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Cultivating Innovative Competency in Higher Education: Challenges and Pathways in the Era of Artificial Intelligence

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Abstract: Innovative competence, as a key component of 21st-century core literacies, should be fully integrated into the entire process of disciplinary curriculum instruction in higher education. Current teaching practices in specialized courses are often constrained by several cognitive and practical misconceptions. These include viewing innovation as an "elite privilege," over-reliance on knowledge transmission and competitive mechanisms, and neglecting the foundational role of core courses in holistic development. To address these challenges, this paper proposes a three-dimensional cultivation model encompassing "motivation–knowledge–innovation." This model underpins a progressive instructional pathway centered on "problem-driven intrinsic motivation activation, technology-enhanced knowledge network expansion, and integrated output for practical transformation." The framework is designed to facilitate a fundamental shift in student learning: from passive reception to active inquiry, from linear knowledge accumulation to dynamic network construction, and from memorization and replication to generative thinking. Consequently, it aims to effectively enhance students' innovative awareness, cognitive quality, and practical capabilities. This study provides an actionable and replicable implementation framework for the systematic cultivation of innovative competence within disciplinary curricula in the era of artificial intelligence.

Keywords: Innovative competency; Specialized curriculum instruction; Pedagogical reform; Problem-based learning

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1. Introduction

In the transition from industrial civilization to the artificial intelligence era, innovation has become the core driving force behind social development. Amidst the new wave of technological revolution characterized by the internet, big data, and artificial intelligence, innovative thinking has emerged as a core competency for individuals and societies to adapt to the future and lead progress. As a critical pillar of China's innovation system, higher education bears the fundamental mission of cultivating a new generation capable of navigating transformative changes and sustaining innovative capabilities. However, current teaching practices in Chinese

universities, particularly in specialized courses, largely adhere to the standardized and scaled educational paradigms of the industrial era. The traditional teaching model, which prioritizes knowledge transmission over the stimulation of critical thinking, stands in stark contrast to the open, iterative, and creative cognitive qualities demanded by the internet age. This lag not only hampers the effectiveness of cultivating innovative talent but also fundamentally impedes the implementation of China's innovation-driven development strategy.

From a theoretical perspective, the connotation of "innovation" has continuously evolved alongside the progression of human society. Schumpeter conceptualized economic innovation as the "new combination" of production factors [1], while Drucker expanded the notion into the realm of management, describing it as a systematic process that endows resources with new capabilities [2]. In 2004, the U.S. Council on Competitiveness proposed a broader definition, framing innovation as the creation of new value and the advancement of social progress. The trajectory of this conceptual evolution itself reflects the deepening of human understanding of innovation [3].In the internet era, innovation is no longer an occasional activity confined to specific domains or a privileged few; rather, it has permeated all sectors as a normalized practice. At its core, innovation manifests as the restructuring of thinking, models, and value through the application of digital technologies. Accordingly, innovation literacy is defined as an integrated competency that enables individuals, within complex and uncertain contexts, to synthesize multi-source information and cross-disciplinary knowledge, and to generate novel and valuable solutions through critical thinking, systematic exploration, and collaborative practice. This literacy comprises three interrelated dimensions: innovative disposition, innovative thinking, and innovative practice [4]. Nevertheless, current educational practices in China remain constrained by cognitive and institutional misconceptions—such as reducing innovation to mere technological invention, over-relying on competitive selection mechanisms to identify innovative talent, and divorcing innovation cultivation from discipline-based curricula in higher education [3]. These limitations fail to align with the intrinsic demands of the internet society for the cognitive qualities required in today's talent.

Against this backdrop, promoting a paradigm shift in professional course instruction in higher education from "knowledge transmission" to "literacy cultivation" has become a critical and urgent issue to address in China's higher education reform. This study argues that the teaching of professional courses in universities must move beyond the traditional "information delivery" model and establish a new "generative" pedagogical paradigm centered on fostering innovation literacy. This transformation requires not only a reorientation of curricular objectives but also a systematic redesign of teaching content, innovative pedagogical approaches, and an optimized assessment system, thereby embedding the cultivation of innovation literacy throughout the entire process of professional course instruction. Specifically, it is essential to develop a progressive instructional model of "problem identification–incremental learning–integrative innovation," guiding students to start from real-world problems and, through self-directed learning, expand and synthesize knowledge to generate innovative outcomes. Ultimately, this aims to advance the transition of China's higher education from a knowledge-based to a literacy-based orientation, offering new pathways for cultivating innovative professionals who meet the demands of the artificial intelligence era.

