

Research on the Teaching Reform of Bridge Foundation Engineering in Applied Universities under the Background of "Double Creation"

Na Zhu¹, Duo Wu², Hongyan Sun², Shufen Zhou²

¹School of Civil and Architecture Engineering, Nanchang Institute of Technology, Nanchang, 330099, China

²Nanchang Institute of Technology, Nanchang, 330099, China

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Abstract: Bridge Foundation Engineering is a practical and applied course, and it is an important professional required course for students majoring in road, bridge and river-crossing engineering. Under the background of "double innovation", universities are faced with the great challenge of "double innovation" personnel training, constantly adjusting and abandoning the unfavorable factors in traditional university education and teaching, and constantly making efforts to cultivate more sophisticated innovative and entrepreneurial talents for the society. It is of far-reaching practical significance for application-oriented universities to train "double-creative" talents with innovative spirit and entrepreneurial ability and meet the needs of modern society by reforming teaching methods. In this paper, based on the transformation background, according to the orientation of personnel training objectives, combined with the idea of transforming undergraduate universities into application-oriented, the teaching reform of Bridge Foundation Engineering was explored, aiming at cultivating applied technical and technical talents that meet the social needs.

1. Introduction

In order to achieve the training goal of applied talents, all universities are actively carrying out the reform and practice of the training mode of road, bridge and river-crossing engineering talents. As an application-oriented university, the road, bridge and river-crossing major takes imparting professional knowledge, cultivating practical ability and improving comprehensive quality as the talent training mode, and shoulders the responsibility of training applied compound talents of road, bridge and river-crossing engineering major for local economy. Road, bridge and river-crossing engineering major is a comprehensive and practical engineering major, and highlighting "application" is the core and foothold of applied undergraduate education of road, bridge and river-crossing engineering major [1].

Bridge Foundation Engineering is a professional core course for road, bridge and river crossing engineering, which is highly practical. At present, many university courses are in the stage of exploration and accumulation, and there are mainly the following problems [2-3]: Most of the existing courses refer to other traditional courses and cannot reflect their characteristics. The curriculum system is biased towards theoretical teaching and neglects practice, which does not meet the social needs and teaching objectives of training applied talents. Traditional teaching methods are mainly taught by teachers in class, which cannot stimulate students' innovative ability. Under the background of "double innovation", this paper makes an in-depth analysis of the problems existing in the teaching of Bridge Foundation Engineering, and discusses the concrete measures for the teaching reform of Bridge Foundation Engineering from the aspects of textbook compilation, teaching content, practice links and teachers' level.

2. "Double Creation" and College students' entrepreneurship

If you have the ability, you will have the responsibility. College students will be responsible for the future construction of China. The purpose of "Double Creation" is to stimulate the infinite

potential of hundreds of millions of Chinese people through a series of publicity and policy support, to bring into full play the wisdom and innovative spirit accumulated by the Chinese 5,000-year civilization, and to gather them into powerful kinetic energy for economic and social development, so as to achieve the goal of making the people rich and the country strong [4]. Under the background of "double innovation", the entrepreneurial spirit of college students will lead them to actively use what they have learned to innovate constantly, lead the trend of innovation and entrepreneurship, and finally realize the economic development and the prosperity of the motherland.

"Double creation" is a call. This call of "resolutely eliminating all kinds of shackles and shackles, and making entrepreneurial innovation the trend of the times" has triggered the thinking on the realization of college students' value. Under such a call, college students will integrate innovation and entrepreneurship into their daily study and life, enrich their own values, actively learn to recharge their batteries, be curious about life, have a sense of exploration and creativity, and give full play to them to achieve personal growth.

The university stage is an important period for the formation of three views and habits. If college students lay a good foundation at this stage, they will undoubtedly bring greater development to themselves and China in the future. If most Chinese people get a sense of accomplishment because they are engaged in challenging work and innovative undertakings, instead of being satisfied through consumption, the result will be very good [5].

"Double creation" has gradually become a kind of culture. The influence of this culture on a person is quiet, especially for college students. Entrepreneurship and innovation match their passionate and energetic age, and complement their dream-seeking needs, which is more conducive to stimulating and nurturing college students' entrepreneurial spirit and making them an important force for practicing entrepreneurial spirit.

3. Problems in the teaching of Bridge Foundation Engineering

3.1. Textbooks lack applicability

The course of bridge foundation engineering includes not only the content of bridge foundation, but also the content of pier and abutment. Considering from the teaching and training plan of this major, this part of pier and abutment should belong to the course of bridge engineering. However, due to the limited class hours and the fact that pier and abutment are not the teaching focus of this course, this part of the content is naturally allocated to the course of bridge foundation engineering for teaching.

