Artificial Intelligence, Medical Engineering and Education
Z.B. Hu et al. (Eds.)

doi:10.3233/ATDE231390

The Influence of High-Level Discipline Competition on the Cultivation of Innovative and Entrepreneurial Talents in Colleges and Universities-A Case Study of W University in Wuhan

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Abstract. This paper is based on a sample study of students in Wuhan W University which describes the basic situation of high-level academic competitions on the cultivation of innovative and entrepreneurial talents in the university. It also analyzes the influence of high-level academic competitions on the cultivation of innovative and entrepreneurial talents and the internal connection among the dimensions in the evaluation system of innovative and entrepreneurial talents through structural equation modeling. The entropy power method was used to analyze the degree of emphasis and concern on the cultivation of innovative and entrepreneurial talents in different dimensions of high-level academic competitions, and to reveal the influence of high-level academic competitions on the cultivation of innovative and entrepreneurial skills, to provide a theoretical basis for the construction of competition-oriented innovative and entrepreneurial talents cultivation system.

Keywords. Academic competition; Innovative and entrepreneurial talents; Structural equation; Entropy method analysis.

1. Introduction

The 20th National Congress of the Communist Party of China pointed out that we should accelerate the building of an innovative country and cultivate large quantities of world-class scientists and technologists, strategically important in their fields, alongside scientific and technological leaders, young talents in science and technology, and high-level innovation teams. As the main training ground for innovative and entrepreneurial talents, the mission and task of innovation and entrepreneurship education in colleges and universities are particularly prominent [1,2]. Although the

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total number of university graduates has reached a record high year after year, it still cannot meet the demand of society for innovative and entrepreneurial talents. Innovation and entrepreneurship education should develop together with entrepreneurs.

In the new century, higher education has placed higher demands on the innovative and entrepreneurial abilities of university student groups. As an essential platform to carry university students' practice, exercise, and test their innovation and entrepreneurship, high-level academic competitions have also ushered in a new stage of development. In particular, and with the implementation and release of several rankings for the cultivation of innovative talents and academic competitions in universities, academic competitions in universities are highly valued by universities and are gradually occupying an important place in the academic career of university students. High-level subject competitions highlight the importance of students' practical solutions to theoretical problems and are an essential measure for the scientific evaluation of students' academic achievement in universities. Different from the general function of regular teaching in colleges and universities, the subject competition of college students plays a vital role in optimizing talents and improving the quality of skills. Therefore, the cultivation of innovative and entrepreneurial talents through high-level university competitions has become an essential path for the cultivation of innovative and entrepreneurial talents in universities.

The effectiveness and effect of high-level academic competitions on the cultivation of innovative and entrepreneurial talents in universities have been a hot topic of research in the education sector. Some scholars have pointed out that college students' discipline competitions are rich in content, diverse in organizational forms and comprehensive, which is a crucial part of scientific research education in colleges and universities. It is also a useful method and a powerful medium to improve college students' innovative spirit, creativity, and teamwork consciousness. However, some scholars have questioned the cultivation of innovative talents through the current high-level disciplinary competitions [3-5]. Qiguang Zhang pointed out that there are problems such as form over substance, unreasonable design, and unclear educational objectives for university students, questioning the effectiveness of disciplinary competitions [6]. A study has proposed a talent training system that "sets goals, integrates frameworks, designs methods and establishes systems" by incorporating the intellectual property system into the training of innovative and entrepreneurial talents [7]. Some scholars have explored the model of innovation and entrepreneurship ability of applied undergraduate engineering talents [8]. The eight disciplinary approach is the appropriate method to improve the nine future-oriented skills of engineering students was proved by Subramaniam Murugan et al. to develop outstanding innovators [9]. Therefore, how properly constructing a competition-oriented innovation and entrepreneurship talent cultivation system is necessary for innovation and entrepreneurship education in universities.

2. Study Design and Methodology

The cultivation of innovative and entrepreneurial talents for college students is aimed at enhancing students' knowledge, ability, literacy and belief in innovation and entrepreneurship [10-11]. To achieve this effect, in addition to professional academic training, it is more critical to make outstanding students stand out by means of high-level academic competitions, and ultimately achieve the goal of common progress

and talent by virtue of the demonstration role of leading the backward with the advanced.

