Exploration and Research on the Construction of Vitality Classroom under the Background of Skills Competition

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Abstract: In the process of traditional classroom teaching, the classroom atmosphere is generally dull, which greatly restricts the teaching quality and learning efficiency. As the only school-enterprise cooperation major, the information security technology application major in Shandong Electric Power College, together with NARI, 360 and other companies, makes full use of existing resources and builds a classroom based on skills competition that is goal-oriented guidance, close to job requirements, competition and cooperation coexisting. Meanwhile, this paper forms a three-dimensional construction model focus on knowledge, ability and quality. Based on the three-dimensional construction model mentioned before, this paper has explored on three aspects: teaching model, combination of competition and training, and multi-level competition mechanism, which is of great significance to the construction of a vitality classroom centered on student learning.

1. Introduction

At present, in the classroom teaching process of higher vocational colleges, teaching activities based on textbooks lead to low students' learning enthusiasm, which restricts the mastery of their professional and technical skills and the improvement of their comprehensive quality. In some developed countries in Europe and the United States, research on improving students' employment skills and abilities through skills competition has been started earlier. In 2022, the American Student Research Foundation conducted a survey on the National Vocational Skills Competition held by SkillsUSA. The results showed that: 83% of students are more interested in the chosen major, and 88% of students said they had a deeper understanding of real work scenarios [1]. Skills competition play a leading and promoting role in students' skills and career development, and skills competition also have a profound impact on teaching. Finnish scholar Tuomas Eerola pointed out that the vocational skills competition is an important tool to promote the development of Finnish vocational education and guide students to make correct employment choices. At the same time, the holding of skills competition helps to promote cooperation among schools, institutions and companies [2]. In the UK, World Skills Competition also has a profound mission. By improving the diversity and inclusion of UK skills competition, it can give more young people from different professions the opportunity to realize their potential [3]. Some scholars have set up control and competition groups for the laparoscopic simulator skills task set up in the introductory surgical residency course, and the only variable introduced in the competition group was the timed releasing of top3 and top10 operating times. The results of the experiment showed that the competition group completed the laparoscopic simulator skills task significantly earlier than the control group, and it was significantly shorter by 33±54 s [4]. We have conducted exploration and practice in three aspects: teaching model, combination of competition and training, and multi-level competition mechanism, which is of great significance to the construction of a dynamic classroom centered on student learning.

In recent years, the Ministry of Education and other relevant departments have issued a series of policies on skills competition, and the number of scholars conducting related research in China has gradually increased. Vitality classroom is an educational concept put forward by Prof. Ye Lan of East China Normal University, the core content of which is mainly "the values of classroom teaching should be transformed from the teaching of ready-made knowledge in textbooks to the realization of a new generation of active and healthy development and vitality in the contemporary society..." [5]. In the CNKI full-text database journals, by searching for the two keywords of higher vocational and vitality classroom, the query results are mainly the research results of public basic courses, and most of the research on the construction of vitality classroom for higher vocational is based on the practical teaching mode of integrating theory and practice [6], Huge mode [7], Q-S teaching mode [8], four-multiple-one-centered teaching mode [9], and the six-step teaching method [10], etc., while less research on the vitality classroom of higher vocational is carried out from the three-dimensional goals of knowledge, ability, quality. Therefore, this paper

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proposes a three-dimensional construction model of vitality classroom in the context of skills competition, as shown in Figure 1. It aims to build a higher vocational classroom with goal-oriented, close to job requirements, competition and cooperation coexisting, and to carry out practical exploration in three aspects: teaching mode, combination of competition and practical training, and multilevel competition mechanism.

2. A three-dimensional construction model for vitality classroom at the higher vocational based on skills competition

2.1. Focusing on knowledge dimension to build a goal-oriented classroom

Behind the rich connotation of the skills competition, there are requirements for schools and majors to cultivate professional and technical abilities and comprehensive professional qualities that are generated by docking actual job requirements. Through competitions, competitions can be used to promote learning, teaching, and competition. The changing structure of industry and education.

Taking the 2021 students majoring in information security technology application as an example, after observing the students’ classroom performance, it was found that students' classroom performance revealed that students who were about to compete in a particular skill competition showed significant improvement in head-up retention, number of classroom interactions, and frequency of asking the instructor for advice after class relative to when they themselves did not have a plan to compete, as well as to those who did not have a plan to compete in the same timeframe. Students with a participation plan were more motivated to learn.