Therefore, in the selection of teaching materials, we should choose not only the bridge foundation engineering but also the pier and abutment. At present, there is a small selection of textbooks that meet the requirements, and they are all textbooks that emphasize theory, calculation and few reference examples. These textbooks are mainly used by colleges and universities that train research talents. For our school, which focuses on training applied talents, the teaching materials lack applicability.

3.2. Problems in practical teaching

Practice teaching can effectively enrich classroom teaching, and curriculum design is the main practice teaching link of Bridge Foundation Engineering course, and the key link to cultivate students' engineering practice ability [6]. In the past, there were some problems and deficiencies in curriculum design, and the design content was not closely related to the actual project, which could not cultivate students' practical application ability to explore and solve problems. The design type is single, which is not connected with the curriculum design of other majors. It cannot cultivate students' practical ability, comprehensive application ability and meet the requirements of training applied talents.

3.3. Teachers have insufficient engineering experience

The course of Bridge Foundation Engineering is characterized by professionalism, comprehensiveness and practicality. Teachers who teach this course should not only have systematic and solid theoretical knowledge, but also have some experience in basic design and construction. However, at present, most of the young teachers in universities come from fresh graduates of master's degree or doctor's degree, and when they give lectures, they are scripted and confined to books, so they are seldom connected with engineering practice, and their teaching effect is poor, which seriously affects students' enthusiasm for learning.

3.4. The transformation of "double innovation" results is very small

The transformation of "double innovation" achievements should go through experiments and practices [7]. Only through professional experiments and practices can we better transform "double innovation" achievements into productivity, promote the development of national scientific and technological innovation, and improve the level of national scientific and technological innovation.

Universities are an important place to train "double-creative" talents, and college students are the living force of "double-creative" in our country. Many excellent "double-creative" works have emerged in the diversified "double-creative" competitions, but these "double-creative" works have not been tested by practice, and their ability to transform "double-creative" achievements has yet to be tested, and their ability to transform into productivity has yet to be practiced.

4. Teaching reform measures of bridge foundation engineering in applied universities

4.1. Update the teaching content

"Bridge Foundation Engineering" is a course with strong theory and practice, and its content is relatively boring. In teaching, we should avoid copying the textbook, reorganize the textbook content and highlight the key points and difficulties [8]. Teach some basic principles, methods and skills to students in the most effective way, so that students can acquire as much knowledge as possible in as little time as possible.

In the actual teaching, it is found that there are some knowledge points in Bridge Foundation Engineering that need to be deduced concretely, such as the determination of the bottom size of shallow foundation, the checking calculation of bearing capacity of shallow foundation, and the checking calculation of bearing capacity of single pile of pile foundation is deduced by blackboard writing, and the teaching effect will be better. When teaching general knowledge points, especially the explanation of engineering examples, we can give full play to the characteristics of multimedia and combine a large number of engineering and accident pictures to explain, thus improving students' enthusiasm and interest in learning. Therefore, the teaching means are different due to the different teaching contents, and the teaching means of cross-use of multimedia and blackboard writing should be adopted.

With the development of science and technology, various new theories, new technologies and new methods are constantly emerging. It is necessary to grasp the frontier trends of Bridge Foundation Engineering, constantly update the teaching contents in the teaching process, and introduce the latest research results to students in combination with lecture contents, so as to broaden students' horizons and stimulate students' interest in learning.

4.2. Practical teaching reform

Foreign countries attach great importance to practical teaching, and each has its own characteristics. Domestic universities explore the theory, methods and approaches of practical teaching with local characteristics by drawing on foreign experience and attaching importance to integrating theory with practice. Application-oriented universities are also actively exploring ways and means to strengthen the construction of students' practical ability and evaluate the teaching effect, so as to improve the quality of personnel training.

In accordance with the requirements of the "double innovation" era, the teaching of Bridge

Foundation Engineering must pay more attention to the transformation to practical teaching. Through the diversified practical teaching methods of reverse living case method, MOOC flip and fusion method, virtual reality simulation method, training practice combination method and multi-party participation and interaction method, a "five-dimensional integration" practical teaching reform strategy diagram is formed, as shown in Figure 1.

