

Policy Recommendations for Promoting the Integrated Development of Education, Science and Technology, and Talent During the 15th Five-Year Plan Period

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DOI: <https://doi.org/10.36348/sjhss.2025.v10i09.003>

| Received: 28.07.2025 | Accepted: 25.08.2025 | Published: 27.09.2025

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Abstract

Promoting the integrated development of education, science and technology, and talent has important strategic value. It is the only way to break through key core technologies and serve the country's high-level scientific and technological self-reliance and strength. It is an urgent need to seize new technological tracks and shape new competitive advantages. It is a key strategy to accelerate the integration of the four chains and empower the high-quality development of the economy in the new era. However, the fragmentation and insufficient development of the education, science and technology, and talent system affect the innovation vitality and efficiency. During the 15th Five-Year Plan period, in order to promote the high-quality development of employment, it is necessary to aim at national self-reliance and strengthen the top-level design and overall coordination of the integrated reform of the education, science and technology, and talent system and mechanism. Aim at national strategic needs and give play to the important role of the new national system in promoting the integrated development of education, science and technology, and talent. Face frontier fields and future industries and explore and practice new organizational forms of scientific and technological innovation. Pool global education, science and technology, and talent resources and build an open ecosystem for the integrated development of education, science and technology, and talent.

Keywords: Integration of Education, Science and Technology, and Talent; New National System; Integration of Industry and Education; System and Mechanism Reform; High-quality Employment.

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I. The Strategic Value of Promoting the Integrated Development of Education, Science and Technology, and Talent: The Core Logic Anchored to National Strategic Needs

General Secretary Xi Jinping pointed out that "to achieve high-level scientific and technological self-reliance and strength, build a socialist modern country, and promote the great rejuvenation of the Chinese nation, the key lies in science and technology, the foundation is in education, and ultimately it depends on talent". From the perspective of the internal relationship among the three, education is the foundation for talent cultivation, science and technology is the core engine of innovation-driven development, and talent is the key link connecting education and science and technology. The three complement each other and support each other, jointly forming the "iron triangle" of innovation and development.

First, it is the only way to break through key core technologies and serve the country's high-level scientific and technological self-reliance and strength. The world is undergoing accelerated evolution of profound changes unseen in a century, and global competition in scientific and technological innovation is unprecedentedly fierce. The United States and the West have imposed comprehensive blockades and containment on China's industrial chain, supply chain, and innovation chain, and the problem of "stuck neck" in key core technologies such as chips, industrial software, and high-end instruments is prominent. Only by giving full play to the advantages of the new national system, accelerating the coordinated development of education, science and technology, and talent, and integrating the basic research capabilities of universities, the technical research capabilities of scientific research institutions, and the achievement transformation capabilities of enterprises can we concentrate superior resources to break through the "stuck neck" problems. During the

15th Five-Year Plan period, China needs to achieve an integrated linkage of "strengthening the foundation through education (cultivating basic research talents), tackling key scientific and technological problems (breaking through core technical bottlenecks), and leading with talent (gathering strategic scientists and leading talents)" to effectively enhance its independent innovation ability and lay a solid foundation for high-level scientific and technological self-reliance and strength.

Second, it is an urgent need to seize new technological tracks and shape new competitive advantages. The new round of scientific and technological revolution and industrial transformation is accelerating. Technological breakthroughs are constantly emerging in frontier fields such as artificial intelligence, quantum information, life science, and low-altitude economy, and new industries, new business forms, and new models are rapidly emerging. The world's major innovative countries are all accelerating their innovation layouts in frontier fields, trying to seize the commanding heights of future competition. It is necessary to promote the coordinated development of education, science and technology, and talent, build cross-disciplinary, cross-industry, and cross-subject collaborative innovation platforms, and give birth to forward-looking and leading major original achievements. During the 15th Five-Year Plan period, in order to implement the requirements of the Third Plenary Session of the 20th Central Committee of the Communist Party of China on "constructing a system and mechanism that supports all-round innovation", it is necessary to take the integrated reform of education, science and technology, and talent as the starting point, promote the concentration of innovation elements in frontier fields, form a preemptive advantage in new tracks, and shape new drivers of high-quality development.