To clarify the impact of the current high-level discipline competition on the cultivation of innovative and entrepreneurial talents. By constructing a structural equation model, this paper analyzes the impact of high-level discipline competitions on the cultivation of innovative and entrepreneurial talents and the internal connection between the dimensions of the innovation and entrepreneurial talent evaluation system; through the analysis of the entropy weight method, to understand the impact of high-level discipline competitions on innovation and entrepreneurship in colleges and universities at different stages emphasis on different dimensions of talent training; revealing the impact of high-level discipline competitions on the cultivation of innovative and entrepreneurial talents, and providing a theoretical basis for building a competition-oriented innovative and entrepreneurial talent training system.

2.1. Study Design

This paper creates an evaluation system for innovative and entrepreneurial talents based on four dimensions: knowledge, ability, literacy and beliefs, and uses structural equation modelling for analysis and modelling. The explicit and latent variables were identified according to the research questions and the pathways were mapped according to the relationships between the variables as is shown in Fig. 1:

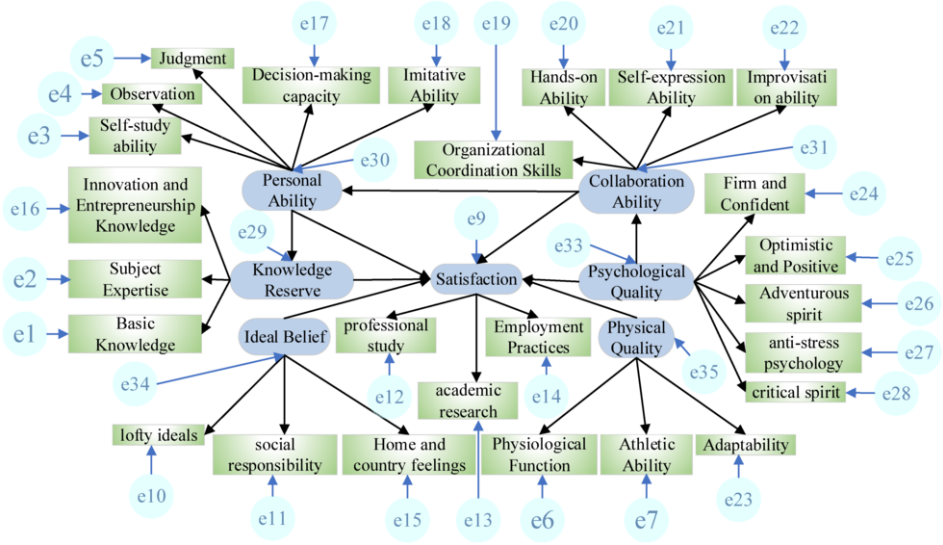

Figure 1. Structural equation model path diagram

In the research model constructed in this paper, the given potential independent variables are knowledge reserve, personal ability, collaboration ability, physical quality, psychological quality, ideal belief and satisfaction. The correspondence between latent variables and observed variables is shown in the following Table 1:

Table 1. Latent variables and their corresponding observed variables

Latent Variables	Observed Variables
Knowledge Reserve	Basic Knowledge Subject Expertise Innovation and Entrepreneurship Knowledge
Personal Ability	Self-study ability Observation Judgment Decision-making capacity Imitative Ability
Collaboration Ability	Organizational Coordination Skills Hands-on Ability Self-expression ability Improvisation ability
Physical Quality	Physiological Function Athletic Ability Adaptability
Psychological Quality	Firm and Confident Optimistic and Positive Adventurous spirit anti-stress psychology critical spirit
Ideal Belief	lofty ideals social responsibility Home and country feelings
Satisfaction	professional study academic research Employment Practices

2.2. Research Methods

(1) The structural equation model is a comprehensive statistical method mainly based on the analysis of the covariance matrix of variables to describe the relationship between variables, and its essence is the extension of general linear models. This paper applies the structural equation model to the field of policy effect evaluation and uses SEM to conduct "counterfactual" inference, hoping to provide a new and more effective policy evaluation method.

