

Design and Implementation of Comprehensive Evaluation System for Vocational College Students with Innovative Thinking Training

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Abstract: Innovative thinking is the key ability to cultivate vocational college students' lifelong learning and adapt to rapidly changing society, and an effective evaluation system helps to understand the level of innovative ability of vocational college students, guide educational practice, and evaluate the effectiveness of innovative education. This study aims to design and implement a comprehensive evaluation system for vocational college students based on innovative thinking cultivation, which includes five dimensions: problem-solving ability, creativity, teamwork ability, future orientation, and communication ability. Through experiments, the impact of this evaluation system on the improvement of vocational college students' innovation ability is explored. In the first year of a certain vocational college, two groups of students were selected, and there was no significant difference in their innovative abilities in various aspects. One group was trained in a traditional way as a control group, while the other group was trained in an experimental group using an innovative thinking evaluation system to implement various dimensions of cultivation. One year later, compare the innovative thinking abilities of the two groups; Compare the experimental group before and after cultivation; Simultaneously conduct self-evaluation of the experimental group and comparison with teacher evaluation. The results showed that through the evaluation system designed in this experiment, vocational college students significantly improved their evaluation scores in various dimensions of innovative thinking, further verifying the effectiveness of the innovative thinking evaluation system in providing comprehensive evaluation of students' innovation ability, and proving that implementing the evaluation system can significantly promote the improvement of vocational college students' innovation ability. Research has shown that the comprehensive evaluation system for cultivating innovative thinking among vocational college students has a significant effect in providing comprehensive evaluation of students' innovative abilities. This will provide guidance for educational practice and provide powerful tools and methods for evaluating the effectiveness of innovative education.

Keywords: Cultivation of innovative thinking, Comprehensive evaluation of students, Evaluation system design, Implementation plan.

1. Introduction

In today's rapidly changing social background, innovation ability is regarded as one of the important qualities for students' lifelong development. Training Vocational college students' innovative thinking ability will not only help them achieve excellent academic performance in school, but also enable them to have the ability to deal with complex problems and create solutions in their future career [1-2]. However, the traditional evaluation system of Vocational college students' achievement often focuses on knowledge mastery and test-taking ability, and lacks the evaluation of students' innovation ability and thinking ability [3-4]. Therefore, it is of great significance to design and implement a scientific and effective comprehensive evaluation system for the cultivation of innovative thinking to promote the comprehensive development of students' innovative thinking ability [5].

In recent years, many scholars and experts have studied the design and implementation of the comprehensive evaluation system for Vocational college students with innovative thinking training. Among them, Kang GJ explained that implementing a student-centered learning model in engineering design courses can provide a more participatory and hands-on learning experience that helps students develop innovative thinking and problem-solving skills. This learning model can be evaluated on multiple levels: student engagement, learning outcomes and student feedback. The

evaluation process needs to take into account the individual differences of students and the reality of the learning goals, and use a variety of assessment methods, such as classroom observation, project reports, and peer review. In addition, the role of teachers also needs to change from traditional knowledge imparts to learning facilitators and instructors, providing support and feedback to students, stimulating their learning interest and motivation. In the implementation process, it is necessary to establish a positive learning environment and cooperation culture, promote cooperation and exchange among students, and combine technological tools, such as online platforms and virtual LABS, to provide students with more learning opportunities and resources. In addition, emphasis should be placed on reflection and adjustment, and teaching methods and course design should be continuously improved according to students' feedback and evaluation results to adapt to students' learning needs and development [6]. Stevens LP says one of the goals of engineering education is to develop students' innovative thinking and problem-solving skills to meet increasingly complex and diverse technological challenges. Innovative thinking means that students have keen insight, imagination and creativity, and are able to propose novel ideas and solutions. Problem solving involves students' ability to apply knowledge, skills and innovative thinking to analyze and solve practical problems in the technical, engineering and social fields. Developing innovative thinking and problem-

solving skills requires a range of teaching strategies and methods. First, schools should provide rich practical opportunities, such as laboratory practice, project-based learning and internships, to help students apply theoretical knowledge to practical situations. Secondly, schools should encourage students to participate in interdisciplinary cooperation and team projects to cultivate students' ability to cooperate, communicate and solve problems in teams [7]. To increase the success of underserved college students, instructional interventions are an effective approach. This intervention is designed to provide additional support and resources to meet students' learning needs and address specific issues. Winkelmes M Outlines a teaching intervention to increase success for underserved college students. The key of teaching intervention is early identification and individualized support. In this intervention, teachers and counselors need to pay close attention to student academic performance and engagement, and use a variety of assessment methods (such as quizzes, assignments, and engagement ratings) to obtain student data. By analyzing this data, teachers can identify underperforming or struggling students and provide them with early help [8].