Third, it is a key strategy to accelerate the integration of the four chains and empower the high-quality development of the economy in the new era. At present, China's economy is showing a steady recovery trend, but problems such as the insufficient depth of integration between the innovation chain and the industrial chain, the insufficient transformation of the advantages of education and talent into industrial advantages, and the need to strengthen the supporting role of scientific and technological innovation in economic growth still exist. General Secretary Xi Jinping requires that "we should integrate scientific and technological innovation resources, lead the development of strategic emerging industries and future industries, and accelerate the formation of new productive forces". It is necessary to accelerate the construction of an ecological system in which the industrial chain, innovation chain, capital chain, and talent chain are closely intertwined. During the 15th Five-Year Plan period, only by promoting the integrated

development of education, science and technology, and talent and opening up the cycle of "talent cultivation - technological innovation - industrial application" can we cultivate and create a number of high-end, precise, and cutting-edge industrial clusters with core competitiveness and provide strong support for the construction of a modern industrial system.

II. The Prominent Shortcomings in the Development of the Education, Science and Technology, and Talent System: A Gap Analysis against National Strategic Requirements

Compared with the important guiding spirit of General Secretary Xi Jinping and the deployments of various plenary sessions since the 20th National Congress of the Communist Party of China, the current education, science and technology, and talent system in China still has problems of fragmentation and insufficient development, and the overall efficiency has not been fully released, which is obviously inconsistent with the requirements of serving high-level scientific and technological self-reliance and strength and building a scientific and technological power.

First, the top-level design is insufficient, and the coordination mechanism needs to be improved. Education, science and technology, and talent are managed by different functional departments, each with a relatively complete working system and division of responsibilities, and are coordinated by different working leading groups. A national unified guiding document for the integrated development of education, science and technology, and talent has not been formed. The construction of a virtuous cycle mechanism of the "trinity" of giving priority to education development, achieving scientific and technological self-reliance and strength, and being led by talent is lagging behind. Problems such as difficult cross-departmental resource integration, poor policy coordination, and insufficient joint efforts are prominent. Against the background of the compilation of the 15th Five-Year Plan, this pattern of "many departments managing one thing" is difficult to meet the needs of the efficient allocation of innovation elements, and it is urgent to strengthen top-level coordination and break down departmental barriers.

Second, the structural contradictions in talent are prominent, and the strength of strategic talent is weak. General Secretary Xi Jinping emphasized that "it is necessary to vigorously cultivate strategic scientists and build a high-level team of leading scientific and technological talents and a echelon of young scientific and technological talents". However, there are obvious shortfalls in China's current echelon of scientific and technological innovation talents: first, there is a shortage of strategic scientists and leading scientific and technological talents. The number of top talents in frontier fields such as artificial intelligence and integrated circuits is less than one-fifth of that in the

United States, and it is difficult to take the lead in solving "stuck neck" technical problems; second, the reserve of young scientific and technological talents is scarce. The proportion of young scientific research personnel under 35 years old is only 30%, lower than the average level of 50% in developed countries, and the mechanism for "cultivating, introducing, using, and retaining" young talents in enterprises is not perfect; third, there is a shortage of professional scientific and technological service talents. The number of talents such as technology managers and concept verification experts is only one-fifth of that in Silicon Valley, and the transformation rate of scientific and technological achievements in universities is less than 8%, far lower than the 40% level in developed countries, which is difficult to support the extension of the innovation chain to the industrial chain.

Third, the cultivation of talents in universities is out of touch with industrial needs, and the integration of production, education, and research is not deep. As the main position for talent cultivation, universities have a tendency of "valuing theory over practice and quantity over quality", and the discipline setting is not fully in line with the development requirements of high-end, precise, and cutting-edge industries. According to the survey, 85% of universities have signed cooperation agreements with enterprises, but less than 30% have truly achieved "joint curriculum construction, mutual dispatch of teachers, and joint research on projects". The integration of production and education mostly starts from the education side, and the enthusiasm of enterprises to participate has not been fully mobilized. This phenomenon of "the separation between university research and industrial needs" has led to the coexistence of "difficult employment" for graduates and "labor shortage" for enterprises, which is not in line with the task requirements of "cultivating new productive forces and promoting industrial upgrading" during the 15th Five-Year Plan period.

