CSCanada
Canadian Social Science
Vol. 10, No. 6, 2014, pp. 144-148
DOI: 10.3968/5376

ISSN 1712-8056[Print]
ISSN 1923-6697[Online]
www.cscanada.net
www.cscanada.org

Practice Teaching Method Research Based on Directional Decomposition of Scientific Research Project

DUAN Jie[a],*; SUN Xianyang[b]

[a]College of Optoelectronic Engineering, Changchun University of Science and Technology, Changchun, China.
[b]Electronic Information Engineering College, Changchun University, Changchun, China.
*Corresponding author.

Received 12 May 2014; accepted 28 July 2014
Published online 28 August 2014

Abstract

To solve some practical teaching problems of current undergraduates including management chaos, unclear objectives, poor content continuity, a kind of practice teaching method based on directional decomposition of the single scientific research project is put forward after the introduction of McClelland achievement motivation theory. Firstly, the importance and the problems of current practice teaching in the college students' training are pointed out. And the McClelland achievement motivation theory and application of this theory in college student's cultivation are elaborated. Combining with the professional practice teaching characteristic, we propose the overall scheme of researched method. By studying the tutor system management and the directional decomposition method of scientific research project, the method, the key technology and the ultimately teaching reform effect on the research teaching that can solve the current problem are given in this paper. Through the implementation of practice teaching reform method, some problems of practice teaching in college students will be effectively resolved, which is an important guiding to the current undergraduate practical teaching management.

Key words: Practice management; Teaching methods; Directional decomposition; Tutor system

Duan, J., & Sun, X. Y. (2014). Practice Teaching Method Research Based on Directional Decomposition of Scientific Research Project. *Canadian Social Science, 10*(6), 144-148. Available from: http://www.cscanada.net/index.php/css/article/view/5376
DOI: http://dx.doi.org/10.3968/5376

INTRODUCTION

With increase of demands for applied talents, the training direction, teaching methods and final results of the undergraduate practical were out of touch with the reality of talent demand for the community. It mainly reflects in the unreasonable practice schedules, without system arrangement of practice and inefficient implementation and so on. The focus is reflected in the contradiction between supply and demand of university graduates and enterprises. So how to carry out the practice tasks, improve the efficiency of the practice and finally make the practice having the best effect in the undergraduate teaching has become the current important subject of teaching reform in universities. It will be of great practical guiding significance from this research of teaching reform methods about university practice, including the content modification, class adjustment and results evaluation etc.. So in this paper, based on the study of McClelland achievement motivation theory, we put forward a practice teaching method that is directional decomposition of scientific research project, and analyze this research method in detailed, which of purpose is to provide an effective management means for college undergraduate course teaching .

1. THE FACING AND THE SOLVING PROBLEMS OF CURRENT UNDERGRADUATE PRACTICE TEACHING

With the development of social economy, politics, culture, there are changes in every part of the whole society. As an important part of our society, the university education should also keep up with the times development, and constantly adjust their target, policy and management methods.

1.1 The Facing Problems of Current Undergraduate Practice Teaching

To a relatively stable area, current university education can not adapt to the rapid development of society in many respects. Especially when the current university practices teaching facing this society actual demand for college student, this problem is very outstanding. Firstly employing company can not find the qualified people owing to the professional skills, at the same time the graduate students are not satisfied with the employing company's treatment. Secondly employing company need ability of graduate students, but at the same time graduate students can not enter the company's technology research department. Above two problems on the surface are absolutely contradictory, but the essential cause of the problem is only one that is the practical ability cultivation of our college students, that is the beginning ability completely unable to match the actual needs of the current society. As a result, students can't find the ideal job, the employing company also can not find the ideal talents. So the problem facing with the current undergraduate practical teaching is unqualified teaching quality .

1.2 The Solving Problems of Current Undergraduate Practice Teaching

For solving the quality unqualified problems of current undergraduate practice teaching, analysis should be carried out from the source involving the school cultivation, the students' learning goals and requirements of the company

From the objectives of school training, the traditional goal of university education is given priority to cultivate students with solid theoretical foundation and professional knowledge. The practice teaching is only an auxiliary function of classroom knowledge in university education. The practice achievement is not important to evaluate the quality of the students in teaching. Therefore the cultivation of the university practice teaching from the school's goals is not the most important.

From the students' learning goals for it, college students's purpose to enter the university is to be able to further grasp the scientific and cultural knowledge, broaden their horizons, providing personal culture. The further is to obtain a good score as a condition to find an ideal job. Hence in the learning process, college students spend more time and energy to classroom knowledge, but put in practice rarely. So that they subjective believe the good or bad practice result is not the key factors of university's final grade. The most obvious choice for a lot of students is despising and giving up opportunities of practice and hands-on learning.

