

## Translation



The following document, issued by the PRC Ministry of Education in 2020, recommends a number of measures to improve China's system for cultivating AI talent. Most of the recommendations address two basic problems: The disconnect between academic training of AI graduate students and the AI work being done in industry, and the difficulty of designing curricula for a field as interdisciplinary as AI.

### Title

Notice on the Publication of "Certain Opinions on Promoting Curricula Merging at 'Double World-Class' Institutes of Higher Education and on Accelerating the Cultivation of Graduate Students in the AI Field" by the Ministry of Education, the National Development and Reform Commission, and the Ministry of Finance  
教育部 国家发展改革委 财政部印发 《关于“双一流”建设高校促进学科融合 加快人工智能领域研究生培养的若干意见》的通知

### Author

The PRC Ministry of Education (教育部), National Development and Reform Commission (NDRC; 国家发展和改革委员会; 发展改革委; 发改委), and Ministry of Finance (财政部)

### Source

Official website of the PRC government. The "Opinions" were issued on January 21, 2020 and were uploaded to the website on March 3, 2020.

The Chinese source text is available online at:

[https://web.archive.org/web/20201217173647/http://www.gov.cn/zhengce/zhengceku/2020-03/03/content\\_5486326.htm](https://web.archive.org/web/20201217173647/http://www.gov.cn/zhengce/zhengceku/2020-03/03/content_5486326.htm)

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To the education departments (education commissions), development and reform commissions, and finance departments (bureaus) of all provinces, autonomous regions, and province-level municipalities; to the Education Bureau, Development and Reform Commission, and Finance Bureau of the Xinjiang Production and Construction Corps; and to the education departments (bureaus) of all relevant agencies (units), and relevant institutes of higher education:

In accordance with the *New Generation Artificial Intelligence Development Plan*<sup>1</sup> issued by the State Council, the Ministry of Education, the National Development and Reform Commission (NDRC), and the Ministry of Finance have formulated *Certain Opinions on Promoting Curricula Merging at "Double World-Class" Institutes of Higher Education and on*

<sup>1</sup> Translator's note: For an English translation of the *New Generation Artificial Intelligence Development Plan*, see: <https://www.newamerica.org/cybersecurity-initiative/digichina/blog/full-translation-chinas-new-generation-artificial-intelligence-development-plan-2017/>

*Accelerating the Cultivation of Graduate Students in the AI Field*, which are hereby issued for careful implementation.

Ministry of Education, NDRC, Ministry of Finance

January 21, 2020

## **Certain Opinions on Promoting Curricula Merging at "Double World-Class" Institutes of Higher Education and on Accelerating the Cultivation of Graduate Students in the AI Field**

Artificial intelligence (AI) is a strategic technology leading a new round of scientific and technological (S&T) revolution, industrial transformation, and social transformation. It has a major and profound impact on economic development, social progress, and international political and economic patterns. Cultivating and gathering high-level talents with innovative capabilities and a spirit of cooperation is an important mission of institutes of higher education. Compared with developed countries, China still faces a big gap in the basic theories of AI, original algorithms, high-end microchips, and ecosystems. Interdisciplinary merging of curricula must be deepened, and the orientation of talent cultivation must be strengthened. In order to implement the important deployments of the Party Central Committee and the State Council on accelerating the development of new generation AI, promoting the construction of "double world-class"<sup>2</sup> institutes of higher education, striving to build an AI talent cultivation (培养) system that approaches the international advanced level, and accelerating the cultivation of high-level talents who dare to rush into "uncharted territory" ("无人区"), the following opinions are hereby offered.

### **I. Overall Requirements**

#### **(1) Guiding Ideology**

Guided by Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, fully implement the spirit of the 19th Party Congress and the Second, Third, and Fourth Plenums of the 19th Central Committee. Rely on "double world-class" construction to deepen the content of AI, build a cultivation system that emphasizes both basic theoretical talents and "AI + X" compound talents, and explore a new model of in-depth integration of curricula construction and talent cultivation. Strive to improve the training level of graduate students in the field of AI to seize the forefront of world S&T for China, achieve major breakthroughs in leading original achievements, and provide more adequate talent support.

#### **(2) Basic Principles**

Demand-oriented and application-driven: Guided by solving the major theoretical and practical application problems of AI, promote research into basic theories of AI and accelerate the conversion and application of AI-related S&T achievements in key industrial sectors.

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<sup>2</sup> Translator's note: The PRC government launched its "world-class universities and world-class curricula" (世界一流大学和一流学科) initiative, abbreviated "double world-class" ("双一流"), in 2017 with the aim of increasing the number of Chinese universities that rank among the world's best.

Oriented toward the application of AI in industry, expand core technologies and innovative methods to realize the empowerment and transformation of related disciplines by AI and form a new compound development model of "AI + X."

Project guidance and diversified support: Serve and support the mission needs of major national projects and major development plans, coordinating the layout of multidisciplinary and interdisciplinary production and education integration innovation platforms and talent cultivation bases in such directions as basic theory, algorithms, software, and integrated circuit design. Give full play to the guiding role of government fiscal investment and policy support and the decisive role of the market in the allocation of resources to encourage enterprises and society to increase investment to form a new pattern in which fiscal funding, financial capital, and social capital<sup>3</sup> work together to support the development of AI-related curricula and the cultivation of high-level talents.

