DOI:10.18686/ahe.v7i31.11512

Analysis of Engineering Surveying Teaching Reform under the Core Concept of Engineering Education Certification

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Abstract: As a key component of engineering discipline, engineering surveying is very important to cultivate engineers with professional skills and practical ability. In view of this background demand, this paper analyzes the necessity and implementation strategy of engineering surveying teaching reform under the framework of engineering education certification. The first evaluation of the current teaching model, including curriculum and teaching methods, student learning effectiveness feedback. Secondly, the core concept of engineering education certification is interpreted in detail, focusing on the alignment of certification standards and educational objectives, as well as the importance of innovation and practical ability training. Finally, the targeted teaching reform measures are explored, including the renewal of curriculum content, the introduction and optimization of practical teaching, and the comprehensive training of innovation ability and engineering literacy, aiming to provide theoretical support and practical guidance for improving the practicality, innovation and adaptability of engineering surveying education.

Keywords: Engineering education certification; Engineering surveying; Education reform

Introduction:

With the rapid development of engineering technology and changes in industry demand, the core concept of engineering education certification has gradually become an important guide to improve the quality of education and adapt to market changes. This paper focuses on analyzing the teaching status of engineering surveying under the framework of engineering education certification, identifies the existing problems, and puts forward practical reform strategies. Through the in-depth discussion and optimization of teaching mode.

1. Analysis of the current teaching situation of engineering surveying

1.1 Curriculum and Teaching Methods

At present, the curriculum of engineering surveying generally follows the traditional teaching mode and pays attention to the teaching of theoretical basis, but it still needs to be strengthened in practical teaching. The course content usually includes basic surveying, topographic mapping, engineering measurement technology, etc., supplemented by relevant software application teaching. However, this teaching model often leads to a disconnect between theoretical knowledge and practical skills.

In terms of teaching methods, the traditional classroom teaching still dominates. Although some colleges and universities have begun to try to adopt new teaching methods such as case teaching and project-driven teaching in recent years, these innovations have not been widely promoted. In addition, the allocation of teaching resources, the construction of teacher team and the perfection of teaching facilities also directly affect the quality of teaching.

1.2 Students' Learning Effectiveness and Feedback

From the perspective of students' learning effectiveness, due to the tendency of the curriculum to emphasize theory and practice, students are often insufficient in mastering the actual measurement operation and the ability to solve practical problems. In addition, the participation and enthusiasm of students in the course learning process are also affected, which affects their understanding and interest in engineering surveying to a certain extent.

Student feedback usually points out that they hope to have more practical opportunities, such as field measurement operations, participation in real engineering projects, etc., in order to better understand and apply theoretical knowledge. Students expect the classroom to be more interactive, and the teaching content can be closer to the actual engineering cases, so as to improve the effectiveness and interest of learning.

2. Engineering education certification core concept analysis

2.1 Accreditation Standards and Educational Objectives

The criteria for engineering education accreditation are based on ensuring that students acquire the necessary engineering knowledge and skills. These standards usually include the rationality of the curriculum structure, the guarantee of teaching quality, the adequacy of learning resources, and the degree of knowledge and skill level of graduates.

The accreditation process emphasizes the alignment of educational objectives with industry needs. It shows that higher education institutions need to fully consider the actual needs of the engineering field when developing educational plans and courses. For example, the curriculum should cover not only core engineering knowledge, but also areas such as emerging technologies, sustainability, ethics and teamwork.

2.2 The Importance of Cultivating the Ability of Innovation and Practice

Practical ability refers to the ability of students to apply theoretical knowledge to practical work. This includes understanding complex engineering systems, using advanced engineering tools, and participating effectively in teamwork. The emphasis on practical ability in the process of engineering education certification urges educational institutions to increase practical teaching links such as experiments, internships, and project-based learning to ensure that students not only master theoretical knowledge, but also have practical operation and problem-solving skills when they graduate.