Therefore, using the knowledge points contained in the skills competition questions as a guide, a competition goal-oriented classroom is constructed for the professional courses such as Python Technical Fundamentals, Network Devices Configuration and Management, and Web Penetration Testing Technology covered by the competition content, and the connotation of the skills competition is organically Integrating into professional curriculum reform can promote students' classroom learning efficiency.

2.2. Focus on the ability dimension and build a classroom that is close to job requirements

In 2022, the Information Engineering Department of Shandong Electric Power College participated in the Shandong Vocational College Skills Competition for the first time, and the student group won the third prize in the information security management and evaluation competition. This year, this paper will focus on cultivating students’ abilities, using the information security management and evaluation competition in the Shandong Vocational College Skills Competition as the starting point to improve teaching quality, cultivate students’ practical skills, promote the high-quality construction of college and major, actively connect with the demand of the information security industry, and utilize the skills competition as a lever to enhance students’ learning enthusiasm and an mental factor to activate class atmosphere. In order to transform students’ learning from passive acceptance to active exploration, this paper constructs a class that is close to job requirements, to some extent, it cleverly answers the question of "for whom to cultivate people and what kind of people to cultivate".

Taking the information security management and assessment competition in Shandong Vocational College Skills Competition as an example, this competition is based on mainstream technology and current business process design in the field of information security. Analysis of past regulations and competition questions shows that participating students are required to master penetration testing. Technical skills that must be known to front-line positions in information security such as offensive and defensive operations. According to the research of network security companies for information security students, based on the real needs of the production line, set the course system, develop teaching content, build a classroom close to the job requirements, so that students immersed, experiential learning, and cultivate students in the future work of the professional ability to really use the workplace, which helps to enhance the vocational ability of the students and the quality of employment.

2.3. Focus on the quality dimension and build a classroom where competition and cooperation coexist

Skills competition, as an effective means of cultivating highly skilled talents, have been vigorously developed in recent years. The 2021 National Vocational Education Conference pointed out that it is necessary to explore the integration of "post, course, competition and certificate" and guide the reform of "teaching method, textbook and teacher" with "post, course, competition and certificate". So, the position of skills competition in the comprehensive education of higher vocational colleges is becoming more and more important.

The Skills Competition not only examines students' professional knowledge and ability, but also tests the comprehensive professionalism of participating students, such as planning and organizing, teamwork, and so on. Through the Skills Competition, students can practically experience student-to-student competition and cooperation, intra-school team-to-team competition and cooperation, as well as inter-school mutual support and cooperation. skills competition expand the boundaries of the traditional classroom, so that teaching is not only limited to the traditional classroom teaching this form, through the breakthrough of professional and psychological difficulties encountered in the preparation for the competition, the students' technical skill level and mental toughness have made great progress, to enhance
the role of training talents in the field of information security in the service of society and industry development.

Figure 1. Three-Dimensional Construction Model of vitality classroom in the Context of Skills Competition

3. Exploration of the construction of a vitality classroom in higher vocational education based on skills competition

3.1. Exploration of "three lectures, three practices and three training" teaching mode under the goal-oriented guidance

The information security technology application program of our school divides the implementation of the course into three stages: before, during and after class, and carries out the reform and innovation of the integrated teaching mode of "three lectures, three practices and three trainings". In the pre-course phase, generalized lectures, exercises on knowledge points and individual student training, in the mid-course phase, focused lectures, exercises on tasks and class training, and in the post-course phase, refined lectures, exercises on projects and team training, to achieve the construction of a goal-oriented classroom in time and space.

Taking the Python Technical Fundamentals course as an example, when explaining string operations to students, the third stage of the 2022 Shandong Province Vocational Colleges and Universities Skills Competition Information Security Management Evaluation Competition Cybersecurity Penetration (Capture the Flag Challenge CTF) question-Reverse File Analysis-is transformed into the use of Python to reverse decrypt the base64 encrypted string to get the FLAG, a learning task that runs through the three stages of the class: pre-course, in-course, and post-course. Before the class, the class, the e-learning platform of Shandong Electric Power College, students are arranged with pre-course micro-lesson video recorded by the teacher in advance, and find out the hidden Flag behind the string based on the practical training equipment in the simulated network environment as the attacker in a small group. Based on the "three lectures, three practices and three trainings" teaching mode, with the goal of mastering the knowledge points, we have created a learning situation close to the competition topics for the students, and put the knowledge points through the competition items to build a goal-oriented classroom.

