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Original article

AI-ENABLED DISCIPLINARY CONSTRUCTION AND ASSESSMENT: DILEMMAS AND PATHWAYS

CONSTRUCCIÓN Y EVALUACIÓN DISCIPLINARIA HABILITADA PARA IA: DILEMAS Y VÍAS

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Abstract

AI has shown significant potential in enhancing the construction and high-quality assessment of academic disciplines. As China transitions from an index-driven to a high-quality development model in disciplinary construction, the focus has shifted from using evaluation indicators to solidify disciplinary foundations, to addressing societal concerns and improving overall standards through assessment, and ultimately toward stimulating the internal motivation for excellence. However, during this critical transformation period, AI-enabled disciplinary construction and evaluation still confront three major challenges, namely ideological inertia, technological limitations, and a lack of ecosystem support. Meanwhile, the historic push toward building a strong nation has accelerated the need for innovation in talent cultivation models, research paradigms, and evaluation mechanisms. In response, this study proposes a strategic path forward through deepening conceptual understanding and breaking cognitive barriers to integrate AI more effectively into decision-making process, building collaborative, open, and value-driven evaluation platforms to foster multi-stakeholder engagement, and advancing human-AI

collaboration to drive adaptive transformation in assessment organizations through technological innovation, thereby creating a governance ecosystem characterized by human-machine complementarity and flexible responsiveness.

Keywords: AI-enabled; disciplinary construction; disciplinary assessment; high-quality development.

Resumen

La IA ha demostrado un potencial significativo para mejorar la construcción y la evaluación de alta calidad de las disciplinas académicas. A medida que China transita de un modelo de desarrollo basado en índices a uno de alta calidad en la construcción disciplinaria, el enfoque se ha desplazado del uso de indicadores de evaluación para consolidar las bases disciplinarias, a abordar las preocupaciones sociales y mejorar los estándares generales mediante la evaluación, y finalmente a estimular la motivación interna hacia la excelencia. Sin embargo, durante este período crítico de transformación, la construcción y la evaluación disciplinarias basadas en IA aún enfrentan tres desafíos principales: la inercia ideológica, las limitaciones tecnológicas y la falta de apoyo del ecosistema. Mientras tanto, el impulso histórico hacia la construcción de una nación fuerte ha acelerado la necesidad de innovación en modelos de desarrollo de talento, paradigmas de investigación y mecanismos de evaluación. En respuesta, este estudio propone un camino estratégico a seguir a través de la profundización de la comprensión conceptual y la ruptura de las barreras cognitivas para integrar la IA de manera más efectiva en el proceso de toma de decisiones, construir plataformas de evaluación colaborativas, abiertas y basadas en valores para fomentar la participación de múltiples partes interesadas y avanzar en la colaboración entre humanos e IA para impulsar la transformación adaptativa en las organizaciones de evaluación a través de la innovación tecnológica, creando así un ecosistema de gobernanza caracterizado por la complementariedad hombre-máquina y una capacidad de respuesta flexible.

Palabras clave: IA habilitada; construcción disciplinaria; evaluación disciplinaria; desarrollo de alta calidad.

Introduction

Disciplinary construction in China refers to project-based, cyclical initiatives with specific development goals, forming a project-driven model of disciplinary advancement. As China's higher education system has matured, academic disciplines have become central to the development of universities, with disciplinary strength seen as a core driver of institutional excellence. Historically, major stages in the development of Chinese universities have been closely linked to the restructuring of disciplinary systems. Since the reform and opening-up period, disciplines have played an increasingly important role in university development.

To meet the demand for high-level talent in national modernization, the government has launched a series of initiatives—such as the Key Discipline Development Program, the "211 Project", the "985 Project", and the "Double First-Class" initiative—leading to the formation of key talent training bases and hubs for scientific and technological innovation.

In this context, disciplinary construction has evolved from an index-oriented approach to one focused on high-quality development, aiming to support scientific progress, national strategic goals, and broader

societal needs. This article proposes a strategic path for conceptually deepening cognitive breakthroughs to more effectively integrate AI into decision-making, build collaborative, open, and value-based assessment platforms to foster multi-stakeholder engagement, and advance human-AI collaboration to drive adaptive transformation in assessment organizations through technological innovation, thereby creating a governance ecosystem characterized by human-machine complementarity and flexible responsiveness.

Laying a Solid Foundation for Disciplinary Development through Evaluation-Oriented Approaches

In the 1980s, to better meet the country's growing demand for high-level talent during the reform and opening-up period, China launched the key disciplinary construction program in the field of higher education. The program aimed to establish benchmarks and explore effective models for developing world-class disciplines. As a major initiative to accelerate the development of Chinese universities, the program sought to concentrate limited educational resources on selected universities and disciplines, enabling them to take the lead and serve as national models.

In May 1983, the National Higher Education Work Conference proposed the goal of "effectively developing a group of key universities and disciplines to serve as the backbone of higher education and as centers for education and scientific research". In May 1985, the Decision of the Central Committee of the Communist Party of China on the Reform of the Educational System called for the "planned construction of a group of key disciplines". In 1988, the State Education Commission of the PRC organized a panel of experts to select 416 key disciplines across 107 universities. In 2001, a second round of selection was launched, resulting in the identification of 964 key disciplines.

