Teaching Quality Evaluation Index of Civil Engineering Training based on Optimal Regression Method

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Abstract
With the deepening of the professional education reform in colleges and universities, the teaching system of various specialties has been deepened continuously. In order to ensure the improvement of teaching quality, it is necessary to establish the evaluation indicator system of teaching quality, so as to investigate the quality of professional teaching. The establishment and improvement of the teaching quality evaluation indicator of the practical training of civil engineering is an important component of the teaching of civil engineering specialty, and is the main component of the improvement and enhancement of the teaching quality of civil engineering specialty. The establishment of practical teaching quality evaluation indicator in civil engineering can provide more professional practical talents for the society. This paper first expounds the characteristics and functions of the establishment of teaching quality evaluation indicator of civil engineering training, and then gives the countermeasures to improve the teaching quality evaluation indicator of civil engineering training, and finally proposes a teaching quality evaluation indicator method of civil engineering training based on optimal regression method. The practice proves that this method can effectively evaluate the teaching quality of civil engineering training.

Keywords: Optimal Regression Method, Civil Engineering, Practical Teaching, Teaching Quality, Evaluation Indicator

1. INTRODUCTION

In recent years, civil engineering has become a popular specialty, which mainly comes from the increase of the number of project projects in society. With the development of civil engineering specialty, the related education and teaching work has entered a stage of deepening development, and reform has been carried out (Bowman-Perrott, Burke, Mack, Samar, Vannest, 2016). In the civil engineering education reform, the teaching quality is not high, the difference between the theory and practice of students understanding and expanding problem is more and more obvious, not only affects the establishment of education system, but also has a great influence on students' future work and employment (Farraj, Hammad, Daoud and Kundur, 2016).

There are some problems in the establishment of teaching quality evaluation index of civil engineering training. The application of case teaching in civil engineering training is insufficient (Ye and Hu, 2016). Although colleges and universities to carry out education and teaching work to recognize the importance of civil engineering training, but also recognized the negative impact of exam oriented education on students. However, some teachers are still difficult to get rid of the traditional education and teaching pattern in the teaching work. In the student training work and the establishment of teaching quality evaluation index, pay attention to the actual theory of students grasp the situation, investigate the actual ability of students (Clerck and Demeulemeester, 2016). For civil engineering students, practical teaching still has some differences with students in the future to the actual job. To enhance the students' practical teaching ability, the case teaching method can help students to refer to the actual cases, which can improve the students' understanding of the training course. But in our country, teachers pay more attention to and lack of case teaching method in teaching. Lack of independent and personalized evaluation index of practical teaching quality in Colleges and universities. The lack of independence and individuality mainly lies in the development of civil engineering training teaching, and the lack of differentiated teaching quality evaluation index. For civil engineering specialty, land survey, project site selection and other professional courses teaching quality has obvious deficiencies. In the establishment of training quality evaluation index for history majors, we should examine students' teaching ability, students' communication, communication and analysis ability, so as to become an excellent teacher. This training quality evaluation is not applicable to civil engineering practice teaching, lack of independent and personalized, so that the evaluation criteria of teaching quality training in the establishment of civil engineering structure is not complete, it is difficult to make the education to carry out the work of deepening progress. Students in the
practice of training, how to improve the specific skills, the future of that kind of training work to help themselves more, but also lack of understanding. Lack of understanding of class hour and importance of civil engineering training teaching. The lack of class when the current civil engineering practice teaching course to carry out the main problems in the development, in the actual teaching, the students accept the course content more, therefore, difficult to guarantee the progress of the class in the civil engineering practice teaching. The lack of class hours will affect students' understanding of practical training teaching. Of course, the lack of class problem also reflects the school in the course of teaching and training to carry out the relevant lack of attention, ignore the practical teaching work, personnel training programs, students' personal skills equal to the important relationship between the training of the teaching hours, the influence of civil engineering training teaching quality evaluation index. The relevant infrastructure of civil engineering training teaching needs to be improved. Civil engineering training teaching infrastructure is not perfect, mainly reflected in the cultivation of students' personal ability of the lack of venues, related to modern equipment, construction and other commonly used equipment and other shortcomings (Alvarado-Quesada and Weikard, 2017). It is difficult for students to understand their professional knowledge because they understand the infrastructure or experimental results in their textbooks. Infrastructure is not perfect, natural training is difficult to carry out, not to mention the establishment of practical teaching quality evaluation index. Feedback from some enterprises and civil engineering graduates, infrastructure training has become a major problem facing the civil professional talents and employment of graduates, influence of personal occupation career and great development.

