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Practice and Exploration of Water Resources Teaching Reform in Colleges and Universities

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Abstract: ***The water conservancy engineering profession has an important position in the current social development, this paper comprehensively discusses the background, challenges and coping strategies of water conservancy teaching reform in colleges and universities, as well as the future development trend of teaching. Under the background of the new period, the teaching reform of water conservancy in colleges and universities is imperative, so it focuses on the innovation of teaching concepts and contents, the construction of practical teaching bases, as well as suggestions on improving the evaluation system. Finally, the prospects of the application of information technology teaching means and the impact of cross-disciplinary integration on the teaching reform of water conservancy are also discussed.***

Keywords: Universities; Hydraulic engineering; Teaching reform; Practice; Development trend.

1. INTRODUCTORY

With the development of society and technological progress, water conservancy teaching in colleges and universities is facing many challenges and opportunities. The traditional teaching mode and evaluation system is no longer adapted to the needs of modern engineering education, there is an urgent need to innovate teaching concepts and methods, to build a closer to the actual teaching system, in order to cultivate high-quality water conservancy engineering personnel to meet the needs of future development.

2. THE BACKGROUND AND NECESSITY OF WATER CONSERVANCY TEACHING REFORM IN COLLEGES AND UNIVERSITIES

With the rapid development of social economy and scientific and technological progress, water resources management and water conservancy engineering construction are facing increasingly complex challenges and needs, which put forward new requirements and challenges for higher education. Firstly, from the technical level, the traditional water conservancy engineering technology can no longer meet the current complex and changing water resources management needs. The frequent occurrence of extreme weather events brought about by global climate change, such as droughts and floods, requires water resources engineering professionals to have a higher level of technology and response capability. Therefore, the teaching of water resources in colleges and universities needs to keep up with technological advances, introduce emerging technologies and concepts, and cultivate professionals with the ability to innovate and solve complex water resources problems. Secondly, from the point of view of social demand, water resources management has evolved from a pure engineering problem to a complex problem involving economic, ecological and social factors. Water resources education in colleges and universities needs to cultivate professionals with the ability of comprehensive analysis and cross-border cooperation through interdisciplinary teaching and research, so as to ensure that they can coordinate and promote the sustainable use of water resources and ecological protection in different fields. Thirdly, from the perspective of educational concepts and methods, the traditional teaching mode and curriculum have been difficult to adapt to the learning needs of modern students and the requirements of social development. The reform of water resources teaching in colleges and universities needs to innovate educational concepts and methods, pay attention to the cultivation of practical ability and comprehensive quality, and strengthen the practical ability and teamwork spirit of students, so that they can be competent and confident in facing the challenges of the actual work [1].

3. CHALLENGES AND RESPONSE PRACTICES IN THE TEACHING REFORM OF WATER RESOURCES ENGINEERING PROGRAMME

3.1 Renewal of teaching concepts and methods

The current teaching concept of water conservancy teaching in colleges and universities is outdated, single method and other problems, has gradually become a bottleneck restricting the improvement of educational quality and the

cultivation of students' comprehensive quality. The traditional teaching mode is often based on the transmission of theoretical knowledge, the lack of practical operation and interdisciplinary integration, can not effectively deal with the complex challenges faced by modern water conservancy engineering.

3.1.1 Teachers' teaching concept innovation is urgent

Modern water conservancy engineering requires the combination of engineering practice and innovative thinking, so the teaching process should pay more attention to the cultivation of problem solving ability, and advocate students to deepen their understanding and application of theory through practical exploration and teamwork.

3.1.2 Diversification of teaching methods is crucial

A single classroom lecture mode is already difficult to meet students' learning needs. Case study, project design, simulation experiment and other teaching methods should be introduced to let students deeply understand the complexity and realistic challenges of water conservancy engineering in practical application through actual cases and real data, and cultivate practical operation ability and innovation consciousness [2].

3.1.3 Teacher team building is a key link in teaching reform

Teacher training and professional development programmes are needed to improve teachers' teaching ability and the speed of updating educational concepts, encourage teachers to participate in scientific research innovation and teaching method improvement, and form a good educational and teaching atmosphere.