(2) The entropy weight method belongs to the objective weighting method. Determining the objective weight according to the level of index variability is the fundamental idea. The lower the information entropy of an index, the greater the variation in the index value, and the more information it provides, the greater the role it can play in the overall assessment and the greater its weight. On the contrary, the higher the information entropy of an indicator, the lower the degree of variation in the value of the indicator, the less information it provides, the smaller its role in the overall assessment and the lower its weight.

3. Samples and Data Sources

This paper takes the students at W University in Wuhan as the survey object, adopts

quota sampling and simple random sampling. A combination of online and offline questionnaires was used to collect data. 800 questionnaires were distributed, and 721 valid questionnaires were recovered. The effective rate of the questionnaire was 90.125%. Among them, the proportion of male students was 54.93% and female students was 45.07%, which basically conformed to the gender characteristics of students in W colleges. Among the respondents, 70.2% of the students had participated in high-level discipline competitions, and 29.8% of the students had no experience in participating in these competitions. Among the high-level competitions with a high participation rate of respondents, from the highest to lowest participation rates were "Challenge cup" National College Student Curricular Academic Science and Technology Works Competition, ACM-ICPC International Collegiate Programming Contest, China Undergraduate Mathematical Contest Modeling, China "Internet+" College Student Innovation and Entrepreneurship Competition and "Challenge Cup" National College Student Business Plan Competition, all in the Ministry of Education In the list of academic competitions.

4. Empirical Analysis

4.1. Reliability Tests

Reliability pertains to the degree of consistency or stability of measurement outcomes and primarily represents the reliability coefficient amidst the outcomes of repeated measurements of the same group of subjects at different times. The results of the reliability test for the current latent variable are shown in Table 2:

Table 2. Latent Variable Reliability Test Results

Latent Variables	Number of Variables	Cronbach's Alpha
Knowledge Reserve	3	0.935
Personal Ability	5	0.950
Collaboration Ability	4	0.792
Physical Quality	3	0.827
Psychological Quality	5	0.788
Ideal Belief	3	0.926
Satisfaction	3	0.834

The alpha coefficient for each latent variable exceeds 0.7, signifying significant reliability and rendering it fit for inclusion in the model path map.

4.2. Interpretation and Analysis of Structural Equation Modeling Results

4.2.1. Relationship between Latent Variables

Analyzing the results of the structural equation model, we understand the relationship between the dimensions of the evaluation system of innovative and entrepreneurial talents and the satisfaction of talent cultivation under the influence of disciplinary competitions. Among them, according to the importance of the path coefficients, the

path coefficient between "physical quality" and "satisfaction" is not remarkable in the set potential variable relationship, which means the initial assumption is accepted: there is no strong correlation between physical quality and satisfaction with the talents cultivation, which means that the direct influence of physical quality on satisfaction with the talents cultivation in the context of disciplinary competitions is small. In contrast, the path coefficients between the other latent variables are all noteworthy, showing that the assumption holds, and a causal relationship exists between the latent variables [12].

The regression coefficient between the knowledge reserve factor and the satisfaction factor is 0.763. This implies that a one percent increase in the factor of knowledge reserve due to disciplinary competition results in an increase in the satisfaction factor by 0.763 percentage points. It is evident that the knowledge reserve of talents has a strong positive influence on the satisfaction of talent training.

The regression coefficient between the personal ability factor and the satisfaction factor is 0.931, demonstrating that an increase of one percentage point in the personal ability factor under the influence of disciplinary competitions is linked to a 0.931 percentage point increase in the satisfaction factor. It is obvious that the personal ability of talent has an extremely strong positive influence on the satisfaction of talent training.

The regression coefficient between the collaborative ability factor and the satisfaction factor is 0.560, which implies that a one percentage point increase in the collaborative ability factor is accompanied by a 0.560 percentage point increase in the satisfaction factor under the influence of disciplinary competition. It is clear that the collaborative ability of talents has a positive influence on the satisfaction of talent training.

The regression coefficient between the psychological quality factor and the satisfaction factor was 0.634, meaning that when the psychological quality factor increased by one percentage point under the influence of disciplinary competition, the satisfaction factor increased by 0.634 percentage points. It is obvious that the psychological quality of talents has a strong positive influence on the satisfaction of talent training.