When a discipline is designated as a key area of construction, it gains access to significant forms of capital within the academic field—including economic, cultural, social, and symbolic capital—and becomes a crucial indicator of a university's academic strength and distinctiveness. The selection criteria for key disciplines serve as a critical guide for discipline development. In pursuit of recognition and resource support associated with key discipline status, universities align their disciplinary development strategies with evaluation indicators to secure competitive advantages in the national academic landscape. Over time, as evaluation experience has accumulated and understanding of discipline development has deepened, the design of evaluation indicators for national key disciplines has become more scientific and objective. Nevertheless, these evaluations remain fundamentally outcome-oriented.

In 1987, China introduced its first official requirements for the selection of national key disciplines. First, the selection and development of key disciplines had to be aligned with the national demand for cultivating high-level talent in support of the Four Modernizations, the trends in scientific and technological advancement, and the availability of national financial resources. Second, key disciplines were to be selected from eligible doctoral programs. Third, construction funding could come from multiple sources, including national support, investment from supervising authorities, and university self-financing. Emphasis was placed on the initiative and vitality of universities and the disciplines themselves, encouraging them to attract diverse funding and collaborative support by producing high-quality talent and research outcomes. Construction was to be carried out in phases as needed. Overall, universities were expected to have strong foundations in disciplinary development direction, research

teams, teaching and research infrastructure, scientific equipment, and access to library and reference resources.

In the 1980s, the conditions for disciplinary construction in Chinese universities were relatively weak, and the overall level was not high. The indicator-oriented selection and assessment system served as an effective incentive mechanism. During the expansion of China's higher education system from small to large scale, this indicator-driven approach played an important role. However, due to the limitations of the time, the academic community's understanding of evaluation indicators was still relatively superficial. The blind pursuit of these indicators also laid hidden risks for the development of some university disciplines. After the large-scale expansion of higher education in China, the indicator-oriented selection system began to show certain limitations.

Driving the Overall Improvement of Disciplinary Construction by Stimulating Vitality

The 1990s was a period of profound transformation in China's social development. The dissolution of the Soviet Union and dramatic changes in Eastern Europe sounded an alarm for China, while the rise of Four Asian Tigers and Tiger Cub Economies in Asia became a source of motivation for China's development. The waves of economic globalization and regionalization also prompted China to actively integrate into the global economic system, with foreign trade gradually becoming an important pillar of economic growth. The 14th National Congress of the Communist Party of China in 1992 set the goal of establishing a socialist market economy, marking a significant milestone in China's economic reforms.

Under the influence of the socialist market economy, the initiative for social development was activated, and the concepts of performance and competition stimulated all sectors of society to pursue change proactively. In disciplinary construction, the key to improving the level of development lies in stimulating disciplinary vitality and responding to the demands of the country and society for various types of high-level talent. A level-based evaluation model centered on disciplinary competition gradually took shape. Within the same disciplinary field, disciplines with higher development levels were selected for key support to further leverage the leading role of key disciplines, thereby enhancing the overall level of disciplinary construction in Chinese universities. Level evaluation involves designing an evaluation index system and setting evaluation standards based on the evaluation's objectives. Using these established standards, the evaluation assesses the construction of degree-granting units and authorized discipline and specialty programs, judging their compliance and capabilities, and measuring their overall performance.

Horizontal assessments generally involve ranking, categorizing, and grading the evaluated units based on the assessment results.[1] Such assessments are sometimes also referred to as merit-based evaluations. One typical example is the disciplinary assessment organized by the Academic Degrees Committee of the State Council and the Ministry of Education, which represents a standard form of horizontal evaluation. This assessment evaluates the overall quality of first-level disciplines authorized to grant doctoral or master's degrees, following the Catalogue of Degree Awarding and Talent Training issued by the Academic Degrees Committee of the State Council and the Ministry of Education. Based on the evaluation results, the development status of each discipline is analyzed and ranked accordingly.

In November 1995, approved by the State Council, the State Planning Commission, the State Education Commission and the Ministry of Finance jointly issued the "211 Project" overall construction plan,

making it clear that "the construction of key disciplines is the core, is an important symbol of the level of teaching and scientific research, and is an effective way to drive the improvement of the overall level of the university". During the "Ninth Five-Year Plan" period, 602 key disciplines construction projects were arranged; during the "Tenth Five-Year Plan" period, 777 key disciplines construction projects were deployed. 1999, the "985 Project" was officially launched, requiring key disciplines to be constructed. In 1999, the "985 Project" was formally launched, requiring key construction universities to focus on "supporting key disciplines, developing advantageous disciplines and encouraging new disciplines" and building "special disciplinary zones".

