

Reform of Assessment Methods for Water Resource Planning Courses in Applied Universities Based on the Background of the "Excellent Engineer Training Plan"

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Abstract: With the development of social economy and population growth, water resource issues are becoming increasingly prominent, and the demand for talent in water resource planning is also increasing. In order to cultivate more high-level water resource planning talents, many applied universities have opened water resource planning courses and evaluated students' learning outcomes through assessment methods. This article will explore the reform of assessment methods for water resource planning courses in applied universities based on the background of the "Excellent Engineer Training Plan".

With the rapid development of social economy and continuous population growth, the rational planning and management of water resources have become increasingly important. As a valuable natural resource, the effective utilization and protection of water resources are of great significance for achieving sustainable development. In the current context, the teaching content and assessment methods of water resource planning courses in universities need to be reformed to cultivate more outstanding engineers with practical abilities [1].

The traditional assessment method for water resource planning courses mainly focuses on mastering theoretical knowledge, and students test their understanding and memory of water resource planning theory through book learning and written exams. However, this assessment method has certain limitations and cannot truly evaluate students' practical application ability and problem-solving ability [2]. In practical work, excellent engineers need to have a solid theoretical foundation and need to be able to apply theoretical knowledge to practical engineering projects to solve practical problems.

In order to better cultivate outstanding engineers with application abilities, the assessment methods of water resource planning courses in universities need to be reformed. The new assessment methods should focus on cultivating students' practical and innovative abilities, so that they can apply the knowledge learned in real engineering projects and solve practical problems. This assessment method can better evaluate students' comprehensive abilities and improve their ability to solve practical application problems.

1. Curriculum Education Requirements for Applied Universities under the Background of the "Excellent Engineer Training Plan"

In the context of the "Excellent Engineer Training Program", applied university curriculum education is facing new requirements. This plan aims to cultivate students with innovative, practical, and comprehensive abilities. Therefore, curriculum education in applied universities needs to closely align with this goal, focusing on cultivating students' practical abilities and innovative awareness.

In terms of practice, combining theoretical knowledge with practical operations, cultivating students' ability to solve practical problems through experiments, practical training, and other forms. Curriculum teaching should focus on practical operations, encourage students to conduct practical operations and on-site inspections, and improve their hands-on ability and practical experience 0.

In the cultivation of applied innovation, curriculum, education in applied universities should emphasize the cultivation of innovative awareness. In modern society, innovation is an important driving force for promoting social development. Therefore, curriculum education in applied universities should focus on cultivating students' innovative awareness and ability. The curriculum should encourage students to engage in research projects, innovative practices, and other activities to cultivate their innovative thinking and abilities. Teachers should guide students to engage in self-directed learning and independent thinking and cultivate their problem-solving and innovative abilities. In addition, the curriculum education requirements of applied universities have the following characteristics (Table 1):

Table 1. Curriculum Education Requirements for Applied Universities

| Specific characteristics | main |
|---|---|
| Close integration with engineering practice | The curriculum education in application-oriented universities requires a combination of theory and practice, emphasizing the cultivation of students' practical operation abilities and problem-solving abilities. The curriculum should include practical links such as experiments, practical training, and projects, so that students can apply the knowledge they have learned in practical engineering projects, cultivate their innovation awareness and practical abilities 0. |
| To emphasize interdisciplinary integration | The curriculum education in applied universities requires breaking down disciplinary barriers and promoting the cross-integration of different disciplines. The curriculum should include interdisciplinary content to cultivate students' comprehensive abilities and interdisciplinary thinking abilities. |
| To emphasize | The curriculum education in applied universities, requires |

| | |
|---|--|
| <p>practical problem-solving skills</p> | <p>the cultivation of students' practical problem-solving abilities. The curriculum should focus on cultivating students' ability to analyze and solve problems and guide them to apply the knowledge they have learned to solve practical problems. For example, engineering course design can set design tasks for actual engineering projects, requiring students to apply their knowledge to design and solve practical engineering problems 0.</p> |
| <p>cultivation innovation ability</p> | <p>The curriculum education in applied universities requires the cultivation of students' innovative abilities. The curriculum should focus on cultivating students' innovative thinking and methods, and guide them to engage in innovative practice. For example, innovation and entrepreneurship courses can cultivate students' innovation awareness and entrepreneurial ability, guiding them to plan and implement innovation projects.</p> |
| <p>Emphasize teamwork ability</p> | <p>The curriculum education in applied universities requires the cultivation of students' teamwork ability. The curriculum should focus on cultivating students' teamwork spirit and communication and collaboration abilities, guiding them to participate in team projects, and cultivating their teamwork and leadership abilities. For example, engineering training courses can organize students to engage in team projects, cultivate their teamwork and problem-solving abilities 0.</p> |