The regression coefficient between the ideal belief factor and the satisfaction factor was 0.872, which shows that under the influence of disciplinary competition, the ideal belief factor increased by one percentage point and the satisfaction factor increased by 0.872 percentage points. It can be seen that the ideal belief of talent has an extremely strong positive influence on the satisfaction of talent training.

4.2.2. Relationship between Latent and Observed Variables

In addition to analyzing the relationship between latent variables, we can also explore the correlation between latent and observed variables in the satisfaction model of innovation and entrepreneurial talent training, to investigate the observed variables that have a significant correlation with latent variables.

The regression coefficient of the observed variable on the latent variable represents the degree of influence of the observed variable on the latent variable. Among the knowledge reserve factors, the regression coefficients of basic general knowledge, subject specialized knowledge and innovation and entrepreneurship knowledge were 0.32, 0.85 and 0.83 respectively. It shows that knowledge reserves such as basic general knowledge, disciplinary professional knowledge and innovation and entrepreneurship

knowledge all influence the satisfaction of training innovative and entrepreneurial talents, among which disciplinary professional knowledge and innovation and entrepreneurship knowledge are the dominant factors, and training innovative and entrepreneurial talents should focus on these two types of knowledge consciously.

The regression coefficients of self-learning ability, observation ability, imitation ability, judgment ability and decision-making ability in the personal ability factor are 0.95, 0.92, 0.73, 0.65 and 0.43 respectively, indicating that self-learning ability and observation ability are the vital personal ability factors for satisfaction with the cultivation of innovative and entrepreneurial talents in the context of disciplinary competitions.

In the collaborative ability factor, the regression coefficients of practical and hands-on ability, organizational and coordination ability, self-expression ability and improvisation ability are 0.86, 0.73, 0.56 and 0.26 respectively, indicating that innovative and entrepreneurial talents in the context of disciplinary competitions should focus on improving their practical and hands-on ability.

Among the physical quality factors, the regression coefficients for physiological function, athletic ability and adaptability are 0.65, 0.58, and 0.37 respectively, indicating that physiological function is the main influence on physical quality.

Among the psychological factors, the regression coefficients of optimistic and positive, firm and confident, adventurous spirit, critical spirit and stress anti-stress psychology were 0.69, 0.64, 0.58, 0.43 and 0.38 respectively, indicating that optimistic and positive, firm and confident are the most important psychological factors for innovative and entrepreneurial talents.

Among the ideals and beliefs factors, the regression coefficients of 0.77, 0.75 and 0.65 for lofty ideals, social responsibility and home and country feelings respectively have a relatively average impact.

4.3. Entropy Weight Method--the Emphasis of Different Stages of High-level Disciplinary Competitions on Different Dimensions of Innovative and Entrepreneurial Talent Development

4.3.1. Test Method and Process of Entropy Weight Method

In this paper, the entropy weight method is used to calculate the weighting of the preparation phase, the incubation phase and the competition phase for the promotion dimension, as well as to calculate the weighting of the promotion of the different dimensions at a given stage. Through the analysis of entropy weight method, we can know how the ability to focus on training in different stages has changed, so as to refine what kind of ability has been trained in what work. The first comparison of the share of facilitation for dimensions at a given stage is shown in the following Table 3:

Table 3. Horizontal Comparison Dimension Weight

	Knowledge Reserve	Personal Ability	Collaboration Ability	Physical Quality	Psychological Quality	Ideal Belief
Preparation Phase	0.32	0.38	0.12	0.03	0.07	0.08
Incubation Phase	0.16	0.28	0.36	0.06	0.02	0.12
Competition Phase	0.07	0.04	0.52	0.04	0.22	0.11

A visual stacked bar chart is drawn from the table data, as shown in Fig. 2:

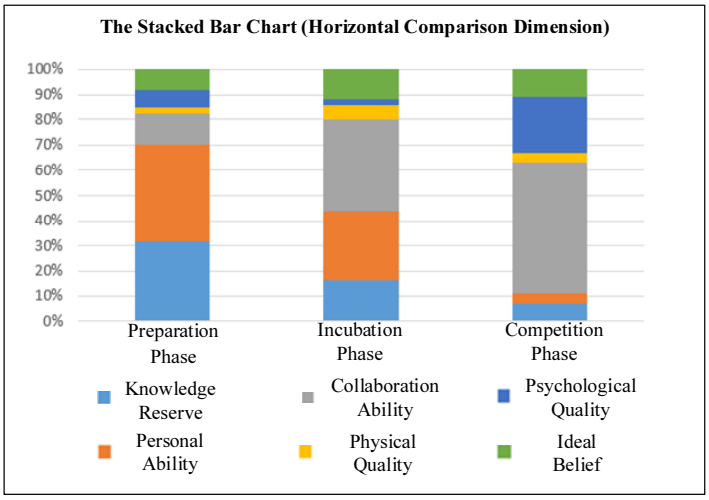

Figure 2. The Stacked Bar Chart (Horizontal Comparison Dimension)

