Research on The Evaluation of Economics Students' Innovative Practice Ability

Miao Renyu[1,a,*] Zhang Qian[2,b]
[1] College of Business, Jiaxing University, Jiaxing, China
[2] Applied Technical School, Jiaxing University, Jiaxing, China
[a]stubbern@qq.com, [b]394190499@qq.com
*Corresponding author

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Abstract. Innovation and entrepreneurship are on the rise, and it has become an urgent and realistic problem to improve the level of innovative practice ability of college students. However, there are many shortcomings in the research on the evaluation of college students' innovative practice ability by domestic scholars. Therefore, this paper constructs the evaluation system of economics students' innovative practice ability, based on the analysis of the characteristics of the innovative practice ability of economics students and the social demand for students' innovation. The analysis of evaluation indicator weights shows that the innovative thinking and innovative experimental ability are the most important factors in the system, and especially it is important to strengthen the students' achievements in the following aspects, such as participation in innovation and entrepreneurship competitions and award, published paper, participation in student scientific research training programs, skill certificate obtained by students and graduation design.

1. Introduction

In 2015, the Prime Minister put forward "mass entrepreneurship and innovation" in the government work report. The tide of innovation and entrepreneurship is booming in various regions, college students are the new force of the dual-creation business and the pillar of the future innovation-oriented nation. However, there is more prominent problem in current higher education, that is, the innovative thinking of college students is poor, the hands-on practical ability is weak, and the ability to use the professional knowledge learned to analyze real problems and solve them innovatively is lacking.

The cultivation of college students' innovative practice ability is an important part of higher education, The Ministry of Education also attaches great importance to practical teaching as one of the key indicators for assessing the college undergraduate teaching level. Domestic scholars paid attention to innovation and entrepreneurship education and how to improve students' innovative practice ability(Zhu Jing, 2017; Zhang Honglei, 2018; Jiang Xiaoyun, 2018; etc), but do less research to assess the level of college students' innovative practice ability and existing problems. Although Feng Yun (2007) constructed the evaluation system of science and technology innovation ability of engineering students from four aspects: scientific and technological innovation ability, participation in scientific and technological activities, extracurricular achievements and scientific and technological competition awards. Wang Jiaqi (2007) used AHP to construct a comprehensive evaluation indicator system for college students' innovation ability from four aspects: innovation ability, innovation knowledge base, innovative thinking ability and innovative skill. Liu Ranhui (2010) used fuzzy comprehensive evaluation method to construct the evaluation indicator system of college students' scientific and technological innovation ability from six aspects: basic platform, activity participation, innovation achievement, science and technology competition, science and technology project and innovation benefit. Shen Yan (2012) used the analytic hierarchy process and fuzzy comprehensive evaluation method to construct the evaluation system of media college students' innovation ability from five aspects: innovative learning, innovative practice, innovative thinking, innovation consciousness and basic knowledge of innovation. In the above studies, the indicator

weights of some systems are less scientific, or many specific indicators use subjective judgment results, and the judgment is lack of objectivity, and these studies are mainly for science and engineering majors. But there is a big difference of college students' innovative practice ability between the economics major and the science and engineering major, and the economics major pays more attention to students' innovative thinking logic and ability and use professional knowledge to solve real problems. Therefore, on the basis of combing economics students' innovative practice ability, this paper uses AHP and comprehensive evaluation method to construct the evaluation indicator system of economics students' innovative practice ability comprehensively, objectively and scientifically, and evaluate the importance of each factor. Based on the above findings, the author proposes targeted improvement for the innovative education of economics, so as to effectively improve economics students' innovative practice ability.

2. Construction of the evaluation system for economics students' innovative practice ability

The college students' innovative practice ability is composed of many factors, and the relationship between various factors is intertwined and complex. Only when we clearly combs the system factors, and follows the systemic, normative, scientific and operability principles to construct the evaluation indicator system, it can scientifically reflect the level of economics students' innovative practice ability.The design of the indicator system is consistent with the requirements of the society for the innovation quality and practical ability of economics students, reflects the four aspects of innovation knowledge: accumulation, acquisition, organization and processing, and innovation effects. The four primary indicators of the economics students' innovative practice ability are as follows: innovative knowledge base Z_1, self-learning ability Z_2, innovative thinking ability Z_3 and innovative experimental ability Z_4. The evaluation indicator system of economics students' innovative practice ability is shown in Table 1.

Among them, the innovation knowledge base Z_1 is the foundation and support of the college students' innovative practice ability. The formation of Z_1 requires a large amount of professional and related knowledge, including the basic and professional courses knowledge, extracurricular knowledge, etc. its secondary indicators consist of basic course score Z_{11}, professional course score Z_{12}, number of books borrowed Z_{13} and total number of course credits Z_{14}.

The self-learning ability Z_2 is a learning ability of college students who should have strong learning consciousness, be good at capturing information, proactively discover problems, independently think based on existing knowledge, boldly explore, and propose new ideas and new methods. It is the guarantee condition for students' innovative practice ability. its secondary indicators consist of participation in academic lecture Z_{21}, participation in academic forum and conference Z_{22}, participation in teacher research project Z_{23} and skill certificate obtained by students Z_{24}.

The innovative thinking ability is the core indicator of students' innovative practice ability. It refers to the ability of organizing and processing knowledge or methods in innovative way to solve theoretical and practical problems. During college, it can be reflected in the innovative design, organization and solutions of participating in discipline competitions, innovation and entrepreneurship competitions, scientific research training and social survey projects. Therefore, its secondary indicators consist of participation in discipline competitions and award Z_{31}, student scientific research training programs Z_{32}, innovation and entrepreneurship competitions and award Z_{33} and social survey Z_{34}.