2. The realistic dilemmas in cultivating innovation competence in Chinese Higher education

The cultivation of innovation competence in Chinese universities still faces multiple challenges, stemming not only from long-standing cognitive misconceptions but also from constraints in teaching methodologies and systemic support.

2.1. Cognitive misunderstandings: The perception gap from "elite privilege" to "universal competency"

For a long time, innovation has been perceived as a special talent possessed only by a select few, leading to a prevalent "elitist" tendency in teaching practices. Many educators equate innovation simplistically with high intelligence or innate giftedness, assuming that only a small subset of students holds innovative potential. Consequently, instruction often unconsciously centers on a limited number of "outstanding students," neglecting the awakening and guidance of innovative consciousness among the majority [3]. Such a mindset not only narrows the talent pool for innovation but also undermines the broader educational function that professional courses should inherently fulfill. In reality, psychological research has long refuted this "genius myth." American psychologist J.P. Guilford's Structure of Intellect theory emphasizes that the core of creative thinking lies in divergent processing and transformative abilities—capabilities that are widely distributed among individuals and can be developed and enhanced through education and training [5]. Similarly, Sternberg's Investment Theory of Creativity posits that creativity results from the interaction of six key factors: intelligence, knowledge, thinking styles, personality, motivation, and environment—rather than being the product of any single intellectual trait [6]. Innovation is not an elusive, mystical gift but a fundamental competence with "potential for development in everyone." In the era of artificial intelligence, innovation has further evolved into a foundational quality necessary for every individual to adapt to change and engage in creation. The goal of education should shift from selecting innovative talents to cultivating innovation competence.

Additionally, there exists an "outcome-oriented" bias in the understanding of innovation. Societal perceptions of innovation often focus on revolutionary technological breakthroughs, patented inventions, or commercially significant outcomes with substantial economic impact. Educational evaluation similarly tends to overemphasize whether students have produced tangible, quantifiable "innovative outputs," such as competition awards, published papers, or patent applications, while neglecting the development of innovation competence. In reality, the core of innovation competence lies in the transformation of thinking patterns and the enhancement of problem-solving abilities—a process of continuous accumulation and dynamic development [4]. Reducing innovation to measurable outcomes as an evaluative criterion can easily lead to utilitarian tendencies in education, fostering short-sighted behaviors driven by "innovation for innovation's sake," and may even contribute to academic misconduct. Genuine innovation education should place greater emphasis on creating an open and inclusive environment that nurtures students' curiosity and desire to explore, encouraging them to ask "naive" questions, experiment with "unconventional" ideas, and develop innovative capabilities through continuous trial, error, and reflection.

Furthermore, the perception of innovation contexts remains narrowly conceived. It is commonly assumed that innovation belongs exclusively to the realms of natural sciences or engineering and technology, while courses in social sciences or foundational theory are often viewed as lacking integration potential for innovation cultivation. This perspective overlooks the intrinsic nature of innovation as an interdisciplinary and cross-contextual capacity in both thought and practice. Every academic discipline can serve as a meaningful vehicle for fostering innovation literacy—what matters is whether instruction can transcend the limitations of mere knowledge transmission and shift toward pedagogical paradigms centered on cognitive inspiration.

2.2. Deficiency in methodology: Lack of pathways from "knowledge transmission" to "cognitive stimulation"

The absence of systematic methodologies constitutes another significant challenge in cultivating innovation literacy within professional courses at Chinese universities. This methodological gap stems from a

fundamental tension between the educational paradigm of the industrial era and the competency demands of the digital age. Traditional teaching, centered on efficiency, prioritizes the structured transmission of knowledge and standardized training, tailored to an industrial society characterized by specialization and clear division of labor [3]. In contrast, the era of artificial intelligence places greater emphasis on critical thinking, integrative transfer, and adaptive evolution—core dimensions of innovation literacy. These divergent objectives and pathways generate structural friction between the two educational approaches. Given that higher education is currently in a critical phase of paradigm transition, pedagogical frameworks aligned with competency development remain underdeveloped. This is often manifested as a practical void characterized by "abundant conceptual recognition yet scarce actionable pathways."