Accordingly, we compare longitudinally the share of promotion weights for a dimension at different stages, as shown in Table 4:

Table 4. Vertical Comparison Dimension Weight

	Knowledge Reserve	Personal Ability	Collaboration Ability	Physical Quality	Psychological Quality	Ideal Belief
Preparation Phase	0.72	0.44	0.42	0.32	0.07	0.37
Incubation Phase	0.12	0.24	0.14	0.3	0.11	0.32
Competition Phase	0.16	0.32	0.44	0.38	0.82	0.31

A visual stacked bar chart is drawn from the table data, as shown in Fig. 3:

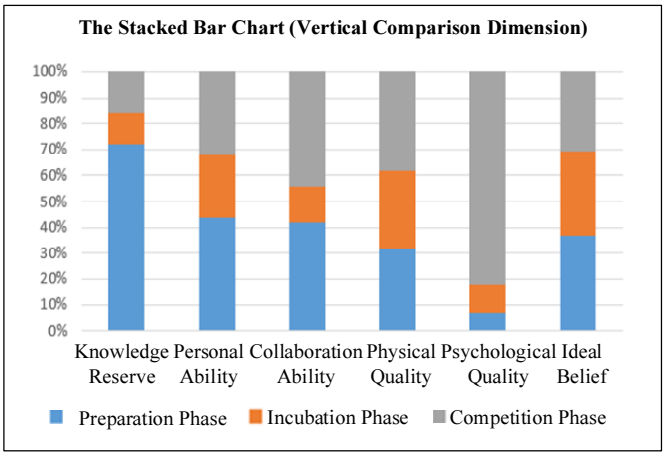

Figure 3. The Stacked Bar Chart (Vertical Comparison Dimension)

4.3.2. Analysis on the Test Results of Entropy Weight Method

Specifically, the preparation phase of the competition contributes significantly more to the knowledge base and individual ability of the innovative and entrepreneurial talent than the other three dimensions. The incubation phase of the competition contributes significantly more to the personal and collaborative ability of the innovative and entrepreneurial talents than the other dimensions. The competition phase of the competition contributes significantly more to the collaboration ability and psychological quality of the innovative and entrepreneurial talents than the other dimensions.

At the same time, analysed in another direction, a certain dimension is improved differently at different stages. The knowledge base dimension of innovative and entrepreneurial talents improves almost exclusively in the preparation phase of the competition. Individual ability is improved at all stages of the competition, with a relatively high degree of improvement in the preparation stage. Collaborative ability is mainly improved in the preparation and competition stages of the competition, and both contribute to collaborative ability to an approximately equal degree. Psychological literacy is improved almost exclusively in the competition phase of the competition. The physical literacy and idealistic belief dimensions remained low at all stages. This is in line with the results shown by the structural equation model.

4.4. Empirical Investigation and Analysis Conclusion

4.4.1. Differential Impact of High-level Disciplinary Competitions on Different Dimensions of Innovation and Entrepreneurship Training in Universities

Based on the entropy weighting method to calculate the weight of academic competitions on the dimensions of innovative and entrepreneurial talent cultivation, we acknowledge that high-level academic competitions have a profound positive influence on the fostering of innovative and entrepreneurial talent in universities. In particular, the four dimensions of the evaluation system of innovative and entrepreneurial talents, namely knowledge reserve, individual and collaborative ability, and psychological

quality, have a significant contribution, while the contribution to the dimensions of physical quality and ideal beliefs is weaker. Among the four dimensions that have been significantly improved, it is worth pointing out that the promotion effect on personal ability is the most obvious.