The purpose of this paper is to discuss the design and implementation of the comprehensive evaluation system for students with innovative thinking. First, the concept of innovative thinking and its importance in education will be introduced. Secondly, it will analyze the problems and limitations of the existing evaluation system, and draw out the necessity of designing a new evaluation system. Then, the theoretical framework and index system of evaluation system will be put forward, and the meaning and function of each index will be elaborated in detail. Finally, it will introduce the implementation strategy of the evaluation system, including the selection and use of evaluation tools, feedback and application of evaluation results.

2. Methods of Designing and Implementing the Comprehensive Evaluation System for Students with Innovative Thinking Training

2.1. The relationship between innovative thinking and Vocational college students' development

Innovative thinking refers to the way of thinking and ability to transcend traditional modes and thinking patterns and propose creative solutions when facing problems or challenges [9-10]. In today's rapidly changing and changeable social environment, it is particularly important to train Vocational college students' innovative thinking ability. Innovative thinking not only helps students achieve excellent academic results in school, but also enables them to cope with complex problems and create solutions in their later careers. First of all, innovative thinking can stimulate the learning interest and motivation of Vocational college students. The traditional teaching mode often focuses on the instilling of knowledge and the training of test-taking skills, which is easy to make students feel tired of learning. While innovative thinking emphasizes students' active participation and inquiry, by providing more challenging and practical learning tasks, stimulate students' curiosity and thirst for knowledge, and cultivate their active research and problem-solving abilities. Secondly, innovative thinking is helpful to cultivate

Vocational college students' critical thinking and problem-solving ability [11-12]. Innovative thinking requires students to analyze, evaluate and critique existing ideas and solutions and to be able to propose new and effective alternatives. By cultivating students' critical thinking, they can actively think about the root causes of problems and possible solutions, constantly pursue better solutions, and improve the effect of problem solving and the potential of innovation [13-14].

2.2. The value of innovative thinking in career

The value of innovative thinking in a career cannot be ignored. It can help to find new solutions in daily work and drive the development of individuals and organizations. The following are the values of innovative thinking in a career: 1) Problem solving: Innovative thinking develops the ability to analyze and solve problems. It encourages thinking differently and finding ways to solve difficult problems that are both practical and innovative. 2) Improve competitiveness: In a competitive workplace, innovative thinking can make you stand out. By constantly coming up with new ideas and creative solutions, you can attract the attention of employers and colleagues and increase your competitiveness. 3) Adapt to change: Innovative thinking can make people more sensitive and adapt to environmental changes. Ability to quickly adjust strategies and adapt to new challenges in a constantly changing business environment. 4) Explore new opportunities: Innovative thinking brings sensitivity to new opportunities. It can help identify market needs and potential opportunities, and bring new growth points for itself and the organization [15]. 5) Encourage teamwork: Innovative thinking fosters open communication and a spirit of cooperation. It encourages team members to share ideas and ideas and draw inspiration from them. Through teamwork, innovative thinking can work better and achieve greater results. In a word, the value of innovative thinking in a career is not only reflected in solving problems and creating opportunities, but also in shaping individual competitiveness, adapting to changes and improving teamwork. It is one of the essential skills in the modern workplace that can lead to long-term success and growth for individuals and organizations.

3. Empirical Experiment of Students' Comprehensive Evaluation System of Innovative Thinking Training

3.1. Design and implementation purpose of comprehensive evaluation system for Vocational college students with innovative thinking training

This experiment aims to design and implement a comprehensive evaluation system to evaluate the innovative thinking ability of Vocational college students, and explore whether the evaluation system can effectively promote the innovation ability of Vocational college students. Through this experiment, we hope to provide an effective assessment tool for schools, educational institutions and teachers to guide them to better cultivate students' innovative thinking ability in teaching.

