

# Practicing and Thinking of International Graduate Education by “World-class Universities and World-class Disciplines Construction” in Beijing University of Technology

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**Abstract**—Through years of exploration, Beijing University of Technology’s internationalization of graduate education has brought about all - around development of talent cultivation, teaching reform and scientific research. This paper introduced the key projects including personnel training mode, scientific research projects and discipline construction achievements such as data analysis and thinking, for the implementation of the "Double First-rate" construction. These results have created new impetus and new thinking to support the "Double First-rate" construction.

**Keywords**—“Double First-rate” construction, Graduate education, Internationalization training

## I. INTRODUCTION

After the first three period construction of Project 211, the disciplinary structure system in Beijing University of Technology have been optimized, the build of key disciplines has become more distinctive, the research conditions have been greatly improved, the academic level has been significantly improved, and Beijing University of Technology has achieved the rapid development of discipline construction. These achievements are inseparable with the exploration of international training for graduate students of Beijing University of Technology, through the exchange of teachers and students learning, our university has established a long-term cooperation with many of the world’s top universities in scientific research, in the projects, our graduate students are inspired by the foreign teachers, there are a lot of opportunities to come into contact with the frontier the discipline of international knowledge and theories, many researchers have made new progress. This essay is aimed at the analysis of the internationalize postgraduate training project, using a systematic analysis and discuss on how to implement the "Double First-rate" construction.

## II. "DOUBLE FIRST-RATE" CONSTRUCTIVE OBJECTIVES AND THE THINKING OF THE INTERNATIONAL TRAINING OF POSTGRADUATES

### A. "Double First-rate" constructive objectives

The school will strive to achieve: peak subject construction make significant effect, outline our subject feature, and get into the ranks of the first-class international disciplines, reach the international advanced level in specific directions; extent the strength of Plateau disciplines, form a strong support for the discipline system, a number of disciplines reach the domestic first-class level, and gain international influence, multiple level subject system be optimized with significant characteristic and advantages; meet the needs of national and Beijing municipal major strategic features of subject construction, increase the comprehensive academic influence significantly besides in peers, the Beijing university of technology be important bases as cultivating innovative applied talents and solve the problem of economic, technological and social development, Beijing University of Technology be the leading position among the same kind of university in the quality of personnel training, scientific and technological level and comprehensive strength of teaching [1]. Specific objectives can be divided into: with the first-class discipline construction, Beijing university of technology will achieve overall subject construction: 1% in front of the ESI or 6-8 of top 400 QS ranking of disciplines; Peakdiscip lines: 1-2 subjects, become the top 10 in the country, and 10 percent relative to the top 10. Expanding the plateau: two to three disciplines, be in the top 15 in the country, and 15 percent relative to the top. Characteristic disciplines: 3-5 academic groups, some of which are in the top 20 in the country, or first 20 percent in the country.

### B. The thinking of the international training of postgraduates

To implement the spirit of the several opinions of Beijing University of technology to further implement the strategy of "talent students, excellent school" and the several opinions of Beijing University of technology on promoting the internationalization, expand horizons, learn widely from others' strong points, and use win-win cooperation, to excellence.

- It is fully advanced from the dots to lines, lines to aspects. In the process of promoting internationalization, based on the experience of the foreign teachers teaching, cultivate young teachers' international thinking, choose a stable foreign partners for our school, and face to the international research frontiers.
- To emphasize the great role of the multidisciplinary fusion in independent innovation, to let the university scientific research development "go out", "invite in" the foreign research strength, cooperation with famous professors in multifaceted subjects.
- Work hard to integrate personal development with the development of our schools. Studying abroad should aim at both the team and the specific research. In communicating with foreign professors, we should maintain the academic exchange attitude of equality and mutual benefit.
- We should make full use of the resources at home and abroad to achieve our own project while maintaining the sustainable development of our team.

### III. THE INTERNATIONAL TRAINING OF POSTGRADUATES PROJECTS IN BEIJING UNIVERSITY OF TECHNOLOGY

#### A. The type and coverage of the international projects

##### 1) The selection and administration of international graduate students

###### a) Projects relying on the national study fund committee of the the country

In 2016, 36 graduate students applied for the national professional graduate programs in our school, after being examined by the school experts, 31 students were recommended. 23 of them were approved studying in the United States, Britain, Canada, Australia and other well-known universities, 2 doctoral supervisors were invited in the short-term visiting project, 19 students has been successfully sent by now, all these projects have promoted our school and the cooperation with the world first-class universities and exchanges, promoted the innovative training of our students and the improvement of the international graduate education

###### b) The administration of international graduate students

In order to enhance the management of the graduate students, a communication group is established, through the network platform, we strengthened the communication between the students; it also has promoted the communication between the senior students and the freshmen. Through the network platform, the school sent blessings to the students on festivals. Let them feel the warmth of Beijing University of Technology.

