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Innovative Project and Praxis Teaching Design of Agricultural Information Technology

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Abstract

Based on the characteristics of perceptiveness, compositionality and intersectionality of the course "Agricultural Information Technology", this paper puts forward the design scheme of curriculum praxis teaching and dynamic evaluation of "two stages" and "three levels". The curriculum is divided into two stages: the integrated teaching of basic knowledge and the praxis teaching of "mass entrepreneurship and innovation", and the curriculum praxis resources combined with reality. The students' learning achievements are dynamically evaluated by three levels of "doing according to", "doing freely" and "standardizing", so as to achieve the goal of training compound talents of agricultural information technology, and to meet the praxis needs of modern agricultural development under the background of rural revitalization strategy.

Keywords: agricultural information technology, praxis teaching, innovation and entrepreneurship, integration of theory and reality, combination of deficiency and reality.

1. Introduction

The rapid development of modern information technology represented by big data, cloud computing, Internet of things, mobile Internet and artificial intelligence is leading to the transformation from traditional agriculture to intelligent agriculture. The state proposes to speed up the construction of ecological civilization and implement the strategy of rural revitalization, which results in increasingly urgent demands for new age agricultural information engineering talents. However, due to the interdisciplinary characteristics of information technology and traditional agriculture, it is not easy to achieve the goal of grafting and integration of these two aspects. At present, projects in the field of agricultural engineering can’t meet actual needs, and the situation that "builders" and "users" are not a group of people is wide prevalence. The main reason is the lack of professional talents that can be both "builders" and "users". "Agricultural information technology" is a general course with the characteristics of compositionality and compositionality that offer to various specialties in agricultural and forestry colleges. Its goal is to cultivate compound engineering and technical talents who understand both agricultural specialty and information technology, so as to meet the urgent needs of the whole society. However, in reality, agricultural informatization in China is still at a low stage. Therefore, compared with other courses, the content of agricultural information technology course is forward-looking and dynamic, but lacks the support of mature industries. Some of the agricultural application cases of information technology are too high-end, the front-line agricultural production cannot directly connect with them, some are not mature and perfect, and still in the theoretical stage. These reasons make the course very abstract and complex, which increases the

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difficulty for teachers to carry out teaching. The ability of students to integrate theory with praxis and innovation needs to be improved.

Therefore, in order to improve the quality and efficiency of the cultivation of agricultural information technology talents, these years, many scholars have made active exploration on the teaching reform of agricultural information technology. In view of the complexity of the curriculum, how to solve the problem of large learning volume in a short time, Liu et al. proposed the mode of introducing MOOC to online and offline dual Teaching[1]; in order to highlight the practical and applied characteristics of the curriculum, Zhang, Wang et al. proposed to change the previous situation that "teaching" and theoretical teaching as majority, but implement research-based teaching and increase the independent design praxis[2-5]. In the aspect of teaching content construction, Wang et al. realized the continuous renewal of teaching resources by carrying out school enterprise cooperation and project-based teaching material development[6-8]; Li et al. used the OBE certification of "result oriented" to carry out the teaching reform guided by the evaluation of students' learning output [9-12].

The above researches on the teaching, praxis, resources and evaluation of agricultural information technology course have a strong pertinence, which provide a useful reference for the construction and improvement of the course. However, by changing the curriculum teaching form, such as offline teaching, can only partially solve the problem of insufficient class hours, but still cannot solve the problem of complexity and abstraction of curriculum caused by the complexity of specialty and the lag of industry. It is an effective way to increase the experimental link of independent design and implement research-based teaching, but the lack of practical resources is a serious obstacle, and relevant research didn’t provide implementation details. In order to meet the needs of modern agricultural development and Rural Revitalization Strategy in the new situation, it is an important task to further deepen the teaching reform of agricultural information technology and improve the efficiency and quality of personnel training from two aspects of strengthening technological innovation and personnel training.