3.2 Building practical teaching bases

In the reform of water conservancy teaching in colleges and universities, the construction of practical teaching base has important strategic significance and practical value. The practical teaching base is not only a bridge combining theoretical knowledge and practical operation, but also an important platform for cultivating students' practical skills and ability to solve practical problems.

3.2.1 The construction of practical teaching base strengthens the practical operation ability of students

Water conservancy engineering involves large-scale equipment, engineering projects and complex environments, and it is difficult to fully cover the skills and knowledge required for practical work only by classroom theoretical teaching. Through the construction of simulation laboratories, field practice bases and other practical teaching places, students are able to operate equipment and solve problems in real scenarios, which enhances their practical operation ability and their ability to cope with complex situations. Practical teaching bases also help to cultivate students' teamwork and project management skills. Modern water conservancy projects often require multidisciplinary and multidepartmental co-operation, and students learn to communicate, collaborate and manage in a team by participating in practical teaching projects, which enhances the teamwork spirit and leadership ability.

3.2.2 The current construction of practice teaching bases faces some problems and challenges

Such as insufficient updating and modernisation of facilities and equipment, and some practice teaching bases have aging facilities that cannot meet the teaching needs of new technologies and methods. Meanwhile, the imperfection of management system and operation mechanism, some bases are chaotic in management, inefficient in resource utilisation, and lack of long-term planning and strategy for sustainable development. In order to solve these problems, the following measures can be taken: First, increase investment and optimise facilities and equipment. Update the hardware facilities of practice teaching bases through the introduction of advanced equipment and technology to ensure that they can support the latest teaching content and methods; Second, establish a sound management mechanism. Formulate detailed rules and regulations for base management, clarify the division of responsibilities and management processes, enhance the effective utilisation of base resources, and ensure the smooth progress of teaching and scientific research activities; Third, expand cooperation and application fields. Cooperate with industrial enterprises and government departments to establish joint laboratories and co-build bases to promote the close integration of teaching and actual engineering projects, and to provide wider practical opportunities and academic support; Fourth, continuous assessment and improvement. Regular assessment of teaching effectiveness, as well as overhaul and maintenance of base facilities and equipment, timely

adjustment and optimisation of teaching content and methods, giving full play to the educational function of practice teaching bases [3].

3.3 Improve the teaching evaluation system

The current evaluation system of water conservancy teaching in colleges and universities, to a certain extent, there are problems such as single evaluation indexes and unreasonable evaluation methods, which affect the comprehensive assessment of students' learning effects and the effective improvement of teaching quality. The traditional evaluation system often focuses only on students' theoretical examination results, ignoring the comprehensive assessment of students' practical ability, innovation ability and comprehensive quality. Water conservancy engineering education needs to focus on the cultivation of practical skills, so the evaluation indexes should include multi-dimensional indicators such as theoretical knowledge mastery, experimental operation skills, project design ability, teamwork ability and so on. The homogenisation of evaluation methods also limits the comprehensiveness and objectivity of evaluation. Too much reliance on the traditional written and oral forms of examination cannot effectively assess students' coping and problem-solving abilities required in practical work. Therefore, diversified evaluation methods should be explored, such as open-ended questions and answers, practical case analyses, project reports, field trips, etc., so as to comprehensively demonstrate students' comprehensive and applied abilities. In addition, there is also a mismatch between the evaluation content and the teaching objectives in the current evaluation system. The evaluation content should be closely centred on the teaching objectives and social needs, reflecting the overall development of students in terms of knowledge, skills and attitudes, etc. Therefore, when formulating the evaluation system, attention needs to be paid to clarifying the objectives of education and training, and ensuring that the evaluation content is in line with them.

In order to improve the evaluation system of water conservancy teaching in colleges and universities, the following suggestions are put forward: firstly, multi-dimensional evaluation is applied. In addition to the traditional written test scores, it should also increase the number of evaluation indicators such as practical performance, project design results, teamwork performance, etc., to comprehensively assess the ability of students in various aspects. Secondly, diversified evaluation methods are adopted. Various evaluation methods such as open-ended question and answer sessions, practical case studies, project reports, oral presentations, etc. should be introduced to encourage students to demonstrate and apply the knowledge and skills they have learnt in different scenarios. Third, regular assessment and adjustment. Establish a sound monitoring mechanism for the operation of the evaluation system, regularly assess the content and methods of evaluation, and make adjustments and optimisation according to the actual results to ensure the effectiveness and scientificity of the evaluation system.

