A Study on the Training of Surveying and Mapping Engineering Talents in Application-oriented Universities

Shuaili Wang
College of Science, Hunan City University, Yiyang, 413000, China

Abstract: With the development of urban construction, surveying and mapping engineering talents become more and more important. Therefore, this paper puts forward the research on the training of Surveying and mapping engineering talents in application-oriented undergraduate colleges. Based on the students' practice, it is of practical significance to train the talents training mode in line with the development of the new era through various flexible teaching reforms and practices.

Keywords: Surveying and mapping engineering; Personnel training; Research; Teaching reform

1. Introduction

Surveying and mapping engineering education is an important part of China's higher education, which plays an irreplaceable role in promoting the process of national industrialization. Engineering education professional certification is an internationally accepted engineering education quality assurance system. With the characteristics of its three basic concepts of "student-centered, output-oriented and continuous improvement", [1-2] has developed into an internationally accepted engineering education quality assurance system. Therefore, the professional certification of engineering education has been attached great importance by the educational and industrial circles in China. Up to the end of 2017, more than 700 majors in 17 professional categories have been certified. More and more colleges and universities are actively applying to participate in professional certification to standardize education management, standardize teaching and improve the quality of talent training. For surveying and mapping specialty, from 2012 to the end of 2016, out of more than 130 general undergraduate colleges and universities of Surveying and Mapping Engineering in China, 18 colleges and universities of Surveying and mapping engineering have passed professional certification, and [3-4] and 10 and 13 colleges and universities of Surveying and mapping engineering have applied for professional certification in 2017 and 2018, respectively. It can be seen that the attention and participation of Surveying and mapping engineering professional certification are increasing year by year.

The fundamental problem of education is the development of human beings. Its starting point and end point should be to cultivate outstanding talents, that is, to focus on learning. The author believes that student-centered is mainly reflected in the following two aspects: on the one hand, when formulating the training objectives and graduation requirements of professional talents, it should be set around the professional ability possessed by the students at graduation and a period of time after graduation, and the curriculum system, teaching staff and supporting conditions should also be oriented to help students achieve the training objectives and graduation requirements. On the other hand, it focuses on students' development, learning and learning effect. The purpose of teaching is not to "teach", but to "learn". Taking students as the center, the most fundamental thing is to realize the transformation from "teaching" as the center to "learning", that is, from "classroom, teachers, teaching materials" to "students, learning, learning process", to really pay attention to students' learning and promote students' development. Output based education (OBE) is an advanced concept advocated by international engineering education, which focuses on "what students learn" rather than "what teachers teach". Therefore, this requires the major to design a scientific and reasonable training program and curriculum outline according to the basic idea of "reverse design, forward construction", starting from the training objectives and graduation requirements. In addition, in the process of teaching, we should adopt the matching teaching content and teaching methods, and allocate enough software and hardware resources. Finally, according to the training objectives and graduation requirements, the students are assessed reasonably, and the corresponding continuous improvement is carried out.

2. The Current Situation of Practical Teaching of Surveying and Mapping Engineering Specialty Guided by the Training of Applied Talents

The personnel training of Surveying and mapping engineering education must face the engineering reality and pay attention to the practicality of engineering education. Surveying and Mapping Science and technology is a very practical subject, most of the knowledge is only oral introduction for students in class, cannot get good results. Nowadays, the goal of independent colleges and universities is to cultivate practical talents. However, the major of Engineering in Colleges and universities still takes theory learning and research as the main goal. The relationship between the school and the enterprise is not close. The enterprise cannot fully identify with the school enterprise cooperative education from the concept, lack the enthusiasm to participate in the cooperative training, and cannot effectively carry out a comprehensive and in-depth school enterprise cooperative education. The practice base is like a decoration. Schools and teachers can't manage practical education well, which leads to internship becoming visit and internship becoming internship.

2.1. Lack of innovation in curriculum

Because the orientation of independent colleges and universities just established is not consistent with the rapid development after, most colleges and universities are not clear about the orientation of application-oriented personnel training, the specific implementation policies and the direction of running schools are not clear, and cannot highlight their own advantages, especially the important problem is that the training programs of colleges and universities usually do not pay attention to the setting of practice links, and cannot arrange practice courses completely. The teaching work in Colleges and universities is autonomous, and the curriculum and teaching plan arrangement do not fully consider the characteristics of the different quality of students and the unstable teachers. The curriculum is lack of innovation, which cannot really meet the requirements of social and economic development for practical ability.

2.2. Lack of practical teaching resources

One of the difficulties encountered in the process of popularization of education in Colleges and universities is the shortage of funds for running schools. Most colleges and universities have insufficient investment in practical teaching instruments and equipment, teaching sites and other aspects, resulting in the shortage of funds and running sites in Colleges and universities. In particular, surveying and mapping engineering and other practical majors cannot meet the teaching needs.

2.3. Lack of practical teachers

Independent colleges and universities can't solve the problem of teachers' establishment, can't get fair support from the government in the evaluation of awards and titles, and the salary and social welfare are lower than that of ordinary colleges and universities. It's difficult to recruit engineers with rich practical experience with high academic qualifications. Most of the teachers are fresh graduates and do not have the ability of Surveying and mapping engineering practice. Some of the external teachers have their own work, so they can't complete the teaching task efficiently.