3.2. Design and implementation analysis of the comprehensive evaluation system for students with innovative thinking training

In order to design the comprehensive evaluation system,

the literature data about the relevant indicators and evaluation methods of innovative thinking were collected and analyzed deeply. A combination of multiple performance assessment and self-assessment questionnaire was selected to fully understand the innovative ability of Vocational college students. Specifically, an evaluation index system with five dimensions is designed: problem solving ability, creativity, teamwork ability, future orientation and communication ability. Each dimension contains specific assessment items. The dimension of problem-solving ability covers vocational college students' strategies, decision-making, and execution abilities when solving practical problems. The creativity dimension can detect whether students have sufficient innovation in problem-solving methods, teamwork ability reflects their ability to assist and cooperate with classmates, future orientation dimension reflects students'

level of planning for the future, and communication ability dimension can reflect students' expressive ability. This article selects a vocational school, and then selects some students from this school to evaluate based on our designed student comprehensive evaluation system. We implement innovative thinking education for one year, and conduct self-comparison before and after training for these students, that is, comparing the dimensions of second grade and first grade, to observe the training effect, and comparing student self-evaluation with teacher evaluation. Students participated in a series of tests related to innovative thinking and were required to complete various evaluation projects in the comprehensive evaluation system during this process. Table 1 shows the self-comparison of students' innovative thinking evaluation scores before and after cultivation, and Figure 1 shows the comparison between student self-evaluation and teacher evaluation.

Table 1. The self-comparison of students' innovative thinking evaluation scores before and after cultivation

Metric index	Grade 1 mean	Grade 2 mean
Problem solving ability	87	92
creativity	79	85
Team cooperation ability	82	84
Future orientation	75	81
Communication ability	86	90

Table 1 shows the comparison of evaluation scores of medical majors in different grades in each dimension of innovative thinking. As can be seen from the table, the Grade 1 students scored 87 in problem solving, while the grade 2 Vocational college students improved their score to 92. In creativity, Grade 1 students scored 79, while Grade 2 Vocational college students scored 85. In terms of teamwork and communication skills, Grade 2 students performed slightly better than Grade 1 students, scoring 84 and 90 respectively. In terms of future-orientation, however, grade 1

students scored 75, slightly lower than Grade 2 students who scored 81. This indicates that students in grade 2 have relatively high scores in the evaluation of various dimensions of innovative thinking ability. Their scores in problem solving ability, creativity, teamwork ability and communication ability are significantly better than those of grade 1 students, which indicates that the innovation ability of students has been improved after the implementation of the evaluation system.

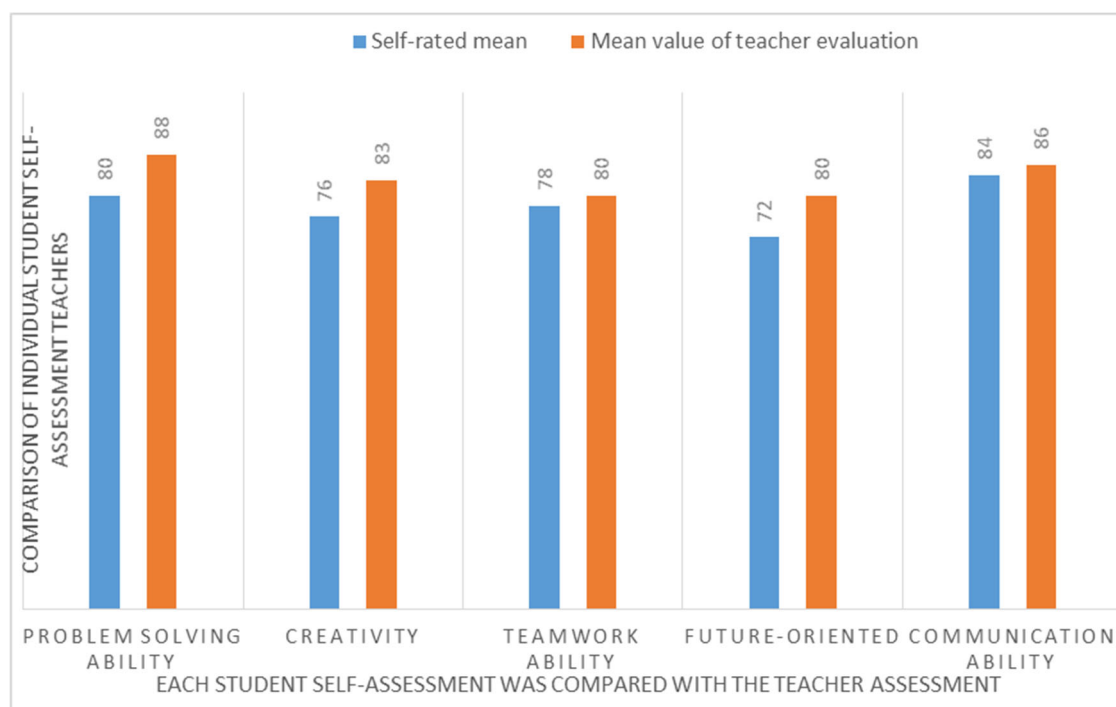


Figure 1. Comparison between student self-assessment and teacher evaluation

Figure 1 compares the scores of Vocational college students' self-evaluation and teachers' evaluation in each dimension of innovative thinking. As can be seen from Figure

