

Developmental Trends of Graduate Education in China

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Abstract

This article offers a snapshot of developmental trends in Chinese graduate education for the past twenty years by examining the differentiated expansion of levels, types, disciplines, and gender composition. Also, the drivers for expansion are analyzed in terms of domestic demands for graduate education and for upgrading research and development workforces. Finally, the potential outcomes for future development are explored.

On December 25, 2021, about 4.57 million applicants took the National Graduate Education Entrance Examination in China, marking the sixth consecutive year of a rate of increase over 10 percent. This indicates the strength of domestic demand for graduate education, at a time when the country is speeding up the construction of its knowledge-intensive economy. As knowledge and innovation have replaced capital assets and labor productivity as the engines for national growth and prosperity, and with worldwide higher education approaching mass and universal stages, many countries have been expanding student participation in graduate education to prepare for the future. Mainly using data from the ministry of education and the National Bureau of Statistics in China, supplemented by data from the World Bank, UNESCO, and the National Science Foundation in the United States (US), this article tries to depict the developmental trends of graduate education in China, which may offer implications for other countries striving to upgrade their workforce.

Differentiated Expansion: Levels, Types, and Disciplines

Since the Reform and Opening-up in 1978, China has witnessed an unprecedented development of graduate education, with an increase of the total number of entrants from about 10,000 in 1978 to 128,484 in 2000, and further to 1,106,551 in 2020. Over the past two decades, the number of master degree entrants grew by a factor of 9.62, from 102,923 to 990,504, while the number of doctoral entrants increased by a factor of 4.62, from 25,142 to 116,047.

In terms of types of education, the past two decades witnessed the rapid development of professional graduate education in China. Professional graduate programs first appeared in 1991, with a large proportion of enrollments from part-time students graduating without degrees. This lasted until 2009, when the ministry of education began expanding professional graduate education to full-time programs. The percentage of entrants into the professional track jumped from 22.17 percent in 2010 to 55.69 percent in 2020 (from 24.83 percent to 60.83 percent in master programs, and from 2.36 percent to 11.82 percent in doctoral programs).

The development of each discipline varied during the expansion. The general trends show that the share of social sciences gained the most, that of medicine and agriculture also increased, while that of engineering, natural sciences, and humanities and arts dropped. At the master level, engineering constantly attracted the largest share of entrants, with a decline, however, from 42.95 percent in 2000 to 27.34 percent in 2010, followed by an increase to 34.92 percent in 2020. The same trends occurred with other applied disciplines, including social sciences, medicine, and agriculture. The share of the natural sciences has been in constant decline, from 12.51 percent in 2000 to 6.83 percent in 2020.

At the doctoral level, engineering has also attracted the most entrants, although also experiencing the trend of a decline and a subsequent increase, and achieving 41.27 percent in 2020. The second largest discipline in terms of numbers of entrants has been the natural sciences, with a relatively stable percentage, from 19.21 percent in 2000 to 18.54 percent in 2020, followed by medicine (15.47 percent) and social sciences (14.67 percent), while humanities & arts saw a continuous decline from 7.88 percent in 2000 to 5.74 percent in 2020.

Women Are Catching Up

From 2000 to 2020, the share of female entrants into graduate education rose from 34.3 to 52.5 percent. Their percentage at the master level has gone up from 36.3 to 53.5 percent; and for doctoral education, it has expanded from 26.6 to 42.7 percent. Notably, women have been catching up and their number now surpasses that of men in graduate education in general, although in doctoral programs, male entrants are still more numerous. Little is known with regard to gender composition within the various disciplines, because of a lack of open data.

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Drivers for Further Expansion

With more than one million entrants in total, the current scale of Chinese graduate education is significant. However, it is still unable to meet domestic demand. The demand-supply disparity of graduate education can be illustrated by the ratio of entrants to applicants, which was 1:3.4 in 2021 and is likely to widen further in 2022, given that 800,000 more applicants took the recent entrance exam. It can be predicted that strong demand will continue to drive further expansion, for a number of reasons:

First, the development of Chinese graduate education has not kept pace with the expansion of undergraduate education. During the period of 2000–2020, the ratio of the number of graduate entrants to the number of bachelor degree awardees was 1: 4.4 on average.

Second, in spite of a nearly tenfold increase of graduate education since 2000, the number of graduate enrollments was only 2.2 per thousand individuals in 2020. China lags significantly behind the United States and most European countries, with figures ranging from 9 to 14 per thousand individuals, respectively.

Third, the Chinese labor market is starved for a more highly skilled workforce. Statistics from the US National Science Board and the US National Science Foundation show that China's share of global value-added output of high and medium-high R&D intensive industries has risen from 13 percent in 2003 to 47 percent in 2018, while the output of knowledge- and technology-intensive industries reached around 2,100 billion US dollars in 2019. Nonetheless, less than 0.7 percent of the total number of employed individuals in 2020 were full-time equivalent members of the R&D workforce. In 2019, about 43.9 percent of the full-time equivalent R&D workforce were researchers, and less than 35 percent of the full-time equivalent R&D workforce members were graduate degree holders. This puts great pressure on the need to increase the Chinese R&D workforce, for which further developing graduate education provides one solution.

Potential for Future Development

China has the financial potential to strengthen its graduate education. Its GDP has increased 10.1 times in the past two decades, and its growth rate exceeded 8.1 percent in 2021, in spite of the pandemic. Meanwhile, its total R&D expenditure experienced a 26-fold increase in the period 2000–2020, from 89.6 billion to 2,439 billion; that of basic research saw a 30-fold growth. Both growth rates outpaced the rate of increase of graduate enrollment.

China acknowledges the strategic role of talent to lead national development. This has recently been stressed by the leader of the Chinese Communist Party, who announced the implementation of a strategy to develop a quality workforce to help reach China's goal of becoming a major world center of talents and innovation. Therefore, as a crucial way to upgrade the nation's workforce, graduate education can be expected to develop further. ▲

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