

Exploration on Optimizing the Course System of Master's Degree in Agricultural Engineering

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Abstract—By investigating the training objectives and curriculum settings of 10 postgraduate training units of agricultural engineering degree in China, this paper analyzed the problems existing in the curriculum settings of this specialty, with a view to optimizing the curriculum system from three angles: adjusting the curriculum structure, enriching teaching methods and improving the assessment system, and conveying high-level agricultural engineering talents for agricultural development in China.

Keywords—Agricultural engineering; Professional degree; Postgraduate; Curriculum system

I. INTRODUCTION

At present, China is in a critical period of transformation from traditional agriculture to modern agriculture. Agricultural engineering plays an irreplaceable role in promoting the development of agricultural production, promoting the transformation of agricultural growth mode and farmers' lifestyle, protecting the ecological environment, making efficient use of production resources and production factors, and achieving sustainable economic and social development. Agriculture and rural development rely more and more on agricultural engineering science and technology. There are 30 universities offering agricultural engineering specialty in China. The realization of the goal of personnel training can not be separated from the perfection of a reasonable curriculum system[1]. It is not only necessary for students to grasp the solid theory and broad and systematic expertise of agricultural engineering specialty, to understand the research trends and development trends of this specialty at home and abroad, but also through professional practice inside and outside the school, to enable students to master advanced technical

methods and modern technical means to solve engineering problems, so that they can carry on independently. Take on the ability of research, product development and management of agricultural engineering technology, and provide a team that understands agriculture, loves rural areas and loves farmers for the construction and development of new countryside in the new era.

II. THE TRAINING OBJECTIVES OF MASTER'S DEGREE IN AGRICULTURAL ENGINEERING

The author investigated 10 authorization points of agricultural engineering degree and found that the training objectives of agricultural engineering degree postgraduates were almost all to require students to master the basic theory and systematic expertise of their specialty, have certain practical ability, and then become applied and compound high-level talents, who are competent in engineering design, engineering implementation, engineering research, engineering development, engineering management and technical management.

III. PROBLEMS EXISTING IN COURSE SETTING

A. *Emphasis on Theory and lack of Practice*

As shown in Table 1, compulsory course credits account for more than 45% of the total credits, with Qingdao Agricultural University accounting for 75% of the total credits. Politics and English account for a large proportion of compulsory courses in the curriculum system. There are no elective courses in the curriculum of Northwest Agricultural and Forestry University, Southwest University and Qingdao

Agricultural University, which greatly limited the space for students to develop their autonomous learning ability. In addition to curriculum learning, professional practice is an important guarantee for the quality of professional degree education. Professional practice can enable professional degree graduates to have a strong ability to solve practical problems, initially possess good comprehensive quality and professional quality, and promote the close connection between the training of professional degree graduates and the actual needs of employing units. From Table 1, it can be seen that the practice time of Hehai University required 10 credits, and the practice time were not less than 12 months. Other universities required that the practice time be no less than 6 months and 6 credits (among them, Northwest University of Agriculture and Forestry Science and Technology and Shandong University of Science and Technology have no practice credits). Through the investigation, it is also found that although there are clear requirements for professional practice in universities, there is a lack of standardized and strict assessment system, and the professional practice ability of graduate students can not be effectively trained.

TABLE I CURRICULA SETTING OF TEN AGRICULTURAL ENGINEERING SPECIALTY TRAINING UNITS

Training Unit	Total credits	Required course	Elective Courses	Practice	Practice time
Northwest University of Agriculture and Forestry Science and Technology	32	17	-	-	Not less than 6 months
Northeast Agricultural University	36	22-24	8	6	Not less than 6 months
Hehai University	40	26	4	10	Not less than 12 months
Southwest University	32	18.5	-	6	Not less than 6 months
Jiangsu University	31	14	6	6	Not less than 6 months
Xi'an University of Technology	32	15	11	6	Not less than 6 months
Qingdao Agricultural University	28	21	-	6	Not less than 6 months
Shandong University of Technology	27	19	8	-	Not less than 6 months
Heilongjiang Bayi Agricultural University	35	19	8	6	Not less than 6 months
Tianjin Agricultural University	32	18	8	6	Not less than 6 months

B. Focus on Foundation and Light Depth

From the perspective of the curriculum design of master’s degree in Agricultural Engineering in 10 universities, besides English and political theory, engineering ethics, progress of agricultural engineering, introduction and introduction are all included as compulsory courses in graduate training. The basic

courses of specialty are still in the undergraduate training stages of C language programming, computer application, Internet of Things technology, information retrieval and so on. The basic courses are the main ones, and the knowledge system is simple, which does not meet the training objectives of high-level and compound talents.