One of the objectives of the "211 Project" is to enable a considerable number of key disciplines to become a base for training high-level specialists, focusing on improving the teaching and scientific research infrastructure conditions in colleges and universities with a high concentration of key disciplines, so as to make significant improvements in the quality of personnel training. The "985 Project" is a "strengthened version" of the "211 Project", and in 2004, the second phase of the "985 Project" was launched. "In 2004, the second phase of the 985 Project was aimed at bringing a number of disciplines up to or close to the level of first-class international disciplines.

Discipline-level assessment aims to measure the development level of academic disciplines and to address key concerns from the state, universities, and society, such as: How should the level of a discipline be recognized? How effective is disciplinary construction? How should such construction be carried out? This stage of discipline-level evaluation represents a critical period of exploration, innovation, and progress in China's academic discipline development. It has played an important role in advancing the overall quality of disciplinary construction. Despite the many challenges and issues it faces, discipline-level assessment has generated valuable experience and laid a solid foundation for future discipline development and evaluation efforts. It has also had a profound and lasting impact on the pursuit of building world-class academic disciplines.

Promoting High-Quality Development of Disciplines with a Focus on First-Class Advantages

In the 21st century, the factor-driven economic era has been replaced by a new era characterized by innovation-driven growth.[2] The rapid iteration of modern information technologies has accelerated the pace of societal development and intensified global competition. Higher education, as the foundation of knowledge innovation and the cultivation of innovative talent, is a key pillar of national competitiveness.

The high-quality development of academic disciplines forms the bedrock of building a strong higher education system. Establishing disciplinary advantages is essential for transitioning from a stage of "following" to one of "leading". Amidst profound and unprecedented global changes, a key challenge for building a strong higher education system lies in identifying a scientific and contextually appropriate path for discipline development that aligns with China's national conditions.[3] Achieving high-quality development of academic disciplines requires a paradigm shift from an "indicator-driven" model to one centered on substantive, high-quality outcomes.

Disciplinary characteristics represent the "gene pool" of disciplinary culture, the driving force behind serving national strategic needs, and the "moat" that safeguards the inheritance of academic traditions. Characteristics reflect uniqueness—they are the essential traits that distinguish one entity from another and form the basis and symbol of its existence. They embody three levels of meaning: possessing what

others do not, excelling where others are comparable, and innovating beyond what others already excel in[4]. The Ministry of Education clearly defines "characteristics" in its Implementation Plan for the Evaluation of Undergraduate Teaching in Higher Education Institutions as: "Characteristics are the distinctive and high-quality features developed over the long course of a university's operation, which are unique to the institution and superior to those of other universities". The disciplinary development process of each university reflects its deep integration with other disciplines, institutions, society, and the nation, and highlights its significant role in specific fields.

At the stage of building China into a leading country in higher education, the primary focus of discipline development has shifted to the construction of world-class and globally competitive disciplines. In 2015, the State Council issued the Overall Plan for Coordinated Promotion of World-Class Universities and First-Class Disciplines, marking a strategic transformation in China's academic development—from key disciplinary construction to first-class discipline development, and from a government-led, selective model to a competitive, university-driven approach. Subsequently, in 2017, the Ministry of Education, the Ministry of Finance, and the National Development and Reform Commission jointly released the Provisional Implementation Measures for Coordinated Promotion of World-Class Universities and First-Class Disciplines. The document emphasized building first-class universities and disciplines with Chinese characteristics and global excellence. It proposed aligning discipline development with the fundamental mission of moral education, taking "first-class" as the goal, "disciplines" as the foundation, "performance" as the leverage, and "reform" as the driving force, in order to advance a number of high-level universities and disciplines into the ranks of the world's leading institutions.

As China enters the second phase of the "Double First-Class" initiative, the report of the 20th National Congress of the Communist Party of China proposed for the first time to "accelerate the development of world-class universities and advantageous disciplines with Chinese characteristics". The concept of advantageous disciplines builds upon the foundation of first-class discipline development and carries specific conceptual and contemporary significance. Advantageous disciplines refer to fields that exhibit clear strengths within their respective domains and are irreplaceable in certain areas.

World-class advantageous disciplines are those with notable comparative and competitive advantages on the global stage, assessed against peer disciplines worldwide. Such disciplines typically possess the following characteristics: academic leaders and research teams with significant international influence; internationally recognized research achievements in specific fields; a track record of cultivating top-tier innovative talents who become core figures and leaders in their disciplines; strong competitiveness in securing research platforms, obtaining research funding, and attracting high-level talent; irreplaceable value in advancing certain scientific or academic fields.

During this period, disciplinary assessment in China evolved from condition- and level-based evaluations to a monitoring-based model. Monitoring assessment refers to the continuous collection and in-depth analysis of relevant data using modern information technology. It aims to provide an objective basis for value judgments and scientific decision-making by visually presenting the state of the system for multiple stakeholders. By leveraging big data technologies, this model enables real-time and continuous monitoring, and is thus characterized by regularity, objectivity, formative feedback, and diverse evaluative perspectives[5].