In response to the problems in the dispatch process and management of the overseas graduate students, the following measures have been taken in the management of national graduate students since 2012:

- Established an audit system registration for the professional graduate students before sending , after

admission, the national professional graduate student must fill out the Beijing university of technology graduate students going abroad (boundary) application form, joint research students should fill in the survival under the Beijing university of technology graduate study abroad situation registration confirmation form, to make sure a graduate student can finish studying according to the related provisions of the current student status management and degree-conferring, to make sure the professional graduate training is in high level.

- We will standardize the process of sending students and make a restriction that they would check in after returning to the country.
- In order to strengthen the management of the students during the period of the foreign exchange, the students should report their academic progress to the teachers, colleges and graduate schools in papers.
- Revise the measures for the management of overseas graduate students in the state of Beijing University of Technology, and strengthen the management of overseas graduate students in a systematic way.

###### c) Strengthen the conclusion of the achievements of the graduate students

In order to know the achievements of students and the foreign policies of graduate education of colleges and universities, and the students of our school's opinion and advice for studying abroad, graduate school have designed the corresponding study summary reports. Students are asked to submit the summary and photos of studying abroad life when they returned home in two weeks.

###### d) Expand the channels for sending graduate students

Before 2016, we have made clear of the selection of national professional graduate student, the sending and returning registration requirements and procedures, we have increased the graduate students' propaganda, broaden the channels for the sending, we have effectively promoted the process of internationalization of graduate education. At present, our school fund project has transformed the postgraduate program to high level project specific programs, exchange scholarship program, artistic talent programs, doctoral supervisor short-term visiting projects, etc. Held on January 10, 2017, Beijing university of technology, the national professional postgraduate study abroad program announcement introduced the national professional graduate application process and matters needing attention in 2016, invited the director of national study foundation to introduce the policy of professional graduate programs in 2017, and invited the doctoral tutors and excellent joint training doctoral students to share their experiences. The convening of the mission laid a good foundation for the work of 2017. In the middle of April 2017, our school has successfully completed the report of the national study fund for overseas study in 2017.

###### 2) Short term joint training programs between schools

As the supplement of the national scholarship committee's national professional graduate program, starting in 2014, Beijing University of Technology launched the short-term joint

training projects, the project involves doctoral and graduate students, encouraging the graduate students participate in the joint training graduate students relying on personal channels of international cooperation. In 2016, there were 25 doctoral students and 57 postgraduate students participated in scientific research cooperation or joint training projects. Nine students went to Xinzhu Taiwan China Jiaotong university, Conservatoire national des arts et métiers in France, and the university of kermes, Austria for a master's degree, 30 graduate students were in the school short-term joint training projects and sent on schedule, By the tutoring and funding of the joint training, 43 graduate students took part in short-term joint training projects, expanded the research scope of their studies, kept pace with the latest research progress, improved the capacity of research, these have provided an important support for the high level graduate students training in our school.

3) *PhD overseas to take part in the international high level international conference funding plan*

In recent years, the school actively construct platform for the internationalization of the innovative talent training, students are encouraged to attend the international conferences, international academic communication, and good results have been achieved. Through academic exchanges, our students can reach out to the most advanced international academic topics and broaden their horizons. From 2013, our university has launched the program of PhD overseas to take part in the international high level international conference funding plan. In 2016, a total of 2016 PhD students in our school are funded by the plan, by attending international conferences, students have widen the academic vision, enhanced the students'

international exchange of information, on the international stage, we showed the elegant demeanor of our students.

International conference: more than 300 people were studying abroad. In 2015, Beijing University of Technology School began the long-term joint training project and short joint cultivation project of Beijing University of Technology. Before 2017, annual number of all kinds of study abroad was a total of 310 people, including 199 international conference, 86 international academic exchanges and research cooperation (including the school's short-term joint cultivation and long-term joint), national professional training sent 19 people.