From the perspective of pedagogical models, current classroom practices remain heavily reliant on the linear transmission structure of "teacher lecturing–student receiving." This model is designed to maximize cognitive efficiency, suitable for covering and reproducing large volumes of knowledge within limited timeframes, thereby meeting the industrial era's demand for rapid training of "specialized professionals." However, the cost of this approach is the compression of space for students to question, reflect, and construct meaning. In the age of artificial intelligence, where access to information has become extremely convenient, the core value of education should shift from "knowledge transmission" to "cognitive stimulation." Yet, current teaching remains constrained by entrenched habits and has yet to develop classroom formats that effectively support students' active inquiry, problem-solving, and knowledge creation.

The teacher-student relationship also exhibits a temporal lag. In traditional teaching, the teacher serves as the authority of knowledge, undertaking the role of "transmitting established truths," while students passively absorb information. This dynamic ensures instructional order and efficiency but suppresses the potential for equal dialogue and critical interaction. Innovation, by its nature, arises from the collision of ideas and the breaking of boundaries, necessitating the joint construction of an "exploratory partnership" between teachers and students. Teachers should become designers of learning contexts, guides of cognitive processes, and facilitators of reflective practice, while students must gradually develop into autonomous and expressive agents of inquiry. However, restructuring this relationship requires not only a shift in role perception but also a systematic renewal of teaching structures and classroom culture—areas in which the current educational system still lacks sufficient conceptual guidance and practical support.

The assessment system also constrains the transformation of teaching methodologies. Existing evaluations predominantly focus on the memorization and comprehension of knowledge, emphasizing standardized answers and problem-solving proficiency. This approach to assessment aligns with the industrial-era logic of selecting "standardized talent," yet fails to accommodate the cognitive qualities, practical capabilities, and individualized growth emphasized by innovation literacy. Competencies are inherently implicit, integrative, and generative, placing particular emphasis on the ability to analyze, evaluate, and create within authentic, open-ended contexts. Current assessment mechanisms not only inadequately measure these dimensions but also reinforce exam-oriented tendencies through the "backwash effect" of high-stakes testing, thereby narrowing students' learning experiences and developmental potential. Constructing a process-oriented, diversified evaluation framework that emphasizes the demonstration of thinking and practical outcomes is a critical bridge connecting competency goals with pedagogical practice—and remains an urgent challenge to address in current methodological exploration.

In essence, the current methodological gap does not simply reflect a lack of techniques, but rather an "adaptive discontinuity" within the educational system's transition from an industrial-era paradigm to a digital-

era framework. Only by genuinely establishing "competency-oriented" instructional objectives at the conceptual level and concurrently reconstructing pedagogical models, teacher-student relationships, and assessment systems in an integrated manner can we gradually overcome the absence of viable pathways. This will enable higher education professional courses to truly become fertile ground for cultivating innovation literacy.

2.3. Systemic fragmentation: The functional disconnection between innovation education and disciplinary curriculum

The cultivation of innovation literacy relies on systematic support from curricula, resources, and pedagogical environments. However, the widespread fragmentation of curricular structures within Chinese universities has hindered the formation of synergistic efforts necessary to foster competency development. In response to the advocacy for innovation education, many institutions have added standalone courses such as "Innovative Thinking" and "Entrepreneurship Fundamentals" alongside existing disciplinary programs. Such superficial course supplementation, however, fails to engage with the core structure of disciplinary teaching. Instead, it leads to a functional separation between innovation education and disciplinary education: disciplinary courses continue to follow the traditional model of knowledge transmission, while the newly added courses merely serve as appendices carrying the label of "innovation." Consequently, students struggle to establish meaningful connections between their disciplinary learning and innovation methodologies, resulting in a "disjunction between learning and application" in competency development [3].

Furthermore, the improper application of digital technologies in the era of artificial intelligence has constrained the implementation of innovation-oriented pedagogy. Although platforms such as MOOCs and SPOCs offer abundant digital course resources, their instructional designs largely perpetuate the traditional "transmission-reception" logic, lacking sufficient interactivity and generativity. As a result, these platforms underutilize the potential of digital technologies to support collaborative inquiry, process-oriented feedback, and iterative improvement of outcomes. This has kept innovation pedagogy largely at the conceptual level, making it difficult to translate into regular classroom practice. The pervasive fragmentation of innovation-related curricular systems within higher education institutions continues to impede the cohesive and effective cultivation of innovation literacy.