The "Double First-Class" initiative represents a key strategic deployment in China's higher education development. Achieving its goals requires a stronger focus on the substantive meaning of "first-class". In December 2020, the Ministry of Education, the Ministry of Finance, and the National Development and Reform Commission issued the Provisional Guidelines for Evaluating the Effectiveness of "Double First-Class" Construction. These emphasized the need to establish a regular monitoring system focused on the developmental progress of universities and disciplines, thereby forming an integrated model of monitoring, improvement, and evaluation[6].

The dynamic monitoring of the "Double First-Class" initiative serves as a key mechanism for guiding its ongoing development in China. As the initiative has deepened, education authorities have strengthened oversight of both the construction process and its outcomes. Building upon the initial implementation framework, dynamic monitoring and evaluation have enabled authorities to better align strategies with the new stage of national development and to advance the high-quality construction of "Double First-Class" institutions and disciplines. This monitoring process emphasizes data-driven and evidence-based evaluation to objectively reflect the current status of the initiative. The disciplinary monitoring framework comprises five core dimensions:

1. Progress in discipline development,
2. Cultivation of top-tier innovative talent,
3. Building of world-class faculty,
4. Advancement in scientific research capacity,
5. Contributions to society.

The purpose of monitoring and assessment is threefold: to support government agencies in overseeing the entire construction process and enabling timely macro-level adjustments; to help universities provide real-time feedback and accelerate internal development; and to inform the public and enhance transparency and social oversight. By processing and analyzing large volumes of data, the monitoring system transforms raw data into valuable information and knowledge, effectively mapping the state of disciplinary development. This feedback loop enables the academic community to make informed, value-based decisions, encourages continuous improvement at all levels, and ultimately fosters a data-driven cycle that supports the high-quality development of disciplines.

Achieving the goal of building a strong higher education system is essential to promoting the high-quality development of academic disciplines. The driving force behind discipline development has gradually shifted from externally imposed evaluation indicators to an internal pursuit of excellence and quality. To achieve a qualitative leap from "following" to "leading", it is crucial to explore the inherent laws of disciplinary development and to innovate disciplinary construction models. In the era of digital intelligence, disciplinary assessment provides robust technical support for high-quality development. By leveraging artificial intelligence technologies, it enables evidence-based decision-making, identifying key leverage points and growth areas through data-driven insights.

Challenges Facing Discipline Development in the AI Era

The rapid iteration of AI technology has had a wide impact on the development of disciplines. However, there is a noticeable lack of motivation among practitioners to actively apply AI in solving problems related to disciplinary construction. Currently, discipline development in the AI era faces several key

challenges: limited awareness and understanding of AI among academic stakeholders; an immature integration of disciplinary development and technological innovation; and the absence of a collaborative ecosystem, which hinders the effective implementation of AI-powered disciplinary construction.

(i) Ideological Constraints: From "Practice" to "Concept"

Although AI is increasingly applied in the field of education, many practitioners remain cautious when it comes to its use in disciplinary evaluation—a core component of academic quality, talent cultivation, and research performance. Skepticism and low acceptance of AI in this context reveal a cognitive gap between technological innovation and traditional approaches to discipline development. This gap is rooted in path dependency and a culture of risk aversion, which together create a dual constraint of cognitive inertia and institutional rigidity. As a result, the application of AI remains largely theoretical, failing to a dilemma which is "suspended implementation".

At the cognitive level, the rigidity of traditional disciplinary paradigms hinders the integration of AI methodologies. This is evident in practitioners' skepticism toward the interpretability of algorithmic "black boxes" and their adherence to human judgment-based models of educational management. Some discipline builders exhibit a "technical cognitive deficit", reflecting a structural conflict between the industrial-era model of knowledge production and the evolving paradigm of intelligent civilization. This deficit exposes an intergenerational disconnect in cognitive frameworks and reveals how the mechanism of knowledge reproduction lags behind technological advancement.

Due to limited understanding of AI and insufficient technical literacy, many practitioners question the feasibility and effectiveness of using AI in discipline development. In addition, some regard qualitative human experience as incompatible with quantitative algorithmic analysis, and presuppose that "algorithmic analysis=dissolution of humanism", which makes practitioners of disciplinary construction panic about the dissolution of meaning.

The internalized institutional defense mechanisms within the system have systematically suppressed the innovative capacity of disciplines. Excessive defensive behavior among disciplinary construction practitioners has triggered an "Innovation Valley of Terror" effect. The unchecked expansion of data security boundaries and the constant shifting of responsibility have mired discipline development in stagnation, making it difficult to clarify and implement responsibilities, rights, and interests. Excessive risk aversion has given rise to a typical manifestation of the "Innovation Valley of Terror". Because AI-enabled disciplinary development still lacks a mature operational paradigm, innovation inherently involves risks. When data security boundaries are overstretched into an open-ended chain of liability transfer, the willingness of stakeholders to engage in the process is significantly weakened.