4. EXPLORE THE DEVELOPMENT TREND OF WATER TEACHING REFORM

4.1 Pay attention to the application of information technology teaching tools

The application of information technology teaching means in the teaching of water conservancy in colleges and universities has a broad prospect, which can significantly improve the teaching effect and students' learning experience. With the rapid development of information technology, the traditional teaching methods are gradually changing to digital and intelligent, which brings new development opportunities and challenges for water conservancy engineering education.

Through multimedia technology, virtual laboratory and simulation software, can vividly show the actual operation process of water conservancy engineering, so that the abstract theoretical knowledge is more specific, easy to understand. For example, the use of virtual simulation technology to show the whole process of dam construction, so that students can participate in the design and operation through virtual reality technology to enhance the interactivity and practicality of learning. Information-based teaching tools can also promote students' independent learning and personalised education, through the network teaching platform and electronic resource library, students can access the latest learning materials and course content at any time and any place, independent learning and personalised customised learning plans. Teachers can also adjust their teaching strategies according to the students' learning progress and feedback to improve the teaching effect. In addition, information-based teaching tools can also expand the boundaries of teaching. Through distance learning, online courses and cross-regional cooperation projects, students can come into contact with advanced teaching resources and expert lectures from all over the world and expand their horizons.

In order to better utilize the advantages of informatised teaching tools, the following measures can be taken: firstly, to strengthen teachers' IT training and competence enhancement, teachers need to master and apply the latest educational technology tools in order to design and implement course contents and teaching activities that meet the needs of informatised teaching; secondly, to build and optimize educational technology support platforms. Colleges and universities should invest funds and resources to build perfect network teaching platforms and electronic resource libraries, and provide stable and efficient technical support and services to ensure the smooth progress of informatised teaching. Thirdly, teachers and students are encouraged to participate in the development and application of informatised teaching tools to promote the innovation and sharing of teaching resources, so as to continuously optimise the teaching process and learning experience.

4.2 Disciplinary cross - fertilisation

As a comprehensive discipline involving water resources management, engineering construction, environmental protection and other fields, the cross-fertilisation of water resources engineering with other disciplines helps to expand the teaching content, improve the quality of teaching and cultivate the comprehensive ability of students [4]. Specifically:

The trend of cross-fertilisation between water resources disciplines and natural science disciplines such as environmental science and ecology is remarkable. As the society pays more attention to environmental protection and sustainable development, the design and implementation of water conservancy projects are no longer limited to the technical level, but also need to consider the integration and protection of the ecological environment. The introduction of environmental impact assessment and ecological compensation mechanism in the teaching of water conservancy helps to cultivate students' awareness and ability of environmental protection in the design of water conservancy projects and enhance their competitiveness in the field of sustainable development.

The integration of water conservancy disciplines with information technology, data science and other engineering and technical disciplines. The rapid development of information technology has brought intelligent and automated new technology applications to water conservancy engineering, such as intelligent monitoring systems and the application of big data analysis in water resources management. The introduction of data analysis and artificial intelligence application cases in water conservancy engineering in water conservancy teaching helps to cultivate students' ability to analyse and solve practical problems and improve their information technology application level.

The integration of water conservancy disciplines and social science disciplines such as economic management and legal policy is also getting closer. The implementation of water conservancy projects not only needs to consider the technical feasibility, but also needs to consider the economic benefits, social impact and legal compliance. The introduction of project management, cost-benefit analysis, legal risk assessment and other contents in water conservancy teaching helps to cultivate students' interdisciplinary comprehensive ability and teamwork spirit, so that they can be competent in the management decision-making of water conservancy projects in a complex social environment.

5. CONCLUDING REMARKS

In conclusion, the teaching reform of water conservancy in colleges and universities will face diversified challenges and changes, and through the wide application of informatisation teaching means and the in-depth advancement of interdisciplinary cross-fertilisation, we are confident to take a solid step forward on the road of educational innovation, and contribute to the cultivation of more water conservancy engineering talents with innovative thinking and comprehensive ability.

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