

Research on the Training Method of Vocational College Students' Innovative Ability Based on Robot Competition

Qingquan Cui, Xin Guo * , Yu Cao

Yunnan Land and Resources Vocational College, Kunming 650251, China.

*Corresponding author:477457517@qq.com

Abstract

As a competition platform with strong application in comprehensive disciplines, robot competition can be an important way and idea to cultivate students' innovative ability. Because higher vocational students' theoretical knowledge foundation is relatively weak and their ability to apply knowledge is poor, the cultivation of Higher Vocational Students' scientific and technological innovation ability needs in-depth research and practice. Based on the robot competition, this paper puts forward the training method of Higher Vocational Students' Innovative Ability Based on robot competition, and gives the corresponding training ideas and measures. Through the cultivation of this method, the feasibility and effectiveness of this method of guiding innovation ability are verified through the robot human competition. The vocational college students based on the boom man competition have demonstrated a good practical ability in scientific and technological innovation, won national awards in a number of competitions and obtained a number of patent achievements.

Keywords

Scientific and Technological Innovation Ability, Robot competition, Vocational College students, Interest thinking.

1. Introduction

With the rapid development of society, science and technology, the demand for new innovative talents is increasing day by day, and the requirements of enterprises for graduates are increasing day by day. They should not only have a certain knowledge base, but also have a strong practical ability and a certain innovation ability. However, in the process of learning, most students do not have a specific learning direction and goal, nor do they have the sense of innovation and subjective innovation ability. College Students' own subjective factors college students are the main body of cultivating their own innovation ability. Their psychological factors and their understanding level, attitude and effort state of this ability are the internal factors, and also the main factors that determine the cultivation status and level of this ability [1,2]. Therefore, how to cultivate the innovative ability of college students deserves our further in-depth study.

Higher engineering education focuses on training middle and advanced engineering technology application talents. Whether it focuses on Engineering Science or engineering technology, it must be based on engineering practice. However, any engineering application technology without the consciousness and ability of innovation will lose its scientific long-term and forward-looking. Robotics integrates multiple technologies such as mechanical design, automatic control, computer and sensor. It is a comprehensive technology that makes machinery flexible and intelligent by using automatic control technology, sensor technology, artificial intelligence, information processing and other technologies [3].

Literature [4] puts forward the research on cultivating the scientific and technological innovation ability of middle and higher vocational students with robots as the carrier, focuses on the application, and puts forward strategies; Literature [5] studies the problems existing in the process of students' learning based on the research on the methods of cultivating students' autonomous learning ability; Literature [6] and literature [7] analyze and study the scientific and technological innovation quality and ability training of vocational students at the same time, and put forward corresponding strategies, but do not give actual research data to prove the effectiveness of the measures. Literature [8] and [9] have conducted in-depth analysis and Research on the problems of higher vocational students in the cultivation of scientific and technological innovation ability, and clearly put forward the importance and urgency of Higher Vocational Students' Cultivation of scientific and technological innovation ability. Therefore, how to cultivate the scientific and technological innovation ability of higher vocational students deserves further in-depth research and practical verification.

Based on the robot competition, this paper puts forward the training method of Higher Vocational Students' Innovative Ability Based on robot competition, and gives the corresponding training ideas and measures. Let students learn robots with active awareness, and guide them to innovate independently with value orientation in the learning process, so as to give play to their potential learning initiative, enthusiasm and creativity. Through the cultivation of this method, the feasibility and effectiveness of this method of guiding innovation ability are verified through the robot human competition.

2. Current situation of the scientific and technological innovation ability

In China's "national medium and long term science and technology development plan", it is clearly proposed that China should change from a "big manufacturing country" to a "powerful manufacturing country". A large number of Engineering Colleges and universities in China will undertake the mission of cultivating graduates with creativity, good engineering awareness and innovation ability.

The engineering major in Higher Vocational Colleges focuses on cultivating students' practical ability. Engineering education not only enables students to learn the theory and knowledge of Engineering Science, but also enables students to "get in touch with the analysis and management of large-scale complex systems", and Practice on actual and small-scale complex systems, so as to cultivate engineering experience and comprehensive analysis ability [10].

At the same time, we should take into account the importance of the basic content of engineering practice, and we should not blindly emphasize innovation and ignore basic training. Therefore, this program actually includes the basic practical training content in the program of "preliminary and intermediate engineering practice laboratory", which only puts more emphasis on students' analysis and innovation, rather than just practical operation. The problems of higher vocational students in the cultivation of innovation ability are shown in Figure 1.

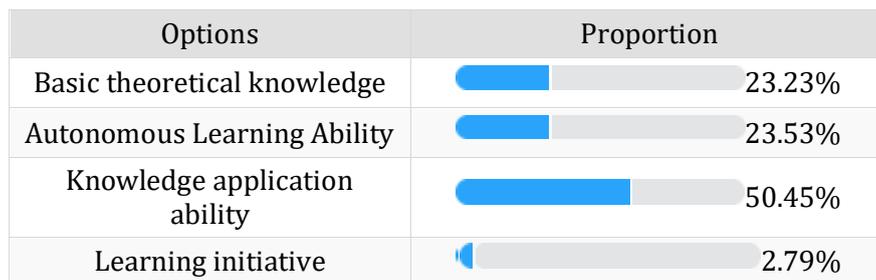


Figure 1: Proportion of major problems

The highest proportion of problems is the lack of knowledge application ability, accounting for nearly 50.45%. The lack of basic knowledge theory accounted for 23.23%, the lack of

autonomous learning ability accounted for 23.53%, and the learning initiative accounted for only 2.79%. In view of these problems and proportions, the following will put forward the methods and ideas to solve these problems, and build measures to cultivate the scientific and technological innovation ability of higher vocational students.