Concurrently, a sense of power transfer anxiety has emerged, as some practitioners fear that their authority could be undermined or even replaced by AI engineers. This deep-seated institutional anxiety stems from a fundamental restructuring of the power dynamics over resource control. As disciplinary development shifts from a manager-dominated model to a triadic model involving administrators, disciplinary members, and AI technologies, the traditional authority of academic managers over resource allocation is facing dual challenges. At the operational level, AI engineers effectively control resource coordination through algorithmic system design; at the discursive level, the deep involvement of intelligent systems in academic decision-making may trigger a "crisis of interpretive authority".

(ii) Technical Limitations in the Transition from "Quantitative" to "Qualitative" Change

The core contradiction in AI-enabled discipline development lies in the tension between the rich, multidimensional nature of disciplinary construction and the insufficient explanatory capacity of current technologies. This contradiction is primarily reflected in the insufficient integration between technological mechanisms and the intrinsic logic of disciplinary development, manifesting in the following three aspects.

First, the insufficient accumulation of discipline-related data. The structuring of educational data is a fundamental prerequisite for AI technologies to function effectively. However, current research on disciplinary construction remains insufficient, and there is no unified consensus on the key elements that should guide the development of disciplines. As a result, process-related data lacks standardized collection protocols. The prevalence of multi-source and heterogeneous data has led to the emergence of serious "data silos". Furthermore, concerns around data privacy and limitations in data timeliness further hinder the practical performance of AI technologies. The lag in disciplinary data has become a critical bottleneck in AI-driven disciplinary construction, which fundamentally stems from a systemic disconnect between the data supply side and the algorithmic demand side.

Secondly, the technical workload involved in constructing knowledge graphs for disciplinary development is immense. Knowledge graphs are not merely storage containers for disciplinary knowledge; they serve as cognitive intermediaries that reshape the modes of academic production. The construction of knowledge graphs within disciplinary development requires the academic community to deconstruct and reconstruct the underlying technical logic. Essentially, this process represents a profound dialogue between technological tools and disciplinary rationality. Therefore, building knowledge graphs for disciplines is not a simple case of technology transfer, but rather a digital reinterpretation of the connotations, functions, and contemporary understanding of disciplinary development.

From the perspective of value theory, this points to an innovation in the cognitive paradigms of the academic community. As a digital foundation for disciplinary construction, the process of building knowledge graphs essentially involves technically deconstructing and reinterpreting the core of the discipline, requiring the academic community to establish a dialectical and unified cognitive framework that reconciles technological logic with disciplinary rationality. Ontologically, knowledge graph engineering must overcome a fundamental paradigm shift—from disciplinary ontology to digital representation.

The construction of disciplinary knowledge graphs must balance completeness with feasibility. Although large language models such as GPT-4 possess relatively reliable semantic interpretation and logical reasoning capabilities, extensive participation from expert disciplinary researchers and practitioners is still necessary during the training process to validate knowledge and ensure accuracy. Evidently, the substantial training demands present significant challenges to the advancement of AI-enabled disciplinary development.

Third, technological limitations lead to increased training costs. Disciplinary construction activities involve the systematic allocation of key resources, namely personnel, funding, and materials. The level of disciplinary development depends on the discipline's ability to deploy, integrate, and utilize these

resources effectively. From an efficiency perspective, disciplinary construction is a process that ultimately achieves performance improvements through a series of inputs, including resource investment, policy support, and management upgrades.

Current AI technologies still exhibit shortcomings in understanding and representing complex systems, making it difficult to fully replace the role of disciplinary construction managers, thus necessitating further algorithm optimization. Moreover, from algorithm refinement to practical application in disciplinary construction, AI technologies require substantial hardware and software support, leading to high implementation costs that some institutions or disciplines may find challenging to afford.

(iii) From "Monolithic" to "Collaborative": The Lack of an Ecological Synergy

In the current era, digital technology, as a driving force behind the global scientific and technological revolution and industrial transformation, is increasingly integrated into all aspects and stages of economic and social development. It profoundly reshapes production methods, lifestyles, and modes of social governance. This integration presents both unprecedented challenges and opportunities for education. Since China established its education informatization strategy, it has implemented a series of policies aimed at building smart education platforms and digitally empowering the higher education sector, thereby advancing the digital transformation of education.

Table 1. List of China's Higher Education Digitalization Policies

Dimension	Year	Related Documents or Policies	Key Deployments in Higher Education Digitalization
Talent Training Methods	2015	Opinions on Strengthening the Construction, Application, and Management of Online Open Courses in Higher Education Institutions	Build a batch of high-quality online open courses represented by massive open online courses, integrating course application and teaching services.
	2018	Education Informatization 2.0 Action Plan	By 2022, basically achieve teaching applications covering all teachers, learning applications covering all eligible students, and digital campus construction covering all schools; generally improve informatization application levels and teacher-student digital competence; build a large "Internet + Education" platform.
	2020	Beijing Declaration on MOOC Development	Established the World MOOC and Online Education Alliance and launched 8 global open courses.
	2022	Launch of the National Higher Education Smart Education Platform	Create China's "golden classroom" that is always online for higher education.
Operating Models	2017	New Generation Artificial Intelligence Development Plan	Proposed "Intelligence Education", emphasizing accelerating reforms in talent cultivation models and blended teaching modes using intelligent technologies; build

