Information Technology Based Forestry Information Technology Application Professional "Post Course Certificate Competition" Curriculum Reform

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Abstract. Forestry Information Technology Application is a composite major based on forestry, which organically combines computer technology, measurement technology, geographic information technology and forestry technology. The national forestry and grass industry is in urgent need of a large number of professional and technical staff to comprehensively promote information technology and intelligence. However, the lack of ability to adapt to new technologies and the lack of standardization and advancement of practical teaching in forestry IT personnel training make it difficult to meet the requirements of forestry IT personnel in the forestry and grass industry. The integration of information technology and curriculum teaching has adapted to the requirements of curriculum reform. Therefore, based on the information technology means, this paper proposes the "post course certificate competition" integrated forestry information technology application personnel training mode, and constructs the forestry information technology application professional "post class certificate race" course platform, Integrate corporate job tasks, vocational certifications and skills competitions into the course platform. By logging into the course platform, students can acquire skills that match the needs of future career positions, improve their professional competence and adaptability, and provide a reference for curriculum reform in the majority of institutions.

Keywords: Information technology · forestry information technology application · post course certificate competition · curriculum reform

1 Introduction

Forestry production, operation, and management are changing from traditional human-intensive to information-based and intelligent [9], and technical job jobs, management jobs, and service jobs in the forestry industry are accelerating their integration with information technology. There has been a serious shortage of applied forestry personnel with information technology in the forestry industry [13]. However, at present, the development prospect of forestry information technology application profession in China's

higher vocational colleges and universities is uncertain, and some students' jobs after graduation do not match with their professions.

With the continuous development and deepening of information technology and curriculum reform, the education reform pays more and more attention to the integration of information technology and curriculum, and gradually forms a new education model with information technology as the teaching media. As a teaching tool and learning tool, information technology serves curriculum learning and is the basis of curriculum reform, providing information security for curriculum reform and effectively improving teaching quality [4].

Forestry Information Technology Application is a composite major based on forestry, which organically combines computer technology, measurement technology, geographic information technology and forestry technology. At present, the construction of forestry information technology around China is in urgent need of a large number of professional and technical people. Therefore, this paper integrates information technology and curriculum based on information technology, and builds a forestry information technology curriculum platform with the integration of "post course certificate competition" [11]. Around the requirements of job clusters, job skills, curriculum teaching, discipline competitions and qualification certification are integrated into one, and job work tasks, vocational qualification certification requirements and discipline competition standards are incorporated into the teaching platform of professional courses. By adjusting the professional curriculum system, improving the practical teaching system, and reforming the assessment and evaluation mechanism, we can securely improve students' employability and cultivate high quality composite technical skill talents for forestry information technology application.

2 Current Demand and Characteristics of Talent Capacity in Forestry It Application Industry

2.1 Forestry Information Professional Competence is Required

The senior forestry information technology application major is a composite major based on forestry, which organically combines computer technology, measurement technology, geographic information technology and forestry technology. Forestry production, operation and management are changing from traditional human-intensive to information-based and intelligent, and the society's requirements for professional competence of forestry information technology application talents are increasing. The teaching and research team of forestry information technology application in Guangdong College of Ecological Engineering conducted research on 67 forestry information technology application enterprises nationwide during July 2020-September 2021 on the demand for specialized talents one after another, among which the statistics of enterprises' requirements for talents' professional ability are shown in (Fig. 1). Among the nearly 20 professional competencies listed, the top 10 competencies selected by enterprises are shown in Fig. 1. The top four competencies, in descending order, are: forest resource survey (83.6%), forestry "3S" information technology (80.6%), forestry engineering survey (76.1%), and forest resources management (71.6%). These four competencies are important tools for solving problems in our profession.
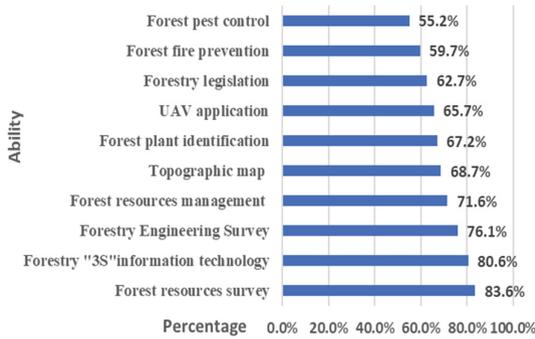
Fig. 1. The requirements of enterprises for professional ability of forestry information technology application students.