3. Robot Competition

As a comprehensive academic and skill competition, robot competition is of great help to students' learning and application. Robotics integrates multiple technologies such as mechanical design, automatic control, computer and sensor. It is a comprehensive technology that makes machinery flexible and intelligent by using automatic control technology, sensor technology, artificial intelligence, information processing and other technologies [3]. For automation, mechanical and electronic engineering, electronic information, mechanical engineering, mechanical design and other disciplines, the cultivation of innovation ability of college students based on robots has become one of the main ways of innovation cultivation in many engineering colleges, which is also suitable for higher vocational colleges.

4. Ideas and methods for scientific and technological innovation ability

4.1. "Guided training" and "Open learning" to promote the cultivation of robot innovation ability

The value orientation should give full play to the individual's subjective initiative, and reflect the main body's active pioneering and enterprising spirit. The pursuit of life value should be consistent with the social value orientation. We should not blindly consider our own conditions, hobbies and interests. The process of individual positioning is not completed at one time, but a process of movement. The starting point of positioning and specific objectives are different, and the level, degree and realm of practice results are also different.

The cultivation of innovation ability based on robot should give full play to the subjective initiative of the participants and let them actively participate in the design, production and debugging of the robot, so as to cultivate their pioneering spirit and fighting spirit. With the guidance of value orientation and belief support, college students will actively think about the robot design process and do their best to complete the production and debugging of the robot.

In the process of innovation training based on robot, we should adopt "guided training" and "open learning" as far as possible. The learning object is regarded as a "project". The teacher analyzes the needs of the project, the overall design idea, and teaches the required knowledge points. Through stage by stage experiments, students finally complete the project to meet the needs raised at the beginning.

The robot platform can cultivate students' independent thinking ability, engineering literacy and engineering experience, and complete open design under the guidance of teachers, which is very ideal for giving full play to students' creativity and cultivating innovative talents.

4.2. Building an innovative and practical learning and research environment "student-centered"

The active teaching method with "student learning" as the center is to cultivate students' interest, so that students can acquire knowledge independently driven by interest. In this case, the main responsibility of teachers is no longer to instill existing knowledge, but to stimulate students' interest in learning and guide students' learning direction. Students can selectively acquire knowledge driven by interest and under the guidance of teachers. This not only improves the efficiency of learning, but also cultivates students' ability to observe, discover, research and solve problems, and improves their comprehensive quality.

4.3. "Interest+Goal" oriented robot science and technology innovation ability training

Interest is the driving force of learning. The engineering practice course based on teaching robot can effectively improve the interest of the course and enhance students' learning initiative.

Direct interest refers to the interest in the activity process. For example, some middle school students are imaginative and creative. They like to make various models. In the process of making models, they concentrate and show great interest; Indirect interest mainly refers to the interest in the results of the activity process. If there is no direct interest, the process of making various models is very boring; Without the support of indirect interest, there will be no goal, and the process will be difficult to last. Therefore, only by organically combining direct interest and indirect interest, can one give full play to one's enthusiasm and creativity, persevere, have clear goals, and achieve success.

4.4. Improve practical ability and application design ability

The cultivation of innovation ability based on robot platform may not involve advanced knowledge fields such as robotics and artificial intelligence, and these difficult aspects of robot technology can only be briefly introduced and demonstrated with knowledge expansion. The design idea of the teaching system in this regard is completely guided by "cultivating students' engineering ability", takes robots as teaching tools and experimental carriers, and uses the interest of robot technology to carry out universally applicable engineering teaching.

5. Training results

5.1. Patent achievements

Through the method of Cultivating Higher Vocational Students' scientific and technological innovation ability based on robot competition proposed in this paper, in the process of nearly one year, the teacher team led the students to successfully authorize 5 patents, mainly utility model patents and appearance patents, involving robot technology, living technology and scientific and technological innovation. The authorization of innovative patent achievements, to a certain extent, shows the feasibility and effectiveness of the training method of scientific and technological innovation ability proposed in this paper.

Table 1: List of patent authorization achievements

No.	Patent name	Patent type
1	An autonomous handling robot	Utility model patent
2	An automatic cooking robot	Utility model patent
3	An active dog walking robot	Utility model patent
4	Biped robot	industrial design patent
5	Multi function parking lock	industrial design patent

5.2. Robot competition results

Vocational college students participated in five types of robot competition projects, mainly including biped robot project, dance robot project, humanoid racing project, robot innovative design project and wheeled robot project, and achieved good competition results, including one first prize, three second prizes and one third prize. The competition results and awards will help to improve the interest and initiative of higher vocational students in learning, and improve their scientific and technological innovation ability and practical ability.

Table 2: Robot competition results

No.	Competitions	Award level
1	Biped robot project	The first prize
2	Dance robot project	The second award
3	Humanoid racing project	The second award
4	Robot innovation design project	The second award
5	Wheeled robot project	The third award

6. Conclusion and Prospect

The method and idea of Cultivating Higher Vocational Students' Innovative Ability Based on robot competition proposed in this paper has been applied to the study and production of students' robot innovation. Under the guidance and guidance of the instructor, the students of the robot team have won a number of competition awards in the robot competition designed, and have also achieved five patent achievements. Let students learn robots with active awareness, and guide them to innovate independently with value orientation in the learning process, so as to give play to their potential learning initiative, enthusiasm and creativity.

Through the cultivation of this method, the feasibility and effectiveness of this method of guiding innovation ability are verified through the robot human competition. How to cultivate innovation ability, there are still many problems and methods worthy of our further in-depth study. In particular, the introduction of educational theories and values of different disciplines into the cultivation of scientific and technological innovation ability will produce better training methods and ideas.

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