Competency Model for Students' Innovation Training Project

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Abstract. The current implementation of the students' innovation training project in which the instructor seeks out the best students with selection method from the reserve students to form a highly effective team is a key issue. Based on the competency theory, a method of evaluating and selecting students is presented. Practice has proved that this method can effectively select the best students, and constitute a good students' innovation training project team.

Introduction

In order to cultivate students' awareness of innovation and study, enhance their enthusiasm for learning and improve their scientific research awareness, the State Ministry of Education launched a national college students innovation training project during the "12th Five-Year". The project aims to promote the transformation of educational ideas, reform the training mode of talents and strengthen the creation of college students. The project also aims to explore the reform of teaching mode with scientific research projects as core, advocate innovative experiments with projects as carrier and taking students as corpus, pay attention to the process of scientific research, mobilize the initiative, enthusiasm and creativity of students, so that students can be trained in innovative scientific research at the undergraduate stage[1].

However, in the course of actual guidance of the National College Students' innovation training project in 2013 and 2018, there is contradiction between large numbers of students actively participating in subject study and the limited number of participants. In the past, the method of selecting students is mainly to see the achievements they had achieved, especially to evaluate the test results, this is an evaluation of "ability to prove the results". The evaluation method have the advantages of easy operation, objective, clear, and reflect students' ability to some extent, the examination process and other factors that affect the result aren't taken into considered, the knowledge and understanding of ability and quality are neglected, and the past achievements are taken into considered too much. Which method can be used for instructors to select the best students to form an efficient research team is an urgent problem to be solved [2, 3].

Based on the ability and quality model theory, this paper discusses the students' quality required by the college students' innovation training project, and proposes a method to evaluate and select these students. Practice has proved that this method can effectively select outstanding students and form a better team of innovation training projects for college students.

Competency Model for College Students' Innovation Training Project

The competency model is a theory first proposed by Dr. Michael Leland in 1973. The knowledge and skill that can't distinguish excellent students and general ones are called as basic quality should be possessed in a certain job in this theory. And the self-concept, trait, motivation that can distinguish excellent students and general ones are called as differential quality [4, 5].
The ability quality of the candidates participating in the college students' innovation training project is also composed of the basic quality and the potential differential quality. The ability and quality requirements for the college students' innovation training projects can be divided into five levels as follows:

1) **Theoretical knowledge.** It refers to the theory and knowledge needed to complete this project, including basic knowledge, professional and related professional knowledge, social and economic legal knowledge, etc.

2) **Technical skills.** It reflects the proficiency of the relevant equipment, tools or software for the project, such as the use of oscilloscopes and the ability to use C language programming.

3) **Work attitude.** The evaluation and behavioral tendency towards work, including the seriousness of work, the degree of responsibility and the degree of effort.

4) **Character.** The difference between people is not only reflected in the ability but also in the difference of character. Selecting students according to their character can make students fit well with the project, and can give a better play to the students' intelligence, so that the research work of this project can be well implemented.

5) **Motivation to participate in a project.** It is the understanding and attitude of this project, and the realization of value pursuit and aspiration for this project.

**Talent Selection Method for College Students' Innovation Training Projects**

At present, the global industrial structure has put forward new requirements for the training of engineering talents. In the age of industrial Internet, enterprises require talents to have the following abilities:

1) Deep cognition and understanding of industrial applications;
2) Having solid professional knowledge for engineering projects;
3) More knowledge reserves in the context of multidisciplinary integration;
4) Ability to design, analyze and implement complex systems;
5) Good learning and comprehending ability of the frontier technology, and better innovation ability;
6) International vision and communication skills;

The electronic information engineering major has the characteristics of engineering, practice and technology updating. It is required that students should have good ability of engineering practice, innovation to achieve the transformation of talents from knowledge-based to new type so as to meet the needs of talents for the development of contemporary information economy and society. Therefore, we must adapt to the development of the times, improve the training mode of electronic information engineering major, and cultivate all-round engineering talents.

Based on the above ability and quality model for college students' innovation training projects, this paper proposes a talents selection method for college students' innovation training projects. The method consists of two parts: basic quality test and differential quality test, as shown in Table 1.

Four levels of not understanding, understanding, mastering and familiarity are proposed in the column of basic quality, the meanings shown as follows:

1) Not understanding (0 points): have no idea what the test program is according to given source code;
2) Understanding (1 points): know the principle and result of the test program according to given source code;
3) Mastering (2 points): can fulfill the programing requirements of test subjects based on relevant examples;
4) Familiarity (4 points): can realize the programming requirements of test subjects just with the help files of the used software;
The distribution of the points of the four levels of not understanding, understanding, mastering and familiarity reflects the principle of the higher degree the more important, that is, the points of the latter is greater than the sum of the points of all the whole preceding items.

The attitude and participation motivation in differential quality column can only be evaluated subjectively because there is no objective and mature theoretical support. But psychologists divide the characters into five categories: friction, ordinary, stationary, leading and escaping according to the adaptability of the individual to the society. People with frictional personality are characterized by personality exposure, tension in interpersonal relationships, inadequate handling, and easy to cause friction. The attitude, emotion, will, and reason of the ordinary type of people are common, general, and not special. People with stable personality have better adaptability to the environment, but they often adapt passively, make good connections and have good interpersonal relationship. A leader's character is adaptable to the society and can adapt himself to the social environment voluntarily. The escaping character is introverted, unsociable and incompatible with the world.

The instructor can obtain the student's score of comprehensive ability and quality based on the interview and written examination, and the students with higher scores can become members of the college students' innovation training project team. They will also enhance their sense of honor as members of innovation training project team.

Table 1. Talents selection test based on competency model

<table>
<thead>
<tr>
<th>Quality</th>
<th>Not understanding (0 points)</th>
<th>Understanding (1 points)</th>
<th>Mastering (2 points)</th>
<th>Familiarity (4 points)</th>
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<td>Character</td>
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<td>Participation motivation</td>
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</table>

Practice Verification

From September 2016 to May 2018, 14 papers have been published with students as the first authors, 4 patents have been authorized with students as the first inventor, 1 computer software copyright has been registered. The students actively participated in various professional competitions relevant to the major, The National College Students' electronic design competition in Guangdong, Guangdong college students' electronic design competition, "Challenge Cup" Guangdong college students' extracurricular scientific and technological competition, the "Blue Bridge Cup" national software and information technology professional competition Guangdong District, the Guangzhou University City intercollegiate experimental comprehensive skill Invitational Competition, and so on, obtained two national awards and twenty-on provincial awards.

After the implementation of the talent selection mechanism, students' scientific research achievements have been improved unprecedentedly, and all indices have been greatly improved.

Summary

This paper proposed a talent selection method based on the ability quality model for college students' innovation training projects. This method is a good choice for selecting excellent students to participate in college students' innovation training projects. The selection mechanism is conducive to improving the quality of College Students' innovation training projects, training students' innovative ability and practical ability, and improving their comprehensive quality. It plays an important role in
promoting the cultivation of talents, and is greatly significant for promoting the cultivation of College Students' innovative ability and practical ability.

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