Cross-disciplinary integration and precise training: Deepen the integration of AI and related disciplines such as basic science, information science, medicine, philosophy, and social sciences, continuously enrich and improve the core knowledge systems and interdisciplinary core knowledge systems of AI, and cultivate new curriculum growth points and new unique directions. Grasp the rhythm of AI talent cultivation, combine learning and application, and strengthen practice. Create new high-level talent cultivation mechanisms and train students to master domain-facing and application-oriented conceptual systems, methods, and tools of different disciplines. Strengthen the integration of production and education and build an atmosphere of independent innovation (自主创新) and talent cultivation.

## II. High-level talent team strengthening

(3) Cultivate high-level innovative talents: Increase the steady support for outstanding talents, especially young talents, and vigorously cultivate AI leaders with development potential. Build a multi-type, high-quality, and rationally structured talent team, covering theories, methods, tools, system research, and the application of AI technology to industrial innovation, social governance (社会治理), and national security. Strengthen education on the ethics of AI scientific research. Encourage leading AI companies to provide experimental and practical environments and train university instructors in accordance with the latest developments in industrial technology and the latest needs for talent cultivation.

(4) Promote the construction of high-end AI talent pools in an orderly manner: Cultivate and attract outstanding talents and high-level innovative teams in the forefront of AI, as well as outstanding young talents with development potential, pay attention to the diversity and complementarity of talents' disciplinary backgrounds, and implement personalized support policies to realize the systematic integration of talents with different disciplinary backgrounds.

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<sup>3</sup> Translator's note: The Chinese term 社会资本, translated literally as "social capital," and its synonyms 社会资金 "social funding" and 社会投资 "social investment," refer to any source of funding outside of government budget outlays. These terms encompass investment by private individuals and private institutions. However, investment from state-funded entities such as state-owned enterprises (SOEs), including state-run banks, also falls under the umbrella of "social capital" or "social funding."

Attract outstanding talents from enterprises and research institutes to carry out scientific research and talent cultivation in institutes of higher education through flexible employment methods such as dual employment. Coordinate the use of various resources to provide good conditions for talent flow and innovation and entrepreneurship.

### **III. High-level development platform construction**

(5) Improve the layout of AI as an academic discipline: Strengthen the establishment of basic theories of AI, machine learning, computer vision and pattern recognition, natural language processing, knowledge processing and mining, intelligent chips and systems, data analysis and big data systems, cognitive psychology, and neuroscience. Encourage institutes of higher education to coordinate various types of funds to support the construction of AI-related disciplines, gradually form disciplinary advantages, and promote the penetration and integration of AI into more disciplines.

(6) Establish innovation platforms for the integration of production and education: Relying on the "double world-class" construction of institutes of higher education, build a national AI industry-education integration innovation platform to implement joint scientific research and integrated education on major issues and breakthroughs in AI development and strengthen the construction of curriculum systems, computing platforms, and experimental environments. Encourage enterprises to participate in joint construction and give priority to support in terms of funds and projects.

(7) Close school-enterprise cooperation: Support institutes of higher education, scientific research institutes, industry alliances and key enterprises, and new research and development (R&D) institutions as they collaborate on the construction of AI open innovation platforms, application scenario platforms, joint laboratories (technology R&D centers), and training bases for major research directions or key industry applications in order to build pilot AI colleges or research institutes. Encourage enterprises to participate in the formulation of graduate training programs, organize high-level AI talent innovation and entrepreneurship and skills competitions, and guide students to carry out innovation and entrepreneurship practices based on actual corporate problems.

### **IV. Innovation in high-level talent cultivation mechanisms and approaches**

(8) Establish special task training mechanisms for graduate students: Taking the special task of addressing major problems through multidisciplinary approaches as the main source and cultivation vehicle of graduate students, support the cultivation of high-level AI talents with high levels of scientific research, support institutes of higher education in major scientific research tasks undertaken as they independently determine the scale of graduate training, formulate personalized training plans, and improve talent cultivation cost sharing mechanisms. For doctoral students undertaking major scientific research tasks, institutes of higher education should refer to the relevant regulations on the management of scientific research personnel and formulate specific measures to guarantee and improve the relevant prerequisites of doctoral students to protect the legitimate rights and interests of doctoral students.

(9) Strengthen interdisciplinary compound training of doctoral students: Focusing on the basic theories and algorithms, key technologies, and core applications of new generation AI, strengthen problem-oriented multidisciplinary and interdisciplinary doctoral training, and improve the ability of doctoral students to integrate and innovate different disciplines' theories and methods, scientific frontiers, and corporate practices. Support institutes of higher education and key enterprises in the field of AI, industrialization bases, and local governments in establishing joint talent cultivation programs, establishing task-driven cross-industry and interdisciplinary tutor teams, and promoting the development of collaborative innovation in scientific research and the joint training of doctoral students. Improve training standards for engineering PhDs, increase the proportion of engineering practice in the training program, and collaborate with enterprises to carry out professional competence certification training for talents. Encourage enterprises to open courses, data, cases, tools, and training platforms to doctoral students.

