

# Exploration on the Cooperative Innovation Training Mode of Foreign Postdoctoral Students in Colleges and Universities

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## Abstract

Exploring the foreign postdoctoral training mode from the perspective of collaborative innovation is of great significance to improve the quality of foreign postdoctoral training and produce high-level research results. In view of the problems existing in the training process of foreign postdoctoral education in China, such as single training mode, loose cooperation between schools and enterprises, lack of inter school cooperation, lack of international cooperation and so on, it is analyzed that the main reason lies in the lack of smooth coordination between the subjects of foreign postdoctoral education and the lack of consistency of action. In view of this, under the guidance of collaborative innovation thought, it is an inevitable choice to pool resources from all parties, build innovative foreign postdoctoral training modes such as new school enterprise cooperation, inter school alliance and international exchange, and put forward guarantee conditions from the aspects of policy introduction, capital investment and evaluation mechanism.

## Keywords

Foreign Postdoctoral Students; Collaborative Innovation; Training Model.

## 1. Introduction

According to the statistics of the entry and exit stations of China foreign postdoctoral study foundation, in the 30 years since the establishment of China's foreign postdoctoral foundation, the number of foreign postdoctoral students in China has increased from 3 in 1991 to 675 in 2015, basically showing an upward trend year by year. In 2015, the number of foreign personnel and returned students (including Hong Kong, Macao and Taiwan) coming to China to do foreign postdoctoral work reached 1755, accounting for 11% of the total number of foreign postdoctoral students enrolled in the country that year, a record high. Among them, the number of foreign postdoctors in China increased from 158 in 2011 to 675 in 2015, with an average annual growth rate of 44%. Foreign postdoctoral personnel come from 103 countries and regions, of which more than half are from countries around China. Although the number of foreign postdoctors has increased every year since 2000. However, since 2000, when the scale of postdoctoral recruitment in China has expanded, the number of foreign postdoctoral students has not increased significantly compared with the total number of postdoctoral students. Judging from the development trend in recent five years, the proportion of foreign postdoctors in the total postdoctors has increased. By 2015, foreign postdoctors in China accounted for 4% of the total number of postdoctors enrolled. The scale of absorbing foreign postdoctors does not adapt to the level of China's economic and social development, and there is a big gap compared with developed countries. At the same time, there are few foreign postdoctoral stations in Nigeria and the United Kingdom, and there are not enough postdoctoral stations from the United States and other countries.

## 2. Related Concepts and Their Relationship Definition

### 2.1. Collaborative Innovation

At present, the collaborative innovation of colleges and universities at home and abroad includes the knowledge sharing mechanism within colleges and universities and the collaborative innovation of industry, University and research outside colleges and universities. The word "innovation" originates from Latin and has three levels of interpretation: first, simple renewal; Second, create new things; Third, change the old things and innovate with new thinking, new invention and new description as the main characteristics [1]. Collaborative innovation theory refers to the innovative organizations of different subjects in collaborative cooperation to realize the optimization, integration and redistribution of resources, produce the behavior of common technology development activities and scientific and technological innovation, and finally achieve the goal of scientific and technological innovation [2].

### 2.2. Foreign Postdoctoral Training Model and its Related Elements

The talent training mode determines the fundamental characteristics of the talents to be trained in Colleges and universities, and embodies the thought and concept of higher education. Huang Guoxun believes that from the operational level, the talent training mode refers to the knowledge, ability and quality structure built by the University for students and the way to realize this structure, including the training objectives, training specifications and basic training methods of talents. It fundamentally stipulates the characteristics of talents and embodies the educational thought and educational concept of higher education. [3] The training mode, organization and operation mode of talents can be defined as various teaching objectives, training mode and comprehensive evaluation system. According to the connotation and constituent elements of the talent training mode, the foreign postdoctoral training mode is not only different from the training mode of general education, but also has commonalities. Its constituent elements mainly include training objectives, training years, training ways and methods, and assessment and evaluation.

### 2.3. The Relationship between Collaborative Innovation and Foreign Postdoctoral Training Mode

In the opinions on comprehensively improving the quality of higher education and the plan for improving the innovation ability of colleges and universities, the Ministry of education will "Vigorously promote the in-depth cooperation between colleges and universities, scientific research institutes, industrial enterprises, local governments and foreign scientific research institutions, explore collaborative innovation models suitable for different needs, create an environment and atmosphere conducive to collaborative innovation, and improve the quality of higher education" as an important topic. The provisions of the above education policies are highly consistent with the connotation of collaborative innovation. As an integral part of the higher education system, the training subjects of foreign postdoctoral education should carry out effective coordination according to the connotation and requirements of collaborative innovation, strengthen the cooperation between colleges and enterprises, colleges and universities, colleges and scientific research institutions, domestic and foreign, and give full play to the resource advantages of each training subject, Effectively integrate the elements that promote the cultivation of foreign postdoctoral innovation ability, cooperate with the actions of various training subjects, innovate the foreign postdoctoral training mode, and further improve the quality of foreign postdoctoral training. [4]

