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The Construction of the Evaluation Index System of Innovation and Entrepreneurship Education in Polytechnic Colleges

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Abstract: In the new era of innovation-driven development, innovation and entrepreneurship ability has become the basic quality for college students to enter the society. Polytechnic colleges are the cradle of the training of comprehensive quality talents, so we must pay more attention to the education and cultivation of innovation and entrepreneurship ability. Therefore, the establishment of a CIPP education evaluation model that permeates and evaluates in the four aspects of background and demand, resource allocation, education implementation and achievement feedback has become an important reference index for the reform and development of innovation and entrepreneurship education in application-oriented undergraduate universities.

Keywords: CIPP model, innovation and entrepreneurship education, evaluation index system

Introduction

Innovation and entrepreneurship education is an important measure for China to build an innovation-oriented country, and an important way to further strengthen the teaching reform of higher education, promote the all-round development of college students and improve the quality of talent training. Scientific quality evaluation of innovation and entrepreneurship can effectively examine the process and effect of education, monitor and evaluate the important standards for the development process of innovation and entrepreneurship education, which is of great significance to improving the quality of education.

In recent years, the research results of innovation and entrepreneurship education evaluation in domestic academic circles. On January 26, 2022, a total of 995 documents were retrieved on CNKI with "Innovation and entrepreneurship education evaluation". From the trend of publications, there was a substantial increase in 2015. In 2019, the number of publications reached the highest in history, with 216 articles and the distribution of research disciplines, 61. 76% were higher education research. From the existing literature, the relevant studies are mostly qualitative analysis and few quantitative studies. Accordingly, This study on the basis of domestic and foreign innovation entrepreneurship education quality evaluation research, analyze the CIPP model and AHP evaluation method applied to the suitability of innovation entrepreneurship education quality evaluation, put forward to CIPP model, hierarchical analysis method to build innovative entrepreneurship education quality evaluation system, can provide reference for similar institutions innovation entrepreneurship education evaluation research.

1. The question is raised

Innovation and entrepreneurship education is a kind of consciousness and value education, to cultivate and improve students' awareness of innovation and entrepreneurship. Innovation and entrepreneurship education in polytechnic colleges is a kind of knowledge and culture education. Through education and training, students can master the knowledge, technologies and methods of laws and regulations, enterprise management, team building and marketing. Innovation and entrepreneurship education in Polytechnic colleges is also a kind of practical education[1]. Through innovation and entrepreneurship project application, subject teaching simulation exercise, business incubation and other practical activities, college students' knowledge application ability, practical ability and problem handling ability are cultivated. As an important breakthrough and an important way to promote the reform of higher education and an important way to train new talents, the development of innovation and entrepreneurship education has received more and more attention[2]. Therefore, it is of certain practical significance to establish a scientific and reasonable innovation and entrepreneurship education evaluation system. Innovation and entrepreneurship education should be evaluated from three aspects of college students' comprehensive ability, innovation and entrepreneurship ability and professional ability. The evaluation mechanism should be feasible, but without building a clear index system. The evaluation system of innovation and entrepreneurship education in polytechnic colleges is the measurement standard for the level assessment of innovation and entrepreneurship education, and also the way to control the development quality of innovation and entrepreneurship education, emphasizing the importance of individual evaluation. The quality evaluation system of innovation and entrepreneurship education in Polytechnic colleges should be evaluated from five parts: system construction, teaching system, cultural atmosphere, management organization and evaluation feedback[3].

At present, the academic research on the evaluation of innovation and entrepreneurship education mainly focuses on the theoretical discussion, while there is little research on the evaluation system. This study uses the CIPP model to initially build the index system of innovation and entrepreneurship education, uses hierarchical analysis method to determine the weight values of all levels in the evaluation system, and obtains a relatively perfect evaluation system of innovation and entrepreneurship education in polytechnic colleges, in order to provide reference for promoting the development of innovation and entrepreneurship education in polytechnic colleges.

2. It is necessary to establish an evaluation system for mass entrepreneurship and innovation education based on CIPP

2.1 Encouraging students to take the initiative to learn

CIPP model will innovation entrepreneurship education the passive, single theory teaching form reform become a "action", starting from the education background as the breakthrough point evaluation, resources, implementation process and performance assessment, meet the needs of students' learning ability and different stages, from passive active, single diversity, greatly improve the enthusiasm of students learning.