In addition, topographic maps, forest plant identification, UAV applications, pest control, forestry legislation, basic knowledge of forest fire prevention and other related professional competencies were also selected by many enterprises, reflecting the high comprehensive ability requirements of enterprises for forestry information technology application practitioners.

2.2   The Demand for Information Technology Application Talents is Rising

With the continuous development of information technology, China is gradually establishing a fully functional, interoperable and shared, efficient and convenient, stable and secure forestry information technology course system. Use information technology to promote scientific forestry decision-making, office standardization, service convenience, and enhance the level of forestry information technology. After more than a decade of development, the new generation of information technology represented by cloud computing, Internet of Things, mobile Internet, big data, and intelligent technology has been applied comprehensively, which has greatly improved the efficiency and effectiveness of forestry modernization construction [5]. "A map" instead of two feet, "satellite remote sensing" instead of two eyes, "e-government" instead of pen and paper [1], forestry information technology is an important part of modern forestry construction [6]. The speed and quality of forestry information technology construction must rely on the overall information technology literacy of forestry practitioners to improve the modernization of forestry must be driven by the modernization of forestry practitioners, which requires forestry information technology personnel to walk in the forefront of the times, with the traditional forestry ability to work hard and have the ability to adapt to the rapid development of the information technology industry.

3   Common Problems in the Cultivation of Higher Vocational Forestry Information Personnel

3.1   Lack of Standardization and Advancement in Practical Teaching

Practice teaching resources are not good enough is the current forestry information technology application professional still exist problems, need a set of combined with job requirements, beneficial to the examination competition of forestry information technology application personnel training practice system. Nowadays, the vast majority of forestry-related majors in higher education institutions are separated from the internal and external practical teaching projects, and the external survey courses are not responsible for teaching the processing of internal data and lack of normativity. The teaching of internal work using only textbook self-contained data the software version is not updated in time, it is difficult to adapt to the development of forestry information technology. This practical teaching mode has generated many problems: Internal software is updated quickly, the new software is difficult and expensive to teach, and the old version of software functions are easily eliminated. The separation of external data collection and internal data processing makes students inexperienced in processing the data collected externally to the data needed internally, resulting in students not meeting the needs of enterprises. At the same time, for teachers who have been teaching courses for a long time, the method of teaching students may still use relatively traditional methods, which will not apply to the current requirements of accuracy indicators, and cannot keep up with the changing needs of the times.

3.2   What Students Lack in Knowledge and What They Lack in Ability

The research found that students lacked knowledge as shown in Fig. 2, among which the proportion of lacking knowledge of forestry "3S" information (50.75%) and forestry engineering surveying (44.8%) and UAV applications (43.3%) was higher, reflecting the following problems: Poor learning ability and inability to master forestry "3S" information software (ArcGIS, ENVI, GPS). For engineering surveying lectures are practiced in groups, many tasks become completed by the group leader and other students are lazy and go through the motions, resulting in poor practice [3].