Therefore, cultivating students 'innovation and practical ability is the key to realize the core concept of engineering education certification. This not only helps to improve the professional competitiveness of students, but also to meet the needs of the development of the engineering industry. By continuously optimizing the course content and teaching methods, strengthening the connection with the industry, and providing sufficient practical learning opportunities, higher education institutions can effectively cultivate engineering graduates with both innovative spirit and practical ability.

3. Strategies and methods of practical teaching reform

3.1 Update of Course Content and Teaching Means

Update the course content to reflect the latest technology and industry trends: To ensure that the teaching content keeps pace with the latest developments in the engineering surveying industry, the course content should be updated regularly. This includes the introduction of new measurement technologies (e. g., laser scanning, drone surveying), the latest software tools (e. g., GIS and 3D modeling software), and emerging topics in current engineering practices (e. g., sustainability, smart construction).

Integrate case studies and project-based learning: Through case studies and project-based learning, students can apply what they have learned in the process of solving practical engineering problems. This method can enhance students' practical operation ability and problem solving ability, and promote the combination of theoretical knowledge and practical application.

Encourage teacher-student cooperation in research projects: Encourage teachers and students to participate in research projects, which can not only improve the practicality of teaching, but also cultivate students' research interest and innovation ability. Such projects can also work with industry to ensure that research is practical and forward-looking.

3.2 Introduction and Optimization of Practice Teaching

First of all, the introduction of strengthening practical teaching means that more field operations, project design and implementation are integrated into the traditional curriculum. This approach allows students to apply and consolidate theoretical knowledge in practice, while developing their intuitive understanding of the practical work of engineering surveying. For example, courses can be designed to be combined with actual engineering projects in local governments or private enterprises, so that students can participate in these projects under professional guidance and apply their knowledge.

Secondly, the optimization of teaching also needs to pay attention to the quality and effect of practice. This includes ensuring that practical activities are closely related to course objectives, as well as providing adequate resources and support, such as advanced measurement equipment, professional instructors and practical case studies. In addition, the evaluation mechanism of practical teaching also needs to be improved to ensure that students can obtain the maximum learning effect from practical activities.

For example, based on the "Urban Planning and Surveying Project". In this project, small groups of students collaborate on

topographic mapping and data analysis. The goal of the project is to provide detailed measurement data for the new area to assist the planning team in formulating an effective development plan. Students need to use a variety of measurement tools (such as total station, GPS system) for field measurements, and use GIS software for data analysis and presentation [1].

Through such practical teaching cases, students can gain valuable practical experience, which not only improves students' technical skills, but also enhances students' professional quality and teamwork ability. Therefore, the introduction and optimization of practical teaching is essential for the success of engineering surveying education.

3.3 Cultivation of Innovation Ability and Engineering Literacy

First of all, cultivating innovative ability means encouraging students to think about new methods and solutions to problems. This requires educators to create learning environments that are open and encourage innovation, where students dare to question existing practices and try new approaches. For example, by designing project-driven courses, students can apply innovative thinking and techniques in solving real-world engineering problems. In addition, teachers can guide students to analyze engineering success cases and failure lessons in history through case studies and discussions, so as to stimulate students' innovative thinking [2].

Secondly, the cultivation of engineering literacy includes not only the improvement of professional skills, but also the cultivation of students' professional ethics, teamwork ability and social responsibility. This means that education should not only impart technical knowledge, but also pay attention to the improvement of students' comprehensive quality [3]. For example, students can learn how to communicate and collaborate effectively in a team in practice through methods such as team projects and role-playing. At the same time, students are taught how to make ethical and responsible decisions at work by discussing topics related to engineering ethics and social responsibility.

Conclusion:

In summary, through the analysis of this paper, it can be clear that under the guidance of the core concept of engineering education certification, the direction and method of engineering surveying teaching reform. The key to the improvement of teaching quality is to pay attention to the timely updating of curriculum content, the innovation of teaching methods, and the cultivation of practical skills and engineering literacy. These reforms will help narrow the gap between education and industry needs, and improve the professional adaptability and innovation ability of graduates. Therefore, continuous teaching optimization and innovation is very important for the development of engineering surveying and even the whole engineering education field.

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