3. Cultivating innovation competence in professional courses within Chinese higher education

The triple predicament of cultivating innovative competency points to a core contradiction—the structural misalignment between the industrial-era "knowledge transmission" paradigm and the AI-era "competency generation" demand. Partial modifications to existing teaching are insufficient to address the root cause. The pedagogical logic must shift from "transmission" to a deeper level of "generation" [7]. It is essential to construct a new generative pedagogical paradigm within specialized university curricula that is rooted in the logic of the Internet era and suited to the needs of an intelligent society. Therefore, this paper proposes a three-dimensional pathway of "Motivation Dimension—Knowledge Dimension—Innovation Dimension." It aims to dismantle the elitist cognitive misunderstanding with the concept of "everyone can innovate"; replace one-way knowledge indoctrination with the practical closed loop of "problem-inquiry-creation"; and bridge systemic fragmentation through the deep integration of technology and curriculum, knowledge, and thinking. This approach translates abstract innovation theory into specific, actionable, experiential, and internalizable classroom actions for every specialized course. It transforms the cultivation of innovative competency from an additional activity

peripheral to the discipline into an "intrinsic product" naturally occurring within the process of specialized learning, thereby resolving the cultivation dilemma. Crucially, this new pedagogical paradigm constructs a new "teaching and learning grow together" ecosystem for mutual teacher-student development. Teachers transition from unidirectional knowledge transmitters to designers and guides of the learning ecology, achieving iterative development in their own teaching philosophies and professional abilities through co-facing challenges posed by authentic, complex problems with students, thereby benefiting all participants in the teaching process.

3.1. The motivational dimension: Stimulating endogenous learning drive through self-problem identification to cultivate an innovative disposition

The cultivation of innovation competence begins with a re-examination of the purpose of learning and a systematic awakening of individual intrinsic motivation. The emergence of creativity is grounded in one's internal drive and proactive agency [8]. The seminal thinkers of the "Axial Age" recognized that being human extends beyond mere existence in reality—it involves transcending the immediate to achieve a "spiritualization of human being" [9]. Accordingly, education should not be reduced to practical techniques or methodological instruction; rather, it should guide individuals toward self-realization, self-improvement, and self-fulfillment through learning in new phases of social development [10]. Innovation competence serves as a key enabler for individual self-actualization in the era of artificial intelligence. Its cultivation can start by activating a sense of existential agency, using self-improvement as an intermediary, and ultimately fostering personal self-realization [11].

The Self-Determination Theory, proposed by American psychologists Edward Deci and Richard Ryan, indicates that when learning activities satisfy three fundamental psychological needs—autonomy, competence, and relatedness—individuals exhibit stronger and more sustained intrinsic motivation and creative engagement. Thus, perceived autonomy serves as the precondition for triggering the learning drive. Such perceived autonomy refers to an individual's awareness and sense of control over their own learning process, manifested in the ability to independently engage in and manage learning activities, self-regulate learning strategies, and autonomously select learning content of perceived value [12].

"Self-problem identification," achieved through formulating questions based on one's professional knowledge and personal interests, serves as a simple yet effective method for enhancing individual learning motivation. Specifically, at the beginning of a professional course or when introducing a key module, teaching activities should focus on creating contexts that guide students—drawing from their lived experiences, observations and reflections on phenomena within the discipline, or genuine intellectual dilemmas encountered during theoretical study—to independently formulate a core question that emerges from within, reflects sincere engagement, and holds genuine value for disciplinary inquiry. This process of "problem articulation" is far more than a mere technical step. It represents a profound psychological journey of self-dialogue and meaning-making. When students transform vague uncertainties, curiosities, or concerns into a clear, researchable academic question, learning shifts from an externally imposed task into a self-directed pursuit driven by the desire to resolve one's own internal queries and satisfy personal intellectual yearnings. Through this process, students gain "definitional authority" and "ownership" over their learning agenda, fundamentally establishing their sense of autonomy. This deeply activates their intrinsic learning motivation and, through sustained practice, fosters the development of an innovative disposition [13]. Existing research also indicates that problem-based learning stimulates students' willingness to engage actively in learning and serves as an effective pathway for competency development [14]. Conducting problem-solving-oriented instruction within authentic, discipline-specific contexts has been shown to significantly enhance students' innovation competence [15].