The students' lack of ability is shown in Fig. 3, among which the proportion of those who are not familiar with the operation of forestry "3S" related software (52.2%), not familiar with forestry related standards and technical specifications (49.3%), and lack of forestry engineering surveying ability (47.8%) is higher. Reflects the following problems: There may be a lack of understanding and operation of computers leading to a lack of familiarity with the operation of forestry "3S" software. Insufficient understanding by teachers of the project requirements for solving current projects and lack of rigorous control of accuracy. The field measurement lacks theoretical support and cannot be flexible in the face of field conditions, resulting in poor engineering measurement ability.
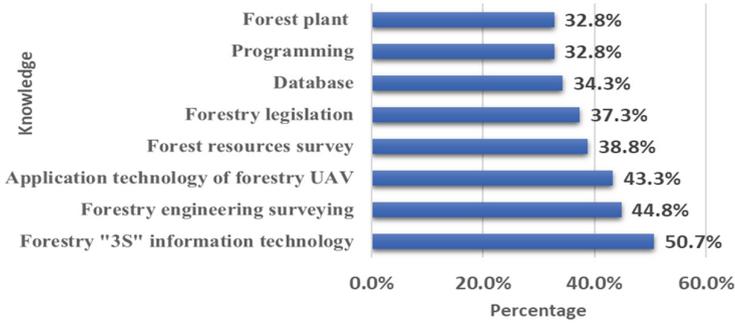
Fig. 2. Lack of knowledge among students majoring in the application of forestry information technology.
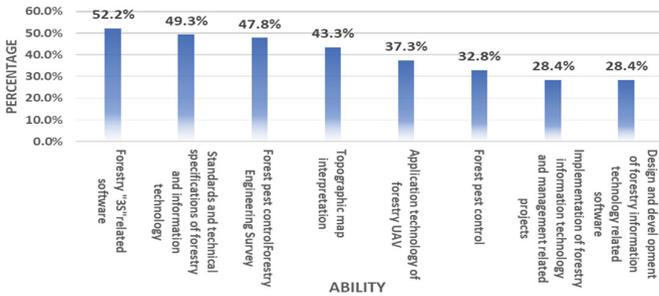

Fig. 3. Lack of ability of students majoring in the application of forestry information technology.

4 Forestry Information Technology Application Professional "Post Course Certificate Competition" Integration Talent Training Mode Implementation Way

4.1 Determining Precise Talent Development Goals

The college adjusted the objective of training talents in forestry information technology application as follows: to cultivate strong ideals and beliefs, comprehensive development of moral, intellectual, physical, aesthetic and labor, with a certain level of scientific culture, good humanistic qualities, professional ethics and innovative consciousness, the spirit of craftsmanship of excellence, strong employability and sustainable development. Master the knowledge and technical skills of this profession, for the forestry industry 3S information technology support, mapping and surveying, forestry planning and design, forest resources monitoring and management, forestry information management and other occupational groups, can engage in forestry resources survey and monitoring, computer and application engineering technicians, mapping engineering technicians and other work of high quality technical skills. The adjusted talent training objectives are clearly oriented, taking into account the overall development of students and adapting to the requirements of the times.
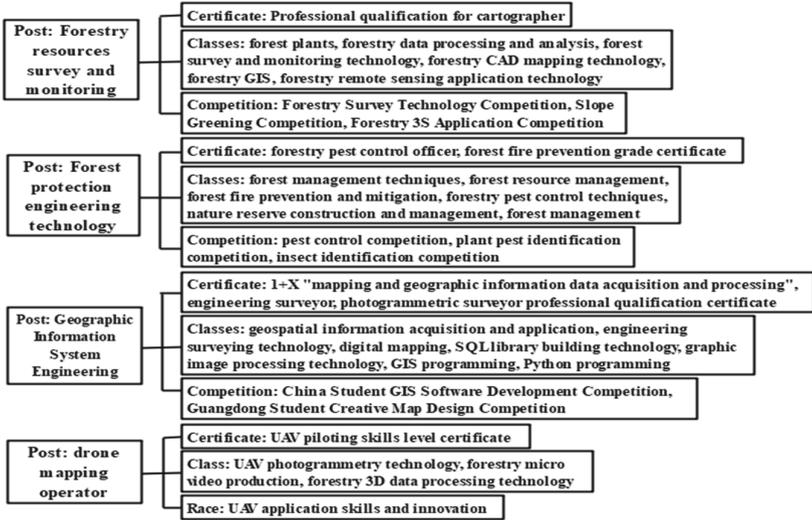
Fig. 4. Integrated curriculum system of "post-course-competition-certificate".

4.2 Course Platform Based on Information Technology Tools

The college actively implements the policy of integration of industry and education, and establishes the talent training mode of order system with Guangdong Southern Digital Technology Co. The college and the enterprise take the training of job ability as the core, integrate information technology and curriculum, and establish the "post, class, certificate and competition" integrated curriculum platform (Fig. 4). The course content such as "course certificate competition" is designed as a requirement for the position, and the course platform is used for the whole teaching management. Students log on to the course platform to learn and complete tasks to improve their skills and abilities through training and practice on the platform, thus actively solving the problems facing the training of forestry IT application talents and achieving the goal of training composite talents.