In summary, in the context of the "Excellent Engineer Training Program", the curriculum education of applied universities requires close integration with engineering practice, emphasizing interdisciplinary integration, and emphasizing the cultivation of students' practical problem-solving abilities, innovation abilities, and teamwork ability, in order to cultivate outstanding engineers with practical application abilities.

2. The Main Content and Existing Problems of Water Resource Planning Courses in Applied Universities

2.1. The Main Content of Water Resource Planning Courses in Applied Universities

The main content of water resource planning courses in applied universities can be divided into the following aspects:

(1) Basic knowledge of water resource planning: Introduce the basic concepts, principles, and methods of water resource planning, including the definition, classification, characteristics, goals, and significance of water resource planning, as well as the basic steps and processes of water resource planning.

(2) Water resource evaluation and monitoring: Introduce the methods and indicator system of water resource evaluation, including the evaluation of water resource quantity, water quality, water environment, and other aspects; introduce the methods and technical means of water resource monitoring, including hydrological observation, water quality monitoring, water environment monitoring, etc [7] (Figure 1).

(3) Water resource demand prediction and supply-demand balance: Introduce the methods and

models for water resource demand prediction, including statistical model, physical model, and system dynamics model; Introduce the principles and methods of water resource supply and demand balance, including water resource scheduling, water supply safety assurance, etc.

(4) Water resource development and utilization: Introduce the technologies and measures for water resource development, including reservoir construction, technology and equipment for water resource utilization, etc; Introduce the ways and means of water resource utilization, including agricultural water, industrial water, domestic water, etc. [8].

(5) Water resource protection and management: Introduce the principles and methods of water resource protection, including soil and water conservation, water environment protection, water ecological protection, etc; Introduce the mechanisms and measures of water resource management, including laws, regulations, policy measures, etc.