			a new education system including intelligent and interactive learning.
	2018	Double Ten Thousand Plan for First-class Course Construction	Construct about 10,000 national-level first-class courses and about 10,000 provincial-level first-class courses, including advanced, innovative, and challenging courses in various formats such as online, offline, blended, virtual simulation, and social practice.
	2021	The Outline of the 14th Five-Year Plan (2021-2025) for National Economic and Social Development and Vision 2035 of the People's Republic of China	Promote inclusion of high-quality socialized online course resources in public teaching systems; develop scenario-based, experiential learning and intelligent education management and evaluation to expand students' digital information resources.
Management System	2018	Guidelines for the Construction and Application of Network Learning Spaces	Promote the "Internet +" initiative, accelerate education informatization, support and lead education modernization, and serve the construction of a strong education country.
	2021	5G Application "Setting Sail" Action Plan (2021-2023)	Vigorously promote the application of 5G in education management, comprehensive student evaluation, and other scenarios.
	2021	Data Security Law of the People's Republic of China	Establish a system for data classification and graded protection.
Support Mechanisms	2022	Several Opinions on Strengthening the Teaching Management of Online Open Courses in General Colleges and Universities	Further clarify requirements for course quality, credit recognition, examination norms, teacher teaching activities, and platform supervision mechanisms for online open courses.

Source:[1]

Embedding digital technology in education governance is a strategic response to the transformations of the times and society. In the era of digital intelligence, educational governance is increasingly advancing toward a scientific and intelligent development path[7]. In July 2021, the "Guiding Opinions of the Ministry of Education and Five Other Departments on Promoting the Construction of New Educational Infrastructure and Building a High-Quality Educational Support System" identified information networks and digital resources as key components of the new educational infrastructure. The Ministry of Education of the People's Republic of China successfully hosted two sessions of the World Digital Education Conference in 2023 and 2024, releasing a series of practical outcomes, including the establishment of the World Digital Education Conference, the launch of a smart education platform, and the publication of the Global Digital Education Development Index. The 2024 conference, held in Shanghai, represents not only a significant initiative in the country's education modernization efforts but also a concrete response to the current needs of education reform. The phase of high-quality development

in higher education imposes higher demands on discipline development, with decisions regarding discipline development determining the future direction and ultimately the "fate" of academic disciplines.

However, in the process of transforming "ideas" into "reality", it is urgent to establish a multi-dimensional synergistic ecosystem to promote the healthy development of AI-enabled disciplinary construction. This ecosystem should include institutional synergy, resource allocation synergy, and humanistic development synergy. First, based on a dynamic governance framework, coordination among disciplinary construction stakeholders is achieved through federated learning, flexible rule negotiation, and multi-agent simulation optimization. Second, with data intelligence as the core, integration of cross-modal cognitive computing and digital twin resources serves as the foundation to realize multi-dimensional and precise mapping of academic resources. Finally, paradigm integration acts as the connecting thread, embedding disciplinary culture into every aspect of disciplinary construction to guide personalized, precise, and intelligent discipline development. However, these three dimensions have yet to form a truly synergistic and healthy ecosystem for AI-enabled disciplinary construction.

Change the Mindset, Embrace AI, and Innovate New Models for Discipline Development

General Secretary Xi Jinping emphasized in the report of the 20th National Congress that "accelerating the construction of world-class universities with Chinese characteristics and advantageous disciplines" highlights the critical role these disciplines play in implementing the strategy of strengthening the country through science and education, as well as supporting modernization through talent development. In February 2022, the Ministry of Education, the Ministry of Finance, and the National Development and Reform Commission jointly issued the "Notice on the List of Universities and Disciplines for the Second Stage of 'Double First-Class' Construction" (Teaching and Research Letter [2022] No. 1), announcing that the number of advantageous disciplines selected for this round reached 433. In January 2025, the CPC Central Committee and the State Council issued the "Outline of the Plan for Building a Strong Educational Nation (2024–2035)", which focuses on advantageous disciplines and calls for a moderate expansion of the scope of the "Double First-Class" construction.

Furthermore, in July 2024, the CPC Central Committee's "Decision on Further Deepening Comprehensive Reforms and Promoting Chinese-Style Modernization" stressed the need to establish a mechanism for adjusting disciplinary settings driven by scientific and technological development and national strategic demands, providing fundamental guidelines for innovating discipline development models.

(i) Service-oriented and Innovative New Model for Talent Training

Talent cultivation to serve national strategic needs should fundamentally adhere to precisely aligning with the demands of regional economic and social development, thereby achieving synergistic quality improvement between the two. This reflects the concrete manifestation of coordinated development between talent training and regional economic and social progress. AI technology injects new vitality into disciplinary construction. Enhanced computational power enables machines to achieve intelligence, handle complex tasks, analyze complicated problems with the help of algorithms, and understand relationships among elements of disciplinary development through massive datasets.

