



## Strategies for innovative education reform in China's institutions of higher learning

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### ABSTRACT

*Our innovative education reform gradually into deep water, this article was completed in a university, we have performed investigations on college innovative education and the innovation needs of students based on psychological cognitive point of view. We elaborated influenced by the factors of gender, grade and disciplinary. Based on the results, we summarized a number of mixed strategies for the innovative education and reform through SWOT analysis. According to the internal and external environment we proposed a series of education reform ideas from the perspective of educators.*

**Keywords:** College students, Innovation System, Innovative Education, Reform strategy

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### INTRODUCTION

To further strengthen the student innovative spirit and hands-on abilities in institutions of higher learning has become a significant part to further strengthen and deepen the comprehensive reform in the education sector. We must build up a long-term mechanism that accord with the socialist core value system. [1] On the basis of expounding the innovative ability and cognitive facts of college students, the author [2] investigates the innovative ability and impetus of target students, reveals the current situations of innovative education in a given college, so as to propose a number of strategies for effective reform in consideration of external and internal differences.

#### 1. Situation in Mind

College students in both age levels and level of intelligence or ability are described as the backbone of innovation-driven force. And if improving the level of innovation can effectively drive the social development of the country, the education of college students is destined for leading one generation to create with independent innovation. There is actually not a small gap between innovation belief and practical ability of most students on the analysis of innovation ability and cognitive level. Therefore, we concentrated on the mechanism of college innovative education, students' recognition and their demand in the process of surveying.

1. Questionnaire Targets and Analysis Plan. Taking a national key university for example and applying questionnaires, 1020 students in the study from different majors and grades were randomly selected as the research objects. Of all 1020 questionnaires, 973 copies were returned, 871 copies were valid, the recovery rate was up to 95.39%, and the effective rate was 89.52%. Samples included 647 copies from boys and 224 copies from girls, covering four subjects including arts, science, engineering, medicine, and involving 574 freshmen, 175 sophomores, 80 juniors, and 42 others (seniors and graduates). Data applying SPSS 18.0 in statistics and constitute more than

describing the use of categorical variables,  $\chi^2$  test was used for comparison between groups; numerical variables mean and standard deviation, t was used between two groups applying analysis of variance test for comparison and group comparison is conducted in accordance with the LSD law. When  $p < 0.05$  the result of comparison is considered statistically significant.

2. Acceptance of Innovative Education and Investigation Analysis of College Student Demands. The reasons for students' lack of ability to ascertain outstanding innovation are showed below: 61.4% believe that focusing on the traditional theory of knowledge and lacking of adequate practice opportunities are the main cause of lack of innovation capability; 14.9% think the opportunities to practice are insufficient and lack of practical platforms and innovative approaches are accounted for 14.5%. For most lacking something innovative, those selecting the "atmosphere" are up to 48.8%, followed by "training method" and the "information" is respectively accounted for 23.0% and 20.8%. And students choosing the "fund" are 7.0%. From the individual sense of improving innovation and the ability to enhancing innovation, 40.1% of students think that other people should be more got involved in discussion and get inspiration from other people's ideas, 29.3% think we should learn innovative ways to master the innovative law, and 20.9% think that we should spend more time and effort on the imagination, for thinking more can naturally increase opportunities for innovation. In terms of innovative education reform, 46.7% think the reform should focus on changing the teaching philosophy, transforming the original mechanical force-feeding education into induction- inspiring education. Thus we can easily see students' innovative talents of the existing education satisfaction are not high and the necessity and urgency of reform is self-evident.

**Table 1. Scoring comparison of innovative ability and education methods from students of different gender, grade, subject**

		N	Mean	Standard Deviation	t/F	P
Gender	Male	647	6.52	1.748	-0.250	0.803
	Female	224	6.55	1.502		
Grade	Freshman	574	6.68	1.604	6.952	0.000
	Sophomore	175	6.40	1.695		
	Junior	80	5.82	1.874		
	Else	42	6.31	2.018		
Subject	Liberal arts	71	6.37	1.279	0.798	0.495
	Science	33	6.42	1.542		
	Medical	29	6.17	2.189		
	Engineering	738	6.56	1.706		

**Table 2. Pairwise comparison the score of school innovative ability and education methods from different grades of students**