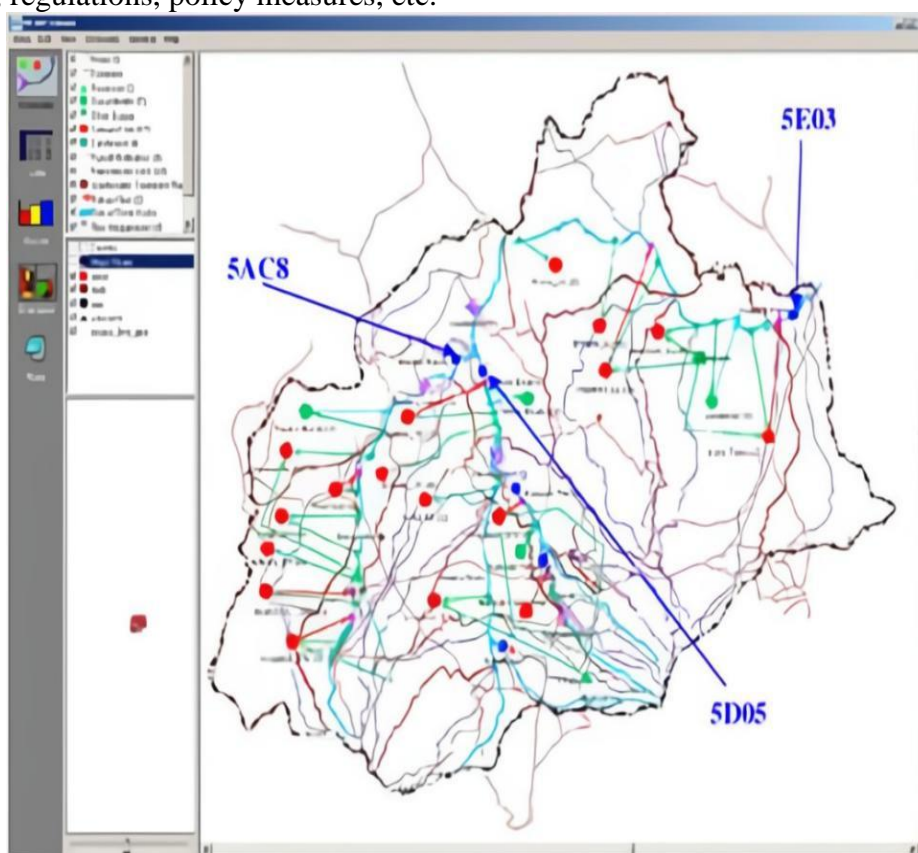


Figure 1. Water resource planning methods

(6) Case analysis of water resource planning: By analyzing actual water resource planning cases, students can understand the specific implementation process and methods of water resource planning, as well as the problems and challenges they face; through case analysis, students can also develop problem-solving skills and innovative thinking [9].

Water resource planning practice: Through on-site inspections, experimental operations, and other forms, students can personally participate in practical activities of water resource planning, understand the problems and difficulties in practical operations, and cultivate practical skills and teamwork spirit (Figure 2).



Figure 2. Practice of Water Resources Planning

(8) Comprehensive training of water resource planning: Through comprehensive training projects, students can apply their knowledge and skills to practical projects, carry out comprehensive water resource planning work, including project research, data analysis, scheme design, etc., and cultivate students' comprehensive quality and practical abilities [10].

The above is the main content of the water resource planning course in applied universities. Through this course, students can comprehensively understand the basic knowledge and methods of water resource planning, master skills in water resource evaluation, demand forecasting, supply and demand balance, development and utilization, protection and management, and cultivate the ability to solve practical problems and innovative thinking, laying a solid foundation for future work in water resource planning and management.

2.2. Problems during Water Resource Planning in Applied Universities

Water resources are the fundamental resource for human survival and development, and it is of great significance for application-oriented universities to cultivate talents in water resource planning. However, there are currently some problems in the teaching process of water resource planning courses in applied universities, which require us to carefully analyze and solve in order to improve the teaching quality of the courses and cultivate students' practical abilities [11].

The teaching content of water resource planning courses in applied universities is too theoretical. The current water resource planning curriculum mainly focuses on theoretical knowledge, neglecting the cultivation of practical operations. Students only passively accept the teacher's explanations in the classroom, lacking opportunities for practical operation. This leads to weak problem-solving and application abilities among students, making it difficult for them to adapt well to practical work needs [12].

The teaching method for water resource planning courses in applied universities is single. The current teaching methods mainly rely on traditional lectures and experiments, lacking case analysis and practical operations related to practical work. This teaching method cannot stimulate students' interest and motivation in learning, nor can it cultivate their practical and innovative abilities.

The construction of teaching staff for water resource planning courses in applied universities is insufficient. Water resource planning is a complex field that requires rich practical experience and professional knowledge. However, there is a lack of experienced professionals in the current teaching team, leading to certain problems in the selection of teaching content and methods. At the same time, the teaching team also lacks professional talents related to practical work, unable to provide guidance and support for students' practical operations [13].

The practical aspects of water resource planning courses in applied universities are not sufficient. Practice is an important link in cultivating students' practical operation and problem-solving abilities, but currently there are few practical links in the curriculum and there is a lack of practical opportunities related to practical work. This leads to students not being able to adapt well to practical work needs after graduation, and they are also unable to fully utilize the knowledge and skills they have learned.

In response to the above issues, we can take a series of measures to improve the teaching quality of water resource planning courses in applied universities and cultivate students' practical abilities. Firstly, we can increase practical links and provide more practical opportunities related to practical work, allowing students to learn and master knowledge and skills through practice. Secondly, we can introduce case analysis teaching methods to enable students to solve problems through analyzing actual cases and cultivate their practical and innovative abilities. At the same time, we can also strengthen the construction of the teaching team, introduce professional talents with rich practical experience, and provide guidance and support for students' practical operations. Finally, we can collaborate with actual work units to establish practical bases and provide students with more practical opportunities and resources.