1, in the evaluation of problem-solving ability, the students' self-evaluation score was 80, while the teachers' evaluation score was 88. Vocational college students scored 76, 78 and

72 on creativity, teamwork and future-orientation, while teachers scored 83, 80 and 80, respectively. In terms of communication skills, Vocational college students scored 84, while teachers scored 86. It shows that there are some differences between students' self-evaluation and teachers' evaluation in each dimension. For example, in terms of teamwork and communication skills, vocational college students have relatively high self-evaluation scores, which are close to the evaluation of teachers. In terms of problem-solving ability, creativity, and future orientation, students' self-evaluation scores are relatively low, which is a certain gap from the teacher's evaluation.

3.3. Results

First of all, the innovative thinking evaluation system is effective in providing a comprehensive evaluation of students' innovative ability. Through the comprehensive evaluation index and activity design, it can better evaluate the Vocational college students' problem-solving ability, creativity, teamwork ability, future orientation and communication ability. Secondly, students in Grade 2 perform better in all dimensions of innovative thinking ability than students in grade 1. This indicates that the design and implementation of this evaluation system can promote the improvement of Vocational college students' innovative thinking ability. Finally, there are some differences between students' self-evaluation and teachers' evaluation in various dimensions. This may stem from students' limited perception of their own abilities, or from inconsistent evaluation criteria. Therefore, when implementing the comprehensive evaluation system, teachers' evaluation and feedback will provide students with more objective and comprehensive guidance for the development of innovative thinking ability. Through this experiment, the effectiveness of the design and implementation of the comprehensive evaluation system for students with innovative thinking training is verified, and a scientific and feasible method is provided for the improvement of students' innovative ability. However, we are also aware of the limitations of the experiment, such as the limited sample size and the particularity of the experimental environment. Therefore, further research and improvement are needed before this evaluation system can be applied to a wider range of educational scenarios.

4. Results and Discussion of The Design and Implementation of The Comprehensive Evaluation System for Vocational College Students with Innovative Thinking Training

4.1. Design and implementation status of comprehensive evaluation system for Vocational college students with innovative thinking training

At present, it is increasingly important to train Vocational college students to think creatively in order to cope with the increasingly complex social and working environment. However, the existing comprehensive evaluation system of students usually lays emphasis on traditional knowledge mastery and test-taking ability, but fails to fully consider the cultivation of innovative thinking. This status quo limits the development of students' innovative potential and may lead to a lack of ability to respond to future challenges.

4.2. Comparison of design and implementation verification of comprehensive evaluation system for students with innovative thinking training

In order to verify the effectiveness of the newly designed evaluation system for cultivating innovative thinking, a comparative experiment was conducted. In the first year of the vocational school, two groups of students were selected, and there was no significant difference in their innovative abilities. Group A received training from the traditional evaluation system, while Group B received training from the evaluation system based on innovative thinking. After one year of implementation, the innovative thinking abilities of two groups of vocational students were evaluated. The results indicate that group B vocational students exhibit significant advantages in innovative thinking. Their scores in problem-solving ability, creativity, teamwork ability, future orientation, and communication ability are significantly higher than those of Group A students. The specific data is shown in Figure 2:

