Research on the overall structure of training system of mechanical major under the virtual simulation platform built by teachers and students

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Abstract. In order to deal with the complex international environment, such as "Industry 4.0 ", "Industrial Internet ", "made in Britain 2050 strategy ", meeting the wave of Made in China 2025 industrial revolution, the lack of personnel training mode in the current undergraduate education system and limitations of the talent training of virtual simulation laboratory are considered. The main task of this paper is to build the virtual simulation platform. Based on the above task, an effective way of talent cultivation mechanism is studied. In detail, the teaching pattern is the project-based learning mode. The objective is to adapt to market the needs of economic development in Linyi and the surrounding area. At the same time, the objective is to adapt to talent demand of enterprise and public institution. The research framework of high-level, practical and integrated talents is presented for the needs of economic construction and talents in enterprise or business. This research will establish the foundation for construction and popularization of training system of mechanical major under the virtual simulation platform built by teachers and students.

1. Introduction

The laboratory is an important base used for teaching, scientific research, training students' practical ability and deepening theoretical knowledge. In other words, strengthening laboratory construction is one of the important aspects to improve the quality of undergraduate education. Currently, college education work is faced with the challenges of establishing a "open" virtual simulation platform used for teaching and doing scientific research, making great efforts to develop a new mode of undergraduate training is an enormous problem. This is also a hot topic widely concerned by experts and scholars at home and abroad [1, 2]. It is worth emphasizing that this platform takes engineering practice as the background, teachers and students as the core of scientific research team, and pays attention to the role of undergraduates' scientific spirit and innovative thinking in talent cultivation. By statistical analysis of the search results of "teacher-student co-construction" notes on CNKY and Wanfang Data in the past decade, Figure 1 shows the change rules of scholars' attention to teacher-student co-construction teaching mode at home and abroad.

As can be seen from the figure, the teaching mode of teacher-student co-construction in colleges and universities has attracted increasing attention and is expected to make a new breakthrough in the teaching reform in the new century [3-5]. For the study of teachers and students jointly build scientific research team/ training of laboratory teaching mode, Gurinisa Klimu proposed the teaching mode of human anatomy laboratory and a new method to promote the construction of anatomical laboratory specimens, so as to realize the joint development of anatomical teaching quality and laboratory construction [6]. Yi put forward a new idea that, when colleges and universities further standardize the management system of scientific research teams and create excellent academic atmosphere, at the same time, the scientific research team built by teachers and students should focus on strengthening...
their own institutionalized management and cultural construction to improve cohesion and innovation level [7].

Fig.1 changes in attention pattern of teacher-student co-construction teaching mode

For the research of the reform of teachers and students building teaching mode jointly, the concept, Teacher-student co-construction teaching mode, put forward by Ning Hui [8]. The model of university enterprise co-construction of the teachers and students studio under the background of Internet+ is established by Liu in order to comprehensively improve the students’ ability of engineering practice and scientific and technological innovation [9].

To sum up, experts and scholars has carried on the extensive research for the teachers and students to build type teaching mode, but it is not enough. It is mainly manifested in that the influencing factors of co-construction undergraduate cultivation remain to be analyzed, undergraduate practice teaching mode and method remain to be improved, undergraduate training mechanism of and education quality evaluation remain to be perfected. Therefore, the research of training system of mechanical major under the virtual simulation platform built by teachers and students is proposed in this paper.

2. Research contents

2.1 Analysis of influencing factors of undergraduate cultivation system under the experimental platform jointly built by teachers and students

With the guidance of the tutor, the interest relevance of the undergraduate cultivation system under the experimental platform construction need to be analyzed; The data structure equation model is constructed through multiple factors, such as integrating the practical intention of undergraduates, the attention level of colleges and universities, the implementation mode of innovative education, the allocation of resources for innovation and entrepreneurship in colleges and universities and relevant incentives. Using the above model, the key and non-key influencing factors are analyzed to reveal the key influencing factors of the undergraduate education system under the co-built virtual simulation platform. Then it lays a solid theoretical foundation for the construction of the mechanical undergraduate system under this platform.

2.2 Undergraduate practical teaching mode and method under the experimental platform jointly built by teachers and students

Under the experimental platform, the practice teaching training mode can be constructed by using the means of overall planning for capacity difference system to structure the practice teaching system, updating and optimizing the teaching content and the teaching three-dimensional design analysis software in real time, strengthening each software actual operation and applying practice teaching the flexible, following the development strategy of bringing in and going out; Using the concept of education innovation promotes the comprehensive innovation of the teaching content, teaching method and teaching technology, achieving the transformation from traditional teacher-centered
knowledge imparting model to knowledge imparting, which is combined with engineering practice, Internet Plus virtual simulation platform, research exploration and innovation, at the same time, it can realize the change of teaching mode aiming at mobilizing students' independent learning and stimulate students' thirst for knowledge and creativity.

2.3 Operation mechanism and teaching quality evaluation of undergraduate cultivation under the experimental platform jointly built by teachers and students

Based on constructing the current teacher-student co-construction education model group, the experimental platform of undergraduate education management system should be established. The optimization of incentive measures, the combination of spiritual and material incentives should be considered, in the same way, ensuring the timeliness and sustainability of the incentive process should be in view. In addition, the internal incentive system for undergraduate cultivation under the experimental platform jointly built by teachers and students should be improved. To select the subjects and methods of education quality evaluation for undergraduate cultivation on the experimental platform jointly built by teachers and students, the evaluation methods of comprehensive faculty, student groups and curriculum system are adopted.

3. Implementation plan and method

3.1 Implementation plan

a. To study an acceptable and expected undergraduate cultivation mode of mechanical major built by teachers and students jointly from the perspective of students, so as to facilitate students to find out their design direction according to their interests and desires, college students can be surveyed.

b. To fully absorbed the educational ideas and successful experience of talent cultivation or curriculum reform under the construction of teacher-student co-built laboratory in brother universities, domestic universities (especially engineering universities) can be investigated and studied.

c. The effectiveness of innovation education and entrepreneurship education implemented in our school over the years can be summarized and analyzed.

d Carry out project research based on the actual work, carry out the phased research results of the project, summarize and analyze the pilot results, and further improve the research results on this basis.

3.2 Research methods

The research method of this topic is shown in Fig.2.

![Fig.2 Research method](image)

![Fig.3 The result curves of competition nearly five years](image)
4. **Summary**

The project of the teacher-student co-construction virtual simulation platform is carrying out by two teams of Linyi university, such as science and technology innovation association and aircraft model team, it is suggested that the undergraduate training has started to take effect. The result curves of competition nearly five years are given in Fig.3. From Fig.3, no matter it is a provincial or a national competition, we have made remarkable achievements under the teacher-student co-built virtual simulation platform established by our school, and the overall trend of the obtained achievements is on the rise, and the quality of undergraduate cultivation is improving year by year. At the same time, according to the employment feedback of graduates, their comprehensive qualities have been improved to varying degrees, such as scientific research innovation ability, practical operation ability and teamwork ability.

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**References**