The innovative experimental ability is a key indicator to measure students' innovation effect. It is an important indicator for evaluating the economics students' innovative practice ability. The innovation results of economics students are reflected in the number and quality of published papers, patent applications, professional internships and graduation design results. Therefore, its secondary indicators consist of published paper Z_{41}, patent application Z_{42}, professional internship Z_{43} and graduation design Z_{44}.

Table 1. The evaluation indicator system of economics students' innovative practice ability

Primary	Secondary Indicator	Indicator Data Source
Innovative Knowledge Base Z_1	basic course score Z_{11}	simple weighted average of basic course score
	professional course score Z_{12}	simple weighted average of professional course score
	number of books borrowed Z_{13}	number of books a student borrowed in the library
	total number of course credits Z_{14}	total number of Course credits taken by a student
Self-Learning Ability Z_2	participation in academic lecture Z_{21}	number of participation in academic lecture
	participation in academic forum and conference Z_{22}	number of participation in academic forum and conference
	participation in teacher research project Z_{23}	number of participation in teacher research project
	skill certificate obtained by students Z_{24}	number of skill certificate obtained by students
Innovative Thinking Ability Z_3	participation in discipline competitions and award Z_{31}	base score of participation in discipline competitions plus the school award scores for each level of competition awards
	participation in student scientific research training programs Z_{32}	school award scores for participation in national, provincial, and municipal level research programs
	participation in innovation and entrepreneurship competitions and award Z_{33}	base score of participation in competitions plus the school award scores for each level of competition awards
	participation in social survey Z_{34}	evaluation score of student's social survey report
Innovative Experimental Ability Z_4	published paper Z_{41}	research score obtained by a student through publishing papers
	patent application Z_{42}	number of patents applied by a student
	professional internship Z_{43}	evaluation score of student's professional internship
	graduation design Z_{44}	evaluation score of student's graduation design

3. Determination of Evaluation Indicator Weights Based on Analytic Hierarchy Process

The specific steps of the analytic hierarchy process to calculate the weight of the evaluation indicators of the economics students' innovative practice ability are as follows.

First, select the evaluation indicator system of economics students' innovative practice ability, let M denote the level of students' innovative practice ability, Z_i denotes the criterion layer, and Z_{ij} denotes the evaluation indicator set.

Second, Construct a judgment matrix to judge the relative importance of evaluation indicators. Here, the relative importance of each factor at each level can generally be judged numerically through the expert consultation method or the questionnaire method, and then we write a matrix form to construct a judgment matrix for calculation. The judgment matrix for comparing the importance of indicators at each level refers to the proportional nine scale system by Satty, as shown in Table 2 below.

Table 2. The scale of judgment matrix and its meaning

Scale	Meaning	Explanation
1	equally important	i is Equally important than j
3	slightly important	i is slightly important than j
5	obviously important	i is obviously important than j
7	very important	i is very important than j
9	extremely important	i is extremely important than j
2,4,6,8	median value of adjacent importance	
Reciprocal	$b_{ji} = 1 / b_{ij}$	

4. Analysis on the Evaluation Indicator of Students' Innovative Practice Ability

The ranking of evaluation indicator weights of the economics students' innovative practice ability is determined by expert questionnaires and analytic hierarchy processes, as shown in Table 3.

Table 3. evaluation indicator weight ranking table of economics students' innovative practice ability

Number	Criteria Layer	Evaluation Indicator of Innovative Practice Ability	Indicator Weight	Indicator Cumulative Weight
1	Z_{33}	participation in innovation and entrepreneurship competitions and award	0.2222	0.2222
2	Z_{41}	published paper	0.1465	0.3687
3	Z_{32}	participation in student scientific research training programs	0.1296	0.4983
4	Z_{24}	skill certificate obtained by students	0.1001	0.5984
5	Z_{44}	graduation design	0.0912	0.6896
6	Z_{31}	participation in discipline competitions and award	0.0629	0.7525
7	Z_{23}	participation in teacher research project	0.0524	0.8049
8	Z_{42}	patent application	0.0443	0.8492
9	Z_{14}	total number of course credits	0.0360	0.8852
10	Z_{22}	participation in academic forum and conference	0.0253	0.9105
11	Z_{34}	participation in social survey	0.0233	0.9338
12	Z_{12}	professional course score	0.0210	0.9548
13	Z_{43}	professional internship	0.0166	0.9714
14	Z_{21}	participation in academic lecture	0.0146	0.9860
15	Z_{11}	basic course score	0.0102	0.9962
16	Z_{13}	number of books borrowed	0.0038	1.0000

From the above table, the cumulative weight of the five indicators reaches 69.0%, they are participation in innovation and entrepreneurship competitions and award, published paper, participation in student scientific research training programs, skill certificate obtained by students and graduation design. These indicators are included in innovative thinking ability, innovative experimental ability and self-learning ability indicators.

First of all, the innovative thinking ability has the greatest effect. It is much higher than other three indicators, because the Cumulative weight of Z_{33} and Z_{31} has reached 35.2%. And it is in line with the importance of innovative thinking ability as a core indicator of evaluation system, and innovative thinking activities play a role in linking up and down.

Secondly, the role of innovative experimental ability is also prominent. Z_{41} and Z_{44} have become key indicators of evaluation system. They are innovation achievements, and directly reflect the level of students' innovative practice ability. Economics students' innovation achievement is different from other majors, especially science and engineering major. The number and quality of published papers and graduation design scores are the main innovation achievements, while patent application accounts for a small proportion.

Finally, the role of self-learning ability is lower than the above two indicators, but the weight of Z_{24} accounts for 10.01% of the evaluation system, it reflects the importance of self-learning ability as a guarantee for other indicators. Only by independent thinking, actively learning and discovering problems, we can generate new ideas and methods, and get innovation achievements.

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