(I) Grade Grouping	(J) Grade Grouping	Mean difference (I-J)	Standard Error	P	95% Confidence Interval	
					Minimum	Maximum
Freshman	Sophomore	0.283	0.144	0.050	0.00	0.57
	Junior	0.858*	0.199	0.000	0.47	1.25
	Else	0.373	0.267	0.162	-0.15	0.90
Sophomore	Freshman	-0.283	0.144	0.050	-0.57	0.00
	Junior	0.575*	0.225	0.011	0.13	1.02
	Else	0.090	0.287	0.753	-0.47	0.65
Junior	freshman	-0.858*	0.199	0.000	-1.25	-0.47
	Sophomore	-0.575*	0.225	0.011	-1.02	-0.13
	else	-0.485	0.318	0.128	-1.11	0.14
Else	Freshman	-0.373	0.267	0.162	-0.90	0.15
	Sophomore	-0.090	0.287	0.753	-0.65	0.47
	Junior	0.485	0.318	0.128	-0.14	1.11

3. Factors like Sex, Grade and Program that Effect the Differential Analysis on College Innovative Education. According to the theoretical study of the United States and other psychologists Sternberg judgment [3], individual creativity (c) is subject to the intellectual (i), knowledge (k), thinking (ts), personality (p), motivation (m) and the environment (e), namely  $c = f(i, k, ts, p, m, e)$ . Research has shown that when individuals situated in the general level of intelligence, the intelligence of a very small impact on their creativity, Li Yan [4], Wang Hanqing [5] and other scholars have conducted a combination of actual verification. Combined with this view, the article focuses on gender, grades, disciplining students for existing educational system and innovative education evaluation, revealing

to improve the awareness of innovation, effective way of innovation, and learning ways to differentiate cognition comparison.

From Table 1, it is found that the marks given by different gender, various types of student in discipline schools are no difference in terms of the innovation ability and education modes ( $p_1 = 0.803 > 0.05$ ,  $p_2 = 0.495 > 0.05$ ). The differences between grades reveal great differences due to the acceptance of the incubation time in school ( $p = 0.000 < 0.05$ ). Further study was focused on grade pairwise comparison in order to further obtain a more accurate comparison (see Table 2):

Other differences between the various grades were not statistically significant ( $p > 0.05$ ), junior scoring lower than freshman and sophomores shows no significant differences between the other grades scoring. Such differences and the length of time during which students are in the school and the degree of access to education exist a great relationship.

**Table 3. The most effective approach to raise awareness of innovation, the ability for students of different gender, grade, subject knowledge acquisition approaches(%)**

		$\alpha$	$\beta$	$\gamma$	Else	Total	$\chi^2$	P
Gender	Male	75(11.6)	314(48.5)	250(38.6)	8(1.2)	647(100.0)	7.035	0.071
	Female	27(12.1)	93(41.5)	104(46.4)	0(0.0)	224(100.0)		
	Total	102(11.7)	407(46.7)	354(40.6)	8(0.9)	871(100.0)		
Grade	Freshman	66(11.5)	269(46.9)	233(40.6)	6(1.0)	574(100.0)	7.169	0.619
	Sophomore	23(13.1)	72(41.1)	79(45.1)	1(0.6)	175(100.0)		
	Junior	10(12.5)	44(55.0)	25(31.2)	1(1.2)	80(100.0)		
	Else	3(7.1)	22(52.4)	17(40.5)	0(0.0)	42(100.0)		
Subject	Total	102(11.7)	407(46.7)	354(40.6)	8(0.9)	871(100.0)	12.069	0.209
	Liberal arts	9(12.7)	24(33.8)	37(52.1)	1(1.4)	71(100.0)		
	Science	3(9.1)	18(54.5)	11(33.3)	1(3.0)	33(100.0)		
	Medical	1(3.4)	12(41.4)	16(55.2)	0(0.0)	29(100.0)		
	Engineering	89(12.1)	353(47.8)	290(39.3)	6(0.8)	738(100.0)		
	Total	102(11.7)	407(46.7)	354(40.6)	8(0.9)	871(100.0)		

Table 3 shows the different gender, grade, type of discipline on college students which think they need to raise awareness of innovation and the ability of the most effective methods, the difference is not statistically significant ( $p_1 = 0.071 > 0.05$ ,  $p_2 = 0.619 > 0.05$ ,  $p_3 = 0.209 > 0.05$ ), where the school expects students to improve their own sense of innovation capability. To find an effective way to motivate students to learn in school, we need the innovative power to study and acquire knowledge in particular ways. From the perspective of accessing to knowledge, the traditional ways of learning from books occupied 36.7% and through lectures was accounted for 24.2%, but more obtained knowledge through the network are accounted for 38.0% , which is also seen in its powerful. Network has gradually shaken the status of traditional teaching methods.

