The Reconstruction of the Teaching System and the Effect of Practice of Engineering Surveying Course on the Backing of Excellent Engineer Education

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Abstract. At present, the increasing higher education in our country has exposed the more serious problem of employment. Education is essentially an industry. Market oriented employment mechanism inevitably make higher education to reform in the idea of running a school, professional settings, teaching content, the construction of teaching team and so on to adapt to the needs of the market initiatives. The state has timely launched the strategic decision of "excellent plan" in compliance with the development of the times. This article reconstructs the teaching system of engineering surveying course in view of the problems in the teaching of engineering surveying, based on the background of the excellent plain and guided by the requirements of the excellent plan training. We have achieved good results through implementation.

Introduction

At present, the increasing higher education in our country has exposed the more serious problem of employment [1-2]. The people's network issued the annual report on the quality of employment in colleges and universities of the education research Institute in twenty-first century on April 2, 2014. The report made an evaluation to the employment report of 75 colleges and universities directly under the Ministry of Education on content completeness, credibility and information disclosure and so on. Only the total score of the employment annual report of 22 universities reached 60 points, and the qualification rate is less than 30%. The employment annual reports of 75 subordinate colleges and universities are not up to the standard as a whole. This fully shows that the employment of college students is not optimistic at present but there are many vacancies in the reality. The root of the problem is not the supply and demand, but the result of the disjunction between higher education and social demand, unreasonable industrial structure, the too big gap between college Students' ideal and reality, the not high themselves quality and ability and so on.

The Launch of the Excellent Plan

Education is essentially an industry. Market oriented employment mechanism inevitably make higher education to reform in the idea of running a school, professional settings, teaching content, the construction of teaching team and so on to adapt to the needs of the market initiatives. The fierce competition in the market also requires us to change our ideas in teaching to cultivate the compound talents with a solid professional foundation, wide knowledge and the ability of engineering practice and innovation.

All colleges and universities in the world pay attention to the practice and research of curriculum teaching since the middle of the twentieth century [3-4]. For example, the University of Applied Sciences of Germany (Fachhochschule) adopts the "3+1" model. Its cultivation goal is to cultivate engineers and technicians who master science way and are good at solving practical problems. The United States Institute of Olin is committed to training the future leading figures in the engineering community. So that the students are required to master the excellent engineering skills. To this end,
our country has timely launched the strategic decision of “excellent plan “in compliance with the
development of the times. Its purpose is to improve the students 'engineering consciousness,
engineering quality and engineering practice ability through close cooperation between education and
industry, universities and enterprises, taking the practical engineering as the background and taking
the engineering technology as the main line, and then cultivate a large number of types of engineers.

Existing Problems in the Teaching of Engineering Survey

The Teaching Content is Complicated and the Emphasis Is not Outstanding

The teaching of engineering surveying has both theory and practice. The theory teaching includes
measurement basis, instrument structure and its principle, error basic knowledge, control
measurement, the basic mapping knowledge of topographic maps, the engineering application of
measurement skill, observation and processing of data and so on. The content of teaching is more and
more miscellaneous. It's a challenge for both teachers and students who complete such a complex
teaching task at 48 school hours. Students have learned a lot of knowledge, but the things they actually
master are limited and no focus from theirs feedback information.

Emphasis on Theory and Light Practice

In our school, there are more than 10 majors that open engineering surveying course for example,
Surveying and Mapping Engineering, Civil Engineering, Architecture and so on. The instruments is
relatively inadequate with the expansion of Higher Education, particularly some sophisticated
instruments. As a result, students’ practices are carried out in groups as units. The opportunity for
students to contact the instruments is limited or not to non surveying and mapping majors. So that
there are a lot of problems in the course of the student's own measurement so as to affect the quality of
the measurement experiment or practice report.