C. Lack of Leadership in Frontier Courses

Due to the late start of professional master’s degree and the weak foundation of curriculum system construction, the curriculum system of professional master’s degree in many schools is consistent with that of academic master’s degree. The key problems and technical problems that need to be solved urgently in the development of the industry are not introduced into the classroom. The lack of connection between classroom teaching and social needs can not fully meet the needs of Engineering master’s own development and can not be better. In order to meet the needs of applied and innovative talents in the new era of our country [2].

D. Lack of professional characteristics

Taking Tianjin Agricultural College as an example, the specialty of agricultural engineering is jointly enrolled by three secondary colleges. It includes four research directions: agricultural mechanization engineering, agricultural water and soil engineering, agricultural bio-environment and energy engineering, and agricultural electrification and automation. Among them, agricultural mechanization engineering and agricultural bio-environment and energy engineering are trained by engineering technology college. The orientation of automation and automation is trained by the college of engineering and technology and the college of computer and information engineering, and the orientation of agricultural water and soil engineering is trained by the college of water conservancy engineering. These four research directions can be divided into many other fields, such as agricultural mechanization engineering can be attributed to mechanical engineering; agricultural soil and water engineering can be attributed to civil engineering, water conservancy engineering; agricultural bio-environment and energy engineering can be attributed to environmental science and engineering; agricultural electrification and automation can be attributed to electrical engineering, electronic science and technology, control science and engineering. Agricultural engineering is a complex cross-cutting field, but the current curriculum design does not reflect the direction differences, which is not conducive to professional and personalized personnel training needs.

IV. OPTIMIZING THE COURSE SYSTEM

The optimization of curriculum system of agricultural engineering specialty should embody thick basic theory, important practical application and broad frontier knowledge, take practical application as orientation, take professional demand as goal, and take comprehensive accomplishment and improvement of applied knowledge and ability as core. The content of classroom teaching should emphasize the organic combination of theory and application courses. Professional practice should focus on cultivating students’ awareness and

ability to study practical problems, increasing practical work experience, improving professional literacy and employment and entrepreneurship ability.

A. Adjusting the Course Structure to Improve the Engineering Practice Ability of Graduate Students

The curriculum structure should closely focus on the objectives and basic requirements of personnel training in the field of agricultural engineering, adhere to top-level design and systematic planning, pay attention to completeness, frontier, hierarchy and intersection, and timely enrich the academic frontiers and disciplines in this field, or the knowledge of new technologies, new methods, new processes, new technologies and new materials currently used by enterprises or industries to theoretical teaching. In professional practice, the training units should reduce the proportion of public compulsory courses, highlight the role of professional basic courses in the process of postgraduate training, and consolidate students' theoretical basis [3]. In the second semester, combined with the direction of student research, the training units should integrate internal and external quality resources, give full play to the advantages of outside-school tutors, and establish a joint training base inside and outside the school to meet the practical teaching requirements of professional degree postgraduates, and really improve students' practical ability.

B. Encouraging a variety of teaching methods into the classroom

Training units should actively respond to the age of MOOC, guide students to make good use of fragmentary time, and learn knowledge related to their own research topics with high efficiency, selectivity and pertinence. Interactive teaching was regarded as the main method of classroom teaching, which uses scientific and effective ways to inspire students' intrinsic interest in the course, so as to actively participate in teaching, learn independently, find problems independently and solve problems, improve classroom efficiency, and give full play to students' initiative [4]. In addition, training units should also pay attention to case teaching, team learning, simulation training and other teaching methods, so that students can truly learn to solve problems through cases, improve students' team cooperation and communication skills, lay the foundation for future work.

C. Establishing a diversified curriculum assessment system

The assessment and evaluation of curriculum learning should pay attention to the combination of process and result, strengthen the self-study outside the classroom, the practical ability of the laboratory, and the synthesis of classroom performance and examination results. In addition to assessing the effect of students' classroom learning, teachers' teaching contents, methods and abilities should also be assessed, and a student evaluation index system should be established to help teachers adjust their teaching methods in a timely manner according to the results of teaching evaluation, so as to achieve targeted teaching and teach students in accordance with their aptitude [5]. For professional practice, the training unit should establish a multi-assessment system, set up an assessment team

consisting of the person in charge of the practice base, the tutor inside and outside the school, and the person in charge of the second-level college[6]. Before the beginning of practice, the students are required to formulate detailed practical training contents under the guidance of the outside tutor. After 2-3 months, the assessment group will conduct a mid-term assessment of the professional practice of graduate students, and the school passed the assessment. Students can continue to practice; students who fail to pass the examination should make timely adjustments according to the actual situation in the process of students' practice.

V. SUMMARY

Master's degree in agricultural engineering is the backbone of China's development and construction of new countryside in the new era. Training units should combine their own professional advantages, keep up with the needs of modern agricultural development, combine the development of disciplines and social needs, constantly explore and optimize the graduate curriculum system, eliminate courses that are not suitable for the needs of personnel training in the new era, improve the professional practice assessment system, improve students' professional practice ability, and accelerate the process of promoting China's modern agriculture.

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