(10) Strengthen the construction of the academic discipline system: Facing the needs of the entire production chain and social development, scientifically design a multidisciplinary and interdisciplinary integrated curriculum system to avoid simple “combinations” (“拼盘化”). Based on theoretical evolution and core technologies in key areas, build a core knowledge curriculum system for AI, focusing on building a batch of basic AI courses that are integrated with mathematics, physics, computer science, control science, neuro- and cognitive science, psychology, and other disciplines. Guided by major technological frontiers and industrial application innovation needs, create a curriculum system related to AI and encourage high-tech innovative enterprises to participate in the construction of a batch of "scenario-driven" application-oriented module courses. Accelerate the conversion of the latest S&T achievements in the field of AI into lesson content and build a batch of influential teaching materials and select national online open courses.

(11) Strengthen international exchanges and collaboration: Aiming at the international cutting edge of AI and at weaknesses in its domestic development, increase support for joint training of doctoral students in AI-related fields at home and abroad. Actively encourage high-level talents to carry out international exchanges and expand the depth and breadth of cooperation. Hold internationally influential AI academic conferences and forums and create high-level academic journals. Build a number of AI international cooperative scientific research platforms and bases and strengthen the development and training of international high-end talents. Encourage institutes of higher education to initiate and organize AI international science programs and create international academic organizations and university cooperation alliances. Promote the formulation of relevant international standards and ethical norms in the field of AI. Vigorously cultivate internationalized talents to participate in the global governance of AI.

## **V. Greater support and organization**

(12) Improve academic discipline establishment mechanisms: Improve the dynamic adjustment mechanisms of disciplines and majors, guided by the basic theories of AI and the needs of industrial development. Allow qualified institutes of higher education to

independently set up AI interdisciplinary curricula in accordance with the needs of economic and social development and talent cultivation.

(13) Improve academic curriculum evaluation mechanisms: Improve the system by which curricula are evaluated with a focus on talent cultivation, knowledge innovation, and application effectiveness. Explore evaluation methods that are conducive to the in-depth integration and development of emerging interdisciplinary curricula, and adopt a relatively relaxed construction and evaluation cycle. Encourage institutes of higher education to carry out self-assessments and support scholarly associations and industry associations that carry out third-party evaluations, and, where reasonable, adopt international evaluation practices. Construct a composite evaluation mechanism that encourages the dynamic flow of interdisciplinary researchers and recognize their dual contributions to source curricula and interdisciplinary curricula, including in such forms as papers, patents, and software copyrights.

(14) Expand the scale of graduate training: Incorporate AI into the scope of support for the “Special Enrollment Plan for the Training of High-Level Talents Urgently Needed in Key National Fields” (“国家关键领域急需高层次人才培养专项招生计划”), giving comprehensive consideration to the high-level instructors of relevant institutes of higher education, national-level scientific research platforms, major scientific research projects, and key research tasks, as well as the integration of production and education, the effectiveness of collaborative education, and arrange for planned special enrollment increments (招生计划专项增量) for graduate students, especially doctoral students. Actively guide institutes of higher education to effectively optimize enrollment structures through the implementation of conventional incremental tilt (常规增量倾斜) and inventory adjustment (存量调整) methods and accurately expand the scale of high-level talent cultivation in AI-related disciplines.

(15) Improve quality assurance mechanisms for academic degrees: Encourage institutes of higher education to set up teaching guidance sub-committees in AI-related disciplines to carry out diversified teaching evaluations. Degree evaluation committees at institutes of higher education shall establish AI working groups to be responsible for the development of AI high-level talent cultivation programs, degree standards and management norms, and to undertake work related to the evaluation of degrees. Improve master's-to-doctorate degree training and diversion and dropout mechanisms. Establish an interdisciplinary review expert group, set up special review elements, and conduct random inspections of academic dissertations in the field of AI and special inspections on the quality of talent cultivation in a timely manner.

(16) Strengthen the guidance of capital investment: Encourage institutes of higher education to coordinate various resources such as financial investment and scientific research income, increase support for graduate training, and strengthen cutting-edge basic research and breakthroughs in key universal technologies (关键共性技术). Strengthen cooperation with key enterprises, use channels such as angel investment, venture capital, venture capital funds, and capital market financing to guide the participation of social capital in the implementation of major AI projects in institutes of higher education, and increase talent cultivation, applied

research, and basic platform construction to support the transfer and conversion of S&T achievements into practical applications (成果转化).

(17) Strengthen organization and implementation: The Ministry of Education shall strengthen the overall coordination of policies and measures, establish an expert committee for high-level AI talent cultivation, instruct institutes of higher education on implementing special talent cultivation programs, and promptly summarize and promote reproducible experiences and practices. Educational administrative departments and institutes of higher education in various regions should strengthen the construction of AI-related curricula and talent cultivation plans, formulate practical implementation plans, and improve the quality monitoring and evaluation mechanisms for talent cultivation.