### **3. Problems Existing in the Current Foreign Postdoctoral Training Mode**

#### **3.1. Single Training Mode**

At present, there are two main training modes for foreign post doctors. One is the "College" training mode, which is the most traditional training mode. Colleges and universities with foreign postdoctoral mobile stations assess foreign postdoctoral applicants and pass the assessment. The learning form is mainly to follow the tutor to do projects and projects. After two years, the projects or projects are completed, exit after assessment; The second is the "school enterprise cooperative" training mode, which is commonly referred to as the enterprise foreign postdoctoral. For enterprises with foreign postdoctoral research workstations or mobile stations, foreign postdoctoral applicants enter the station through assessment, and the enterprise signs a contract with colleges and universities to jointly train foreign postdoctoral. Generally, the tutors in the enterprise are responsible for the practical part, and the tutors in Colleges and universities are responsible for theoretical research, after a certain number of years, the project or experiment is completed and the station passes the examination. In terms of the number of stations set up by enterprises and colleges and the proportion of foreign post doctors, foreign post doctors in Colleges and universities occupy an absolute advantage, and the "academic" training mode is still the mainstream, which is not conducive to the improvement of foreign post doctors' practical ability and affects the training quality of foreign post doctors.

#### **3.2. Inter School Cooperation is Relatively Lacking, and the Degree of Resource Sharing is Low**

Various colleges and universities have different resources and advantages. How to make these resources and advantages play the most effective role in the training of foreign post doctors is a problem that colleges and universities with foreign postdoctoral mobile stations need to think about. Joint training is undoubtedly a path worthy of consideration. However, due to the influence of the well-defined management system and the inertia of conservative management thinking, through network search and telephone interview, we find that few colleges and universities with foreign postdoctoral mobile stations in China cooperate with other colleges and universities to cultivate foreign postdoctoral students.

#### **3.3. International Exchanges are not Enough, and the Internationalization of Foreign Postdoctoral Education is not High**

From the development trend of world education, the internationalization of talent training is deepening. However, at present, due to the influence of training funds, study abroad policy, foreign language level of foreign postdoctors and other factors, the number of foreign postdoctors who can receive training and exercise abroad is still small, and the transnational training of foreign postdoctors in China is still in the exploratory stage. Therefore, strengthening cooperation with foreign universities, enterprises and scientific research institutions and creating conditions for joint training of foreign postdoctors with foreign countries have become a subject that can not be ignored in the future.

#### **3.4. Innovation and Reconstruction of Foreign Postdoctoral Training Model based on Collaborative Innovation**

The most fundamental problem of the "academic" foreign postdoctoral training model is that it fails to fully coordinate all training subjects, share all kinds of resources and maximize the efficiency of resource utilization. Therefore, under the guidance of the idea of collaborative innovation, we should reconstruct the training mode which is in line with the development of the times and can effectively improve the quality of foreign postdoctoral training on the basis of the original mode.

### 3.5. Establish Inter School Training Mode

According to the concept of resource sharing, colleges and universities can share resources such as teachers, books and equipment, which can improve the efficiency of running a school. The application of Intercollegiate training mode in the process of foreign postdoctoral training will certainly improve the quality of foreign postdoctoral training and improve the efficiency of colleges and universities.

Teacher sharing inter school training mode. There are two ways: one is to send a certain proportion of foreign postdoctors between universities by signing an agreement according to their own wishes, research background, tutor's project needs and other standards; Second, foreign postdoctoral tutors are hired from each other. In order to realize the complementary advantages of disciplines, for disciplines with relatively weak teachers, part-time tutors can be hired from other colleges and universities. Realize the inter school training mode in the form of project cooperation. In the same research direction, carry out inter school cooperation according to the homogeneity of research projects, sign cooperation agreements, form a research team with a certain scale and strength, share research platforms and scientific research achievements. Through the above cooperation, a variety of resources can be integrated to form an educational joint force, so as to improve the quality of foreign postdoctoral training.

### 3.6. Promote Transnational Joint Training Mode

On the one hand, excellent foreign postdoctors are selected to go abroad for short-term training and investigation. According to the needs of economic and social development, a certain number of excellent foreign postdoctors are funded by the talent development fund to go to Europe for training, investigation and cooperative research every year. This joint training model not only promotes the contact between China's foreign postdoctors and the cutting-edge world research frontier, improves their research vision, but also brings infinite vitality to the local and national scientific and Technological Development and progress. On the other hand, foreign postdoctoral exchange training with relevant foreign institutions. Domestic and foreign postdoctoral training units actively strengthen cooperation with foreign colleges and units with doctoral degrees. The internationalization trend of foreign postdoctoral training is constantly strengthening. The central and local governments, foreign postdoctoral mobile stations and workstations should actively create opportunities and cooperate with foreign well-known universities, scientific research institutions and well-known enterprises to speed up the pace of transnational joint training.

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