It is found in Table 4 that the favorite ways for students from different gender, grade, type of student in different discipline to acquire knowledge are not statistically significant ( $p_1 = 0.060 > 0.05$ ,  $p_2 = 0.169 > 0.05$ ,  $p_3 = 0.584 > 0.05$ ), combining with the target population for network. It showed that college students are generally adapted to the current network interconnection model, and can not be affected by sex, grade and major. Therefore, the impacts of the network on the daily life of college students and their impacts on traditional education are not to be underestimated. It is also found that different types of gender and discipline students who want to improve their sense of innovation and creativity in the choice of methods are basically the same ( $p_1 = 0.311 > 0.05$ ,  $p_2 = 0.625 > 0.05$ ); different grades of students choose local statistical difference significance ( $p = 0.002 < 0.05$ ), in which the freshmen and sophomore students chose to "learn innovative ways to master the law of the innovative" proportion are up to ( 31.2% and 29.7 % ) which is more than other grades and junior students ( 17.5% and 23.8% ).

Several studies above show that there are certain differences in the ways of innovation between different groups within the range of colleges and universities, which are limited to the differences in the degree of accessing to higher education. But expectations for innovation and eager to accept the extent of innovative methods of education are not subject to gender, grade, and other factors affecting the type of discipline, which verifies the theory of research. Experts like Sternberg has provided a solid foundation to develop education reform strategy.

**Table 4. Students of different gender, grade, subject knowledge acquisition approaches(%)**

		Books, Newspapers and Magazines	Class Teaching	Net	Else	Total	$\chi^2$	P
Gender	Male	226(34.9)	152(23.5)	261(40.3)	8(1.2)	647(100.0)	7.420	0.060
	Female	94(42.0)	59(26.3)	70(31.2)	1(0.4)	224(100.0)		
	Total	320(36.7)	211(24.2)	331(38.0)	9(1.0)	871(100.0)		
Grade	freshman	224(39.0)	136(23.7)	207(36.1)	7(1.2)	574(100.0)	12.855	0.169
	Sophomore	65(37.1)	42(24.0)	66(37.7)	2(1.1)	175(100.0)		
	Junior	18(22.5)	25(31.2)	37(46.2)	0(0.0)	80(100.0)		
	Else	13(31.0)	8(19.0)	21(50.0)	0(0.0)	42(100.0)		
	Total	320(36.7)	211(24.2)	331(38.0)	9(1.0)	871(100.0)		
Subject	Liberal arts	29(40.8)	14(19.7)	27(38.0)	1(1.4)	71(100.0)	7.507	0.584
	Science	10(30.3)	12(36.4)	11(33.3)	0(0.0)	33(100.0)		
	Medical	13(44.8)	4(13.8)	11(37.9)	1(3.4)	29(100.0)		
	Engineering	268(36.3)	181(24.5)	282(38.2)	7(0.9)	738(100.0)		
	Total	320(36.7)	211(24.2)	331(38.0)	9(1.0)	871(100.0)		

## 2. Be prepared for danger in times of safety

“Be prepared for danger in times of safety ” is a true reflection of the development momentum of innovative education in colleges and universities today: SWOT analysis method is applied to analyze the inner and external factors affecting the innovative education in colleges and universities, including the Superiority(S), Weakness(W), Opportunity(O) and Threats(T). In the meantime, probing into the educational reforms and strategies on innovative systems are of great significance.

We've attach great importance to study the development momentum of innovative education in colleges and universities carrying SWOT model, as shown in Figure 1. Superiorities exist in: ①The basis for the development of higher education has been more solid with the economic boom as well as the increasing efforts and concerns to support coupled with the traditional superiorities accumulated for years. ② College students occupy high levels of knowledge. Meanwhile, the group knowledge and intelligence are relatively dense and intensive, accompanied by high level of technical superiority. ③The comprehensive study level in colleges and universities is highlighted under the background of interdisciplinary settings. As a result, those students are provided with plenty of ambition and fighting spirit of innovation.[2] Even so, quite contrary to the corresponding superiorities, the innovative education system has also manifested a number of alarming signs: ①Although college students have learned certain theoretical knowledge from books, but they are still short of the necessary management experience and practical ability, therefore, their judgment processing capacity is greatly affected.② Students' interest in acquiring knowledge through classroom-learning is generally not high. ③ With regard to the aspects of vigorously developing extracurricular activities especially in the construction of academic societies often lack the integration of innovation and heritage.