4.3 Course Content Based on Vocational Skills Competitions and Job Occupational Standards

First of all, in order to let students sort out their professional learning objectives as early as possible, they start to carry out innovative and entrepreneurial design of forestry information technology applications and participate in industry competitions to promote learning through competition. According to the logical relationship of the course, based on information technology to collect data, update the teaching content of the course platform, so that the course teaching content and job typical work tasks deep integration. The optimized path includes: in the forest survey technology course added a total station to set up fixed sample plots [10], the use of external survey tablet installation forest survey APP, GIS data collection and processing. In the forestry 3S information technology course, before the class, students complete the basic operation by comparable as the

usual homework, and the project teaching according to the enterprise job task as the big homework, and the comprehensive practical training takes the forestation planning of the school as the target, decodes the current situation of land use with RS knowledge, verifies it with GPS field investigation, and later uses ArcGIS for stand analysis to improve students' comprehensive application ability. Because of the duplication of basic surveying and mapping technology and GNSS satellite mapping technology, and the requirement of reducing theoretical teaching hours, the two courses are combined into a new "Engineering Surveying" course with 64 h, and each student is required to record their own practical operation video in the corresponding module of the platform and import the measured data into CASS to draw topographic maps. Focusing on improving students' information technology quality, we have added big data processing technology (Python) and forestry data processing and analysis. In order to meet the needs of the new positions, UAV photogrammetry technology is added and comprehensive practical training on forestry UAV application is set up. The teaching materials used are school-based materials prepared by the team of lecturers according to the application of UAV in forestry, which are aligned with the needs of enterprise positions.

4.4 "Innovation and Entrepreneurship Practice Teaching" by Post Course Certificate Competition

Forestry information technology application courses are integrated into entrepreneurial practice, and a professional teaching module of "post course certificate competition" is established. Putting job practice, qualification exams and skill competitions throughout the teaching process, promoting the penetration of job standards, competition regulations and teaching to improve the quality of teaching and students' practical skills. Starting from the first year of university, teachers guide students to apply for innovative experimental projects according to the three-level goal of "school level, regional and national" [2]. Students are also guided to participate in social practices such as innovation and entrepreneurship competitions, qualifications and various skill competitions. Teachers lead students to participate in the production practice process by undertaking various social service projects (forest fire prevention channel design, forest resource survey) to enhance students' hands-on skills. The competition promotes practical teaching, implements project-driven teaching, and realizes the conversion of coursework into entries. The competition is used to promote innovation and entrepreneurship, and the entries are transformed into student papers, patents and entrepreneurial projects [12] and updated in real time in the platform.

4.5 Book and Card Race Integration, Establish Credit Bank System

Based on the "post course certificate competition", the assessment of professional forestry information technology application courses is practice-oriented, covering project reports, written tests, machine tests, and oral tests [7]. Integrate skill level certificates and competitions such as mapper, forestry pest control, forest fire prevention, UAV piloting skills, 1+X "mapping and geographic information data acquisition and processing" and engineering surveyor into the curriculum system and content (Fig. 4). Students can upload the acquired skills certificates to the platform to be exempted from

the corresponding related courses or convert the credits to achieve the book-certificate integration [8]. In addition, the first, second and third prizes won by students in the competition will be automatically counted as corresponding credits to realize the integration of book and competition and the conversion of learning outcomes.

5 Conclusion

Forestry information technology application professional "post class certificate competition" curriculum reform, the integration of information technology and curriculum teaching, break the traditional teaching methods, with jobs, certificates, competitions as the carrier, to build the curriculum platform. Invest in training hands-on, high-quality technical skills personnel with good labor spirit and craftsmanship, and promote information technology-based curriculum reform. In addition, because the application of forestry information technology is a newly established profession, no certificate has been developed to fully align with the profession. The teaching and research team of the college is focusing on the development of forestry digital cartography skills level certificate and the corresponding development of professional skills standards for forestry digital cartographers, which is also beneficial to the reform of the curriculum.

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