The Research of the Students' Professional Qualities Cultivation Based on Professional Experiment

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Abstract

Just like physicists will be divided into theoretical and experimental physicists. The arrangement of school teaching program is also made up of theory and experiments. But in university education, examination - oriented education are still playing a leading role in criteria for assessing students, which is due to human factors leading to students and teachers ignore the importance role that professional experiment plays in the process of cultivating students' professional quality. In this paper, we will propose a project based on the professional experiment, explaining how the professional experiments make contribute to students' learning abilities, scientific thinking, psychological qualities, as well as the ability of team cooperation.

Keywords

Professional experiments, Professional qualities, Comprehensive capacity.

1. Introduction

Experiment teaching plays an important role in the teaching links especially in engineering undergraduate colleges. It is the responsibility of higher education and scientific research keeping in close connection with each other in the teaching process, training students by professional category. [1] Indeed, for some majors, scientific research is always concerned a lot, especially Engineering, Chemistry, or other science subjects. Because as undergraduate students graduating from university, whether they go to work or continue to study, having comprehensive capacity is very essential to their future life. But it seems that the students' polarization is quite obvious, and the proportion is imbalance.

In my opinion, what we need is that we should change our method of inspiration. The point is how to train students' professional quality by experiments, which let them go further in later life. Our ancients said, "Give a man a fish is inferior to teach a man to fish". This article comes up with a reform based on professional experiments, and we will explain it in four aspects from the perspective of students, using the program to develop students' professional quality.

2. the Students' Professional Qualities Cultivation Based on Professional Experiment

2.1 Learning capacity.

Learning is one of the professional qualities for students in higher education. In the process, they will gradually engage in the professional curriculum, theory, or even thought. What they should do not only learn knowledge, but also get used to taking the knowledge as a tool for their own use, and that's where the value of learning.

As Boyle says, no experiment, any new stuff can not be known. [1] In the engineering curriculum, learning theoretical knowledge must be combined with practice, in order to reach better teaching effect. Students' cognitive process is two leaps which include perceptual knowledge to rational knowledge, and the rational knowledge into practice. They are all necessary to combine theory with practice. Obviously truly effective learning is to combine theories and practices. [2]

Our project will runs like follows. In the experiment class, dividing students into groups. Each group consists three students. In class, teacher set the topics and students will try their best to complete the experiment with various of outcomes, which means that students should get the certain degree of knowledge and can use it flexibly to solve problem. The arrangement of the experiment course could get basic experiment courses integrated into comprehensive experiments. Comprehensive experiments' topics can be made as follows. We can bring the products that are already published on the market to let students to analyze them. Also teachers could select calendar contest topics that are related to the majors to enlighten students giving the rein to their imagination to complete the answer. Or we can choose some less difficult project which is authorized by companies and school. Through this way not only can deepen students' understanding of the theory, because in practice they will continue to consolidate what they have learned. But also help them find missing point when they learn the theory. Review what has been learned and learn something new, which can support students to accumulate knowledge. These knowledge will come into being a source of innovation finally. While basic experiments can be placed in each section of the teacher's course.

For example, for communications engineering students, professional experiments can be classified into hardware, software, and a combination of both.[3] The basic theory of' the hardware experiments includes analog circuit, digital circuit and so on. Integrated circuits are made up of some basic function modules. Students should both know the principle and function of the basic circuits. When some element changes, they would know how to analyze and use them.

Then the experiments of software are usually brought after specialized courses. Just like C, C++ and MATLAB and so on. These software platforms are not difficult to operate, the key is the programming ideas. Before programming, students should know what is the key question, and what do they want the software to do to meet the requirements of the problems. This requires students to have some idea of the software, knowing how they work and can use them freely. Each of the software has their own advantages. Thus students should summarize the experiments and relevant software.

2.2 Scientific thinking.

A successful experiment and scientific thinking are inseparable. Scientific thinking can help students better learn to observe things and generate new ideas. For example, when analyze products already listed on the market. The parts of the products can not be dismantled or observed, so we can begin to carry out "black - box experiment". To study the "black box" internal state, structure and mechanism, so as to reveal the characteristics and laws of the object by providing input voltage or current, and the output information from a "black box". Through this thinking, we can skip the unnecessary details to research the objects. This is the same as making some components as integrated chips. When we use these chips, we do not need to understand how semiconductor element cooperate in circuits, only need to know how to use the integrated chips.

We can training scientific thinking through making students write the reflection in the summary report after each trial. The summary includes the progress of every day, explaining the reason of failure or success. If students meet with failure, they should find the improvement to make the plan successful. And though students' current project is already qualified, they still can figure out another plan. In addition they can enumerate the feasibility and advantages of the new program with the more details the better. Experimental Report of the reflection reflects the thinking of students during the experiment, on behalf of the process of cultivating the professional quality of students. Therefore, experiments reflection summary will share more the percentage score than experimental results.

2.3 Psychological quality.

No matter what kind of professional majors, psychological quality is an important factor in judging students. Students with good psychological quality regardless of personal ability, will be with more possibility having a positive development in future academic and living. Because they will make good psychological adjustment when they face failure or success; Conversely the more capable students, if they do not have good psychological quality, when they suffering in the face of setbacks,

and they will be knocked down by a negative state of mind. Thus the significance of professional experiment course, is shouldering some of the functions of cultivating students' psychological quality.

Comprehensive experiments are likely to require more hours. General competition will last 3-5 days. Under the pressure of students in such a long time, they need to focus on and make achievements. This requires them that whenever they meet with difficult dilemmas. They still can calm down with clear thinking. Eventually they will get over through collective cooperation and teachers guide. If students do everything they can do but fail yet. At that time teacher should encourage students and help them find out the cause of the failure and regain confidence. In the meantime, teachers can carry out small tests on the experimental class. Examination may take the form of questions and answers in class. Or within the specified time, each experimental group is required to given the appropriate solution to the problem. With the appropriate pressure test, the method can train students how to face the big race, examinations, with good psychological qualities.

2.4 Teamwork ability.

Team collaboration capability has been regarded as one of the indispensable qualities of modern innovative talents. During the experiment, we will pay more attention to this aspect.

Groups should have discussions and clear division of labour when given the topic. Whether each group has a leader is not very important. The essential part is developing some attributes to strength the ability of communication. First, respecting other people, it is not only a good manner, but also a attitude that represents you are willing to listening other thoughts. Despite it is in confrontation with yours. After that, you will find some changes in way of thinking with open mind and can analyze things more comprehensive. Second factor is confidence. When students give a report in front of all classmates and teachers or just member of the group, speaking loudly and clearly to let them know your mind better. Third factor is finding common ground while groups have reserving differences. Three people merge their thoughts to complete one target together, forming mutual understanding with wearing-in. Responsibility is the forth factor. We should educate students developing their responsibility to works. It means that they must be serous enough to face their experiments and knowledge.

3. Conclusion

This paper proposes a program of professional experiments to train students' professional qualities, explaining many details about it. Through the practice of school and students' feedback, students are preferring this way to do experiments with enthusiasm. It seems that this scheme is effective to a certain extent. During the project, we still have some shortages and it will be perfect in our future research.

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