Apart from the conditions mentioned above, the changing internal and external circumstances of educational development have brought some opportunities and threats. Opportunities exist in: ① Innovative knowledge-based economy provides a strong support for the further expansion of innovative education in colleges and universities. ② The perfection of Higher Education Reform Project offers a solid support for research institutions in the concept of management system, operation mechanism, personnel training and academic teams.[6] ③With the deepening of the comprehensive reform of education into the deep water, our state has conducted a number of strategies making the orientation and determination of the educational reform become more and more distinct. ④The phenomena of students relying on network are increasingly obvious and the digital network sharing platform in education is also more mature, especially those aimed at community-oriented, public higher education curriculum. As a result, actualizing the construction of Massive Open Online Course has largely broken through the existing barriers in sharing resources. Opportunities are always accompanied with various threats: ①the indoctrination legalistic teaching approach is likely to affect the ways of college students' divergent thinking, and all this is quite contrary to the requirements of innovation active thinking. ②Teaching methods used in some universities are excessively simple, interaction- deficiency and lack of motivation. All these threats pose a new challenge for the currently innovative education.

<p><b>S</b></p> <ol style="list-style-type: none"> <li>1. More solid basis for the development of higher education</li> <li>2. High levels of knowledge distribution and interdisciplinary settings</li> <li>3. Plenty of ambition and fighting spirit of innovation</li> <li>4. Strong academic atmosphere and theoretical research foundation</li> </ol>	<p><b>W</b></p> <ol style="list-style-type: none"> <li>1. College students are short of practical experience</li> <li>2. Students' interest in acquiring knowledge through classroom-learning is generally not high</li> <li>3. The traditional lecture-based teaching model affects the ways of college students' divergent thinking</li> <li>4. Innovation is greatly lost in extracurricular activities.</li> </ol>
<p><b>O</b></p> <ol style="list-style-type: none"> <li>1. Demand for the higher education institutions by the era of innovative knowledge-based economy</li> <li>2. Higher Education Reform Project such as 985 projects and 211 Project has been improved</li> <li>3. National education reform direction and determination is more clear</li> <li>4. A mechanism of sharing network education (MOOC) has been fulfilled.</li> </ol>	<p><b>T</b></p> <ol style="list-style-type: none"> <li>1. The transmission of information networking has produced great impact to the traditional education mode</li> <li>2. Traditional teaching mode brought students of the mind-set</li> <li>3. Teachers lack innovative quality and innovation power</li> </ol>

**Fig. 1** SWOT analysis of development momentum of innovative education in colleges and universities

### 3. Executed in dual

To develop and formulate innovative education reform strategies in colleges and universities, we should make use of SWOT analysis method combining the actual condition and considering the existing strengths and flaws exposed to analyze it. We'll start with multi-perspectives from internal and external environment and set a series of practical education reform strategies as the goal to alter the existing mechanism of educational administration and management in colleges and universities. We'll help education practitioners to strengthen the understanding of innovative teaching significance and education mode as well as formulate a variety of possible strategies based on practice to practice what you learnt and apply knowledge to all.

1. Analysis of the innovational educational reform in universities and the corresponding strategies. In the light of the current development of innovative education in China, there are some inspirations which can be provided for the future educational development and direction of innovation from the SWOT study model: First, Superiorities - Opportunity Strategy: Universities could utilize the online education sharing mechanism to set up a innovative education platform which includes theory study, practical operation and skill training for college students. Combining the public service platform with the Innovative Mechanism of Higher Educational Reform Projects, to complete the construction of Higher Education Technology Incubation Park and facilitate achievements transformation. Second, the weakness - the opportunity Strategy: Universities should deepen reforms at all levels of academic tech contest and vigorously advocated the "Challenge Cup" and the implementation of large influential activities and increased funding to support efforts to provide students with academic innovation initial support. Third: Superiorities-Challenge Strategy: completing the distribution system, and other assessment mechanism of the integration of mobile, incentives, constraints, security. On the one hand, establishing a comprehensive evaluation system for university teachers can be multi-layered and diversity criteria, on the other hand, combining credit system to build holistic evaluation mode by which all the in-school students are assessed from multiple angles including test scores, expertise, human quality and social participation in practice.

### CONCLUSION

The survey into college students' awareness of the current innovative education in colleges and universities can offer education practitioners' help to interpret the expectations and needs of innovative education based on thinking skills[7], and at the same time to find out the gap between the current situation and the social demand for talents and to study the development strategy for colleges and universities through SWOT model combing the advantages of the pros and cons under the new era. From reform to change the route of the development and the implementation of the teaching model of education, innovation always acts as the soul of the university construction. All sectors of society are required to play every effort for colleges and universities, including effective coordination, clear goals, deepen ideas, changing the way and the accumulation of atmosphere. All these are bound to cultivate a large number of innovative high-level talents equipped with profound cultural heritage, solid professional knowledge and broad international perspective.

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