2.2 Promoting the virtuous cycle of teaching evaluation system

The four evaluation links are embedded in the whole process of innovation and entrepreneurship teaching. With the promotion of the teaching plan, evaluation to feedback, reevaluation and feedback, the CIPP model constantly integrates the feedback information into the teaching decision, so that the innovation and entrepreneurship teaching forms a virtuous cycle process[4].

2.3 Promoting the scientific and systematic teaching evaluation system.

The evaluation factors of "four-dimensional integration" are integrated through every link of innovation and entrepreneurship teaching, making the teaching evaluation system more comprehensive and scientific. This highly integrated CIPP model helps the teaching decision-making process to be more systematic, and then improve the scientific nature and credibility of teaching evaluation[5]. Based on this, combined with the characteristics and objectives of

innovation and entrepreneurship education in application-oriented colleges, the four evaluation elements are improved and integrated, and a model suitable for the quality evaluation system of innovation and entrepreneurship education in application-oriented colleges is established.

3. Comparison of the quality evaluation of innovation and entrepreneurship education

The United States is both a pioneer and a communicator of entrepreneurship education. As early as 1947, Harvard Business Polytechnic College first opened a course in entrepreneurship education. American entrepreneurship education has gone through three stages of starting and developing to maturity, and has established a relatively perfect evaluation system[6]. In terms of the evaluation criteria, the American Entrepreneurship Education Alliance has released content standards (CEE), practice standards (PEE), and assessment scales (AEE) nationwide. Relevant administrative departments and authoritative institutions also provide a variety of evaluation indicators for the implementation of entrepreneurship education and entrepreneurship plan projects from different perspectives, which can be used as a reference for multi-subject evaluation. However, these standards are only referenced during implementation because of the lack of top-level design, thus greatly reducing the standardization and effectiveness.

With the development and deepening of innovation and entrepreneurship education in China, the research on evaluation criteria has been gradually enriched. From the initial curriculum, teachers, environment and students of the four aspects, to now from the government, Polytechnic colleges, teachers, students and society and other several aspects of innovation and entrepreneurship education quality evaluation index system[7]. Because the quality of innovation and entrepreneurship education is affected by many factors, such as student quality, curriculum system setting, teacher ability, Polytechnic college atmosphere, and local policies, it is very difficult to use unified evaluation standards, and each Polytechnic college should adjust them dynamically according to the actual situation. Compared with foreign countries, domestic evaluation standards are becoming more and more diversified. Different regions and Polytechnic colleges will set different standards, but on the whole, the lack of high-level authority as the leading role[8].

In the form of evaluation, foreign countries are dominated by private enterprises and institutions. This evaluation mode of introduction to the third party requires too much financial investment. However, the Chinese evaluation form mainly stays at the level of theoretical analysis, lacks practical demonstration, and does not form a closed loop with polytechnic colleges' innovation and entrepreneurship education management. Some polytechnic colleges mainly focus on self-evaluation, or there is no evaluation or monitoring. In general, there is a lack of a multi-level, whole-process and multi-subject evaluation mode.

4. Construction principle of evaluation system

4.1 The principle of objectivity

In the process of index system construction, to consider various influencing factors, and combined with the orientation and actual law in polytechnic colleges, objective and reasonable selection evaluation index, to ensure the integrity and rationality of the evaluation system index, then based on hierarchical analysis algorithm at all levels of index weight evaluation system, build a set of scientific and reasonable innovation entrepreneurship education evaluation index system.

4.2 Systemic principles

Innovation and entrepreneurship education itself is a complete education system. In the construction of the evaluation index system, attention should be paid to the internal connection between various elements, the hierarchical relationship between the index system, and the connotation and significance of the indicators, and an evaluation index system with clear multi-level structure, easy to operate and implement is constructed from multiple angles.

4.3 The dynamic principle

As the external environment faced by Polytechnic colleges is constantly changing and developing, the development concept and education and teaching system of innovation and entrepreneurship education in polytechnic colleges should be

constantly adjusted according to the social and economic development and changes. In the process of constructing the evaluation index system, the evaluation index system needs to be constantly improved and adjusted according to the change and development of the external environment.