From the employing company's recruitment conditions, because of more attention from company to stability of traditional products production, which makes relatively small investment to research and development in the product, so company only to notice students' basic school grades in the recruitment process and ignores on the investigation to the students' practical ability and creativity. It is a misleading to students that are getting a high score by improving textbooks theory knowledge in school while ignoring the practical ability cultivation. As a result, when the investment of current product technology research and development and innovation is increasing and the technical personnel is lack. When employing company changed the previous recruitment conditions, the students' training aim has still insisting.

It is obvious that the school, students and employing company all should have a very important role in the cultivation of students' practical ability. But in contrast to the actual, they reflect the negative role in traditional practice teaching. That cause is each party needs and goal in practice teaching setting an error. So to solve the teaching quality unqualified problems of current practice teaching, we have to solve three problems, namely what is the aim of practical teaching? What need to do in practice teaching? How to don in practice teaching? These problems are the main research purpose of this research topic.

2. RESEARCH AND APPLICATION OF MCCLELLAND ACHIEVEMENT MOTIVATION THEORY

To solve the problem of undergraduate practice teaching between needs and objectives, we will introduce McClelland achievement motivation theory, and apply this theory to the undergraduate practical teaching methods. Finally we will put forward a scientific and reasonable practical teaching method in order to solve above problem.

2.1 McClelland Achievement Motivation Theory

McClelland achievement motivation theory also known as the three kind of need theory, namely needs of achievement, power, and affinity. In this paper, studied method of practice teaching is based on the need for achievement.

McClelland thought that the people owing the strong achievement need eager to do things more perfect, improve work efficiency and gain greater success. They pursue for a process of overcoming difficulties, solving problems, working hard and a sense of achievement after successful personal. They do not value the material rewards of success.

McClelland found high achievement demanders having three main features:

First, high achievements Demanders like to set up moderately challenging goal, don't like to accept especially easy or particularly difficult task in their opinion. They are not content to drift aimlessly and happy-go-lucky, and always wanted to do something. High achievement demanders like research, problem solving, rather than relying on chance or others to achieve results.

Second, high achievement demanders will avoid too much difficulty to select target. They like the medium

difficulty goal, which is no sense of accomplishment with easy to him, nor is difficulty with rare chance. They will estimate their ability, and then select a difficult goal they can target. Namely they can choose the most difficult challenge to win. For them, when the probability of success and failure is the same, it is the best opportunity to experience the joy of success and satisfaction in the struggle.

Third, high achievement demanders like to complete some jobs with an immediate feedback. For their goal is very important, so they hope to get clear feedback information timely about the job performance, and to know whether there is any progress. This is one of the reasons for high achievement demanders tend to choose professional career.

2.2 Application of Mcclelland Achievement Motivation Theory in the Undergraduate Practice Teaching

In the long process of university education, theory teaching has been dominant, while practice teaching is always as the basic professional knowledge, which is completely ignoring the ability cultivation. If consider other reasons, for example ,the employing company, social evaluation system and so on, all reasons make the achievement motivation level of undergraduate practice teaching generally low. Therefore, it is very important to a country's economic development to make the current undergraduate students into people with high levels of practice ability.

According to the theory of achievement motivation, practice teaching should do some adjustment in this researched topic.

2.2.1 Implement of Encouraging Education

Analyzing of the differences between two parts of students with high achievement motivation and low achievement motivation, McClelland found that the achievement motive level of students have a close relationship to their evaluation of learning behavior and learning results from teachers. Generally speaking, if teachers gave a high evaluation to student's learning behavior and learning results, or often undertake praise and affirmation to the student, so this part of the students' achievement motivation level is often higher.

Now that teachers' encouraging evaluation is helpful to improve the level of students' achievement motivation, so we can let more teachers to participate in the students' learning, rather than simply let the counselor to complete learning management to a grade or a class at ordinary times. Students can be assigned to more teachers in order to make a deeper level of communication between teacher and students. Above theory is same as the tutor system proposed in this study.

2.2.2 Independent Training for Students

Independent training and achievement training are indispensable to cultivate students' achievement motivation. The purpose of independent training is to foster student's ability to deal with things. The purpose of the training achievement mainly trains the students' ability to skillfully get things done. These two abilities must be emphasized to train skilled talents.

According to McClelland achievement motivation theory, using the theory to solve practical problems during the training process, students' independent training and achievement training play important roles to their achievement level in the future development. There are a lot of methods on the independent training. For example, students are encouraged to experiment independently and their writing practice report and so on. In the process of education, teachers try to let students themselves do it that students can do by themselves, instead of the traditional teaching. So as to truly takes the student as the main body in teaching and cultivate his independence.