2. Curriculum status

Since 2011, Jiangsu Vocational College of agriculture and forestry has set up the course of agricultural information technology in the major of modern agricultural technology. There are 120 class hours, and two semesters are arranged for teaching. In the teaching praxis, the teaching content of the two semesters has been lack of connection. And because of insufficient teaching hour mentioned before, students cannot get enough foundation knowledge and practical conditions. In recent years, with the change of situation and the increase of school investment, the teaching conditions and facilities have been greatly improved, the teaching content has been updated in time, the accumulation of teaching resources has been completed, especially the formation of professional teaching team, so that the curriculum has the conditions for key construction. As an important professional course, the course is gradually offered in other majors, such as Internet of things application technology, horticulture technology, etc., and the relevant content is also applied to the training of the new professional farmer "Internet + Intelligent Agriculture" project. This paper focuses on the review and summary of the praxis teaching and resource construction of the course, which provides a reference for the next step of the construction of the course.

3. Course project design and Implementation

3.1. Curriculum design objectives and design ideas

As a general education course for all majors of the school, the agricultural information technology course aims to develop social services for "agriculture, rural areas and farmers", revitalize the agricultural industry, and cultivate modern agricultural technology talents with innovative and information technology literacy. Around this goal, curriculum teaching design is guided by innovation and entrepreneurship praxis, with project learning as the framework and agricultural intelligent product design as the main line, students can explore and experience key agricultural information technologies in real situations, learn about intelligent product design, the operation mode of intelligent product application and transformation, so as to obtain the growth of knowledge, skills, quality, etc.

On the basis of previous research and summary of previous work, the paper puts forward the "two-stage" course teaching design and "three-level" dynamic evaluation of practical teaching based on the OBE concept, that is, the course teaching duration is one academic year. The first semester is a basic knowledge teaching stage that focuses on the construction of practical teaching combining the virtual and the real. The second semester is application innovation stage, in response to the "mass entrepreneurship and innovation", combined with the college students' entrepreneurship and innovation training plan and competition projects, it integrates the teaching praxis of entrepreneurship and innovation, and students will participate in the actual innovation project research and development process to carry out the second level. During the second stage, with the guidance and education of the relevant knowledge of agricultural product technology and agricultural information industry standards, the students' rigorous and standard working attitude is cultivated. Their professional praxis is altered to "standard praxis". The students participate in the "mass entrepreneurship and innovation" competition. And the innovative works of graduation design is important basis of three-level achievement evaluation. Through the progressive design of practical teaching and the evaluation of dynamic results, we can achieve the goal of taking the course as link, the innovation as driving force, the demand as guidance. And also get effective integration of teaching resources, application of students' learning, and advancement of teaching content, so as to achieve the goal of cultivating innovative talents of agricultural information technology with high quality.

3.2. Curriculum praxis teaching design

3.2.1. Teaching mode of integrating theory with praxis

The teaching mode of agricultural information technology course is generally in the form of large courses. Aiming at the problem of students' general information technology knowledge shortage, through the integration of multiple information-based teaching technology means, the course teaching mode of integrating theory and praxis is adopted to realize the connection between teaching and production. This teaching mode can also avoid the abstraction and dryness of pure classroom theory teaching and increase the enthusiasm of students in school. So, it is easier for students to accept the relevant professional basic knowledge learning, obtain the practical perception of the post and occupation, learn to apply, improve the efficiency of learning and training, and achieve the training goal of professional ability.

After years of accumulation and construction, the course has established perfect practical teaching resources, and the practical instruction of agricultural information technology has been fully used in teaching, so that each chapter has rich and interesting practical links, which greatly promotes students' interest in learning. In view of the serious lack of experimental conditions, at present, the school has built advanced Internet of things training room and agricultural information technology laboratory and developed the virtual simulation training software of agricultural internet of things, which can better meet the needs of the integration of theory and praxis teaching. Compared with other mature courses, the particularity of

this course is that many agricultural information application technologies cannot be displayed and practiced on the first line, such as the traditional remote sensing technology mainly based on satellite remote sensing, which is far away and unfamiliar to students. But with the development of technology, now in the comprehensive introduction of remote sensing theory and knowledge, we can build a complete UAV low altitude remote sensing system, as shown in Figure 1. So that students can operate the remote sensing platform, acquire and process remote sensing images, extract remote sensing information, so as to have a deep experience of the agricultural application of remote sensing technology. Through the establishment of similar practical projects, the theoretical teaching and practical teaching are alternately carried out, such as agricultural information collection system, UAV low altitude remote sensing system, agricultural Internet of things system and other practical and virtual operations. Students ca understand the theoretical teaching content through hands-on praxis better.