3.2. Exploration of practical training for competitions and attack and defense exercises that are close to the reality of jobs

The Information Security Technology Application Program of our university, together with 360 Company, relies on the training base of Qingdao 360 City Security Brain to explore the possibility of effective combination of students’ skills competition and practical training, so as to improve the degree of matching between the training of talents specialized in information security and the needs of actual jobs.

Focusing on the job requirements in the field of network information security, such as security monitoring, security product development, CTF, emergency response, vulnerability mining, etc., utilize practical training opportunities such as awareness internships and on-the-job internships carried out at the training base to comprehensively understand the work processes and environment of security companies, and help students establish a macro blueprint and structure for network security work.

At the same time, students are organized to carry out second classroom activities such as visits to practical training bases and visits to Qingdao’s overall national security concept theme exhibition hall to promote the overall view of network security into their minds and hearts, and to cultivate and select technical and skilled talents for the national information security industry. At the same time, students are organized to carry out second classroom activities such as visits to practical training bases and visits to Qingdao’s overall national security concept theme exhibition hall to promote the overall view of network security into their minds and hearts, and to cultivate and select technical and skilled talents for the national information security industry.

3.3. Exploration of multi-level competition mechanism based on skills competition

As the status of vocational education in the national talent training system continues to increase, measures to promote teaching through competitions play a unique guiding role in professional construction and teaching
reform. Various higher vocational colleges have paid more attention to skills competition, and the number of participating students attracted has also increased significantly in recent years. Usually, students participating in high-level competitions such as provincial competitions and national competitions have been selected by expert coaches for many rounds and have strong professional knowledge and abilities. At the same time, various competitions in skills competition are mostly conducted in group competitions of 2-3 people. Students with strong professional skills were also tested in terms of comprehensive qualities such as teamwork, coordination and organization. How to explore the multi-level competition mechanism based on skills competition is of great significance to building a classroom where competition and cooperation coexist.

Our school has set up a four-level ladder competition mechanism, covering school-enterprise cooperation enterprises competitions, on-campus competitions, provincial competitions and national competitions. The difficulty of the four-level ladder competitions rises step by step, and differentiated teaching is carried out on the basis of full consideration of the students' situation in an effort to achieve full coverage of all students’ participation, encouraging each student to enroll in at least one competition, so that each student has a sense of access and stimulates students' interest in learning. For example, it will be mandatory for freshmen to participate in the Network Equipment Configuration and Maintenance Enterprise Tournament as a semester end requirement, while individual students with high proficiency levels and more talented students may follow up by competing in the top CTF offensive and defensive tournaments.

The four-level ladder competition mechanism is the way for students to participate in the provincial and national competitions, and there is competition and cooperation between students and school teams in the multi-layer selection. Students communicate with each other to complement each other's strengths and weaknesses when preparing for the competition, but they are in a competitive relationship on the field. How to cultivate and guide students to deal with the relationship between competition and cooperation, and learn teamwork and coordination and organization are also the current quality requirements for talent training in the field of national information security. Through the exercise of the four-level ladder competition mechanism, it is observed that students are more organized in dealing with unexpected situations in the competition and communication and coordination within the participating teams.

4. Conclusions

Skills competition has an important position in the teaching reform of higher vocational colleges and universities. Driven by the national vocational colleges and universities skills competition, the information security technology application program of Shandong Electric Power College holds the principle of promoting teaching by competition and carries out the exploration of vitality classroom construction, proposes the three-dimensional construction model from the dimensions of knowledge, ability and quality, and carries out the practical exploration based on the three-dimensional model. As a next step, we should take the skill competition as a platform in the teaching of information security technology application in our school, strengthen the construction of dual-teacher faculty and reform of the student evaluation system, promote vocational education in the same direction as the development requirements of the industry, and deliver high-quality skilled talents for the field of information security.

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References

2. Eerola T, (2013) Towards Vocational Top Expertise
8. Wu DX, (2021), Study on "Four-Multiple-One-Center" Teaching Mode to Enhance the Effect of Energetic Classroom Teaching--Taking Introduction to Pharmacy as an Example of Basic Pharmacy