In this context, how to improve the teaching quality of civil engineering has become the key. In improving the quality of teaching, the quality of teaching is not the establishment or assessment of the system, but the need to improve the evaluation index system to solve. Through the establishment of evaluation index system, let teachers in teaching, according to the content of the indicators to judge, and set up a score line, in order to investigate the teaching quality of civil engineering specialty. In this study, the main civil engineering training teaching quality as an example, to carry out evaluation index research. Hope to improve the teaching quality of civil engineering training in China through the research of evaluation index, promote the reform of civil engineering education and teaching, and perfect the teaching structure of practical training course.

2. THE CHARACTERISTICS AND FUNCTION OF ESTABLISHING EVALUATION INDEX OF CIVIL ENGINEERING PRACTICE TEACHING QUALITY

The establishment of practical teaching quality evaluation index of civil engineering major is to train excellent civil engineering talents for the society, which is also the goal of talent training in Colleges and universities. In order to achieve the goal of education, teaching and courses of civil engineering are deepening and reform. However, the current evaluation system of teaching quality of civil engineering training is still not perfect, establish the system of obvious deficiency, based on this point, the establishment of clear requirements evaluation index evaluation index, according to the characteristics of carrying out quality evaluation work, to avoid the problems he established evaluation indicators. First of all, social needs. According to the current personnel training plan of the education department and the competent department of Civil Engineering Specialty in our country, the training teaching quality evaluation index is improved. China's relevant education departments and authorities are based on many years of actual data on the basis of the development of the direction of talent development model, the foundation of civil engineering training teaching work. Secondly, experience summary. The experience summary mainly is abandons the University civil engineering specialized personnel training environment, carries on the quality appraisal target to the education department, the graduate student, the investigation and the scientific research organization and so on carries on the teaching material appraisal. The subjects of these surveys face no competition with colleges and universities, but stand on a more objective point of view, and give their own views and reasonable suggestions on how to carry out the teaching quality of practical training. Thirdly, enterprise demand. The demand of enterprises is the civil engineering talents recruited from colleges and universities. It meets the needs of enterprises for talent training, and evaluates the overall situation of civil engineering talents training in Colleges and universities. Especially in the construction enterprise for college students to provide civil engineering professional internship positions, providing opportunities for practice. This is the most direct study on evaluation criteria of teaching quality and training school. Finally, combined with school educational goals. To establish the evaluation index of civil engineering practice teaching quality, can not be divorced from the school education goal, to carry out the work on the one hand is to cultivate talents of civil engineering practical needs of society, on the other hand, it is an important content to cultivate and improve the quality of teaching in higher education.

The evaluation index of civil engineering training establishment of teaching quality plays a great role. First, the establishment of teaching quality evaluation index of civil engineering training is the basic requirement of modern civil engineering personnel training. The economic and social development, the demand of talents has become more diversified. The occupation training among them, through the talent training for social occupation, better for civil engineering students, improve employment ability and level, this is also the important content of
the strategy of strengthening college talent training. For civil engineering training teaching, through practical training teaching, teachers should according to the actual needs of society, the development of enterprises for civil engineering professional training, and on this basis to carry out education and teaching work. In the establishment of teaching quality evaluation index, based on the improvement of professional talent training structure, according to the different positions, formulate the corresponding talent training plan and job requirements. Strengthening the goal of personnel training in Colleges and universities, at the same time, let the civil engineering students more clearly and clearly understand their shortcomings in the post field, to improve. Secondly, the theory and practice of integration of teaching objectives. In fact, China's current civil engineering professional training in many colleges and universities, the corresponding training base and training center is established, through the establishment of modern training studio, instrument room, let students to participate in the curriculum practice, the theory and practice of integration. At the same time, in order to enhance the enthusiasm of students in class, recognize the importance of practical teaching, and enterprises to carry out school enterprise cooperation, and jointly cultivate outstanding talents of civil engineering. Finally, to achieve the goal of promoting education curriculum project. Colleges and universities in China after years of development, between enterprise and society and carry out local good cooperation. Some universities even can provide professional advice for project enterprises, guide enterprises to carry out construction projects. In a training course, let students participate in practical work. Through the establishment of teaching quality evaluation index, the students' learning, education and practical ability are investigated, and the evaluation indexes of deepening practical courses are explored and studied constantly.