2.2.3 Setting Suitable Excellent Goal for Students

People usually agree with the view that a person often has the faster talent development when pursue the higher goal. The goal is consistent with the achievement motivation we called. If a student can determine the higher suitable starting point at the beginning of the achievement motive formation, a good foundation will be provided for the future development.

Therefore, on the one hand, teachers should make efforts to guide the student to form the consciousness of a kind of pursuit of success. It has a positive role for their future growth and development. On the other hand, the students' achievement motivation should be consistent with their practical ability and level. The main reason is that students may be frustrated, or lose confidence to pursue success and have a psychological avoiding failure if the high standard of achievement motivation is beyond the student's ability and level. To students getting good results in the practice teaching, the target of raising practice ability cannot be too high. It is needed to develop the students' self-confidence. To excellent goal setting for students, the first target is not too high. Once the students reach the goal, self-confidence to pursue the success often can produce. Then, the teacher will gradually increase target again. The target incentive will give full play to them, and lead students to well step by step. For example, a freshman needs to establish a great goal. Under the big target, students determine many small goals further. One by one small target in the near further can reach through their own efforts and step by set to reach the end. In a word, the teacher should give full consideration to each student's practical ability and level in determining students' excellent goal.

3. PRACTICE TEACHING IDEAS BASED ON DIRECTIONAL DECOMPOSITION OF SCIENTIFIC RESEARCH PROJECT

After analyzing of McClelland achievement motivation theory and introducing it into undergraduate practice teaching, Practice teaching method research based on

directional decomposition of scientific research project is put forward in this paper in order to solve current problems in practice teaching. The research topic overall scheme is constituted by tutor system and management system based on project directional decomposition type. The purpose of using tutor system is to promote an active exchange of students and teachers, in order to improve student-learning initiative.

On the basis of the implementation of tutor system, the directional decomposition management of project can be carried out. These projects could be derived from undergraduate electronic contest, Ph.D. research, College students' innovative entrepreneurial project, and off-campus practice based on research projects etc..

According to McClelland achievement motivation theory, the difficulty of these projects cannot be too high and must be suitable to the students' overall level. At the same time, a certain amount of research content is ensured also.

If each instructor has 10 students in a research, and several directions decompose every project, such as optical, mechanical and electrical one, at least three projects will be presented. According to McClelland theory of achievement motivation, the students' training must perform independently. So before the project decomposition, the first completed thing is the skills training of scientific research to each student. Taking technique and instrumentation of measurements as the research object, basic training is primarily a software training, including the electronic class protel, protenus, optical class zmax, lightools, such as machinery of AutoCAD, NX, solid works, the control class Labview, Matlab, and so on. After completion of basic training, teachers can decompose projects and assignments to each student based on students' ability and interest. Through forming the project team, students can be united and cooperated in research and design. The final grade is decided by the project appraisal, project design, project acceptance and evaluation. The last item can be completed by the final graduation design defense. Figure 1 gives the detailed process of researched method.