Fourth, the evaluation and incentive mechanism is rigid, and the innovation vitality has not been fully released. The evaluation mechanisms in the fields of education, science and technology, and talent are relatively independent, lacking connectivity and compatibility, and an integrated coordinated evaluation system has not been formed. There is still a "four only" (only focusing on papers, titles, academic qualifications, and awards) orientation in universities and scientific research institutions. It is difficult for enterprise R & D achievements to replace academic achievements in professional title evaluation. There is a "small circle" phenomenon in scientific research project management, and the selection of major projects is out of touch with the actual industrial needs. At the same time, the talent evaluation standards among universities, scientific research institutions, and enterprises are significantly different, and there are "identity barriers" for talent cross-border flow, which restricts the free flow and

optimal allocation of innovation elements and is inconsistent with the requirements of the Third Plenary Session of the 20th Central Committee of the Communist Party of China on "deepening the reform of the scientific and technological system and forming a basic system that supports all-round innovation".

III. Practical Paths for Promoting the Development of Education, Science and Technology, and Talent Undertakings in an Integrated Manner During the 15th Five-Year Plan Period: Closely Aligning with National Arrangements and Planning Tasks.

During the 15th Five-Year Plan period, promoting the integrated development of education, science and technology, and talent must be guided by Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, deeply implement the spirit of the 20th National Congress of the Communist Party of China and the Third Plenary Session of the 20th Central Committee, closely focus on the core task of the 15th Five-Year Plan, which is "constructing a new development pattern and promoting high-quality development", take the reform of the institutional mechanism as the driving force, promote the deep coordination of education, science and technology, and human resources, construct an ecological environment of "integration of four chains", and promote the high-quality development of employment.

(1) Aiming at national self-reliance and strengthening the top-level design and overall coordination of the integrated reform of education, science and technology, and human resources

First, strengthen the unified leadership of the Party and improve the integrated planning system. Implement the instruction of General Secretary Xi Jinping on "adhering to and strengthening the Party's overall leadership over scientific and technological undertakings", establish a leading group for the integrated development of education, science and technology, and human resources led by the leaders of the Central Committee of the Communist Party of China and the State Council, and make overall plans to promote the national reform work. In combination with the compilation of the 15th Five-Year Plan, study and formulate the "Guiding Opinions on the Integrated Reform of the Institutional Mechanisms of Education, Science and Technology, and Human Resources", clarify the overall goals (by 2030, the total number of strategic scientists will exceed 150, the transformation rate of scientific and technological achievements in universities will reach 30%, and the talent gap in the digital economy will be basically filled), key tasks and responsibility divisions, explore the legislation for the coordinated development of education, science and technology, and human resources, strengthen the consistency review of policy objectives, and ensure that the policies of education, science and technology, and human resources are complementary and connected, and work in the same

direction. Second, promote the overall coordination and linkage of departments and improve the collaborative working mechanism. Clarify the division of labor and responsibilities of departments such as education, science and technology, human resources and social security, and development and reform, establish a working mechanism of "monthly scheduling, quarterly supervision, and annual assessment", and incorporate the effectiveness of integrated development into the performance assessment of local governments and departments. Strengthen the coordination between the central and local governments, establish a central-local consultation mechanism, jointly strive for the landing of national-level innovation platforms and major scientific and technological research projects, and promote the preferential allocation of high-quality innovation resources to local areas. Build a "one-stop" cross-department service platform to realize "one-window acceptance and parallel approval" for matters such as talent identification, project application, and resource allocation, and compress the handling time by more than 50%. Third, take major projects as the traction to optimize the allocation of innovation resources. Closely adhere to the task of "strengthening, supplementing, and extending the chain" in the 15th Five-Year Plan, rely on the national major science and technology plan and the industrial foundation-laying project, encourage enterprises to play the leading role in innovation, take the lead in forming industry-university-research alliances, and promote the in-depth cooperation between universities, scientific research institutions and enterprises. Focusing on frontier fields such as artificial intelligence, quantum information, and biological manufacturing, lay out a number of "education-science and technology-human resources" integration projects, scientifically coordinate resources such as funds, talents, and technologies, ensure the effective implementation of reform measures, and accelerate the deep integration of the industrial chain, innovation chain, capital chain, and talent chain.