3. THE COUNTERMEASURES OF ESTABLISHING THE EVALUATION INDEX OF TEACHING QUALITY OF CIVIL ENGINEERING TRAINING

3.1. The Improvement of the Case Teaching of Civil Engineering Training and Pay More Attention to Students' Autonomous Learning

As we all know, with the deepening development of education system, each stage of teaching has been recognized by the examination oriented education theory ignores practical influence on the students on the growth and development of the individual, in the process of education reform, pay attention to the combination of theory and practice, enhance the integration of theoretical teaching and practical work of the waste of resources and avoid duplication of teaching, let the students to participate in classroom teaching work. To enhance students' understanding of the training of civil engineering quality evaluation index, improve the evaluation index structure (Chen and Lee, 2014). It is suggested that teachers should adopt case teaching method in education and teaching. Through practical cases, students' knowledge in practical training should be improved, students' practical training ability should be strengthened, and the quality evaluation index should be guaranteed. Specifically, in the civil engineering work carried out in practice, let students participate in a specific project, how to carry out the project cost management, let the students to enter the actual case, understanding of cost management is not only the management system, but the specific period of investigation, once expected cost, the late operation. To each link in civil engineering work to deepen the training, so that students may face problems in the actual work actively to deal with.

In addition, from the current situation of civil engineering teaching in Colleges and universities, the majority of teachers explain, answer students' questions, and then allow students to conduct their own practical operation (Ghondaghsaz, Fatemeh, Rasekh and Abdolrahman, 2012). In the process of student operation, teachers take the way of after-school guidance, answer some questions for students. This method avoids the traditional theory of learning and teachers to explain the method, so that students have the characteristics of rigid memory. Students in the practical training, can study independently, find problems in group training, solve the problem, plays an important role in improving students' actual ability. Civil engineering training teaching quality evaluation indicators continue to improve and extend to other professional education, can play an important role.

3.2. The Improvement of the Teaching Quality of College Training and Individualized Independent Evaluation Index

The key to improve the teaching quality evaluation index of civil engineering training is to improve the independent and personalized evaluation index of training teaching quality in Colleges and universities (Messaid, Bouzid and Ellouze, 2016). For the professional development of college education, almost all to carry out practice teaching, so that students can become a better future application talents to meet the social needs, and adapt to the early integration work. To improve the independent and individualized evaluation index of teaching quality, it is necessary to carry out the training teaching in Colleges and universities according to the particularity of civil engineering specialty. Instead of taking the mastery of the way, let any student evaluation of teaching quality with the same set of training, and the lack of difference index assessment method, individualized and independent of the alienation not only science, it is difficult to achieve the practical teaching of civil engineering students goal. Therefore, it is suggested that colleges and universities should establish the
quality evaluation index according to the specialty of civil engineering specialty, and ensure the establishment of the index is in line with the development of civil engineering students. As in the engineering practice, the training base and speed quality training base; in topographic survey, choose the training hall; control strategy, establish the measurement instrument laboratory belongs to civil engineering; engineering measurement of civil engineering measurement instrument room, according to different training project, and establish the corresponding training studio training base.

