovation ability as the core.

3. Main Measures for Constructing the Experimental Practice Teaching System of the Economic Statistics Major

Based on the background of the integration of ideological and political education, and oriented to the talent needs of social enterprises and industries, we are committed to cultivating applied and interdisciplinary talents in economic statistics who meet market demands.

3.1 Connotation Construction of the Experimental Practice Teaching System for the Economic Statistics Major

In accordance with the teaching design idea of "two connections" and the curriculum setting is connected with the requirements of professional ability, and the teaching form is connected with the type of courses, and with the goal of realizing the progressive improvement of students' professional and vocational ability of "knowledge-skills-ability", a "four-stage and three-step" experimental practice teaching system has been constructed (as shown in Figure 1).

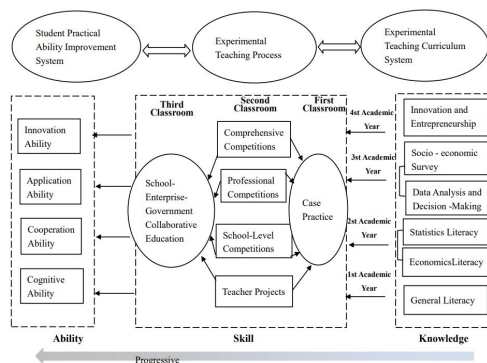


Figure 1. Four-stage and Three-step Experimental and Practical Teaching System

Firstly, the experimental practice teaching curriculum system is reconstructed in four stages over four academic years, including economics literacy and statistics literacy, social and economic research, data analysis and decision-making, and innovation and entrepreneurship literacy. Starting from the "special competition-practical course" mode, professional course teachers can find the shortcomings in teaching, so as to re-plan the elective courses in the training program. Seven special courses have been opened, such as "Guidance on Innovation and Entrepreneurship Training", "Special Topics on Big Data", "Data Mining and Analysis", "Guidance on Writing for 'Challenge Cup'", "Mathematical Modeling", "Market Research and Analysis", and "Financial Statistics". The teaching content has been reset, the teaching methods have been changed, and in the continuous reform, the experimental teaching ability of teachers and the experimental ability of students have been improved, so as to realize "promoting teaching through competitions".

Then, in the experimental practice teaching process, special competition projects are transformed into teaching cases and introduced into the classroom, which is reflected in the "three classrooms": taking the discipline competition cases in the second classroom as the source to form the professional practice outline in the first classroom, so that students' learning is more targeted and the goal of "promoting learning through competitions" is achieved; relying on discipline competitions, re-planning the elective courses in the training program, resetting the teaching content, changing the teaching methods, and realizing "promoting teaching through competitions"; driving multi-dimensional integration of industry and education, such as school-enterprise joint development of majors and courses, school-enterprise joint project construction, and school-enterprise joint discipline and professional competitions, so as to realize the collaborative education of schools, enterprises and governments (the third classroom) and "promoting reform through competitions". For example, SAS, the organizer of the National Data Analysis Competition, is introduced to undertake competition training, data analysis skill training, skill level identification, talent evaluation, etc., so that talent training is connected with job requirements. In addition, a CATI voice telephone interview laboratory has

been jointly built with Huatong Company on campus, and projects such as curriculum development, teaching activities, and mutual employment of senior talents and industry talent training have been carried out in cooperation, providing students with high-quality off-campus practice tutors.

Finally, it corresponds to the four - stage progressive practice mode for improving students' practical ability, including cognitive ability, cooperation ability, application ability, and innovation ability. The specific four-stage progressive practice mode is as follows: in the freshman year, tutors need to guide students to help them make a good plan for their college life. In the sophomore year, projects are carried out in a division of labor and cooperation way, and the way of "intra - group cooperation and inter-group competition" is adopted to improve students' cooperation ability and competitive awareness. In the junior year, students are encouraged to apply for some provincial or national professional competitions, such as the Market Research Competition and the Statistical Modeling Competition, and to have a deep understanding of the social demand for professional knowledge. In the senior year, students are encouraged to participate in national comprehensive competitions, such as applying for college students' innovation and entrepreneurship training projects at or above the provincial level and the "Challenge Cup" College Students' Extracurricular Academic and Technological Works Competition, so as to enhance their ability to solve practical problems and cultivate their "innovative ability".

3.2 Optimizing the Student Assessment and Evaluation Index System

The evaluation index should be comprehensive, scientific and operable. The assessment and evaluation indicators can be divided into qualitative and quantitative indicators (as shown in Figure 2), which comprehensively assess and measure the internship effect and performance of students. The practical teaching assessment and evaluation index system is used to reasonably and systematically measure the effect of students' internships, which directly affects students' enthusiasm for internships and their acquisition of abilities [6]. The evaluation indexes should be comprehensive, scientific and operable. The assessment and evaluation indexes can be divided into qualitative and quantitative

indexes (as shown in Figure 2) to comprehensively assess and measure the effect and performance of students' internships.

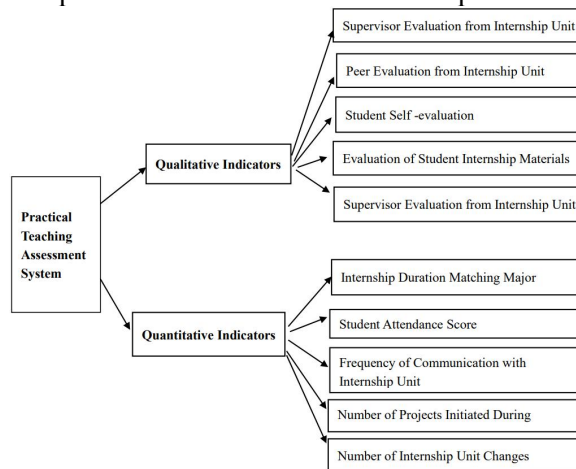


Figure 2. Four-Stage and Three-Step Experimental and Practical Teaching Evaluation System

3.3 Creating an Atmosphere for Discipline Competition and Experimental Innovation and Constructing an Incentive Mechanism for Experimental Innovation

Give play to the role of senior students in "passing on, helping and guiding" junior students. Take more successful teams as models, publicize among junior students, absorb excellent junior students to participate in the teams, help these junior students get in touch with relevant basic knowledge and skills in advance, and then take these students as team leaders to absorb new members to participate in the teams, so as to drive junior students to actively participate in academic teams and form a virtuous circle mechanism for both tutors and college students. Make full use of various on-campus resources such as laboratories, libraries and seminar rooms, and actively carry out activities such as science and technology competition forums, lectures and salons to create an atmosphere that encourages practice and innovation in discipline competitions.

4. Conclusion

Under the concept of "application-oriented undergraduate education", this paper, combined with national policies and literature research, uses the case analysis method to analyze the construction of experimental practice teaching systems at home and abroad, so as to explore new ideas for the construction of a unique experimental practice teaching system for the

Economic Statistics major. It enriches the forms of experimental practice teaching, improves the talent training system that enables students to upgrade from cognitive ability to innovative ability, and explores new ways for the cultivation of innovative talents in the Economic Statistics major. The "four-stage and three-step" experimental practice teaching system has important popularization value and can provide certain experience references for other similar undergraduate colleges or other undergraduate colleges.

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