3.2. The knowledge dimension: Reconstructing knowledge systems through "technology-enabled incremental learning" to shape innovative thinking

The emergence of problems stems from the relative inadequacy of an individual's existing knowledge reserves. To address the questions raised, it is necessary to engage in supplementary incremental learning. Classroom instruction provides a fundamental framework and logical structure for such incremental knowledge acquisition. With the support of Generative Artificial Intelligence (GAI), the content available for incremental learning will become more comprehensive, and the means of acquiring new knowledge will be significantly more efficient and accessible.

The empowerment of technology is reflected in the diversified access to and intelligent integration of learning resources. Students can utilize MOOCs and digital libraries to incorporate interdisciplinary perspectives, forming a "knowledge radiation circle" centered around their core questions. This process breaks away from the linear structure of traditional textbooks, transforming learning content from being pre-determined to being dynamically generated, and from uniformity to personalization. Digital tools not only facilitate resource acquisition but also, through functions such as algorithmic recommendations and relational analysis, help students uncover implicit connections between different pieces of knowledge, thereby providing technological support for subsequent knowledge integration.

After broadly gathering resources, students need to undertake the systematic reconstruction of knowledge frameworks. Generative artificial intelligence technology is not merely a general tool applicable to education; it can also be employed to design complex interactions among specific disciplinary elements [16], enabling the critical filtering, logical organization, and meaningful synthesis of fragmented information. This process of reconstruction is, in essence, a crucial stage in transforming public knowledge into an individual's cognitive structure. It not only deepens students' understanding of disciplinary knowledge but also cultivates their abilities in information synthesis, critical evaluation, and systemic thinking, thereby laying a solid cognitive foundation for innovative output.

3.3. The innovation dimension: Achieving competency externalization through "integrated output and social dialogue" to engage in innovative practice

The ultimate manifestation of innovation competence lies in the ability to integrate acquired knowledge and produce solutions characterized by novelty, value, and feasibility—thereby accomplishing the transition from being a knowledge consumer to a knowledge creator [4]. Specifically, teaching and learning should ultimately converge on "integrative output." Students must return to their initially articulated "anchor problem," synthesize and apply the dynamic knowledge network they have constructed, re-examine the core question, and propose their own interpretations and solutions. The essence of innovation lies in generating outcomes that positively impact a specific context through knowledge reorganization and cognitive transformation. When students re-examine their anchor problem, they engage in a process of deconstructing the original question into its constituent elements, assimilating incremental knowledge, breaking it down for absorption, and then reconstructing and articulating new insights in relation to the initial challenge. The result of this integrative output is not only grounded in a uniquely framed problem but also transcends the content acquired through incremental learning, embodying the characteristics of innovative outcomes [13]. In essence, this process naturally yields innovative results and elevates innovative thinking.

The results of integrated output are ultimately presented through various forms of communication and sharing, such as academic competitions and project proposals. Through these channels, students' individual work is subjected to examination by diverse stakeholders and evaluated against multiple criteria. As students

articulate their conceptual approaches to the problem, absorb audience feedback, and iterate on their solutions, they not only hone their critical thinking and communication skills but also allow their innovative outcomes to undergo a process of conventionalization—transitioning from "personal conception" to "socially negotiated consensus." The sociocultural theory proposed by the Soviet psychologist Lev Vygotsky in the 20th century posits that individual cognition develops and refines through social interaction, and innovation evolves precisely through such dialogue between the individual and the collective. According to Harré's theory of psychological space, this process of externalization and dialogue enables students to traverse from the "individual cognitive realm" (private quadrant) to the "social interactive realm" (public quadrant). This movement not only makes personal innovation visible and socialized but also promotes further cognitive evolution and the conventionalization of competence through interaction [17]. Thus, innovation competence is fully externalized from an internal cognitive potential into an observable, evaluable, and transferable practical ability, achieving a closed-loop process in its cultivation.

4. Constructing a multi-dimensional assessment framework for cultivating innovation competence in Chinese higher education

In the era of artificial intelligence, the effectiveness of fostering innovation competence through professional courses in higher education urgently requires a new type of assessment system that can scientifically measure and continuously promote such development. It is essential to fundamentally transform the philosophy of assessment and, on this basis, establish an operable and observable dual-dimensional "process-outcome" assessment matrix. This framework will externalize the implicit progression of competence into evaluable and actionable teaching practices.