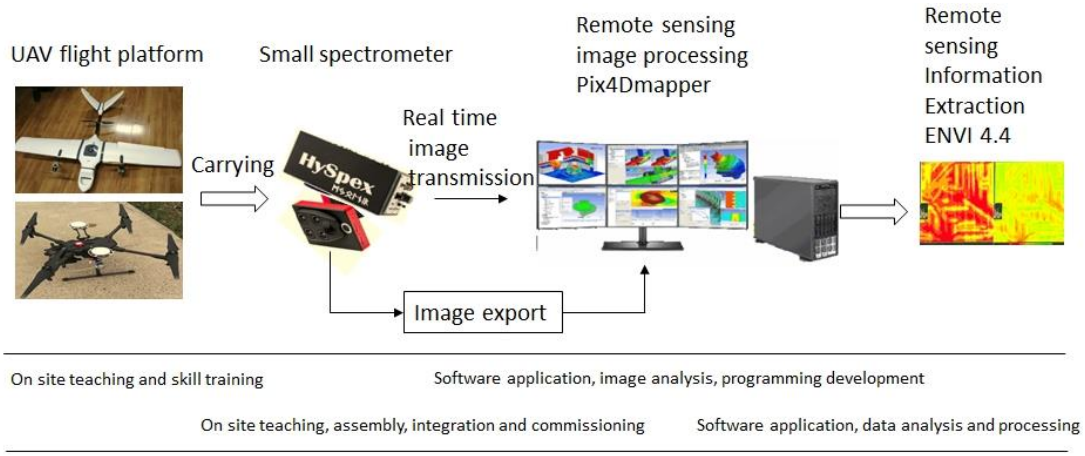

Fig.1. Low altitude remote sensing praxis platform of agricultural UAV

On the basis of mastering basic knowledge and corresponding practical skills, students are required to complete the task by data query, brainstorming and independent learning, and the results are evaluated by teacher review, group discussion, case presentation, etc., after carried out among the students, some of the assignments have developed into "mass entrepreneurship and innovation" entries, and the mode shows up good results.

3.2.2. Construction of practical teaching resources based on the combination of virtual and real

In view of the lack of practical resources of the course, the method of combining the virtual and the real is adopted to construct practical teaching resources. While improving the experimental training facilities, various teaching software resources are collected and sorted out through various aspects. At the same time, based on VR, AR and other technologies, combined with the practical application of modern agriculture, the characteristic virtual simulation practical teaching department with good immersion and interaction is developed. In a word, the system can realize the functions of such as structure display, virtual assembly, online debugging and operation, knowledge assessment, etc., the same as agricultural intelligent application system. It effectively solved the problems of insufficient experimental resources and possible risks of students' operation in the state of large-scale teaching, and the lack of resources. It effectively improved the teaching effect and talent training efficiency.

At present, the composition and teaching method of practical teaching resources of the course are shown in Figure 2. The whole course is composed of real operation environment, virtual simulation environment

and virtual reality combination environment. This paper mainly introduces the composition of virtual reality combination praxis environment, such as intelligent temperature control system of glass greenhouse shed. Based on the consideration of management and safety, it is not realistic to carry out on-site spray cooling experiment in the training room, so we adopted the virtual processing mode of equipment working state, that is, the software and hardware of the whole control system, including greenhouse model, all kinds of controlled spray equipment, pipeline, solenoid valve, etc., is still the "real" mode of on-site operation drill, but the "virtual" mode of screen video schematic is adopted for the spray state of control object, which not only ensures the real scene experience of students' practical training projects, but also takes into account the maintenance of electricity safety in the environment of the training room. The physical scene and virtual scene effect of the project training are shown in Figure 3. Similar practical projects with the combination of virtual and real situation like intelligent irrigation system, intelligent water and fertilizer system, etc., become the highlight of practical resource construction of this course.