The Teaching Method is Single and Depends on the Classroom Teaching

The course has been taught at 4 hours a week. The theory teaching and the practice teaching are
2:1, first theory and practice. Although the experimental instruction is given to students in advance,
the students rarely look at them. So the teacher has to say it again before each experiment. Classroom
teaching is too much to rely on books. Although the courseware is carefully prepared before class, it is
difficult to get rid of the shadow of “cramming teaching” because of the more content and the short
time. This single teaching method makes the interaction between teachers and students very few, and
then the enthusiasm of the students is difficult to be mobilized.

Curriculum Assessment is Heavy Result and Light Process So to Reflect the True Level of the
Students

The theoretical teaching assessment consists of two parts, that is, ordinary performance and
examination. The ordinary performance generally is determined by the attendance, the performance,
and the questions in the classroom and so on. The practice teaching assessment includes two parts
too, that is, ordinary performance and practice report. Regular attendance and classroom questions are
few because of the more content and less time. There is a problem of plagiarism in the course
assignments. The ordinary performance assessment is just a form In fact. The proportion of the exam
and the practice report is high in the total score. So that students' total achievement can not reflect the
their comprehensive performance in the whole teaching process. It is difficult to reflect the students' 
real ability.
The Teaching System Reconstruction of the Engineering Surveying under the Excellent Background

The Ministry of Education launched the "education and training program for excellent engineers" in June 2010. It is not only the spirit of implementation the "planning outline for the reform and development of the middle and long term education of the state" but also a major measure to Promote our country from the great power of engineering education to the power of engineering education. The aim is to cultivate a large number of high quality engineering talents with strong innovation ability and adapting to the needs of economic and social development to serve the strategy of talent power.

In 2011, the Ministry of education and the State Bureau of Surveying and mapping jointly decided to implement the excellent plan in the field of Surveying and mapping to promote the implementation of the education and training program for excellent engineers. For example, Central South University became the first pilot Majors of the excellent plan in 2011[5]. Then many scholars have studied the excellent plan from different aspects of theory and practice etc [6-13]. In 2013, the major of Surveying and mapping in our school was included in the training plan for the national excellent engineers. Combined with the implementation of the national excellence program for surveying and Mapping Engineering in our school and guided by the requirements of excellent plan training. We have reconstructed the teaching system of engineering surveying course in view of the problems in the teaching of engineering surveying.

Guiding Ideology

Guiding ideology of reconstructing the teaching system of Engineering Surveying is to establish the idea of a comprehensive development of talents, to face the main battlefield of national engineering construction, closely to clasp the professional training goal of "excellent plan" , comprehensively to analysis the social requirements for the measure ability to engineering major, to grasp the pulse of the development of curriculum history, fully to considerate the latest development of science and technology in surveying and mapping. In this way, a new curriculum teaching system is built to improve the practical and innovative capacity of the project.

The Basic Ideas

In the reconstruction of curriculum teaching system, On the one hand, the original teaching content is adjusted. For example, the following Gauss projection is put into the ground point position determination of the introduction In order to facilitate the full and complete understanding of the measuring coordinates for the students. On the other hand, we continue to update and supplement new knowledge. That is because the new theory; new technology and new method of measurement constantly emerge with the rapid development of optoelectronic technology, computer technology, information technology and space technology. When the current content increases and the hours are reduced, we will further optimize the knowledge structure of the curriculum. At the same time, by taking into account the differences between surveying and mapping and non surveying and Mapping Majors, we integrate the resources advantage of related majors, strengthen the basic teaching of general knowledge theory, focus on professional features and pay attention to practical ability. The aim is to cultivate engineering professionals with thick foundation, wide caliber, characteristic and high quality.