4.1. Transforming the philosophy of assessment

The traditional assessment paradigm has long remained entrenched in a "measurement and control" model, relying primarily on standardized testing to deliver summative judgments about the mastery of static knowledge. This approach is fundamentally misaligned with the dynamic, generative, and individualized nature of innovation competence. Moreover, through the "backwash effect" of high-stakes evaluation, it can inadvertently reinforce exam-oriented tendencies and stifle students' courage to explore and creative potential.

Therefore, it is imperative to shift the assessment philosophy from "assessment of learning" to "assessment for learning" [18]. The primary purpose of assessment should no longer be ranking and selection, but rather diagnosing the learning process, stimulating intrinsic motivation, and providing generative feedback. Assessment should become an embedded, supportive, and dialogic tool integrated throughout the teaching-learning cycle. It should focus on how students engage with authentic problems, integrate multi-dimensional knowledge, and iteratively refine innovative solutions. Its core function is to help students discern the gap between their current state and desired goals, thereby supporting them in autonomously adjusting their learning strategies and continuously deepening their innovative practice [19].

4.2. Constructing a dual-dimensional "process-outcome" assessment model

Guided by the philosophy of assessment aimed at promoting learning, it is essential to establish a dual-dimensional "process-outcome" assessment matrix. The integration of ongoing process-based tracking and outcome-oriented evaluation enables a holistic depiction of students' developmental trajectory in innovation competence, representing a critical pathway toward effective assessment.

The process-oriented assessment dimension corresponds to the three-dimensional teaching pathway of "motivation-knowledge-innovation," focusing on evaluating the dynamic trajectory of competency development. In the motivation dimension, methods such as learning journals, reflection reports, and classroom participation observation scales are used to assess elements of innovative disposition, including students' curiosity, intrinsic motivation, and perseverance. In the knowledge dimension, tasks such as concept mapping, analytical reports on incremental learning resources, and records of inquiry processes supported by generative artificial intelligence are employed to evaluate students' abilities in information filtering, critical integration, and constructing dynamic knowledge networks—the foundational aspects of innovative thinking. In the innovation dimension, tools such as peer evaluation records during innovative output presentations, and self- and peer assessments of contributions to group collaboration are utilized to gauge students' capacity for executing innovative practices. The core value of process-oriented assessment lies in its formative nature, where continuous and timely feedback guides students in adjusting their learning behaviors, thereby integrating competency cultivation into daily practice.

The outcome-oriented assessment dimension focuses on the crystallization and presentation of competency development. It evaluates the comprehensive outputs students produce around their "anchor problem," such as research papers, project design proposals, or public presentations. Assessment criteria must move beyond the correctness of traditional answers to emphasize novelty, value, feasibility, and persuasive articulation. Ultimately, students are required to systematically organize and present key artifacts, process reflections, feedback records, and final outputs from the entire learning cycle for the evaluation of their innovative outcomes. This not only serves as the final vehicle for assessment but also constitutes a critical stage for students to engage in metacognitive reflection and achieve self-cognitive advancement through the very process of constructing their portfolios.

5. Conclusion

The advent of the artificial intelligence era has not only reshaped societal demands for talent but also profoundly called for a systematic transformation of the educational model in higher education. Innovation competence, as a core quality enabling individuals to adapt to the future and drive progress, must be deeply integrated throughout the entire process of professional course instruction. Currently, higher education faces practical challenges at the cognitive, methodological, and systemic levels in cultivating students' innovation competence. There is a need to construct a new cultivation model structured along the three-dimensional pathway of "motivation—knowledge—innovation," accompanied by an aligned assessment philosophy of "assessment for learning" and a dual-dimensional "process-outcome" evaluation system. This will drive a fundamental shift in professional education from the industrial-era paradigm of "knowledge transmission" to the intelligence-era paradigm of "competency generation."

The analysis suggests that a teaching pathway that begins with students' authentic problems, is supported by technology-enabled inquiry, and culminates in social dialogue and externalization can effectively stimulate students' innovative potential and foster the synergistic development of their cognitive qualities and practical abilities. Moving forward, higher education institutions must further advance in a coordinated manner across curriculum systems, faculty development, institutional support, and technological ecosystems. This will translate the cultivation of innovation competence from conceptual advocacy into tangible, everyday teaching practice, thereby truly fulfilling the mission of nurturing innovative talents required by the times and providing

solid human capital support for the nation's innovation-driven development.

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