

Thoughts on Cultivating Students' Innovation Ability in Civil Engineering Undergraduate Teaching¹

Bing Liu

Guilin University of Technology Guilin 541006

Abstract: In today's quality education environment, higher education has many new requirements for undergraduate training in civil engineering, and cultivating the innovative ability of undergraduate has become a hot topic. This paper puts forward the thinking on how to cultivate students' innovation ability in the undergraduate teaching of civil engineering from four aspects of education thought, training mode, education method and teaching form.

Keywords: Civil engineering; Undergraduate teaching; Innovation ability; Tutorial system

1. Change educational thought and establish educational idea

For a long time, China's higher education system has been an education system that mainly transmits the knowledge of predecessors. In the teaching of primary and secondary schools, there is the phenomenon of exam oriented education, which has also been extended to higher education. Undergraduates also have the phenomenon of exam oriented education to cope with examinations when they study. They do not really study, but only to meet the requirements of school graduation, which makes them lose the ability to think independently and explore knowledge, which is not conducive to the cultivation of undergraduate innovation ability and independent thinking consciousness. Admittedly, the education thought based on the education system that mainly transmits the previous knowledge can establish a good foundation for students, have a fixed learning thinking mode, and enable students to quickly adapt to learning, but the lack of innovative education thought will become an obstacle to cultivating students' innovation ability. In the requirements of quality education, students should not only have a solid foundation, but also need a wider range of knowledge, scientific research thinking and innovative thinking. Undergraduate students who only have knowledge but cannot innovate are equivalent to having a huge treasure house but lack the key, and can only "look at the treasure and sigh".

The key and premise of implementing innovative education lies in the change of college teachers' ideas. To improve students' innovation awareness, the concept of college teachers must be changed. The old teaching model cannot be used to let students learn. New teaching concepts must be used to explore students' innovation awareness. First of all, we should give full play to the leading role of college teachers in teaching activities and the main role of students, fully mobilize the students' initiative and enthusiasm in learning in the course of teaching, so that students can closely follow the teaching pace in the classroom, think seriously and be good at asking questions. In the process of students' learning, college teachers should be the organizer of the classroom, the guide of knowledge, the helper, the evaluator and the puzzle solver, rather than the indoctrinator of knowledge. Teachers' ideology should not be imposed on students; The students are the participants, explorers and cooperators of teaching activities. The students' learning motivation, ways and willpower play a decisive role in the students' learning

¹ **Fund project:** This paper is the research result of the key project of Guangxi Higher Education Undergraduate Teaching Reform Project "Construction and Practice of Innovation Ability Training Mode for Civil Engineering Students" (No. 2021JGZ124), and also supported by the National Natural Science Foundation Youth Fund (52108201), Guangxi Natural Science Foundation Youth Fund (2021GXNSFBA220049), Guangxi Science and Technology Base and Talent Project (Guangxi AD22035999) and other projects.

effect. Secondly, in terms of teaching methods, guidance heuristic, discussion and inquiry should be adopted to enable students to integrate new and old knowledge and build a new knowledge system through independent thinking, exploring new knowledge, summarizing and connecting relevant information. Only in this way can students develop good learning habits, obtain the joy of success, meet their psychological needs, reflect their self-worth, and further stimulate their internal learning motivation, Cultivate students' sense of innovation.

2. Change the training mode to meet the requirements of innovation

As a reserve force for scientific research, there are not many undergraduates who finally embark on the road of scientific research. Therefore, certain changes should be made in the training mode to meet the requirements of current social development and innovation. Cultivating innovative talents is of great significance to the sustainable development of the country. Cultivating innovative talents can promote social development. Adequate talent reserve is of great strategic significance to national development. The country's abundant innovation strength comes from the cultivation of innovative talents. Only when the country has sufficient innovation strength can it achieve rapid development in economy, culture, science and technology.

Among the top universities, there are more undergraduate students taking the scientific research path because of their leading research guarantee rate and training methods. They can focus on the training and training of scientific research innovation, while ordinary universities have certain weaknesses in the research guarantee rate and other aspects, and there are fewer groups taking the postgraduate entrance examination, which can focus on the training and innovation in practical applications. Different colleges and universities should formulate different training programs according to the actual situation to train students, so as to achieve better results. For the head college students, let them carry out scientific research independently, cultivate their innovation awareness and problem-solving ability, and then deepen their understanding of the knowledge points learned, which is conducive to the cultivation of innovative and entrepreneurial talents in colleges and universities; For ordinary college students, let them participate in the innovation competition more, exercise their practical ability, enhance their innovation awareness, and further deepen their understanding of innovation and entrepreneurship.