There are some problems in the teaching process of water resource planning courses in applied universities, which require us to carefully analyze and solve. By improving teaching content, teaching methods, teacher team construction, and practical links, we can improve the teaching quality of the curriculum and cultivate students' practical abilities, making greater contributions to the cultivation of water resource planning professionals [14].

3. The Principles and Necessity of Reforming the Assessment Methods of Water Resource Planning Courses in Applied Universities

3.1. Principles for the Reform of Assessment Methods for Water Resource Planning Courses in Applied Universities

With the development of social economy and the increase of population, water resource problems are becoming increasingly prominent, and the demand for water resource planning talents is also increasing. The assessment method of water resource planning courses in applied universities plays an important role in cultivating students' practical abilities and comprehensive quality. In order to better adapt to social needs and student development, the assessment methods for water resource planning courses in applied universities need to be reformed. The following are the principles for reforming the assessment methods of water resource planning courses in applied universities.

3.1.1. Comprehensive Capability Evaluation Principles

Water resource planning is a comprehensive discipline that requires students to possess strong comprehensive abilities. Therefore, the assessment method should focus on evaluating students' comprehensive abilities, including their mastery of professional knowledge, problem-solving ability, innovation ability, and teamwork ability. Assessment can be conducted through comprehensive

practical projects, case studies, paper writing, group discussions, and other methods to comprehensively evaluate students' comprehensive abilities [15].

3.1.2. Principles for Cultivating Practical Abilities

Water resource planning is a highly practical discipline that requires students to possess practical skills and problem-solving skills. Therefore, the assessment method of water resource planning courses in applied universities should focus on cultivating students' practical abilities. Assessment can be conducted through on-site inspections, experimental operations, simulation exercises, and other methods to enable students to learn and improve in practice and cultivate their practical operation and problem-solving abilities.

3.1.3. Principles for Cultivating Innovation Awareness

Water resource planning is a constantly developing and innovative field that requires students to possess innovative awareness and ability. Therefore, the assessment method of water resource planning courses in applied universities should focus on cultivating students' innovative awareness. Assessments can be conducted through innovative projects, design schemes, classroom presentations, and other methods to encourage students to propose new perspectives and methods, and cultivate their innovative abilities [16].

3.1.4. Practical Evaluation Principles

Water resource planning is a highly practical discipline that requires students to possess practical application abilities. Therefore, the assessment method of water resource planning courses in applied universities should focus on evaluating students' practical application abilities. Assessments can be conducted through practical project solutions, case analysis, and solutions, allowing students to learn and improve in practical applications, and cultivating their practical application abilities.

3.1.5. Personalized Evaluation Principles

Each student has different personalities and strengths, and the assessment method of water resource planning courses in applied universities should focus on personalized evaluation. Assessments can be conducted through individual reports, group discussions, practical projects, and other methods to enable students to leverage their strengths and develop their personalized abilities.

3.1.6. Evaluation and Feedback Principles

The purpose of the reform of assessment methods is to better promote students' learning and development. Therefore, the assessment methods of water resource planning courses in applied universities should focus on evaluation and feedback. Evaluation can be conducted through regular exams, homework evaluations, practical reports, and other methods, and timely feedback can be given to students to help them identify shortcomings and improve.

The principles for reforming the assessment methods of water resource planning courses in applied universities should be comprehensive ability evaluation, practical ability cultivation, innovative awareness cultivation, practical evaluation, personalized evaluation, and evaluation, and feedback. By reforming the assessment methods, students can better cultivate their practical abilities and comprehensive qualities, adapt to social needs and personal development.

3.2. The Necessity of Reforming the Assessment Methods of Water Resource Planning Courses in Applied Universities

Water resources planning is one of the core courses for water resources majors in applied universities, which mainly cultivates students' scientific understanding and planning abilities of water resources. However, traditional assessment methods have to some extent limited students' learning interests and ability development. Therefore, reforming the assessment methods is of great necessity for improving students' learning enthusiasm and professional abilities.

