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*Research Article*

# Patent Education and System Construction in Research Universities

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## Abstract

The global economy and culture competition in the 21st century is becoming increasingly fierce and the essence of this is the competition of knowledge and talents. Therefore, the protection of patent rights and the cultivation of talents with patent knowledge are becoming more important. Colleges and universities are the training base for talents and they are the hub for turning knowledge into actual productivity. It is of great significance for the improvement of students' quality and scientific and technological progress to extensively implement patent education in research universities which attach great emphasis on the cultivation of innovative talents. However, China's patent education started relatively late, and there are still many problems in the actual development process. This paper investigates the status quo of education, summarizes and analyzes the existing problems and draws on the experience of patent education in developed countries through the research on patent education in research universities in a province. Also, this paper proposes the suggestions for the construction of patent education in research universities in China from the perspective of breaking through the educational concept and enriching the structure of teachers.

## Keywords

Research university • Patent • Education • Construction

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The patent system is an important weapon for countries in the era of knowledge economy to protect their innovation ability (Chen, 2004). The establishment, implementation and application of the patent system are inseparable from compound and professional talents. As the training and export base for talents, the patent education in colleges and universities is of great significance to the promotion and protection of national innovation capabilities (Matthews, 2009). Developed countries attach great importance to patent education (Zhang & Wende, 2007), who make full use of various resources, create the awareness to promote patent protection and use patent education as an important means to improve international competitiveness.

With the development of the “Thirteenth Five-Year Plan”, China has placed greater emphasis on building an innovative economy. Whether it is science and technology, management and other innovations are inseparable from the support of the patent system (Dong, Li, Chen & Zheng, 2002). For research universities which focus on the cultivation of students' innovative ability, the implementation of patent education can cultivate a large number of compound talents with the awareness of patent protection and corresponding capability for the country, which has far-reaching significance for China's scientific and technological progress (Watt, 2007). With the introduction of a series of patent education related policies, many regions regard the improvement of the innovation ability of patent talents as an important task. However, on the whole, the development of patent education in research universities in China is still relatively slow and there are many problems. This paper investigates the development of patent education in research universities in a province, analyzes the existing problems and seeks the room for improvement, which hopes to play a promotion effect in the theoretical research and practice of patent education in research universities in China.

## Research Background

### Patent Education

Patent education refers to a series of activities of imparting knowledge of relevant laws and regulations, system and culture of patent through a series of educational methods to enable the educatees to have the awareness and ability of patent protection (Zhao, 2006). The content of patent education is shown in Table 1:

Table 1  
*Contents of Intellectual Property Education*

No.	Education profiles	Education content
1	Ideological education	Intellectual Property Concepts, Laws and Regulations
2	Consciousness education	Consciousness of protecting one's own legitimate intellectual property rights and applying others' intellectual property rights according to law.
3	Competency based education	Ability to create, use and manage intellectual property rights. Reasonable use of intellectual property rights, access to relevant information.

### Patent Education in Research Universities

The patent education in research universities refers to the imparting of relevant legal knowledge of patent and the cultivation of the practical application ability based on the professional background of students with the

use of the university as an educational platform. Students who receive patent education can be divided into two types: one is law majors, for whom the patent education is part of their professional education curriculum; the other is students in other majors. Their awareness and ability of patent protection can be improved through the patent education (Ribeiro Nogueira Ferraz, Quoniam, Reymond, & Maccari, 2016; Ubaid & Abdel-Razek, 2018; Jiang, Wang, Hui & Zhang, 2016).

## **Research Content and Method**

### **Research Content**

This paper investigates and studies the current status of patent education in six research universities in a province. The research content includes:

- (1) The status quo of patent education is studied and the achievements and existing problems are analyzed and summarized;
- (2) The patent education experience of research universities in developed countries are studied to provide reference for relevant educational activities in China;
- (3) The room for optimization and improvement of patent education in research universities in China is explored and relevant suggestions are put forward.

### **Research Method**

This paper uses the following methods to conduct the research:

- (1) Literature law: Through collecting and referring to relevant literature and papers, we can have a comprehensive and overall understanding of the patent education in research universities;
- (2) Investigation and theoretical analysis method: Through questionnaires, the development of patent education in research universities in the province is studied. The first-hand research data is obtained and the achievements and problems are analyzed.
- (3) Comparative analysis method: By analyzing the development of patent education in developed countries and the comparison with the actual situation in China, this paper proposes the solution for the improvement of patent education in China.

### **Questionnaire Design and Research Implementation**

In order to fully understand the actual situation of patent education in research universities in the province, this paper designs questionnaires and conducts the research based on the relevant literature.