3.3. Optimization of Teaching Hours and Importance of Civil Engineering Training Teaching

Although colleges and universities begin to attach importance to the civil engineering training teaching course, the class hours occupied by theoretical courses are obviously higher than those of practical teaching. Lack of training teaching hours, students can not find the appropriate training base, the training base is not the individual development of students, it is difficult for students to carry out practical training, the difference between theory and practice is still great (Zhao, Guo and Yan, 2017). Therefore, here the main university in civil engineering practice teaching, pay attention to practical teaching in class, to carry out more in the course of civil engineering curriculum based on the perfection of civil engineering structure to carry out the guarantee of training, teaching work, and to improve the teaching quality of civil engineering training evaluation index. At the same time, in promoting the importance of understanding, colleges and universities as the forefront of education and teaching reform, should pay attention to personnel training strategy formulation. In the teachers' research and related work, focusing on how to carry out the training work, improve the empirical analysis and research, in the study of civil engineering practice teaching to enhance the importance of understanding, and this understanding must be extended to daily teaching work, to realize the teaching reform of high professional education and training.

3.4. Strengthening the Related Infrastructure of Civil Engineering Training Teaching

To enhance the infrastructure of civil engineering practice teaching, is mainly aimed at the civil engineering training work carried out in some colleges and universities related training base, training workshops, research and other infrastructure failure are discussed. In the development of practical work, the students' training work is carried out more through the training base and specific places. The lack of related infrastructure, resulting in the difficulties of students training teaching work, the training ability of students and civil engineering related skills to enhance the impact. After graduation, the ability to society in the aspects of the problem, not only caused the students to the teaching quality of civil engineering training evaluation index of the bad feeling of actual employment enterprises in the students' work, there will be bad for the students, the school teaching quality (Tiryaki and Ahlatcioglu, 2015). Therefore, strengthening the construction of related infrastructure is particularly important. In some universities the problem of insufficient funds, suggestions in universities can carry out school enterprise cooperation, strengthen the talent training strategy of cooperation, let the civil engineering related enterprises to provide more training base for the school, to avoid school funding issues caused by lack of training base. In addition, colleges and universities can use the help of local enterprises and social organizations at all levels to help schools, improve training bases in Colleges and universities, and ensure the improvement of infrastructure.

4. STEPWISE OPTIMAL REGRESSION METHOD

Step1. All the m variables and dependent variables respectively, y establishment of a regression equation.

Step 2. The test statistic \( \{ F_1, F_2, \ldots, F_m \} \) of regression coefficient is given, and the maximum value is obtained

\[
F_{k_i} = \max \{ F_1, F_2, \ldots, F_m \}
\]

If

\[
F_{k_i} \leq F_j = F_{n_1} (1, n-2)
\]

then stop screening.

If

\[
F_{k_i} > F_j = F_{n_1} (1, n-2)
\]

let \( x_{k_i} = x_1 \), then enter Step 3.
Step 3. The two variables regression equation was established by the independent variable group \((x_1, x_2), (x_1, x_3), \ldots, (x_1, x_m)\) and the dependent variable \(y\), and \(x_2, x_3, \ldots, x_m\) in the regression equation of the regression coefficient test statistic \(F\) was calculated, which is denoted as \(\{F_{2,1}^2, F_{2,2}^2, \ldots, F_{m,1}^2\}\).

The maximum value is taken (Zhao, Cai and Fan, 2016)

\[
F_{k,i}^2 = \max \{ F_{k,i}^2, F_{k,i+1}^2, \ldots, F_{m,i}^2 \} 
\]

If

\[
F_{k,i}^2 \leq F = F_a(1, n-2-1)
\]

then stop screening, the regression equation between \(y\) and \(x_i\) is the optimal regression equation.

If

\[
F_{k,i}^2 > F = F_a(1, n-2-1)
\]

and \(x_k = x_2\), then enter Step 4.

Step 4. For the variables that have been selected into the model, \(x_1, x_2, \) and above the cycle, until all the \(F\) values of the independent variables are less than the corresponding critical values, the regression equation is the optimal regression equation.

That has been carried out \(i\) screening, and selected variables \(x_1, x_2, \ldots, x_i\) now proceed to step \(i+1\) screening:

The \(i+1\) variables regression equation was established by the independent variable group \((x_1, x_2, \ldots, x_j, x_{i+1}\), \(x_1, x_2, \ldots, x_j, x_{i+2}\), \ldots, \(x_1, x_2, \ldots, x_j, x_m\) and the dependent variable \(y\), and \(x_{i+1}, x_{i+2}, \ldots, x_m\) in the regression equation of the regression coefficient test statistic \(F\) was calculated, which is denoted as \(\{F_{i+1,1}^2, F_{i+1,2}^2, \ldots, F_{m,1}^2\}\).

