The Research and Reform on Professional Degree Graduate Cultivating Model of Master Based on the New Engineering

You-wen TIAN, Tong-yu XU*, Jun WANG, Ying-li CAO and Ping SONG
College of Information and Electric Engineering, Shenyang Agricultural University, Shenyang, China

*Corresponding author

Keywords: New engineering, Professional degree postgraduate, Research on teaching model.

Abstract. In recent years, with the development of economy and the progress of society, the state and society urgently need high-level talents with the ability of new disciplines. Therefore, it is necessary to adjust the traditional teaching mode of professional degree postgraduates in order to meet the requirements of new engineering for talents. Based on the analysis of the present situation of the cultivation mode of professional degree postgraduates in China, this paper puts forward that under the background of new engineering, we should construct the cultivation objective of scientific agricultural engineering and information technology postgraduates, optimize the cultivation plan scientifically, build a platform for sharing curriculum network resources, reform the teaching methods and means, and encourage postgraduates to participate in scientific research and competitions so as to speed up the training of outstanding agricultural engineering science and technology talents who can adapt to and lead the new round of scientific and technological revolution and agricultural industry reform.

Introduction

In 2016, after the Ministry of Education put forward the concept of "new engineering", many colleges and universities have actively discussed the connotation and construction of new engineering[1]. The Ministry of Education has also organized several new scientific research seminars to encourage all kinds of universities to actively explore the "new concept" of Engineering education, the "new structure" of disciplines and specialties, the "new model" of personnel training and the "new quality" of education and teaching. The Fudan Consensus issued in 2017 clearly points out that on the one hand, we should take the initiative to accelerate the construction and development of new engineering specialties, such as big data, cloud computing, artificial intelligence, intelligent manufacturing, robotics and other specialties that were not previously available. On the other hand, we should promote the reform and innovation of the existing engineering specialty, and upgrade the existing engineering specialty[2]. In January 2018, the General Office of the Ministry of Education issued the Notice on the First Batch of New Research and Practice Projects, which put forward the requirements of accelerating the training of Engineering Science and technology talents in emerging fields, transforming and upgrading the traditional engineering specialty, and actively laying out the talents training in future strategic areas. Therefore, corresponding exploration and creation should be made in terms of educational concept, mode, method and technology to meet the requirements of new engineering.

Professional degree postgraduate education is an important symbol of the development level of education and science and technology in a country, and it is also the industry foundation and important channel of training high-level applied talents[3]. The construction of postgraduate courses is closely related to the quality of students' training, and is also an important part of the construction of professional characteristics. The postgraduate course of "Agricultural Engineering and Information Technology" involves the requirements of new engineering such as big data, cloud computing, artificial intelligence, intelligent manufacturing, robotics and so on. Therefore, how to apply modern Internet technology to the field of education, guided by the requirements of new engineering, and deeply integrate the requirements of education and teaching with those of new subject, is of great significance to train more high-level innovative applied talents in line with the national strategy and the major needs of the industry.
Problems in the Teaching of Postgraduates with Professional Degrees

Although with the development of agricultural science and technology, its content is updated, through years of graduate teaching experience, there are still some problems in graduate teaching, mainly reflected in the following three aspects.

(1) The teaching resources are single, the teaching content is updated slowly, and there is a big gap with the practical application technology. In recent years, new scientific research achievements have emerged in the field of agricultural informatization, and the content of classroom teaching is mainly theoretical. Most postgraduate courses are taught on the basis of textbooks. Some courses even lack textbooks. Their knowledge is trivial and complicated. They will basically be “forgotten after learning”. Finally, it will fundamentally affect the effective formation of a solid professional foundation for postgraduates.

(2) The teaching mode is traditional, and students are not active in learning. At present, most of the teachers still give priority to traditional classroom teaching, with less integration with actual projects, students' interest in learning is not high, initiative is not strong, and they are lazy in thinking in class, which is not conducive to the cultivation of graduate students' innovative thinking and practical application ability.

(3) The lack of practical teaching content, the derailment of students' research topics from enterprises and the lack of practical project exercises make graduate students poor in practical ability and not suitable for the requirements of new engineering[4].