Innovation Features

Engineering measurement is a very practical basic course. Facing the goal of cultivating diversified talents, the innovation and characteristics of the reconstruction of the curriculum teaching system lie in: ①Classification treatment, different treatment. The course teaching is divided into two parts: the theory class teaching and the extracurricular practice teaching first. Secondly, we allocate hours reasonably according to professional differences. For example, in the engineering survey of the geological engineering major, the theory teaching is 24 hours and the practice teaching is 8 hours and a week's internship. ②The theory teaching not only takes into account the characteristics of the
curriculum, but also follows the law of teaching. At the same time, it also pays attention to the level of knowledge and the application of engineering. The restructure of teaching content adopts the modular structure, as shown in Table 1. The practice teaching emphasizes the ability and emphasizes the professional morality. Its ability architecture is built as shown in Table 2.

Table 1. The Structure System of the Teaching Content of Engineering Surveying.

<table>
<thead>
<tr>
<th>First module Measurement basis</th>
<th>Second module Engineering application</th>
<th>Third module modern surveying Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring coordinate system</td>
<td>Civil engineering</td>
<td>The use of modern surveying</td>
</tr>
<tr>
<td>The point determination</td>
<td>Road engineering</td>
<td>and mapping new instruments</td>
</tr>
<tr>
<td>The use of measuring instruments and tools</td>
<td>Bridge engineering</td>
<td>Digital mapping technology and its Application</td>
</tr>
<tr>
<td>The basic work of measurement</td>
<td>Engineering</td>
<td>Geological engineering</td>
</tr>
<tr>
<td>The basic skills of measurement</td>
<td>Mining engineering</td>
<td>RS technology and its Application</td>
</tr>
<tr>
<td>Topographic drawing and Its application</td>
<td>Real estate</td>
<td>GIS technology and its Application</td>
</tr>
<tr>
<td></td>
<td>The foundation</td>
<td>Application</td>
</tr>
</tbody>
</table>

Table 2. Construction of Measurement Capability System.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Classification</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Instrument operation</td>
<td>Level.; Theodolite; Total station; Compass and so on</td>
</tr>
<tr>
<td>2</td>
<td>Data processing</td>
<td>Calculation of internal and external industry, error and so on</td>
</tr>
<tr>
<td>3</td>
<td>Topographic mapping</td>
<td>Traditional mapping; Digital mapping; Computer graphics</td>
</tr>
<tr>
<td>4</td>
<td>Application of topographic maps</td>
<td>Reading internal and external industry and application of topographic maps</td>
</tr>
<tr>
<td>5</td>
<td>Engineering application</td>
<td>Civil Engineering; Architectural Engineering; Architecture; Geological Engineering etc</td>
</tr>
<tr>
<td>6</td>
<td>Professional ethics</td>
<td>Professional norms; Working attitude; Team collaboration; Management of results etc</td>
</tr>
</tbody>
</table>

The Practical Effect of the Teaching System Reconstructing of Engineering Surveying Course

The teaching system reconstructing of Engineering Surveying Course has achieved good results. It is mainly shown in the following three aspects. That is the effect of classroom teaching, students’ award-winning and curriculum evaluation.

The Teaching Effect

The object of the curriculum reform is the students of the 15 level geological engineering. The results of the reform will directly benefit the students. There is a clear promotion in attendance rate, pass rate, average achievement and so on, as shown in Table 3.

Table 3. The Comparison of the Teaching Effect before and after the Curriculum Reconstruction.

<table>
<thead>
<tr>
<th>Category</th>
<th>Level 2014(before)(%)</th>
<th>Level 2015(after)(%)</th>
<th>Rate of change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>attendance rate</td>
<td>94</td>
<td>100</td>
<td>6</td>
</tr>
<tr>
<td>pass rate</td>
<td>67</td>
<td>92</td>
<td>15</td>
</tr>
<tr>
<td>average achievement</td>
<td>65</td>
<td>78</td>
<td>13</td>
</tr>
</tbody>
</table>
**Students’ Award-Winning**