4) *The program of international development of young teachers*

In order to promote the internationalization of graduate education, improve the ability of the internationalization of young teachers in our school team and the quality of graduate education, implement the construction goal of being an international, famous, distinctive and high level university [3], the school set up special funds supporting youth teachers ability of internationalization development, after looking though the youth teachers application, examined by their college and school expert group ,the auditions have done at the end of 2013, a total of 31 mentors earned the funding, the project was concluded and summarized in 2016 [1]. By the project financing, youth mentor participated in international academic conference, to be the international journal reviewers, invited foreign experts to do reports, visited abroad in a short term, with these efforts, we have achieved a substantive cooperation with the foreign research, promoted the reputation of our school in the world.

TABLE I. INNOVATION PROJECT

<b>The project name</b>	<b>Direct object</b>	<b>Cumulative recommendation</b>
CSC graduate student aboard program	graduate student	226
Long-term joint training	graduate student	35
Short-term joint training	graduate student	42
International Conference of doctoral students	PhD	253
international development of young teachers	young teachers	31
Employ foreign experts	Graduate course teacher	50

B. *The achievement of the international projects*

(1) *The CSC graduate student aboard program*

Over the past nine years, our school has basically achieved the goal of cultivating high-level creative talents. In the doctoral students funded by the national public school, 93 were returned and 33 percent received the excellent doctoral

dissertation. 75 people earned their doctorate in excellent grades; 25 people received the excellent doctoral dissertation; two people received the excellent doctoral thesis in Beijing; one person obtained the national excellent doctoral thesis [2].

(2) *The program of international development of young teachers*

1) *Guidance for graduate tutor*

This project directly guided 14 doctoral candidate, 167 master's students, 12 people of them won the national scholarship, 1 was being honored with the Beijing outstanding graduates, 1 student gained the principal scholarship, 6 outstanding master papers in our school, 2 students was honored the school outstanding graduates, 90% won the school scholarship, attended the international conference on 9 times, finished 9 school graduate students of science and technology fund project, one graduate student was in the capital of excellent graduate student, one student went abroad at the University of Maryland to do the joint training. A PhD student won the third Asian magnetism alliance International Conference (The 3rd International Conference of AUMS) AWARD for The best wall newspaper "(EXCELLENT POSTER AWARD)".

### 2) *International communications*

The implementation of the program of international development of young teachers aimed at improving the internationalization of young teachers in our school team and the quality of graduate education, making them to be the pioneers of the internationalization. The implementation of this plan has been strengthened in the following areas:

#### a) *Participant in and organize academic conference*

To participate in the international academic exchanges 128 person-times, and to report, to actively publicize the academic achievements of our school in different disciplines

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#### b) *To be the reviewers of international journals*

Young mentors have been the reviewers in many journals: Ultrasonic, Materials Evaluation, Journal of Intelligent Materials and Structures, Wave Motion, International Journal of Precision Engineering and Manufacturing, Microelectronics Journal, Journal of Material Chemistry A, Metallurgical and Materials Transaction B, Journal of High Temperature Process, IEEE TRANS.on Wireless Communications, IET Communications, Journal of Earthquake Engineering and Engineering Vibration, Mathematical Problems in Engineering, Optics Express, Optic letters, Applied Optics, Optics Communications, Welding in the world, Environ. Sci. & Tech., Water Research, Recent Patents on Materials Science, Journal of Physical Chemistry, Journal of Urban Planning and Development, etc.

#### c) *Invite foreign experts to make academic reports*

Professor Xuerong Mao, of the royal college of science in Edinburgh, UK, was invited to speak. The collaboration invited Professor Purnendu k. Dasgupta to do the research, and invited Professor Antic, the Serbian institute of nuclear technology to visit. Invited Dr. Tokita, Japan's NJS Company, to visit; Invited professor J.P.L. from the University of Texas, Dr. Kevin Elkins.

### 3) *The paper is published by Chemical Reviews, a leading international journal of Chemical science*

Environment and energy engineering college of Beijing university of technology researcher's paper "TiO<sub>2</sub> Nanoparticles as Functional Building Blocks", is published as one of the cover of the journal of the American Chemical society "Chemical Reviews, (2014, Vol. 114, No. 19, pp9283-9318). Chemical Reviews is one of the highest international influence chemicals in academic periodicals, as the journal of the American Chemical society the most authoritative review, impact factor of 45.661 in 2013, ranked third in all academic journals. This is the first time that our school has published an academic paper in Chemical Reviews by the First complete unit, and the first author.