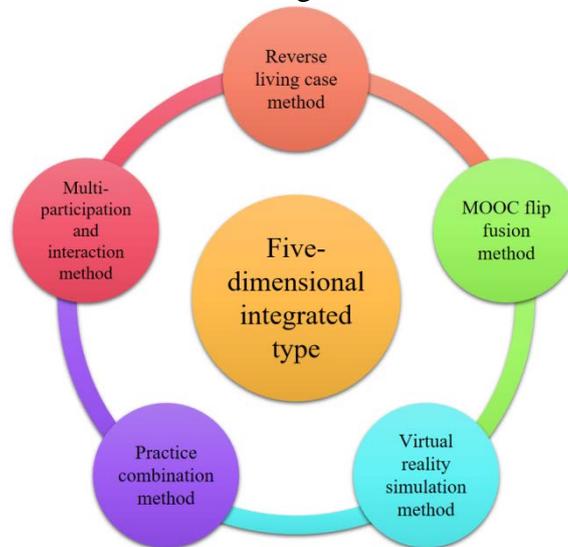


Figure 1 Strategy chart of practical teaching reform

Through on-the-spot teaching, students can know the functions and applications of deep and shallow foundations and foundation pit projects. For example, by watching the piling process on the spot, students are no longer unfamiliar with the basic construction methods such as drilling and piling, and have a deeper perceptual knowledge of pile foundations such as single pile cap and three pile caps, thus realizing the organic combination of theoretical teaching and practical teaching.

At the same time, in order to cultivate students' innovative ability, our college has also carried out practical training for college students' innovation and entrepreneurship, allowing students to choose their own topics and apply for research related to Bridge Foundation Engineering, thus improving students' ability to correctly use basic knowledge to analyze and solve engineering problems.

4.3. Introduce new technology

To strengthen the application of new technologies such as artificial intelligence-aided architectural design and the construction of computer 3D modeling courses, the construction of professional software skill courses should be based on the construction of course resource database and architectural design scheme database, and take architectural ability training as a means to reform the teaching methods and strengthen post skill training.

There are few talents who master the whole process of BIM information model application in road bridge and river crossing engineering majors. In applied universities, we should carry out the training service of BIM standardized "double-creative" teachers, and improve the teaching ability of applied undergraduate teachers, so as to train applied undergraduate talents who are truly seamless with enterprises.

4.4. Procedural evaluation of grades

Pay attention to the assessment of students' practical application ability. Traditional curriculum assessment ignores students' dominant position in the teaching process. Teachers should, according to the characteristics and teaching objectives of Bridge Foundation Engineering, carry out the assessment throughout the whole teaching process, organically combine the assessment of learning process with the final assessment, and comprehensively assess students' knowledge structure, application ability and comprehensive quality.

In order to adapt to the reform of the new teaching mode and evaluate students' learning effect

objectively and fairly, the assessment method of Bridge Foundation Engineering course has been partially adjusted. In the theoretical part, the written examination is still adopted, but the usual examination comprehensively considers classroom attendance+usual homework+classroom performance+curriculum design+practice performance, and the examination method pays more attention to cultivating students' comprehensive quality.

In the process of finishing the big homework, the teachers leave more than 2 weeks of practice time, leaving enough room for students to think, so as to avoid them rushing things in order to catch up with homework. Classroom rewards and punishments mainly come from classroom exercises. Students who have completed classroom exercises and performed well will be given 1~3 points, while those who have not completed or performed poorly will be deducted 1~3 points. This is a teaching reform that attaches importance to the thinking process and encourages innovation.

4.5. Improvement of teachers' own level

Bridge Foundation Engineering is a highly practical discipline, so teachers are required to have strong practical experience in addition to high theoretical knowledge, and teachers are required to improve their own level in the following aspects:

Teachers should correctly handle the mutual promotion and interdependence between teaching and scientific research, promote scientific research by teaching, and promote teaching by scientific research. Teachers should actively participate in off-campus scientific research projects, so as to improve the practical ability and innovative ability of combining theory with practice.

To carry out teaching reform and exchange with foreign schools and professional teachers, and to improve teaching methods so as to be suitable for the cultivation of applied talents. Some schools have implemented the teaching reform of this course earlier, and have achieved some good results in terms of teaching materials and teaching methods. We should learn from the reform methods applicable to our students.

Participate in academic exchange activities, and know the latest trends of bridge foundation engineering knowledge so as to update the teaching contents in time.

5. Conclusions

Applied universities should obey and serve the local economy and adapt to the new normal requirements of industrial transformation and upgrading. The teaching of Bridge Foundation Engineering should be based on the background of "double innovation" and explore effective practical teaching methods. In the process of reforming teaching methods, we should keep pace with the times, complement each other's advantages, combine theoretical teaching with practical teaching, and increase the training of innovation and entrepreneurship. At the same time, besides imparting knowledge, teachers should pay more attention to the cultivation of students' innovative ability and ability to apply knowledge, and cultivate high-quality talents to adapt to social development.

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