By integrating and matching diverse viewpoints, suggestions, and proposals, and combining historical decision-making data, AI technology can accurately assess the current needs and future directions of regional economic and social development. This enables a dual function of presenting the status of disciplinary construction and forecasting trends. Consequently, talent cultivation can be tightly aligned with regional high-quality development, aiming to identify new directions for talent training in emerging regional development trends. Within the strategic framework integrating education, science and technology, and talent development, the positioning of talent cultivation is clarified, maximizing the value of talent services to regional development.

Closely integrating the needs of national strategic development with talent cultivation, universities should dynamically establish disciplines and majors aligned with regional high-quality development. They should launch talent training programs that integrate multiple high-level disciplines, guided by key development issues and major projects. Based on this, universities can foster positive interaction between enrollment and regional development by formulating employment-oriented admission policies and implementing order-based talent training models. Universities should align the direction and goals of cultivating regional innovative talents with their own disciplinary characteristics and strengths, thereby clarifying the specific content and methods of talent development. disciplinary construction must be supported by training high-quality, innovative talents. AI technology should be leveraged to ensure curriculum content closely matches regional development needs.

Practical teaching methods such as internships and field training should be utilized to enhance students' practical skills and professionalism, building a regional high-quality talent cultivation system. The advantages of AI in identifying regional development trends should be fully utilized. High-level talents play a key role in supporting regional high-quality development; through establishing comprehensive regional employment identification and guidance systems and strengthening career counseling, graduates can receive more personalized employment services, helping them better achieve independent employment and entrepreneurship. In summary, disciplinary construction should rely on AI technology to establish an integrated "enrollment–training–employment" talent development linkage model. It should progressively adopt combined strategies, including building advantageous disciplines, demand-driven adjustments, and information optimization, to fully harness AI's role in fostering innovative talent cultivation and provide robust technical support for the systematic development of regional innovative talents.

(ii) Innovating a New Model for Scientific Research with the Goal of Overcoming Challenges

First-class universities are the main drivers of knowledge innovation. In the natural sciences and engineering, the focus is on producing original innovations and achieving breakthroughs in critical "bottleneck" problems, often described as moving from "0 to 1". In the humanities and social sciences, the primary task is to foster theoretical innovation, establish a system of philosophy and social sciences with Chinese characteristics, and construct an independent knowledge system for China. Major national strategic needs are typically problem-oriented, requiring interdisciplinary and cross-sector collaboration to tackle challenges in both knowledge and technology. The key to building a strong higher education system lies in focusing on national strategic demands and intensifying research efforts on core technologies in critical fields.

AI-enabled research innovation employs a data-driven and intelligent analysis approach to analyze unstructured data and predict national strategic demands. It establishes a foundation for assessing national strategic needs and clarifies the driving factors behind disciplinary adjustments. The research mainly involves two components: demand decoding and disciplinary response. Demand decoding transforms national strategic demands from abstract concepts into measurable and trackable elements. This involves constructing a data collection layer and enhancing multi-source data acquisition. Using web crawlers and other techniques, extensive political, economic, social, and technological information related to national strategy is gathered to build a strategic demand prediction database. Models are programmed to enable batch processing of current and historical data. National strategic demands can be categorized as explicit or potential. Explicit demands are documented and released by relevant government departments. However, each discipline typically focuses only on documents issued by its corresponding department, resulting in limited scope. For instance, the education sector mainly monitors documents from the Ministry of Education but may lack comprehensive interpretation of those from the Ministry of Industry and Information Technology.

Therefore, a statistical platform for aggregating and synthesizing these demands is necessary. Potential demands arise from unforeseen events or sudden key needs, which can trigger chain reactions across sectors. It is essential to statistically analyze these based on their interrelations. Combining explicit and potential demands forms the foundational dataset for national strategic demand analysis. Demand response utilizes natural language processing (NLP) and sentiment analysis to extract keywords from text, perform demand clustering, and clarify priority areas for national development. Time series forecasting models such as ARIMA are applied to predict the number of research outputs, research teams, and other relevant metrics in these areas. Furthermore, deductive models are used to identify disciplinary fields that the nation may need to develop to meet future strategic demands.

AI-enabled scientific research aims to serve disciplines by creating competitive advantages in research and addressing major scientific challenges, focusing on identifying research gaps closely aligned with national strategic needs. It transforms the scientific research outcomes required in key national development areas into essential elements for disciplinary development, thereby establishing a proactive state of disciplinary construction that supports national strategic priorities.

(iii) Shaping a New Model for Disciplinary Assessment Aimed at First-Class Excellence

The evaluation of academic disciplines is closely tied to the development trajectory of higher education. Therefore, the education evaluation system in the new era should incorporate the contribution to regional economic and social development as a key criterion, emphasize the application- and service-oriented nature of disciplinary construction in meeting national strategic needs, and establish a robust evaluation framework for building leading disciplines. This will sustainably drive the effective enhancement of these disciplines' capacity to support high-quality regional economic and social development.