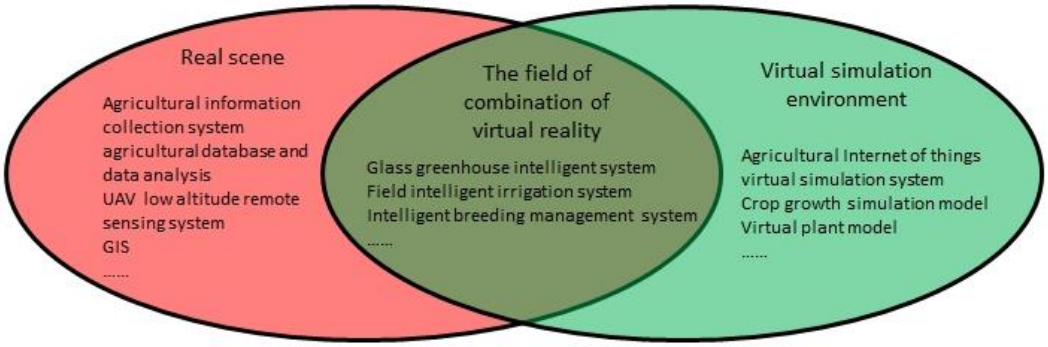

Fig.2. Structure of curriculum practical teaching resources

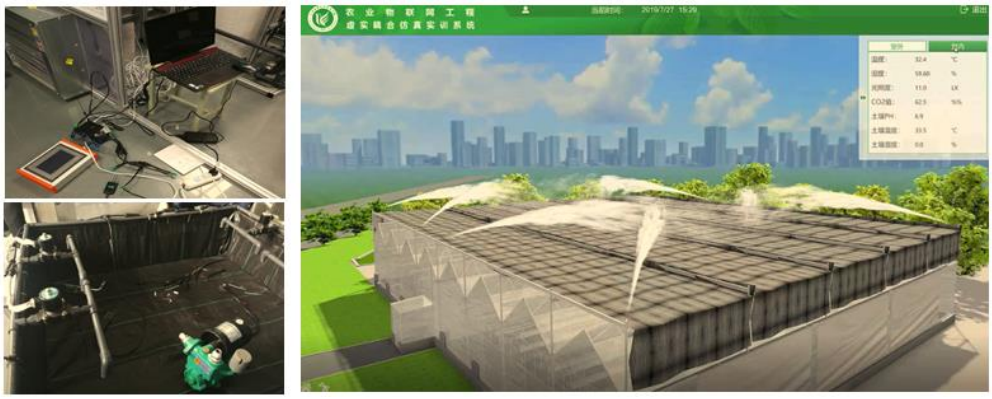

Fig.3. Scene of intelligent temperature control combined with praxis in glass greenhouse

3.2.3. Curriculum innovation praxis project design integrating "mass entrepreneurship and innovation"

Under the background of "mass entrepreneurship, mass innovation", the scientific and technological innovation activities of college students such as "Challenge Cup" and "College Students' innovation and Entrepreneurship Project" are booming. Innovation and entrepreneurship has become an important starting point for higher vocational colleges to improve students' innovation ability and employment ability. The teaching mode of "integration of theory and praxis" has reached the professional praxis goal of "follow up" in the first stage and enabled students to have the awareness and ability of applying information technology to the agricultural field. On this basis, the curriculum teaching will be actively integrated into the "mass

entrepreneurship and innovation" platform. Relying on the school's professional teaching praxis place and school enterprise cooperation base, the innovation and entrepreneurship education and professional education will be organically integrated. Students will participate in teachers' scientific research, innovation studio and other innovation teams. The second stage of "let go" professional innovation and entrepreneurship plan training is carried out, and students are encouraged to participate in the school enterprise joint training Engineering research and development praxis projects, in order to improve their ability to develop practical engineering projects and solve practical engineering problems, and bring personalized innovation praxis projects into elective credits, so as to stimulate their awareness and practical ability of independent innovation and development of new products. For the achievement transformation entrepreneurship projects supported by innovation projects, through the incubation of entrepreneurship parks and cooperative enterprises in the school, we will provide students with a real entrepreneurial environment for entrepreneurial experience and encourage the integration of innovation and entrepreneurship praxis and achievement incubation into internship and graduation project design.

