

New Education Model for Developing the Application and Innovative Thinking Ability of Students Majoring in Surveying and Mapping Engineering

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Abstract—In order to develop talents meeting modern requirements and the requirements of modern surveying technology on construction site, schools have to reform the surveying engineering courses and use the new education model to develop students' professional application ability and innovative thinking ability in surveying and mapping engineering.

Keywords—surveying and mapping engineering; application ability; innovative thinking ability

I. INTRODUCTION

With the continuous development of society, science and technology are also developing constantly, and the surveying instruments, techniques and methods used in engineering are constantly being updated. Therefore, it has become an important issue whether scientific construction can be applied in the engineering. In terms of scientific construction, the first is to be able to ensure accurate surveying. In addition, engineering surveying requires high specialized ability. To meet the demand of today's society for talents, the application ability and innovative thinking ability of surveying and mapping engineering majors have become particularly important. Schools strive to train students into talents who know technology and have innovative ability at the same time.

Application ability of surveying and mapping engineering students mainly refers to their ability to apply theoretical knowledge to practical operations. Only with this application ability can they work smoothly in their professional positions and not be eliminated by the society. For example, data acquisition ability, as engineering surveying data are mainly collected in the field, which requires students to learn to use traditional instruments, total station, GPS, electronic level and other instruments for data acquisition; data processing ability requires students to know data processing methods and can use common data processing software, etc.; drawing ability is mainly to edit and sort out the data collected in the field and use the mapping software for drawing. Innovative thinking ability refers to the thinking process when people are exploring new things. Innovation requires the guidance of innovative thinking ability which guides innovation and is the soul of

innovation. In professional learning, students are required to be able to continuously explore and innovate according to the knowledge they have learned.

II. NEW EDUCATION MODEL OF SURVEYING AND MAPPING ENGINEERING COURSES

A. Reforming the Surveying and Mapping Engineering Courses

To cultivate students' professional application ability and innovative thinking ability, it is necessary to reform the existing education model in cultivating students' comprehensive surveying and mapping ability to establish a new education model. The reform of education model includes the reform of teaching content, teaching method, practical training course, achievement assessment and other aspects.

1) Reform of teaching content: In colleges and universities in China, the textbooks they use at present in the teaching of surveying and mapping engineering are relatively backward. Textbooks are still introducing backward balance level gauges and theodolites, etc., which fail to keep pace with the modern instruments used in the construction sites of today. As a result, students cannot keep up with the pace of the times and become divorced from the society. Therefore, the teaching content must be reformed. Schools may compile textbooks that keep up with the pace of the society and suitable for themselves according to the actual situation of today's society and of their schools in combination of the original textbooks, such as deleting the backward contents and adding the operation and practice contents of some advanced instruments and equipment.

In traditional teaching materials, the explanation of the use of instruments is relatively simple, which cannot comprehensively and clearly explain the use and operation details of various instruments. However, these are contents that need to be talked about in formal surveying engineering classes, so we need to optimize the teaching content to give detail explanation of the operation and use of various instruments.

2) *Reform of teaching method:* The main method for teaching surveying and mapping engineering courses is based on the combination of theoretical courses and practical operations. Now, in colleges and universities, teachers give one lesson of theoretical knowledge of engineering surveying and then give practical operation, but this method makes theoretical course become too boring. As a result, students fail to have a good command of the theoretical knowledge, even become tired of theoretical courses and cannot actively learn the theoretical knowledge of surveying and mapping engineering. Therefore, in the reform of teaching methods, teachers should reduce pure theoretical knowledge courses and combine practical courses and theoretical courses, so as to impart theoretical knowledge to students in practice, which not only can let the students master the use of the instrument but also can have a better grasp of the theoretical knowledge. Not all theoretical knowledge is suitable for combination with practical courses, so for necessary theoretical courses, teachers can use advanced teaching methods, for example, playing relevant videos to attract students and stimulate their interest in learning to achieve teaching objectives. In addition, teachers can also bring the specific problems in the modern engineering into the classroom for students to discuss these problems, let them to use theoretical knowledge, fully play imagination and actively participate in the discussion of the methods to solve the problems. This kind of teaching method requires teachers to go to the construction site and communicate with the staff there.

3) *Reform of practical training of surveying and mapping engineering:* Practical training is a process that schools carry out professional and technical training for students according to the teaching purpose and the goal of talent training, which is an important part of the teaching process. Practical training of surveying and mapping engineering is an important means to bring theoretical knowledge into practice, and in the training, students are required to master the use of instruments of engineering surveying. Current practical training courses are carried out according to the old teaching materials, which fail to combine with the modern engineering construction. For the reform of practical training courses, the first thing is to update the teaching material, as mentioned above, and the second is that schools should update the equipment in the training room. Due to financial matters, some schools purchase only a limited amount of new equipment. Due to the limited number of equipment and the large number of practical training classes, it is necessary to adjust the practical training classes in the reform. That is, schools should make reasonable arrangement of the practical training time of each class and stagger practical training content to enable different classes to carry out different training contents at different times so that each class can use the new requirement.

4) *Reform of achievement assessment:* Achievements are the only way to test learning outcomes. The practical operation content takes up a certain proportion in the surveying and mapping engineering course, but test paper can

only test students' theoretical knowledge but cannot reflect their practical operation ability. Therefore, students' learning outcomes cannot be reflected only by the score of a test paper.

In the assessment reform of surveying and mapping engineering, teachers cannot assess students' learning outcomes solely by their test paper scores. In the assessment, teachers should pay attention to students' classroom performance and assess their learning outcomes based on their practical operations together with their discussion in class. Students' practical operation in class mainly includes their proficiency in the use of all kinds of equipment and instruments and their understanding of the functions of the instruments, as well as the accuracy of their collating and calculation of surveying data.