The laboratory opens to the students in order to create more practical opportunities for students. At the same time, every year, we organize students to carry out the intramural surveying and mapping skills competition, and select excellent students to participate in the province and national competition of Surveying and mapping skills. The students have achieved good results in all kinds of games. For example, Students (Zhang Yuan, Zhou Chuanyi, Ou Haijun and Liu Chaohu) in our school got the first prize of the four level leveling, the three prize of the first grade traverse survey and the two prize of the 1:500 digital mapping in college Students' scientific and technological innovation and professional skills competition in Jiangxi Province in 2015. Students(Qiu Pengxun, Huang Jun etc)in our school got the first prize of the photovoltaic traverse survey in The sixth innovation competition of Surveying and mapping in Jiangxi University of Science and Technology in 2015. In "Tianyu Cup" Fourth National College and university students surveying and mapping skills competition in 2016, students(He Weiguo, OuYang Dongsheng, Xiao Gang, Liu Renzhi)in our school got the first prize of the digital mapping, the first prize of the traverse survey and the two prize of the two level leveling, and students(Zou Shipan,Huang Liexing)in our school got the first prize of the measurement program design. At the same time, they got the first prize of the group general achievement. Students(Zheng Wenjie, Qiu Fengqin, Liu Zhiqiang, Hu Xuhang)got the first prize of the two level leveling, the first prize of the traverse survey, the two prize of the digital mapping and the first prize of the group general achievement in the "CNOOC Cup" mapping skill competition in Jiangxi Province 2017.

College students show excellent spiritual features and solid professional strength in all previous mapping skills innovation competitions. It's obvious that members of the project group make students not only to gain knowledge, but also have strong ability to practice and solve problems through the teaching reform of the course. Teaching has realized the transformation from the teaching to the practice and the research type. Thus, the social competitiveness of the students of Surveying and Mapping Engineering in our university is greatly improved, and the employment rate of students has been promoted. At present, the phenomenon of short supply often appears in the our students' employment, such as Surveying and mapping engineering major and other related engineering major. Jiangxi University of Science and Technology was awarded the top 50 colleges and universities of national innovation and entrepreneurship in 2017.

**Curriculum Evaluation**

The teaching of "engineering survey" has achieved good results through reform and practice. It is affirmed by the supervision of the school teaching. Such as the teaching supervision briefing [2016] 11: The main content is skilled, a clear explanation of the relevant knowledge points, the more detailed graphic process and the case to the point. The teaching organization is reasonable and can be connected with the actual teaching. Teaching emphasizes the cultivation of students' ability to analyze and solve problems. At the same time, the course teaching is highly appraised by the students too, such as the summary of the students' comments in Table 4. In addition, there is good colleague’s accreditation. In a word, the comprehensive evaluation of the course teaching is excellent.

<table>
<thead>
<tr>
<th>Serial number</th>
<th>Summary of students' comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The lecture is interesting</td>
</tr>
<tr>
<td>2</td>
<td>The teacher talks about a wide range of knowledge.</td>
</tr>
<tr>
<td>3</td>
<td>Conscientious and strict teaching attitude</td>
</tr>
<tr>
<td>4</td>
<td>Teachers have a sense of responsibility</td>
</tr>
<tr>
<td>5</td>
<td>Class is very energetic</td>
</tr>
</tbody>
</table>
Concluding Remarks

This article reconstructs the teaching system of engineering surveying course from two aspects of theory classroom teaching and practical teaching in view of the problems in the teaching of engineering surveying, based on the “excellence” background and oriented diversification goal. In the reconstruction of the theory classroom teaching, we emphasize the systematicness and completeness of knowledge. The restructure of teaching content adopts the modular structure. In practice teaching, we focus on the innovation and ability of engineering practice. The course teaching is not only received by the school supervision and the students' but makes the students to been improved in enthusiasm for class, the achievement of the curriculum, especially the creative ability of engineering practice greatly through a year of teaching practice. At the same time, students have made good achievements in a number of provincial and national level mapping skills competitions. In a word, the reform of curriculum teaching has achieved good results.

Acknowledgement

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References