(1) Questionnaire content: The questionnaire includes the basic information about the education of students, such as school, major, grade, etc.; the students' understanding of the patent; and the actual situation of patent education in the school and the expectation of students. There are a total of 35 problems designed, of which the number of closed and open questions is 34 and 1 respectively.

(2) Survey scope: The questionnaire survey is conducted among students in 6 research universities in the province, including majors such as automation, environmental engineering, material chemistry and fashion design. A total of 1400 questionnaires are distributed and 1,308 valid questionnaires are collected, with a recovery rate of 93.4%.

### Survey Results

Through the analysis and summary of the questionnaire, the paper draws the following research results.

#### Achievements

The survey finds that the schools involved in the survey have all regard the patent-related courses as basic courses or elective courses. The popularity of patent education has increased the number of students receiving this education. In addition, according to the questionnaire, 88% of the students believe that it is very necessary for the school to carry out patent education whether it is for the improvement of national science and technology competitiveness or the improvement and protection of the innovation and entrepreneurial ability of college students; more than 92% of students express their interest in learning patent-related courses. It can be seen that educators pay more attention to patent education and are interested in learning.

#### Existing Problems

The survey finds that there are still the following problems in patent education:

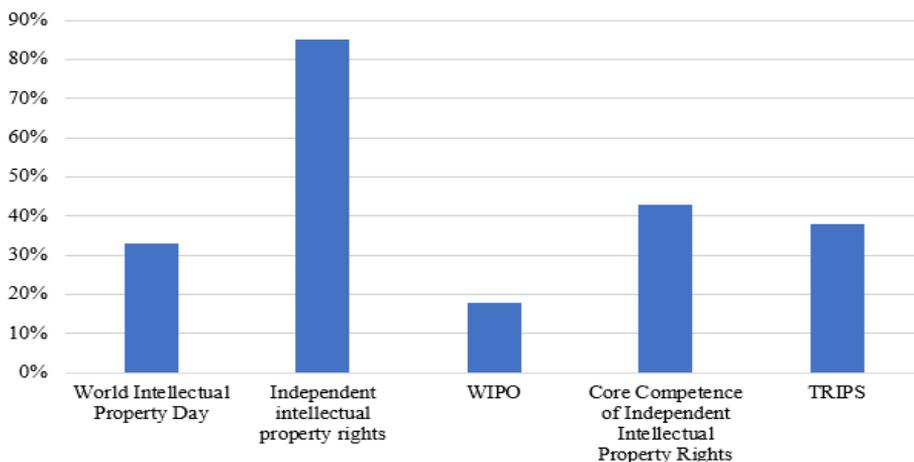


Figure 1. Investigation on the Meaning of Intellectual Property Related Terms.

**Misunderstandings of patent education:** The survey finds that implementers of higher education do not combine social needs with school training objectives and fail to fully understand the high demand of the society for compound talents with certain patent level so that teachers and students have some misunderstandings about patent education: believing that it is only necessary for students from other majors to know the basic knowledge of patent since patent education is the professional curriculum of law major. Therefore, in the development process of education, more emphasis is placed on the cultivation of legal professionals while ignoring the patent education for students from other professional backgrounds. There are phenomena such as the lack of scientific design of curriculum content and unreasonable arrangement of class hours so that students do not have a good command of patent related knowledge (see Figure 1).

**Single faculty structure:** Teachers, as direct participants in teaching activities, the level of faculty has an important impact on teaching effectiveness. The survey finds that the teachers of patent education in colleges and universities are all faculty members of law major background. Compared with lawyers and managers who are engaged in patent-related work, they are lacking in practical work experience. This faculty of single structure has certain restrictions on the cultivation of students' professional knowledge and ability.

**Textbook content is not designed to meet the needs of students:** Since the patent teaching material system has not yet been formed in China, in carrying out relevant education, the legal professional textbooks are directly used in colleges and universities to facilitate this process. The teaching content (see Figure 2) emphasizes the theory, lacks practical guidance and is weakly combined with the professional background of the educated students. There is little knowledge absorbed, transformed and practically applied by students and it has little practical effect in future patent application and patent infringement.

**Single teaching method:** The survey finds that all students study the patent knowledge through “classroom theory teaching” and learn through “experience learning”, “case teaching” and “discussion method” with the proportions of 5%, 48% and 66% respectively, so there are problems such as single method and less interaction in teaching. In addition, students have single access to patent-related knowledge, mainly through classroom learning. The proportion of knowledge acquisition through the Internet and media is still low even Internet usage is extremely common.