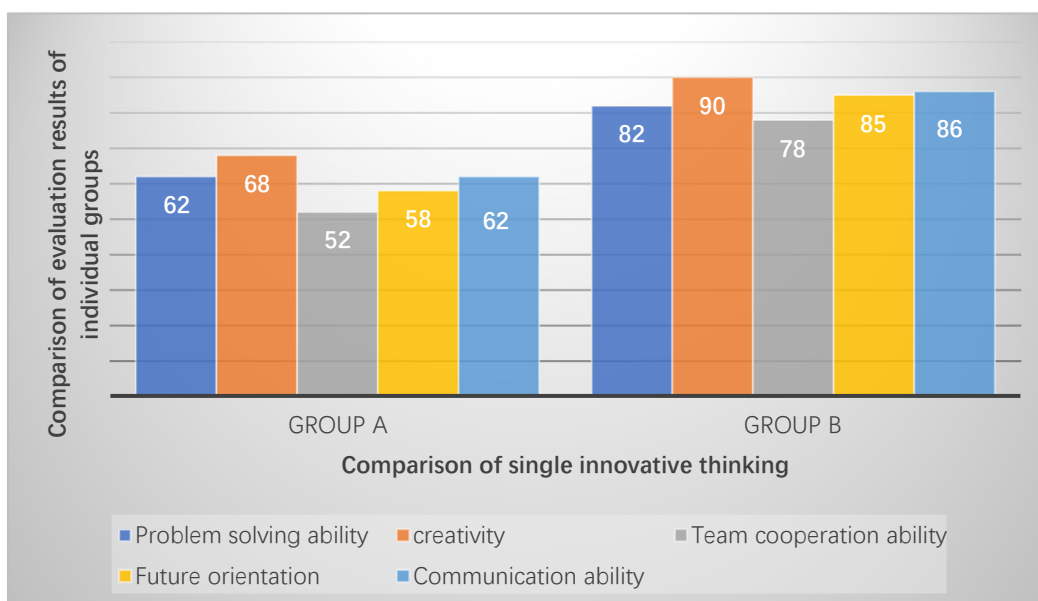


Figure 2. Comparison of evaluation results of innovative thinking training

Through Figure 2, it can be seen that there are differences in the scores of problem-solving ability, creativity, teamwork ability, future orientation, and communication ability between Group A and Group B vocational students. Among them, Group B scored 82 points in problem-solving ability, which is higher than Group A's 62 points. This indicates that vocational college students who accept the evaluation system based on innovative thinking cultivation have higher abilities in problem-solving. The independent thinking score of Group B students in creativity is 90 points, while Group A only has 68 points. This indicates that Group B students perform better in terms of creativity. In terms of teamwork ability, Group B students scored 78 points in creative output, while Group A students only scored 52 points. This indicates that an evaluation system based on innovative thinking cultivation can promote students' teamwork ability. In the future oriented approach, Group B students scored 85 points in terms of teamwork, while Group A scored 58 points. This indicates that students based on the evaluation system for cultivating innovative thinking have more planning for the future. In terms of communication skills, Group B scored 86 and Group A scored 62, indicating that cultivating innovative thinking can help improve communication skills. The evaluation system based on innovative thinking cultivation has had a positive impact on students' communication skills. The scores of group B students in problem-solving ability, creativity, teamwork ability, future orientation, and communication ability are significantly higher than those of group A students, indicating that the design and implementation of a comprehensive evaluation system for cultivating innovative thinking have a positive impact on the development of students' innovative abilities.

4.3. Design and implementation strategy of comprehensive evaluation system for Vocational college students with innovative thinking training

In view of the verification results, the following strategies are proposed to improve the design and implementation of the comprehensive evaluation system for students with innovative thinking training:

1) Revision of evaluation indicators: The existing evaluation indicators need to be further revised to better evaluate the innovative thinking ability of Vocational college students. This includes adding metrics on issues such as problem solving, creative output and teamwork to fully assess students' ability to innovate.

2) The use of multiple evaluation methods: the traditional written examination evaluation can only reflect the knowledge mastery of Vocational college students, and is not enough to comprehensively evaluate innovative thinking. We should adopt a variety of evaluation methods, such as project assignments, oral presentations, team projects, etc., to promote the comprehensive development of Vocational college students in innovative thinking.

3) Innovative improvement of the training environment: Schools and educational institutions should create a positive training environment to encourage the spirit of exploration and innovation of Vocational college students. This can be achieved by providing innovative courses, incentive rewards and innovative activities.

Through the implementation of the above strategies, it is expected to improve the comprehensive evaluation system of

Vocational college students with innovative thinking training, and better train students' innovative ability to cope with the challenges and needs of the future society. At the same time, we should also fully prepare students for evaluation in terms of innovative thinking and share our implementation experience with other schools and educational institutions.

5. Conclusion

The innovative thinking evaluation system is effective in providing a comprehensive evaluation of Vocational college students' innovative ability. Through comprehensive evaluation indicators and activity design, we can accurately evaluate the level of Vocational college students in the aspects of problem solving ability, creativity, teamwork ability, future orientation and communication ability. Compared with students in grade 1, students in Grade 2 perform better in all dimensions of innovative thinking ability. Through the implementation of the evaluation system, the scores of students' problem-solving ability, creativity, teamwork ability and communication ability are significantly improved, which verifies the effectiveness of the evaluation system and proves that its implementation can promote the improvement of students' innovation ability. There are some differences between students' self-evaluation and teachers' evaluation in each dimension. Students tend to be more conservative about their ability performance and have lower self-evaluation scores, while teachers' evaluation gives a more objective and comprehensive evaluation of innovative thinking ability. Teachers' evaluation and feedback are crucial to the development of students' innovative thinking ability.

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