Therefore, how to apply modern Internet technology in the field of education, guided by the requirements of new engineering, deeply integrate information technology with education and teaching, explore the new paradigm of excellent course teaching for postgraduates majoring in new engineering, construct the platform of course network resources sharing, reform the teaching methods, carry out the combination of school and enterprise and science and education, so as to improve the innovative quality, research literacy and practical ability subject of postgraduates are of great significance to train more high-level innovative applied talents in line with the national strategy and the major needs of the industry.

Reform and Optimization of Professional Degree Postgraduate Training Mode Based on New Engineering

In order to better train high-level innovative applied talents under the background of new engineering, professional degree postgraduate training must follow the development law of postgraduate training education, according to the current situation of training in China, draw lessons from advanced and scientific training experience, rationally reform and optimize the current training mode.

Defining the New Engineering Concept and Constructing the Training Objectives of Scientific Professional Degree Postgraduates

Taking the construction of "new engineering " as an opportunity, facing and leading the future, we should explore the innovative, comprehensive and open concept of talent training, adhere to the orientation of industrial demand, adhere to the student-centered approach, focus on the overall development of students, respect the status of students as the main body, realize the transformation from "teaching" as the center to "learning" as the center, and make the achievements of teaching reform benefit all students. For this reason, the training objectives of graduate students majoring in agricultural engineering and information technology should actively adapt to and lead new technologies, new industries, new formats and new modes, realize the matching of talent training mode with national demand, link professional teaching system with industrial chain, innovation chain and talent chain, and build a first-class major in agriculture engineering and information technology facing the future, adapting demand, leading development, advanced concept and strong guarantee. The main objectives of postgraduate education of agricultural engineering and information technology are to train applied, cross-cutting and compound high-level talents for
enterprises, institutions and management departments of agricultural informatization, such as technology research, development, application, promotion and management, new rural development, modern agricultural education, etc. Professional postgraduates under the background of new engineering should master the solid basic theory, systematic professional knowledge, and related engineering practice ability of agricultural information technology direction; and they should have broad knowledge, strong professional skills and technical imparting skills, innovative consciousness and new agricultural technology research, development, application, promotion and management concept, and can independently engage in the promotion of modern agricultural technology and the construction and development of new rural areas at a higher level.

Guided by the Needs of New Engineering and Optimizing the Training Scheme Scientifically

To meet the needs of integration of graduate students of agricultural engineering and information technology with new engineering, we should optimize the training plan scientifically, set up curriculum modules scientifically, adjust compulsory courses and elective courses, and increase elective courses with practical operation characteristics. The choice of courses should be guided by the frontier development of subjects and be combined with the needs of new engineering, and focus on the cultivation of practical and innovative abilities of postgraduates with professional degrees, highlighting the applicability of courses. This paper explores the master's degree and postgraduate courses integrated with new engineering. In the course design, courses related to artificial intelligence and big data should be added, such as "agricultural big data" course in the main courses in the field, and "machine learning" course in the specialized elective courses. We integrate AI, big data and other related contents into relevant courses, such as arranging big data technology and its application in agriculture and artificial intelligence technology and its application in agriculture in the field of "Agricultural Information Technology" as the backbone course in order to meet the needs of high-level informatization talents in the field of agricultural engineering under the background of new engineering.

Constructing the Course Network Resource Sharing Platform Based on New Engineering

According to the core content of the new engineering, i.e., new idea, new mode, new method and new content, the course network resource sharing platform is constructed. The platform includes teaching material resources, teaching PPT, video and other shared resources, the establishment of knowledge point explanation database system, network learning guidance resources, scientific research case database, science and technology frontier and other parts. And the platform widely aggregates high-quality curriculum resources from different channels, including domestic and foreign first-class universities, industry enterprises and network media. The construction of curriculum network resources should take full account of the choice between traditional curriculum content and modern technology and methods. It not only embodies the accumulation of subject knowledge, but also pays attention to keeping pace with the times. It should integrate the latest achievements in discipline construction and scientific research into the curriculum network resources and the content required by new engineering such as big data, artificial intelligence, intelligent manufacturing and robotics. Through the sharing platform of postgraduate curriculum resources, students can be guided to study independently after class. Courses can be selected according to their professional interests and career planning, thus providing a broader space for students' personalized development. The construction of course network resource sharing platform will become a high-quality "open source" platform in the digital age, promoting teachers to carry out knowledge imparting and innovative research across time and space, realizing the diversification of students' learning resources supply, and providing them with "customized" and "personalized" education, so then it can cultivate graduate students' knowledge acquisition ability, independent research ability and ability to solve practical problems in order to promote the cultivation of high-quality innovative applied talents.