3. Corresponding Curriculum System and Teaching Reform

3.1. Build a curriculum system suitable for innovative personnel training mode

In the process of talent training, we should focus on the cultivation of professional ability to meet the needs of the industry, promote the sustainable development of students, and improve their ability of follow-up learning. Based on the requirement of talent training that "not only meets the requirements of Surveying and mapping industry for professional ability, but also has the potential for sustainable development", through market research, demonstration by the steering committee of Surveying and mapping professional construction, combined with the requirements of various development and construction for surveying and mapping industry, seven post groups, including "engineering surveyor", "digital topographic map surveyor" and "GIS operator", are determined. Then, according to the post group, it analyzes the moral quality and ability requirements of each post, and forms a systematic mode of basic knowledge teaching and professional ability training. [5] Taking Guizhou Province as the main province and taking into account the ability requirements of Surveying and mapping technology posts in surrounding industries, and referring to the national vocational qualification standards, the work tasks of Surveying and mapping posts are determined, and the complex and difficult work tasks are integrated into comprehensive engineering projects, so as to build a project-based course system, determine the core courses to support surveying and mapping engineering projects, and formulate the curriculum of core courses. Accurate, the teaching content relies on the project organization design, realizes the theory practice integration teaching material construction, constructs the multimedia

teaching courseware, develops the network curriculum for the independent study, satisfies the mapping core specialized ability training demand. According to the post group, according to the principle that the ability training is in line with the post necessity and the employment necessity, different opinions of experts in various industries are displayed, and the typical surveying and mapping engineering projects are formed by summarizing, analyzing and integrating. According to the professional ability requirements of seven professional posts, such as "engineering surveyor", "digital topographic map surveyor" and "GIS operator", the curriculum system based on the mapping task is reconstructed according to the mapping task faced by each post group. The whole teaching process of classroom teaching and practice training is designed and implemented in a systematic way. At the same time, enterprises are allowed to participate in the process, and the corresponding practice training is jointly developed to realize the systematic cultivation of hands-on ability. Combine the basic course reform with the professional courses, fully study its application scope and degree in each professional course, design the basic courses based on the needs of professional development and follow-up learning ability of Surveying and mapping engineering technology, and strengthen the teaching of "College English", "higher mathematics", "Engineering Mathematics", "CAD" and other courses. The purpose of professional courses is to ensure the smooth implementation of Surveying and mapping tasks and projects. According to the new surveying and mapping technology and standards, the curriculum should be adjusted in time, and the new technology and standards involved in the corresponding courses should be added, so that teaching and engineering projects can be closely and flexibly linked, forming a curriculum system integrating theory and practice. according to the tasks of each course, according to the process from simple to complex, modular and project-based learning situation design. Taking the course design of "principles of geographic information system" as an example, the design focuses on the construction of "land right confirmation", analyzes the work tasks, and carries out the course design based on the process of spatial data processing of agricultural land and the curriculum standard. In the process of project promotion, students have completed the knowledge learning and skills training, and then combined with the project task book to assess and evaluate students.

3.2. Implementation of "progressive" teaching mode

In the course construction, relying on the existing equipment conditions of the major, carry out the operation training of Surveying and mapping instruments and modular surveying and mapping ability training, and build the teaching mode of "integration of theory and practice". According to the path of progressive accumulation of professional ability from "basic ability" → "modular ability" → "comprehensive ability" → "industrial ability" and gradual improvement of ability, the combination of project and teaching task, the reorganization of teaching content, the systematic curriculum teaching design according to the working process, and the combination of project teaching in the "integration of theory and practice" classroom, the real realization of "learning while practicing" , learning while doing, and realizing the training of "basic ability". In the course construction, relying on the existing equipment conditions of the major, we should carry out modular practical training of Surveying and mapping, cultivate practical ability of Surveying and mapping, practice the teaching mode of "integration of theory and practice", and give full play to the role of practical training in the teaching system. In the process of gradual progress of professional ability, from basic ability to modular ability, to comprehensive ability, and then to industrial ability, the project and teaching task are closely integrated, and the teaching content is modular reorganization, so as to truly achieve the training of "basic professional ability" by "learning while practicing, doing while learning".

3.3. Increase the learning of computer information content

The students of Surveying and mapping engineering are faced with great employment pressure. The ability of measuring and calculating by computer alone cannot meet the needs of the society for students, and they also need the ability of secondary development on the platform of basic operating system. Therefore, in the computer teaching process of Surveying and mapping engineering, the teaching contents of basic knowledge, software engineering and digital image processing should be integrated into the design of computer class hours.

3.4. Increase teaching of related subjects

With the rapid development of Surveying and mapping technology, surveying and mapping technology is applied to more and more fields, and the scope of Surveying and mapping instruments is also expanding. For example, GPS system has just been applied to surveying and mapping, and now it has been gradually applied to industry, agriculture and service industry; the development trend of Engineering Surveying and mapping is towards the integration of GIS, CAD and digital map; the integrated computer-aided design

system such as total station and aerial photogrammetry is used to design roads and bridges, calculate earthwork, etc. Therefore, it is necessary to join the teaching of related subjects strictly according to the expansion of the application scope of Surveying and mapping, so as to provide more employment opportunities for students.

4. Conclusion

The professional certification of Surveying and mapping engineering education standardizes the management of higher education and improves the education quality assurance system, which has a positive role in promoting the construction of "double first class" in China. In a word, the training of applied talents has become the key content in the teaching reform of Surveying and mapping engineering. The main goal is to strengthen the training of talents, take the employment of students as the guidance, cultivate the practical ability of students, innovate the setting of practical courses, enrich the practical teaching resources, build a professional teaching team, and lay a good foundation for the training of applied talents.

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