

# Professional Cognitive Education Model for Agricultural Water Conservancy Engineering under the Background of New Agricultural Science

Chong DU, Da KONG, Tangzhe NIE

Heilongjiang University, Harbin 150080, China

**Abstract** The construction of new agricultural science requires the use of modern scientific and technological means to transform and enhance current agricultural related majors. The agricultural water conservancy engineering major, with its inherent disciplinary advantages, plays an indispensable and important role in the construction of new agricultural science. In recent years, the lack of professional cognitive education has gradually become a significant problem in the training of talents in agricultural water conservancy engineering. Therefore, this paper deeply analyzes the problems and reasons faced by professional cognitive education, and proposes specific educational strategies for several key aspects such as enrollment promotion, freshman enrollment education, construction of teacher team, combination of scientific research and teaching, and strengthening professional cognition through competition activities. It aims to provide reference for improving the quality of professional cognitive education and exploring effective ways.

**Key words** New agricultural science construction, Professional cognitive education, Agricultural water conservancy engineering

## 1 Introduction

In October 2018, the Ministry of Education of the PRC officially issued a document stating that higher agricultural colleges should shoulder the historical responsibility of serving the rural revitalization strategy and ecological civilization construction, and specifically elaborated on the goals and tasks of educational and teaching reform<sup>[1]</sup>. At the same time, the Ministry of Education proposed to use modern scientific and technological means such as biotechnology, information technology, and engineering technology to transform and enhance existing agricultural majors, and to lay out new agricultural majors that meet the development needs of new industries and formats, promoting reforms in curriculum system, practical teaching, collaborative education, and other aspects<sup>[2]</sup>.

In the process of cultivating agricultural talents, the agricultural water conservancy engineering major is a key base for cultivating talents in the field of agricultural irrigation and drainage. It naturally has the advantage of integrating agricultural and engineering technology, and is always committed to cultivating high-quality professionals with noble character and exquisite knowledge and skills. In recent years, with the new requirements of China's national food security for agricultural development, several problems have also emerged in the process of cultivating agricultural talents<sup>[3]</sup>. Among them, it is particularly significant that the pro-

fessional cognitive education of agricultural water conservancy engineering is insufficient, and the professional identity is not high, which limits the growth of professional talents. If college students lack understanding and passion for their majors from the beginning of their enrollment, and fail to receive timely and effective guidance during the four-year education process, it may lead to a decrease in educational effectiveness and the inability to cultivate professional talents that meet the needs of the country and industry. In this context, conducting research on professional cognitive education methods for agricultural water conservancy engineering, trying new and effective professional cognitive education methods and approaches, enabling students to enhance their understanding of agricultural water conservancy engineering, clarify major tasks, understand hot topics in the field, and admire the achievements of predecessors, and improve the social recognition that agricultural water conservancy engineering needs to be studied.

## 2 Current status of professional education cognition

**2.1 Current situation of professional enrollment** The difficulty of enrollment is relatively high. Due to the relatively less popular nature of agricultural water conservancy engineering compared to other majors, as well as the possibility of facing difficult working environments and harsh living conditions, as well as relatively low salary benefits after graduation, this major has suffered a certain degree of neglect among college entrance examination students and their parents. The application rate for this major is low, and some universities even have zero first-choice application rates for agricultural majors in certain years. In the enrollment process, most students majoring in agricultural water conservancy engineering are transferred from other majors, which leads to in-

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Chong DU, associate professor, PhD., research fields: agricultural water and soil engineering.

sufficient understanding of their own majors and a lack of clear understanding of what kind of work they will engage in, how to learn and develop in the future, resulting in a weak sense of professional identity. Students are unwilling to delve into such majors and industries, resulting in low learning enthusiasm and a lack of social responsibility and sense of responsibility.

**2.2 Current situation of professional training** The level of professional enthusiasm is clearly insufficient. In the traditional education system of agricultural water conservancy engineering, the curriculum includes public courses, basic courses, professional courses, and practical internships. In order to meet the needs of basic and quality education, while also considering personalized training, the proportion of hours for professional courses is not strictly limited. However, under such a curriculum system, students have relatively less contact with professional course teachers, and some professional course teachers leave after teaching, further reducing mutual understanding and communication between students and professional course teachers. The scope and level of professional cognitive education are insufficient, resulting in a lack of understanding among college students about their teachers and majors. Some students even have no knowledge about what kind of job they will pursue after graduation, what positions they are suitable for, what key issues are in their professional field, research hotspots, and industry leaders. Due to a lack of understanding of agricultural water conservancy engineering, students find it difficult to cultivate a passion for the major, let alone talk about dedicating themselves and striving for it.

**2.3 Current situation of professional employment** The phenomenon of career transition is quite significant. The employment rate of graduates majoring in agricultural water conservancy engineering in China is still acceptable, but the career transition rate is relatively high. The main reason is that the current national demand for agricultural professionals is urgent, and the development trend and requirements of agriculture pose new challenges to agricultural water conservancy engineering professionals. Due to lack of professional interest, a considerable number of students tend to engage in other industries or majors. Some students may choose industries related to the major, such as construction.

### 3 Cause analysis

**3.1 Insufficient enrollment promotion** Due to insufficient knowledge of the agricultural water conservancy engineering major among candidates, if the promotion is not sufficient during the enrollment process, it will be difficult to enhance the in-depth understanding of the major among college entrance examination candidates, resulting in unclear understanding of their employment direction and career development after graduation. This situation often leads to a low admission rate for first choice students, and the final admitted students are mostly transferred from other majors. These students lack understanding and interest in the major, which may ultimately lead to a lack of enthusiasm for the major during their school years. They invest less energy in learning pro-

fessional knowledge, lack initiative to learn, and do not plan their career independently, resulting in a decrease in the quality of student training.