In addition, when analyzing the results of the structural equation model, the regression coefficients of the observed variables on the latent variables represent the degree of influence of the observed variables on the latent variables. In the knowledge reserve factor, the regression coefficients of subject expertise and innovation and entrepreneurship knowledge are similar, while the regression coefficients of basic general knowledge are too small; in the personal ability factor, the regression coefficients from high to low are self-learning ability, observation ability, imitation ability, judgment ability and decision-making ability; in the collaboration ability factor, the regression coefficients from high to low are practical and hands-on ability, organization and coordination ability, self-expression ability, and The regression coefficients of the physical fitness factor are, from high to low, physiological function, athletic ability and adaptability; the regression coefficients of the psychological factor are, from high to low, optimistic and positive, firm and confident, adventurous spirit, critical spirit and anti-stress psychology; the regression coefficients of the ideals and beliefs factor are, from high to low, lofty ideals, social responsibility and home and country feelings.

4.4.2. The Impact of Different Stages of High-level Disciplinary Competitions on the Various Dimensions of the Evaluation System of Innovative and Entrepreneurial Talents in Universities has its own Focus

Using the entropy weighting method, the weight of the impact of each stage of the competition on each dimension of the innovation and entrepreneurship talent evaluation system and the weight of the degree of improvement each dimension receives at different stages are calculated.

The analysis showed that the preparation phase of the competition promoted the knowledge base and personal ability of the innovative and entrepreneurial talents significantly more than other dimensions; the incubation phase of the competition promoted the personal ability and collaboration ability of the innovative and entrepreneurial talents significantly more than other dimensions; the competition phase of the competition promoted the collaboration ability and psychological literacy of the innovative and entrepreneurial talents significantly more than other dimensions.

At the same time, from another perspective, the knowledge reserve dimension of the innovation and entrepreneurship talents was improved almost exclusively in the preparation phase of the competition; the personal ability dimension was improved in all phases of the competition, with a relatively high degree of improvement in the preparation phase; the collaboration ability dimension was improved mainly in the preparation and competition phases of the competition, and the degree of promotion of collaboration ability by both was almost equal; the psychological quality dimension was improved almost exclusively in the competition phase of the competition; the physical quality dimension and the ideal belief dimension remained low in all phases, which is consistent with the results shown by the structural equation model.

5. Conclusion

5.1. For Schools

5.1.1. Improve the Construction of Curriculum System Related to Subject Competition

Subject competitions have a strong role in promoting knowledge reserve, individual ability, collaborative ability and psychological quality in the evaluation system of innovative and entrepreneurial talents. Schools should set up supporting courses for subject competitions, use subject competitions as a guide to optimize students' knowledge structure, exercise students' comprehensive innovative and entrepreneurial ability, and play an important role in subject competitions in promoting knowledge reserve, individual ability and collaborative ability.

5.1.2. Strengthen the Education on the Ideals and Beliefs of Innovative and Entrepreneurial Talents

The structural equation model shows that ideal beliefs are an important factor influencing satisfaction with innovation and entrepreneurship education. However, according to the results of the entropy weighting method analysis, the level of influence of disciplinary competitions on ideal beliefs at this stage is low, and the competition-oriented education for innovative and entrepreneurial talents is missing the important link of ideal beliefs education. Academic competitions should be combined with other cultivation measures to achieve complementary advantages.

5.2. For Students

5.2.1. A Proper Attitude to the Competition, with Competence Development as the Starting Point

The low level of influence of the current academic competitions on ideals and beliefs is not only due to the problems of the construction of academic competitions, but also due to the utilitarian attitude of university students towards competitions, who are accustomed to taking the prize gain as the main reward for participating in academic competitions, while neglecting the more important aspect of academic competitions -- the cultivation of abilities. University students should correct their attitude towards academic competitions and innovation and entrepreneurship education, integrate their personal ideals into the cause of the country and the nation, and contribute to the development of the motherland.

5.2.2. Targeted Competency Training with Your Own Reality

Grasp the multi-dimensional contribution of disciplinary competitions to the evaluation system of innovative and entrepreneurial talents, and find your own ability positioning. Actively engage in disciplinary competitions to improve their own competency structure and build on their strengths and avert their weaknesses. Strive to develop into outstanding innovative and entrepreneurial talents.

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