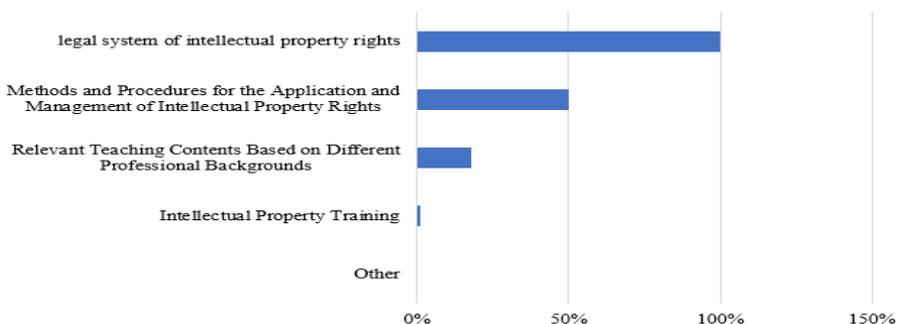


Figure 2. Investigation on the Meaning of Intellectual Property Related Terms.

## **Education Suggestions Development in Foreign Countries and on the Patent Education in Research Universities in China**

The patent education in developed countries starts relatively early and there is rich experience. When developing patent education in China, we can fully draw on its strengths for the promotion and improvement in light of the problems existing in the education development process in China.

### **Relevant Experience and Enlightenment of Developed Countries**

The developed countries such as the United States, the United Kingdom, and Japan all attach great importance to patent education. All colleges and universities in the United States have opened patent courses. Research universities mainly take patent education as elective courses. The diverse and experienced faculty members use a variety of teaching methods for the cultivation of students. The United Kingdom has facilitated the patent education in colleges and universities through policy guidance and the establishment of a special network education base. Japan takes the improvement of the creative ability of students as the purpose of patent education and support and standardize this education through a complete patent legal system. It can be seen that developed countries attach great importance to the cultivation of talents with patent knowledge. The patent education in colleges and universities is strengthened through the policy guidance, system building, and faculty training.

### **Research on the Construction of Patent Education in Research Universities in China**

Through the investigation of the status quo of patent education in research universities in a certain province in China, the existing problems are analyzed. Also, the following suggestions are proposed for patent education in research universities in China combined with the development in foreign countries:

**Setting teaching objectives and designing teaching content in combination with social needs:** The core purpose of patent education in research universities is to cultivate the innovation ability and patent practice ability of students from different professional backgrounds. In the development process of patent education, teaching objectives should be set in accordance with social needs and the teaching content should be designed and updated combined with the professional background of students. The theoretical difficulty should be reduced; the knowledge absorption and transfer ability of students should be improved; and the existing cross-disciplinary replication mode should be eliminated.

**Adopting various teaching methods to improve students' learning interest:** Research universities pay more attention to the cultivation of students' independent learning ability and innovative ability. Therefore, in the process of specific teaching practice, students should be regarded as the subject of learning and the heuristic teaching should be adopted to improve their thinking ability. The achievements of scientific and technological development should be fully utilized; the application of modern teaching methods should be deepened; and

multimedia and other teaching resources should be fully used to mobilize students' learning enthusiasm. In addition, the practical application ability of students can be cultivated through science and technology competitions, knowledge quizzes and mock courts can be carried out through university-enterprise cooperation among schools and between school and enterprise.

**Enriching the structure of faculty and setting up effective reward mechanisms:** The needs of students from different professional backgrounds in research universities are different. Therefore, the faculty should be composed of teachers with high professionalism, strong learning ability and innovative spirit. Through various forms of cultivation, schools can establish effective incentive mechanisms to promote the continuous learning and improvement of teachers. In addition, due to the single faculty structure in the patent education in colleges and universities, colleges and universities can actively introduce interdisciplinary patent talents and employ lawyers or other professionals with practical experience as part-time teachers, which is conducive to broadening the horizon and the exercise of practical ability practical practice of students.

### Research Conclusions

In today's knowledge economy era, competition between countries is becoming increasingly fierce and the role of the protection of patent is self-evident in improving international competitiveness. This paper investigates and analyzes the development of patent education in six research universities in a province through questionnaire survey and draws the following research conclusions:

(1) Problems such as ambiguous teaching objectives, single faculty structure and single teaching method still exist in the patent education in research universities;

(2) Developed countries attach great importance to patent education and try to improve the effectiveness of patent education in higher education institutions through the policy guidance of laws and regulations, media propaganda and financial support;

(3) Colleges and universities can set teaching objectives in combination with the actual needs of the society, design teaching content that fits the professional background of students, and provide more practical activities for students in the form of school-school and school-enterprise cooperation.

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