5. The construction of the evaluation index system for innovation and entrepreneurship education

CIPP model is an evaluation model proposed by American scholar Stufflebeam, D. L. in 1967. CIPP model is composed of four process evaluation: background, input, process and result. It is a decision-oriented evaluation model, which is widely used in the process of index system construction and evaluation. In the process of promoting students' innovation and entrepreneurship awareness cultivation, knowledge reserve and ability improvement, innovation and entrepreneurship education in polytechnic colleges needs to carry out a series of integration of educational resource input, educational process control and achievement evaluation under a certain environment, so as to have a high fit and consistency with the CIPP model. The construction of the evaluation system will be analyzed and evaluated one by one from the four aspects of the educational background, educational input, educational process and educational achievements of innovation and entrepreneurship education.

Innovation and entrepreneurship education environment (C) is the atmosphere and environment faced by the development of innovation and entrepreneurship education in polytechnic colleges, which mainly includes three aspects: the external support environment (C1), the Polytechnic college implementation environment (C2) and the Polytechnic College's entrepreneurial ability (C3). The external support environment (C1) includes government support policies (C1-1) and social assistance (C1-2). The Polytechnic college implementation environment (C2) includes the talent training program (C2-1), the organization and management organization (C2-2), and the formulation of the entrepreneurial income distribution system (C2-3). The Polytechnic College's entrepreneurial ability (C3) includes the signing of technology transfer (C3-3).

The investment in innovation and entrepreneurship education in polytechnic colleges mainly refers to the resource investment and the resource allocation ability of polytechnic colleges, including three aspects: the construction of teachers (I1), the current situation of funding investment (I2) and the construction of practice platform (I3). Teacher team construction (I1) includes the allocation of on-Polytechnic college teachers (I1-1), the allocation of external entrepreneurship mentors (I1-2) and the allocation of full-time teachers (I1-3). The current situation of funding investment (I2) includes the on-campus special fund guarantee (I2-1) and students' personal investment (I2-2). The construction of practice platform (I3) includes the number and scale of practice teaching base (I3-1), the number and scale of holding (I3-2) and the opening of teachers and students of the practice base (I3-3).

The process of innovation and entrepreneurship education (P) is the core content of education quality control. Through timely monitoring and effective feedback on the promotion of innovation and entrepreneurship education, three indicators of curriculum system design (P1), service guidance and support (P2) and student participation process (P3) are mainly selected. The course system design (P1) mainly includes the proportion of courses in courses (P1-1), the proportion of course hours in courses (P1-2), the proportion of course credits in courses (P1-3) and the penetration of courses in professional courses (P1-4). Service guidance and support (P2) includes the release of innovation and entrepreneurship information (P2-1), the construction of innovation and entrepreneurship guidance institutions (P2-2), and the construction of innovation and entrepreneurship education associations (P2-3). The student participation process (P3) includes course attendance (P3-1) and student participation in activities (P3-2).

The evaluation of innovation and entrepreneurship education achievements is a kind of result feedback evaluation, which provides a basis for the implementation and improvement of new educational programs, mainly including social impact (P1) and educational effectiveness (P2). The social impact (P1) includes the number of successful alumni (P1-1) and the number of base training enterprises (P1-2). Educational effectiveness (P 2) includes the improvement of students' entrepreneurial quality (P2-1) and the proportion of the number of graduates in the employed students (P2-2).

The CIPP model analyzes the characteristics of innovation and entrepreneurship education, and the CIPP model is used to sort out the innovation and entrepreneurship education system in polytechnic colleges, thus preliminarily constructing the evaluation system of innovation and entrepreneurship education, as shown in Table 1.

Table 1 Evaluation system of innovation and entrepreneurship education based on the CIPP model