However, as China advances into the stage of building a strong higher education system, some inadequacies in disciplinary evaluation have gradually emerged. The evaluation index system reflects a performance management mindset and overlooks the intrinsic characteristics of disciplinary development. Although various types of disciplinary assessments exist in China, most are designed to cater to evaluations conducted by national education authorities and to compete for resources. disciplinary evaluations inherently carry an official background and hold considerable influence and

authority in the public[8], compelling Chinese universities to align their disciplinary construction efforts with the specific requirements of these assessments. Consequently, universities primarily focus on improving their discipline rankings, while issues such as respecting the natural laws of disciplinary development and achieving major breakthroughs in the discipline receive far less attention.[9]

Reforming and innovating the evaluation system is the driving force and an important pathway to accelerate the high-quality development of disciplines. The primary purpose of evaluation is not to prove, but to improve[10]. Leveraging artificial intelligence technology, monitoring and evaluation can guide the construction of advantageous disciplines, accelerate the reform of education evaluation, ensure universities maintain the correct direction, and steer disciplines toward reasonable positioning. AI-enabled disciplinary assessment serves as both an evaluation tool for the level of disciplinary construction and a decision-making tool for disciplinary development. It can formulate personalized development strategies based on the unique characteristics of disciplines and their development intentions.

This real-time, online decision-making mechanism not only facilitates rapid access to the latest information and data but also allows discipline developers to flexibly adjust their actions, enabling bottom-up proactive adjustments to meet the evolving needs of discipline development. In the digital intelligence era, digital technologies realize a more efficient decision-making mechanism through computation, greatly enhancing management efficiency. Large language models, built upon digital and intelligent technologies, provide real-time data support and development recommendations by understanding the relationships and interactions among disciplines and prioritizing decision-making tasks. Intelligent technologies far surpass traditional manual operations in information processing speed, enabling disciplinary development decisions to respond more swiftly to rapidly changing environments, improving decision efficiency while reducing management costs.

AI-enabled “human-machine collaboration” in disciplinary development decision-making can formulate personalized development strategies based on the characteristics and development intentions of each discipline. This real-time, online decision-making mechanism not only facilitates rapid access to the latest information and data but also enables university practitioners involved in discipline development to flexibly adjust their actions. It supports bottom-up proactive adjustments to meet evolving discipline needs, reduces management costs, and enhances management efficiency.

Conclusions

Prioritizing disciplinary construction has served as the driving force behind China's rapid advancement in higher education. China's approach to disciplinary development has followed a three-phase evolution. Phase 1: index-driven consolidation-Establishing foundational strength through evaluation metrics; Phase 2: Assessment-led elevation-Enhancing overall quality via systematic appraisal; Phase 3: Excellence-oriented transformation-Advancing high-quality development through world-class initiatives.This trajectory reflects the evolving strategic focus of disciplinary construction across different stages of China's higher education development.

As the nation advances toward global higher education leadership, the impetus for disciplinary construction is shifting from externally imposed incentives (evaluation metrics) to internally generated momentum (the pursuit of excellence). This marks China's transition into a new era where disciplinary development progresses from index-driven to high-quality development-oriented paradigms.

The primary barriers to AI-enabled disciplinary construction and evaluation are ideological inertia, technological limitations, and an underdeveloped ecosystem. Ideological inertia manifests in the rigid closure of traditional disciplinary paradigms that impedes AI integration, evidenced by practitioners' skepticism toward algorithmic "black box" explainability in disciplinary development and persistent adherence to human-experience-based models in educational administration.

Technological limitations arise from insufficient disciplinary data accumulation, prohibitive engineering requirements for knowledge graph construction, and elevated training costs due to technical constraints—collectively creating financial burdens beyond the capacity of many institutions. Ecosystem deficiencies stem from the absence of synergistic environments across institutional coordination mechanisms, resource allocation frameworks, and humanistic development support systems, which fail to establish a favorable ecosystem for AI implementation.

Realizing AI-enabled disciplinary construction and evaluation requires: first, dismantling cognitive barriers to leverage AI for evidence-based decision-making; second, establishing multi-stakeholder collaborative networks complemented by open resource platforms and quality assessment mechanisms to foster integrated disciplinary development; and ultimately, driving organizational transformation through AI-powered evaluation frameworks that reshape assessment paradigms and cultivate new disciplinary ecosystems. By fully harnessing artificial intelligence for monitoring and evaluation—which steers educational assessment reform—institutions ensure adherence to sound educational orientations while guiding disciplines toward rational positioning.

As AI's technological dividends increasingly permeate education, its pivotal role in talent cultivation, scientific research, and disciplinary assessment will amplify—progressively enhancing AI-enabled disciplinary construction and evaluation. Concurrently, greater accessibility of disciplinary data and enhanced computational capacity will reduce technical costs while elevating AI-driven decision-making precision, thereby propelling high-quality disciplinary development.

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Conflict of interest:
The authors declare that they have no conflicts of interest.

Authors Contribution

- Zhanjun Wang: Conceptualization, Methodology, Project Administration, Writing- original draft, Writing - review & editing.
- Zehui Zhang: Conceptualization, Methodology, Writing- original draft, Writing - review & editing.