The traditional assessment method mainly focuses on written exams, emphasizing the evaluation of students' memory and theoretical mastery. This approach has problems with mechanical memory and exam-oriented education, which cannot truly reflect students' understanding and application abilities of water resource planning courses. Water resource planning is a highly comprehensive and practical discipline that requires students to possess strong practical skills and problem-solving abilities. Therefore, reforming the assessment methods and introducing practical links can better cultivate students' practical operation and problem-solving abilities.

Lack of comprehensive evaluation of students' comprehensive quality. The study of water resource planning courses not only involves theoretical knowledge, but also requires students to possess comprehensive qualities such as teamwork, communication, and innovation. However, traditional assessment methods often only focus on students' mastery of subject knowledge, neglecting the cultivation and evaluation of students' comprehensive quality. Reforming assessment methods can introduce various forms such as project practice, group discussions, and oral reports to comprehensively evaluate students' comprehensive quality and better cultivate their comprehensive abilities.

Lack of integration with practical work, water resource planning is an applied discipline, and students' learning goal should be to be able to apply the knowledge they have learned to solve practical problems. However, traditional assessment methods often only focus on students' mastery of theoretical knowledge, neglecting the cultivation of students' practical application abilities. Reforming the assessment method can increase practical links, introduce practical cases and projects, and enable students to apply the knowledge they have learned in practical work, thereby improving their practical application abilities.

The traditional assessment method lacks personalized and differentiated evaluation. Each student's learning abilities and interests are different, and traditional assessment methods often only focus on the evaluation of the overall level of students, ignoring individual differences. Reforming assessment methods can adopt personalized evaluation methods, develop corresponding assessment methods based on students' interests and strengths, and stimulate their learning interest and motivation.

The reform of assessment methods for water resource planning courses in applied universities is of great necessity. Reforming the assessment method can better cultivate students' practical operation and problem-solving abilities, comprehensively evaluate their comprehensive quality, integrate with practical work, evaluate students in a personalized and differentiated manner, and improve their learning enthusiasm and professional abilities. Therefore, it is necessary to reform the assessment methods of water resource planning courses in applied universities, which helps to cultivate high-quality water resource planning professionals.

4. Specific Measures for Reforming the Assessment Method of Water Resources Planning Curriculum under the Background of the "Excellent Engineer Training Plan"

In the context of the "Excellent Engineer Training Program", the assessment methods of water resource planning courses need to be reformed to cultivate more outstanding engineers. The

assessment method should pay more attention to the cultivation of practical abilities. The traditional examination method mainly focuses on students' mastery of theoretical knowledge, while in practical engineering projects, engineers need to possess certain practical abilities. Therefore, practical assessment projects can be introduced, such as truthful investigation and actual case analysis, to assess students' application ability and problem-solving ability in practical engineering projects.

4.1. Conduct Assessment through Group Collaboration

Water resource planning is a comprehensive discipline that requires students to possess the ability to work in teams. Therefore, students can be divided into small groups for assessment of group projects. Each group can be responsible for a specific water resource planning project, including research, analysis, scheme design, etc. Through group collaboration, students' teamwork and collaboration abilities are cultivated.

4.2. Introduction of Case Analysis Assessment Method

Water resource planning is a highly practical discipline, and case analysis can better cultivate students' practical operational abilities. You can choose some practical water resource planning cases for students to analyze and design solutions, and conduct a defense to test their analytical and problem-solving abilities.

4.3. Introducing an Open Assessment Approach

The traditional exam method is mainly a closed book exam, where students need to memorize a large amount of theoretical knowledge. However, in practical engineering projects, engineers need to possess not only the ability to memorize knowledge, but also the ability to innovate and solve problems. Therefore, an open assessment method can be adopted to allow students to engage in independent learning and research within a certain period of time, followed by an open defense to assess their innovation and problem-solving abilities.

5. Conclusion

In the context of the "Excellent Engineer Training Plan", the reform of the assessment methods for water resource planning courses in applied universities should focus on matching course objectives, cultivating practical abilities, cultivating innovative abilities, emphasizing comprehensive evaluation, and emphasizing individual development. By reforming the assessment methods, we can better cultivate high-level water resource planning talents and contribute to the sustainable development of the social economy.

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Data Availability

The datasets used during the current study are available from the corresponding author on reasonable request.

Conflict of Interest

The author states that this article has no conflict of interest.

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