Innovative thinking comes from the original conventional thinking, but it is different from conventional thinking. Innovative thinking is the product of a thinking process that has been carefully considered. Innovative thinking refers to generating new discoveries, new solutions, and new insights into certain things, problems, and ideas. Innovative thinking refers to breaking through people's inherent thinking, which is different from the common understanding. It is to have a further view and understanding of things. Through this kind of thinking, people can have a deeper and more thorough understanding. Therefore, innovative thinking is the catalyst of innovative ability. Confusion about problems is an effective means to inspire creative thinking. Therefore, teachers should throw out problems in classroom teaching, guide students to think independently and explore knowledge, so that students can always maintain an active thinking state in the classroom. Through a series of questions, students can master the key points and break through the difficulties. To innovate, imagination is essential, which can be verified through imagination simulation and actual operation. Imagination refers to the psychological process of creating new images through new cooperation on the basis of perceptual materials. Through imagination, people can see problems from the outside to the inside, from the phenomenon to the essence, making a qualitative leap in thinking activities, and rich imagination can create different things. Therefore, students' imaginative thinking should be guided in the teaching process.

3. Changing the Education Mode and Paying Attention to Practical Teaching

The purpose of practical teaching is to strengthen the awareness of cultivating people through practice. Students are the main body, mainly consolidating knowledge and mastering skills as the basis, focusing on learning ability, innovation ability, practical ability and communication ability, and aiming at the overall improvement of comprehensive quality. It integrates knowledge teaching, ability training and quality education. According to different subject knowledge structures and practical skills, change the traditional mode of practical teaching, and create a new innovative mode of independent operation of practical teaching.

4. Change the teaching form and develop the tutor system

At present, the training mode of civil engineering discipline is mainly large class teaching. A course can have as few as 20 students in a class and as many as 100 students in a class. Because college classes are not like a whole class in primary and secondary schools facing a fixed number of teachers, each student can choose courses and teachers independently. In this way of teaching, teachers can't be all inclusive and take care of every student. Therefore, we need to change the teaching method, fully

integrate the existing teaching resources, make the teaching more efficient, increase the proportion of class hours and credits of the most important courses, and try to reduce the number of students taught by one teacher, so as to make the teaching more efficient and effective.

Secondly, the tutor system can be widely carried out, not only for graduate students, but also for undergraduates. To carry out the tutorial system, each student can choose his or her own tutor independently, which makes full use of teacher resources, and also enables students to connect with scientific research or social practice more quickly. Students can carry out scientific research thinking training and innovative thinking training through the tutor's scientific research projects, or start to contact with social production reality through the tutor, and speed up the process of knowledge transformation to production practice. The tutorial system allows students to access not only civil engineering majors, but also other college related projects and become cross talents.

5. Conclusion

Cultivating students' innovative ability is a major task of colleges and universities. Due to the influence of traditional teaching mode, there is a lack of innovative thinking. In today's quality education environment, it is of great significance to cultivate students' innovation ability in civil engineering discipline of colleges and universities. With the development of the times, the national economy, science and technology have developed rapidly, and the demand for talents has increased dramatically. This requires higher and higher personnel training, and requires high-quality innovative talents to solve various problems in development.

Cultivating innovative undergraduates in colleges and universities can not only improve students' innovation ability, but also improve their discipline influence and social recognition. To cultivate outstanding innovative talents in civil engineering, colleges and universities need to start from educational ideas, training models, educational methods, teaching forms, etc. , and cultivate undergraduates to become talents with excellent comprehensive abilities in civil engineering.

References

- [1] Zhang Leiyang. Research on the Cultivation of Innovation Ability of Civil Engineering Students in Application oriented Universities [J]. Science and Technology Information, 2007 (09): 81. DOI: 10. 16661/j. cnki. 1672-3791. 2007. 09. 068
- [2] Chen Xin, Zhang Xiongwu, Cai Xinjiang, Mao Xiaoyong, Cao Xiqing. Exploration and practice of project-based teaching method for the cultivation of innovative ability of engineering college students -- Taking civil engineering as an example [J]. Laboratory Research and Exploration, 2019, 38 (09): 194-199+246
- [3] Liu Yongjian, Li Youqun, Liu Guangjing. Strengthening Practical Teaching to Cultivate the Innovation Ability of Civil Engineering Students [J]. Higher Architecture Education, 2008, 17 (05): 107-109
- [4] Liu Zhiyong. Cultivation of Innovative Talents in Civil Engineering in Applied Undergraduate Colleges [J]. Science and Technology (Academic) in Western China, 2007 (05): 106-108