(2) Aiming at national strategic needs and giving play to the core role of the new national system in integrated development

First, construct an efficient national laboratory network and strengthen the strategic scientific and technological strength. Implement the requirement of the Third Plenary Session of the 20th Central Committee of the Communist Party of China on "improving the new national system", strengthen the leading role of national laboratories in the integrated reform of education, science and technology, and human resources, and make pilot explorations in terms of resource integration, personnel incentives, scientific research organization, and fund management. Rely on the systematic development of national key laboratories, support leading science and technology enterprises to take the lead in building national key laboratories, and promote enterprises to jointly build R & D platforms with

universities and scientific research institutions to form a full-chain innovation ecosystem of "basic research - technological research - achievement transformation". Second, build a top-notch education and research highland and gather high-quality human resources. Support high-level research universities and scientific research institutions to deepen the reform of the talent training model, give play to their role as the core platform for the integration of educational resources and scientific and technological talents, and construct a closed-loop system of "scientific research - achievement transformation - industrial upgrading". Continuously promote the construction of world-class new R & D institutions to provide new space for the deep integration of education, science and technology, and human resources; closely adhere to the task of "cultivating strategic scientists" in the 15th Five-Year Plan, rely on major innovation platforms, increase the efforts to discover and cultivate strategic scientists, explore the rapid growth path of young scientific and technological talents, and attach importance to the introduction and cultivation of industrial innovation talents and technology transfer talents. Third, innovate the organized scientific research model and overcome major scientific and technological problems. Keep up with the trend of interdisciplinary integration, deepen the cooperation among universities, scientific research institutions, and enterprises, and promote the formation of a new scientific research organization model of "large-scale coordinated operations", concentrate forces to overcome key technical bottlenecks. Focusing on the future industries specified in the 15th Five-Year Plan (such as low-altitude economy and brain-computer interface), organize cross-disciplinary and cross-unit teams to carry out joint research, optimize the allocation of education, science and technology, and human resources, and ensure the efficient implementation of national major strategic tasks.

(3) Facing frontier fields and future industries and innovating the organization mode of scientific and technological innovation

First, give play to the leading role of large enterprises and construct a collaborative innovation ecosystem. Strengthen the leading role of leading enterprises in the industry in the innovation ecosystem, promote the landing of innovation consortium projects, overcome core key technologies, incubate leading talents, and support the development of innovative small and medium-sized enterprises. Construct an industrial science and technology innovation platform to make up for the weak links in the industrial chain and innovation chain; encourage leading enterprises to deeply participate in basic scientific research, integrate technology-driven and market-demand-oriented, and create a new model of original basic research, which is in line with the task requirement of "strengthening the main position of enterprise innovation" in the 15th Five-Year Plan. Second, take the market and scenarios as the

traction to coordinate the allocation of innovation resources. Optimize the market-oriented scientific and technological project organization mechanism, establish an enterprise-demand-driven project formation mechanism, and ensure that scientific research "comes from the industry and goes back to the industry". Closely adhere to the requirement of "developing new productive forces" in the 15th Five-Year Plan, take scenario applications as the starting point, face frontier technologies and future industry fields, design a list of major application scenarios (such as intelligent factories and autonomous driving), integrate education, science and technology, and human resources to carry out joint research, and accelerate the deep integration of the innovation chain and the industrial chain. Third, based on the regional coordination strategy, promote the docking of the industrial chain and the innovation chain. In combination with the regional coordination development tasks of the 15th Five-Year Plan, promote the integrated reform of the institutional mechanisms of education, science and technology, and human resources in key regions such as the Beijing-Tianjin-Hebei region, the Yangtze River Delta, and the Guangdong-Hong Kong-Macao Greater Bay Area, and strengthen the co-construction of regional key industrial clusters. Draw an industrial chain map, and formulate "one-chain-one-strategy" plans for strengthening, supplementing, extending, and optimizing the chain; promote the cross-regional flow and efficient allocation of innovation elements such as talents, technologies, capital, and information, and construct a collaborative innovation ecosystem and an industrial cooperation ecosystem covering the entire chain of "basic research - technological research - technology application - achievement industrialization".