In terms of classroom discussion, teachers shall mainly observe whether students can actively participate in the discussion of the actual engineering problems raised by teachers in class, and then fully play their imagination to find the method for solving the problem. The achievement assessment shall also include a test paper that test the theoretical knowledge involved in the operations and discussions. The test paper shall not determine the learning outcomes of students, and shall only take up a small part of students' final assessment score. Students' final academic performance shall be determined through the comprehensive assessment according to students' test paper result, practical training and classroom discussion.

In surveying and mapping engineering training, one student cannot complete the training, so it requires students to work in groups, cooperate with each other and have team spirit. In the assessment of comprehensive training performance, teachers should pay attention to the assessment of the training process, which requires teachers to check the training of every team at different times every day to check the work content of each student in the group, whether they are serious in the training, their proficiency in operation and their accuracy in data surveying and processing. After the comprehensive training, teachers can make a reasonable comprehensive assessment of each student's performance according to the check situation of every day.

B. Creating a New Education Model

1) *Interesting class to mobilize students' enthusiasm for learning:* In the traditional teaching class, dominated by the teacher, the class is boring and difficult to arouse students' enthusiasm. The content of the surveying and mapping engineering class is mostly composed of theoretical knowledge and some data, which makes the class more boring, so students have no enthusiasm or desire to learn. Therefore, teachers should change the teaching method to make the teaching content become lively and interesting and create a good classroom learning atmosphere to arouse students' enthusiasm for learning.

To increase the interestingness of the class, teachers, during the preparation of lessons, may find relevant examples or find time to construction sites to collect living examples, so that they can combine the problems in modern engineering with the theoretical knowledge in class and present the

examples through modern advanced technology such as animation, video, etc. In this way, teachers can make the dull theoretical knowledge become lively and interesting and enable students to learn easily, so as to achieve the learning goal. At the same time, with the rapid development of modern technology, surveying tools and technology are also developing rapidly, so teachers should understand the advanced surveying tools and technology and intersperse them in classes. Besides, teachers shall also realize the problems students encounter in the process of learning in time and help students to solve these problems to ignite their thirst for knowledge and arouse their interest in learning so that students can take initiative to learn to achieve learning goals.

2) *Application of various modern teaching methods:* Traditional teaching methods (teachers give lessons and students learn) can no longer adapt to students under the new teaching model in the new era. In the new era, students are required to have both professional application ability and innovative thinking ability. The traditional teaching model fails to make students concentrate on learning, let alone arouse their enthusiasm for learning, which has been mentioned above. The post-2000s generation have entered the university campus and are full of curiosity about new things. Teachers should make full use of this and apply different teaching models in class to satisfy their curiosity. For example, teachers can organize grouping of students, in-group discussion, teacher-student interaction and other methods in class. Moreover, teachers can use modern multimedia teaching methods such as electronic schoolbag, MOOCs, etc. to continuously improve students' learning initiative, help them consolidate theoretical foundation knowledge, develop innovative thinking and improve their comprehensive ability.

3) *Combination of theory with practice to cultivate students' application ability:* Most students have the common problem that when they go to work, they have solid theoretical knowledge, but poor operational ability, so they fail to successfully complete the tasks in the work. To solve this problem, schools should pay attention to the cultivation of students' professional application ability, adjust the courses and increase the number of practical courses. The practical content should be combined with the practical engineering. In the practical courses, teachers should strive to enable every student to carry out practical operation, and to operate in every link. It is far from enough to cultivate students' professional application ability only through practical courses. Thus, schools can also organize professional operation skill competitions. As students are competitive, in order to win the competition, students will actively learn the operations, which effectively arouses their enthusiasm for learning and thus improve their professional application ability.

4) *Changing the homework type:* Nowadays, most college students are the only child and the treasure in their families. Therefore, most parents will help them solve the problems they meet in their growth, but after entering the college, they need to face the problems alone. Sometimes, they are not interest in learning and feel difficult in mastering professional

knowledge. Their incomprehension of the knowledge results in low rate of finishing homework, let alone the quality. Facing this phenomenon, teachers should actively change the way of homework, and set more open questions in the homework, so that students can look up information by themselves, and combine with practical cases to think about the problems in the homework from multiple aspects. In class, teachers should guide answers through finding the solutions to the left problems and the final answers shall be given by the students themselves, so that students can have a sense of achievement. Besides, this also enables students to participate in each question and consider problems from multiple aspects so as to cultivate their ability of active learning and innovative thinking.

III. CONCLUSION

In a word, schools should train talents according to the requirements of the times, help them master modern professional knowledge and improve comprehensive quality. Only in this way can they meet the requirements of the actual development of modern society. The above reform measures of surveying and mapping engineering courses are expected to be helpful to the schools. On this basis, schools should train their teachers, so that the teachers can understand modern advanced knowledge and equipment, and should also introduce outstanding teachers from outside of the school.

REFERENCES

- [1] Miao Xiaomang. Teaching Reform and Practice of Civil Engineering Surveying Courses [J]. *Construction Materials & Decoration*, 2018(39):156-157. (in Chinese)
- [2] Yu Mingxu, Lin Lesheng. Teaching Reform Strategy of Engineering Surveying Courses in Higher Vocational Colleges [J]. *Western China Quality Education*, 2017,3(16):229-230+232. (in Chinese)
- [3] Li Jiangping. Analysis of Attempts to Cultivate Students' Application Ability and Innovative Thinking Ability in Engineering SurveyingTeaching [J]. *Contemporary Education Research and Teaching Practice*, 2018(11):172-173. (in Chinese)