**3.2 Insufficient social recognition** One of the root causes of the above problems is the generally low social recognition of agricultural majors<sup>[4]</sup>. In the current social division of labor system, agricultural industries face multiple challenges. Firstly, the working and living environment in rural areas is still inferior to that in cities. Although rural areas have made significant progress in prosperity, transportation convenience, living facilities, hospitals, schools and other supporting facilities in recent years, there is still a noticeable gap compared to cities. Secondly, the salary and benefits in the agricultural industry are generally not high, and graduates from agricultural majors lack competitiveness in terms of salary compared with industries such as finance, business, law, civil engineering, construction, and IT. In addition, some college entrance examination candidates and parents have misconceptions about agricultural majors, simply equating them with traditional agricultural labor and ignoring their technical and professional aspects. In addition, with the increasing proportion of urban students in recent years, many parents of urban candidates are unwilling for their children to engage in what they consider to be difficult industries, which further exacerbates the low social recognition of agricultural majors.

**3.3 Shortcomings in the cultivation process** In the process of continuously deepening reform and expanding higher education, we are facing a series of challenges. On the one hand, universities are actively expanding their enrollment scale, and the teacher-student ratio has undergone significant changes compared to the early days of the founding of the People's Republic of China, which undoubtedly puts forward new requirements for teaching quality. On the other hand, in order to promote the comprehensive development of students, universities emphasize personalized training and have added numerous elective and personalized courses. This undoubtedly enriches students' learning choices, but at the same time, it also brings about the problem of reduced opportunities for professional course teachers to interact with students.

In addition, teachers bear heavy research tasks, and some teachers are difficult to find a balance between teaching and research, which affects the quality of teaching. For the students, due to the variety of courses, tight schedules, and limited school training funds, internship and practical activities are often difficult to fully carry out, and even become a formality, which further weakens students' professional competence and practical ability.

### 4 Paths of reforming professional cognitive education

**4.1 Strengthening enrollment promotion from multiple perspectives** In order to enhance the attractiveness of the agricultural water conservancy engineering major and increase the admission rate of the first choice, it should adopt a more comprehensive and multi-faceted enrollment promotion strategy. This includes establishing close connections with former students, graduates, and alum-

ni, sharing personal experiences and professional insights through them, and providing valuable references for potential students. At the same time, it should increase the intensity of enrollment lectures in major enrollment provinces. The characteristics, advantages, and employment prospects of the agricultural water conservancy engineering major should be fully showcased through vivid explanations and rich promotional materials, thereby deepening the understanding and cognition of college entrance examination students towards this major.

#### 4.2 Strengthening the enrollment education for freshmen and enhancing professional recognition

In order to promote the recognition and interest of freshmen in the field of agricultural water conservancy engineering, it should design and implement a series of diverse entrance education activities. These activities can include professional teacher meetings, where students can experience the professional charm and enthusiasm of teachers through face-to-face communication; professional introduction course, which provides students with a systematic introduction to the history, current status, and future development trends of the major; freshman seminar course, which encourages students to actively participate in discussions, and cultivates critical thinking and problem-solving skills; professional homeroom teachers or academic mentors meetings, which provide personalized academic guidance and career planning advice for students; freshmen visiting the laboratory, which could let students experience the progressiveness of professional experimental equipment and the fun of the experimental process; extracurricular activities organized by professional teachers, such as on-the-spot investigation and professional competition, which allow students to deepen their understanding and love for the major through practice. Through these activities, it aims to help freshmen quickly integrate into the professional environment, enhance their professional identity, and stimulate their interest and willingness to learn actively.

#### 4.3 Deepening the practice oriented professional cognitive education system

In the early stage of undergraduate education, the internship base visit activity will be included in the freshmen enrollment education plan. This aims to fill the gap in freshmen's understanding of the field of agricultural water conservancy engineering. Through on-site visits, students can intuitively feel the charm of the major, stimulate their interest in learning and exploration desire, and lay a good foundation for subsequent professional learning and cognition. Furthermore, it is necessary to continuously strengthen the practical teaching process, encourage students to actively engage in engineering practice, and achieve seamless integration of theoretical knowledge and practical operation, thereby deepening students' understanding of professional characteristics, and promoting the improvement of their professional cognitive level. In addition, diversified professional cognitive education channels can be explored, such as regularly holding professional teacher research achievement sharing meetings, senior student experience exchange meetings, and excellent alumni career develop-

ment lectures, to broaden students' horizons, and enhance their intuitive understanding of engineering practice and scientific research practice, thereby enhancing the overall sense of identity of the agricultural water conservancy engineering major.

#### 4.4 Professional cognitive education model integrating scientific research

Given that there are many scholars with rich research experience and projects among professional teachers, their research practice achievements are important resources for enhancing students' professional cognition. Therefore, it is recommended that professional teachers make full use of their own advantages in daily teaching to impart research methodology, disciplinary development trends, and cutting-edge knowledge to students, guide students to pay attention to new theories, new perspectives, and new methods, and create conditions for students to participate in research projects, personally experience the research process, thereby stimulating students' professional interest, strengthening their determination to engage in research of the major, and effectively enhancing their professional identity and confidence.

#### 4.5 Strategies for strengthening professional identity through subject competitions

It should build a professional practical education system based on subject competitions. By organizing multi-level and multi-dimensional competition activities (including internal professional, college level, school level, provincial and even national level competitions), it should encourage students to actively participate, and apply their learned knowledge to solve practical problems. Students' professional literacy and comprehensive abilities could be comprehensively exercised through literature review, design schemes, hands-on practice and other links. This not only helps to enhance students' practical abilities and innovative thinking, but also deepens their understanding and identification with the major during the competition, further consolidating their professional beliefs.

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