### C. *The graduate science and technology innovation award*

In 2003, to improve the quality of graduate education, encouraging graduate students actively to carry out scientific and technological innovation activities, our school has set up a graduate student of science and technology innovation prize[2], outstanding achievements in every school year in science and technology innovation of graduate students are commend and reward. The award settings are detailed below

In 2016, a total of 2,653 scientific and technological achievements were obtained by graduate students of our university. Among them, the SCI (area one), included 78 dissertations, SCI, 508 papers (non area one), the SSCI 4 papers, CSSCI 84 dissertations, EI, the non conference theses of 347 papers, EI collected 229 conference theses, ISTP, 38retrieval papers, 141 papers were published in journal of our school newspaper, 413 papers were published in domestic core journals. (public) 6 international invention patents, (authorized), 408 national invention patents, utility models and designs licensing 49 items, 297computer software copyright; To be involved in 4 writing technical standards, books and textbooks; Obtaining one provincial and ministerial science and technology awards; Won 17 national science and technology competition awards, 14 provincial and ministerial science and technology competition awards, and 15 other external technology competition awards.



**TABLE II. BEIJING UNIVERSITY OF TECHNOLOGY INNOVATION AWARDS**

<b>Award type</b>	<b>Special award</b>	<b>The first prize</b>	<b>The second prize</b>	<b>Honorable mention</b>
The paper	SCI (area one) Indexed paper	SCI (non-area one) 、 SSCI Indexed paper	EI (non conference theses) 、 CSSCI、 A&HIC Indexed paper	EI (conference theses) 、 ISTP Indexed paper
Patents, Software copyright	International patent (public)	-	National invention patent (authorized)	Utility model patent, design patent, computer software copyright
Monograph, The technical standards	The international standard	Special and national standards	The provincial or ministerial standard	
Science and technology competition, Design competition	-	International/national level (including national level 1) first prize (or 3)	Second prize (or 4-5) in international/national competition; The first prize (or the first three) in the provincial and ministerial level	Other external technology competitions or design competitions
The Tech Awards	-	Provincial or ministerial level of science and technology award	-	-

#### IV. SUMMARY AND OUTLOOK

Before 2020, Beijing university of technology's goals: has the important influence and competitiveness disciplines at home and abroad, make a number of academic masters and leaders, build a high level of discipline platform, have good ability of education internationalization and international characteristics [2], have an outstanding school's characteristics, upgrade the level of the running of our school, improve our reputation and social influence significantly, make Beijing university of technology to become an international famous, distinctive, high level research university [4].

For the internationalization of graduate education in our school, we should pay attention to make it comprehensive, diversified, three-dimensional, internationalization should be training to each grade, professional, and multiple points of view of teaching, scientific research and daily activities, In the process of building international culture in the campus, which is carried out by Chinese and foreign students, our university should focus on the international communication ability and innovation ability of graduate students [5]. In the field of international operation, we should pay more attention to the promotion of international teachers' allocation, international research cooperation projects and the quality and quantity of international scientific research output. In particular, take the following measures

#### A. Build a team of international teachers

##### 1) Bringing in high-level teachers from abroad

On the one hand, hire foreign experts and scholars, study overseas talents with international experience and the international top experts as a tutor [6], increasing the number of teachers with international standards, enhance the international competitiveness of each course and the internationalization of teacher knowledge structure. Internationalized vision will promote the internationalization of graduate student scientific research and innovation ability raising; On the other hand, invite foreign experts and scholars to give lectures or participate in short-term research collaboration, introduce international advanced technology, thoughts and the latest academic research achievements, promote the high level of international academic exchanges, promote the improvement of graduate teaching and research..

##### 2) Implement the program of international teacher training

Create the conditions of the cooperation and communication for the postgraduate, through studying abroad, and the investigation of visiting, international academic activities, scientific research methods such as cooperation, promote the international exchange of personnel, increases the chances of teacher contacting world discipline frontier theory, expand the teachers' international field of vision, improve

teachers' ability of international communication and international scientific research level [4].

#### *B. Promote the cultivation of international talents*

The research output of graduate students and teachers in our university includes publishing papers, publishing monographs and obtaining patent authorization. International scientific research achievements obtained is a reflection of our school's international scientific research strength, the scientific research achievements directly affects the quality and quantity of the scientific research evaluation between colleges and universities [6]. At the same time, we should pay attention to improving the quality of international scientific research output, graduate students and teachers are encouraged to publish papers, books and textbooks, obtain patent licenses in the first-class international journals and international conference [7].

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