The maximum value is taken

\[
F_{k,i+1}^2 = \max \{ F_{i+1,1}^2, F_{i+1,2}^2, \ldots, F_{m,1}^2 \} 
\]

If

\[
F_{k,i+1}^2 \leq F = F_a(1, n-(l+1)-1)
\]

The regression equation, which is the best regression equation, is obtained by stopping screening.

If

\[
F_{k,i+1}^2 > F = F_a(1, n-(l+1)-1)
\]

\(x_{k,i+1}\) was selected into the model for further screening.

It can also be from the reverse regression, the method is characterized by: once the independent variables are eliminated, no longer enter the model.

The minimum value is taken

\[
F_{k}^1 = \min \{ F_{1}^1, F_{2}^1, \ldots, F_{m}^1 \} 
\]

If

\[
F_{k}^1 > F = F_a(1, n-m-1)
\]

The regression equation is the optimal regression equation without the independent variable.

If

\[
F_{k}^1 \leq F = F_a(1, n-m-1)
\]

Let \(x_k = x_m\), the minimum value is taken

\[
F_{k,2}^2 = \min \{ F_{1}^2, F_{2}^2, \ldots, F_{m-1}^2 \} 
\]
If
\[ F_{k_i}^2 > F_c = F_{a} \left( 1, n - (m - 1) - 1 \right) \] (14)
then there is no independent variable to be eliminated, and the regression equation at this time is the optimal regression equation.

If
\[ F_{k_i}^2 \leq F_c = F_{a} \left( 1, n - (m - 1) - 1 \right) \] (15)
Let \( x_{k_i} = x_{m-1} \) in the regression equation, the \( F \) value of the regression coefficients of each variable is greater than the critical value, that is, there is no variable in the equation to be eliminated, and the regression equation is the optimal regression equation at this time.

That has been the \( i \) step removed, the independent variables in the model is \( x_1, x_2, ..., x_{m-1} \) step \( i + 1 \) is now removed. Building \( x_1, x_2, ..., x_{m-1} \) the regression equation of \( x_{m-1} \) with \( y \) and the regression coefficients of \( x_1, x_2, ..., x_{m-1} \) in the equation are tested by \( F \) and the corresponding \( F \) statistic is denoted as the regression coefficient
\[ F^{i+1}_1, F^{i+1}_2, ..., F^{i+1}_{m-1} \] (16)
The minimum value is taken
\[ F^{i+1}_{k_{i+1}} = \min \{ F^{i+1}_1, F^{i+1}_2, ..., F^{i+1}_{m-1} \} \] (17)
If
\[ F^{i+1}_{k_{i+1}} > F_{a} \left( 1, n - m + l - 1 \right) \] (18)
then stop screening, \( y \) and \( x_1, x_2, ..., x_{m-1} \), the regression equation between the optimal regression equation.
If
\[ F^{i+1}_{k_{i+1}} \leq F_{a} \left( 1, n - m + l - 1 \right) \] (19)
let \( x_{k_{i+1}} = x_{m-l} \), and the next step is to screen.

5. CONCLUSION

Generally speaking, it is the key to achieve the goal of teaching and learning in Colleges and universities to strengthen the teaching content and link of the current lack of school. For civil engineering such as the need for training subjects, should not ignore the practice of the impact and importance of students. Through the improvement of training teaching quality evaluation index, let students understand the actual needs of talents in different civil engineering positions, and actively strive to improve their own deficiencies in learning and life. The school, on the basis of strengthening theoretical education, deepen practical teaching, enhance the realization of the strategic objectives of the training of students, and promote the improvement of the university education system.

ACKNOWLEDGEMENTS

The work presented in this paper is partially supported by a grant from National Natural Science Foundation of China (Grant No. 51508419), also partially supported by the Zhejiang Provincial Natural Science Foundation of China (Grant No. LY14E080018).

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