Reform of Teaching Method Based on Resource Sharing Platform

Relying on the platform of course resource sharing, the hybrid teaching mode of online and offline
combination is developed. Students can study online and offline through the network resources of the course through the network teaching platform, so as to realize the application of active learning methods such as problem-based, seminar-based and task-based. Firstly, teachers set up academic background and put forward questions according to the actual needs of agricultural production line. Students search relevant information offline through the network teaching platform, and form their own views preliminarily with the knowledge of artificial intelligence, big data and so on. Then on-line, students are divided into groups and teachers to analyze and discuss the problems together. After class, teachers can arrange relevant tasks according to actual needs. Students can research through integrating the knowledge of artificial intelligence, big data and so on. It is also possible to combine online and offline teaching through cases, that is, combining agricultural production examples, according to the form of "problem-based case → analytical case → breakthrough case → expanding case" to form a "case chain" to guide students to explore the integration of artificial intelligence, big data and other knowledge of agricultural production frontline problems. Through the mixed teaching mode, the maximum sharing of curriculum resources can be realized. Meanwhile, the ability of thinking, problem analysis and problem solving of graduate students can be trained. It can promote the omni-directional integration of supply-side and industrial demand-side structural elements, and train a large number of high-quality innovative and applied talents and technical and skilled personnel.

Combining Scientific Research and Competition to Cultivate Postgraduate's Innovative Practice Ability

Students are encouraged to participate in scientific research projects and science and technology competitions. The course resource sharing platform can provide students with abundant top-level knowledge of subjects, and teachers can make full use of advanced methods and technologies such as big data, artificial intelligence, intelligent manufacturing, robots, pay attention to cultivating students' engineering practice ability and innovation ability, and carry out an open and innovative teaching mode combining teaching with scientific research and competition. Teachers actively encourage students to make full use of the favorable conditions of open laboratories, organize students to participate in University Students' electronic design competitions, "Mitsubishi Electric Cup" National College Students' Electrical and Automation Competition and "Dongfanghong Cup" National College Students' Intelligent Agricultural Equipment Innovation Competition, etc., which form a systematic training mode of students' scientific research skills and innovative skills, so as to enhance graduate students' scientific research skills and innovative abilities. In addition, teachers can guide graduate students to participate in research projects jointly tackled by tutors and enterprises, and let students participate in application for scientific research projects, key technology research, annual progress report writing of scientific research projects, patent application, final acceptance and so on, which is very important value for students to learn scientific research methods, develop independent innovation and practical ability, solve practical production problems of enterprises, and broaden their academic horizons.

Conclusion

With the continuous development of the world economy and science and technology, the society's demand for high-level talents of compound and applied type is increasing, and more and more requirements are put forward. Under the background of new engineering, the training and education of professional degree postgraduates need to adapt to the overall level of higher education and the development of social economy and high-tech in order to meet the needs of the society for high-level talents of compound and applied type under the new situation. Therefore, we need to reform and optimize its training mode, clarify the connotation of professional degree postgraduate training under the background of new engineering, construct scientific training objectives, build a platform for sharing curriculum network resources, and reform teaching mode to cultivate postgraduate innovative and practical ability. We should actively explore the theory of new training mode and the reform and optimization of training mode, highlight the individualized training under
the background of new engineering, according to the characteristics of students, speed up the training of outstanding engineering science and technology talents adapting to and leading the new round of scientific and technological revolution and the transformation of agricultural industry, and build the world agricultural engineering innovation center and talent plateau.

Acknowledgement
This research was financially supported by Research Topics of the Agricultural and Forestry Subject Working Committee of the Chinese Academy of Degree and Graduate Education and Research Project of Postgraduate Education and Teaching Reform in Shenyang Agricultural University.

References