(4) Gathering global resources and constructing an open ecosystem for the integrated development of education, science and technology, and human resources

First, create an overseas-like innovation and entrepreneurship environment and optimize international talent services. Implement the instruction of General Secretary Xi Jinping on "gathering the best talents from around the world and making good use of them", implement more relaxed and convenient talent introduction policies, simplify the procedures for foreign talents to work, reside, and obtain permanent residence in China, and explore the establishment of a highly flexible international professional talent practice system. Provide an attractive living environment, support innovation entities to expand their international vision, optimize the global allocation of innovation resources, and lay a foundation for enhancing the international talent competitiveness during the 15th Five-Year Plan period. Second, deepen the reform of the evaluation mechanism and release innovation vitality. Closely adhere to the requirement of the Third Plenary Session of the 20th Central Committee of the Communist Party of China on "improving the evaluation mechanism for

scientific and technological achievements", adhere to the assessment orientation of long-term cycles, development indicators, representative achievements, and classified evaluations, take "breaking the four onlys" and "establishing new standards" as the breakthrough points, construct a scientific and technological talent evaluation system oriented by innovation value, ability, and contribution, and establish a talent identification and evaluation system for high-end industries. Promote the connection of evaluation standards among universities, scientific research institutions, and enterprises, eliminate barriers to talent flow, and promote the free flow and optimal allocation of human resources. Third, optimize the open innovation environment and improve the service support system. By releasing the superposition effect of policies, attract foreign-funded R & D centers to gather in China and form an innovation highland; improve the "from introduction to development" one-stop service system to provide full-cycle support for education, science and technology, and human resources; unblock the channels for talent flow, and take the lead in implementing a special allocation mechanism for talents tackling key core technologies that "hold up the neck" in the national strategic scientific and technological forces, break the barriers to talent flow among universities, scientific research institutions, and enterprises, and provide a guarantee for constructing an open and inclusive innovation ecosystem during the 15th Five-Year Plan period.

Promoting the integrated development of education, science and technology, and human resources is a strategic measure to cope with global changes, cultivate new productive forces, realize Chinese-style modernization, and promote the high-quality development of employment. During the 15th Five-Year Plan period, it is necessary to use systematic thinking to break down institutional and mechanism barriers, use innovative practices to open up the channel of "education building the foundation - science and technology tackling key problems - human resources leading", let all kinds of innovation elements flow fully, and provide a solid support for building a powerful country in education, science and technology, and human resources.

ACKNOWLEDGMENT

This paper is a phase-specific outcome of the 2025 General Research Project "Research on the Mechanisms and Key Pathways for the Digital Economy to Promote High-Quality Employment Development in Beijing" (Project KY2025C0334) conducted by the Beijing Academy of Social Sciences.

General Secretary Xi Jinping emphasized that "it is necessary to promote the integrated development of education, science and technology, and talent and build a talent competitive advantage". This important instruction profoundly reveals the dialectical and unified

internal logic of education, science and technology, and talent, and points out the fundamental direction for innovation and development in the new era. The 20th National Congress of the Communist Party of China for the first time made a centralized deployment of "trinity" of education, science and technology, and talent, clearly stating "adhere to the priority development of education, scientific and technological self-reliance and strength, and talent-led driving". The Third Plenary Session of the 20th Central Committee of the Communist Party of China further proposed "coordinating the integrated reform of the system and mechanism of education, science and technology, and talent, improving the new national system, and enhancing the overall efficiency of the national innovation system". Currently, it is a crucial connection period for the conclusion of the 14th Five-Year Plan and the compilation of the 15th Five-Year Plan. Based on the new development stage and closely adhering to the core task of the 15th Five-Year Plan of "constructing a new development pattern and promoting high-quality development", it is necessary to deepen the coordinated reform of education, science and technology, and talent with a systematic thinking, fully release the multiplication effect of the integration of the three, and provide a solid support for the realization of Chinese-style modernization.

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