First level index	Second level index	Three level index
Innovation and entrepreneurship education environment (C)	External support environment (C1)	Government support Policy (C1-1) Social financial assistance status (C1-2)
	Polytechnic college Implementation of Environment (C2)	Talent Training Program (C2-1) Organizational Management Organization (C2-2) Establishment of Entrepreneurial Income Distribution System (C2-3)
	Entrepreneurial ability of the Polytechnic college (C3)	Technology transfer signing situation (C3-1)
Investment in innovation and entrepreneurship education in polytechnic colleges (I)	Construction of teachers (I1)	Allocation of teaching teachers in Polytechnic colleges (I1-1) Allocation of external business mentors for students (I1-2) Allocation of full-time teachers (I1-3)
	Current situation of fund investment (I2)	On-campus special fund guarantee (I2-1) Student input (I2-2)
	Practice Platform Construction (I3)	Number and scale of practice teaching bases (I3-1) Number and scale of holding events (I3-2) Opening status of teachers and students in the practice base (I3-3)
Innovation and entrepreneurship education process(P)	Curriculum System design (P1)	proportion of courses in courses of the major (P1-1) Proportion of course hours to the major courses (P1-2) Proportion of course credits to the major (P1-3) Penetration in professional courses (P1-4)
	Service guidance and support (P2)	Release of innovation and Entrepreneurship information (P2-1) Construction of innovation and entrepreneurship guidance institutions (P2-2) The Construction of Innovation and Entrepreneurship Education Association (P2-3)
	Student Participation Process (P3)	Course Attendance (P3-1) Student Participation in activities (P3-2)
Achievements of innovation and entrepreneurship education (P)	Social impact (P1)	Number of successful alumni (P1-1) Number of base training enterprises (P1-2)
	Educational effect (P2)	Improvement of students' entrepreneurial quality (P2-1) Proportion of employed graduates in employed students (P2-2)

6. Study recommendations

This study designed the evaluation index of education quality based on four levels of CIPP model. From the perspective of process, the comprehensive evaluation method of CIPP model is a simple and scientific qualitative and quantitative analysis method, with hierarchy, rationality and interpretability. When similar higher vocational colleges try to use this method for evaluation, they also need to be corrected and improved according to the actual situation.

6.1 To increase the investment in teachers and improve the professional level

Innovation and entrepreneurship education is a multi-disciplinary comprehensive education, which requires the teachers to have the comprehensive quality of "sufficient quantity, excellent theory and excellent practice". At present, one of the bottlenecks hindering the improvement of the quality of innovation and entrepreneurship education in Polytechnic colleges is the lack of teachers, the single knowledge structure of teachers, the lack of transformation motivation of teachers, and the lack of education form and content innovation, which are also the common problems of most colleges and universities. Therefore, the Polytechnic College should focus on the construction of teachers, teachers' professional level, training and incentive mechanism as the starting point, form a multi-functional department coordination linkage mechanism, from talent introduction to professional training, stimulate the motivation of teachers to dare to transform and innovate, and put the higher professional level on students.

6.2 To strengthen the "special innovation and integration", and build a three-dimensional curriculum system

On the basis of the continuous improvement of the professional level of teachers, strengthen the integration of innovation and entrepreneurship education and professional curriculum system, and enhance the coverage of "special and innovation integration" courses for students. In terms of theoretical teaching, the Polytechnic College offers elective courses of management, financial management and marketing for the whole Polytechnic College according to the students' professional characteristics. In terms of practical teaching, the lower grades mainly adopt basic enterprise cognitive practice, such as visiting enterprises and cognitive practice, etc.; encourage middle and senior students to carry out subject competition, entrepreneurship competition, skill training, etc. The graduating students can enter enterprise incubation and carry out entrepreneurial practice training. It should not only be "special innovation and integration", but also combine theory and practice to build a multi-level, three-dimensional and whole-process curriculum system.

6.3 To optimize the resource allocation and enhance the entrepreneurial ability

The funding source of private colleges and universities is single, which is mainly reflected in the special funds set by the Polytechnic colleges themselves, so the investment in resource allocation is limited. The Polytechnic College has set up a special fund to support teachers and students to start their own businesses. The Polytechnic College can expand the sources of funds in various ways, such as donations from enterprises, non-governmental organizations, alumni associations, etc. Multi-channel funding sources can ensure the sustainable development of "mass entrepreneurship and innovation" education in Polytechnic colleges. At the same time, by providing college students with entrepreneurship subsidies, loans, simplify the work process to help college students to solve the difficulties encountered in entrepreneurship. In addition, it can provide site support for small, medium and micro enterprises in the early stage of entrepreneurship, and improve the utilization rate of the incubation base in the campus. Give full play to the advantages of Polytechnic college-enterprise cooperation, increase cooperation, as much as possible to provide students with entrepreneurial resources, let them feel the spirit of enterprise, understand the enterprise operation, for students with entrepreneurial ideas, dare to act to expand business channels, solve the production and marketing problems, and then let students get practical experience.

Conflicts of interest

The author declares no conflicts of interest regarding the publication of this paper.

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