The specific teaching in this stage is divided into two parts: in class and out of class. As shown in Figure 4, the in class teaching is mainly in the form of lectures, which mainly includes the case appreciation of "mass entrepreneurship and innovation" works, the progress of agricultural information technology, "mass entrepreneurship and innovation" knowledge, agricultural product technology and industry standards, financial management knowledge, human resource management, etc. This part mainly involves cooperation between the secondary schools of the University, and among teachers of major, administration and academic work. Then it forms an open classroom teaching form. Students are divided into various communities, laboratories, research and development centers, training bases and other "entrepreneurship and innovation" teams out of class. Combined with professional characteristics, they participate in the "entrepreneurship and innovation" activities in a "project" way under the guidance of their tutors. Their "entrepreneurship and innovation" results is presented in the form of participating in the "entrepreneurship and innovation" competition, completing the graduation project, etc. The course teaching extends from the inside class to the outside class, and the inside class and outside class work together to achieve the goal of cultivating the awareness of "mass entrepreneurship and innovation" and improving the ability of innovative design and engineering praxis.

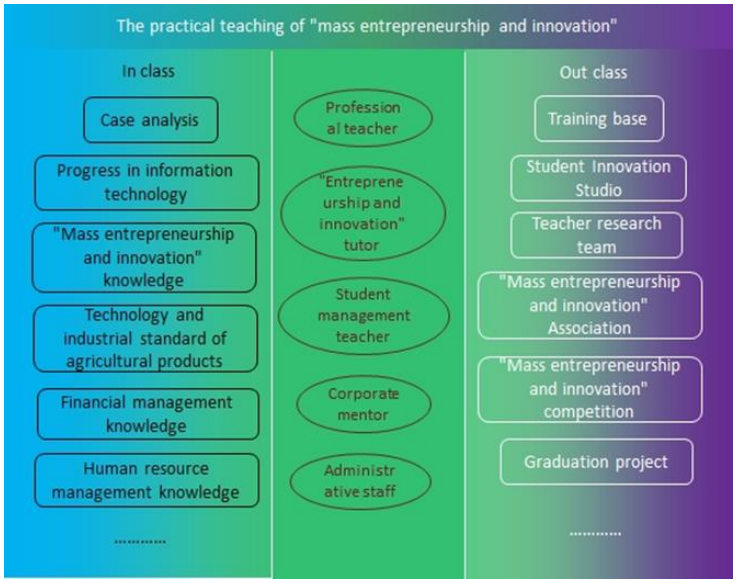

Fig.4. design diagram of integrated "mass entrepreneurship and innovation" project

4. Conclusions

Combining with the teaching reform praxis of agricultural information technology course in recent years, this paper introduces the overall teaching design of "two-stage" course, which transforms the disadvantage of insufficient application background of the course into the advantage of innovative application of agricultural information and changes the teaching form from the inside of the course to the outside of the class. And it also cuts the traditional teaching mode of "the end of the course, the end of the study", and realizes the "general" teaching mode and knowledge, cultivation of awareness, research and learning, experimental verification, to "innovative application, comprehensive" and gradually improve the level of learning needs. This kind of integration of "mass entrepreneurship and innovation" teaching praxis, which is linked by courses and driven by the demand of modern agricultural industry, runs through the innovation and application of agricultural information technology. In the long-term edification, students experience the success and honor obtained from the "mass entrepreneurship and innovation" activities of modern agriculture, so as to have a sincere love for agriculture. After graduation, they will have a better chance to continue engaging in modern agricultural production and agriculture Information technology "mass entrepreneurship and innovation" related work, so as to provide information technology professional talents for the agricultural industry that in urgent need.

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