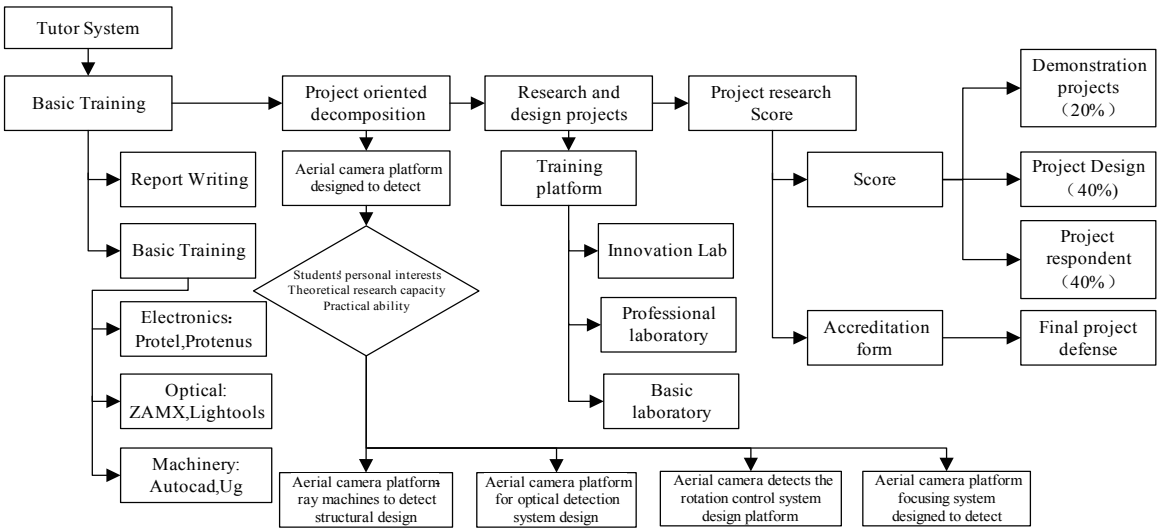

Figure 1
Detail Process of Practice Teaching Method

4. PRACTICE TEACHING METHOD BASED ON DIRECTIONAL DECOMPOSITION OF SCIENTIFIC RESEARCH PROJECT

4.1 Formulation and Implementation of Tutor System

The basic rule of tutorial system is matching students and teacher. Teacher directly supervises one group of students including the basic class, course design and graduation design and so on.

4.2 Practice Management Based on the Project Directional Decomposition Type

In order to solve some practical problems of the current university practice teaching including the course design, production practice, graduation practice and graduation design and so on, a new type of practice teaching management is put forward, namely the practice management based on the directional project decomposition, which mainly composes of project planning, basic skills training, project decomposition, and project defense.

Project planning is put forward of the projects according to the number of students, personal interest in learning, current advanced technology and so on.

Basic skill training is the basic knowledge reserves of project research based on the practical application characteristics of student's professional, which includes theory and software training. Project decomposition is to decompose one project into several different research subject, namely each student is responsible for a part of the project. Through the cooperation they can complete the project's overall research. Project defense refers to the students' practice results that are decided by subject defense of each student.

5. THE RESOLVED KEY PROBLEMS OF PRACTICE TEACHING REFORM METHOD

Researched topic involves all contents of university practice teaching, so in practice time, school distribution, project set and students' practical training content and so on need to solve the following key problems.

5.1 Reasonableness of the Proposed Project

Project must be considered of the basis professional knowledge level of undergraduate students, and we should ensure moderate difficulty, and strictly complete it at the end of the graduate.

5.2 Reasonableness of Practice Project Period Distribution

The practice of project management is conducted under the unified program, so practice class should be reasonably adjusted to the existing practice teaching plan. Table 1 shows a practice teaching period according to the project type of practice management.

Table 1
Content Arrangement of Practice Teaching

Practice name	Semester	Weeks	Content	Training platform
Electronic cognition practice	1	1	Electronic components and electronic instrumentation cognitive	Electrical and electronic center
Electronic circuit design	3	2	Electronic circuit design, production, testing	Electrical and electronic practice base
Electronic innovation practice	4	3	Protel training based electronic contest	Electrical and electronic practice base
Microcomputer principle and interface experiment	4	1	Computer system design programming and debugging	Microcomputer principle and interface laboratory
Single-chip computer and application of comprehensive experiment	5	1	MCU system design programming and debugging	Microcomputer principle and interface laboratory
EDA design of electronic technology	5	1	Electronics design EDA simulation	Electrical and electronic practice base
Labview technology and emulation	6	2	PC control interface training	Professional laboratory
Mechanical software training	7	2	AutoCAD, UG, Ansys software training	Professional laboratory
Optical software training	7	2	ZMAX,Lightoos software training	Professional laboratory

Table 1 shows the content of the practical aspects that are carried out in accordance with the development of the project process.

From the basis of professional knowledge to single application of professional knowledge, finally to the operation of the basic software needed to complete the overall project, every step of practice management all has strong practical relevance.

5.3 Project Funding Sources

The existing university teaching funds are independent accounting for each practice aspect. The funds of project type practice teaching must be put forward, step-by-step be achieved and gradually added. The funds audit is relatively strict.

6. THE IMPLEMENTATION OF PRACTICE TEACHING REFORM METHOD

In March 2013, College of Optoelectronic Engineering has begun the implementation of the tutorial system, and practice teaching project management has been from the class of 2,012 students.

The professional teachers are involved in the electronic contest, college students' innovative undertaking, doctor/master graduate student learning and off-campus training based on scientific research and other activities, so the project content and the technical level can ensure the quality of all the practice of the students is higher. Each mentor applies funding for the project independently, and the school has approved one by one.

CONCLUSION

Research purpose of decomposition type of practice teaching reform method based on the directional decomposition of scientific research project is to solve some problems of unclear training purpose and low practical ability. Through clarifying the teaching thought of this method, the content of study, methods, and the implementation of the measures are analyzed.

The implementation of research method will greatly change the current graduate practice troubles that teacher management is not strict, students' interest of practical is low, which can guarantee the university practice learning, and realize the real practice ability training.

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